

Appendix G

Compilation of Public and Stakeholder Comments Received in 2021 and 2022

From: [Napoli, Kelly](#)
To: [Kym Holzwart](#)
Subject: RE: FPL Clarifying MFL Questions
Date: Tuesday, January 4, 2022 11:35:52 AM

[EXTERNAL SENDER] Use caution before opening.

Happy New Year, Kym!

I hope you had a great holiday. Thank you for your response. Is possible, FPL would like to schedule a meeting with you and the Regulatory Staff. Danielle Hall, Paul Linton, and I are available January 19th, 20, and 21st, any time after 12 noon. Please let me know if these times work for your team.

Thank you!

Kelly Napoli, EI
Environmental Specialist II
Florida Power & Light | Environmental Services
700 Universe Blvd | JES/JB C5073
Juno Beach FL, 33408
O. 561.694.4015
C. 561.335.6659



 Please consider the environment before printing this email

From: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Sent: Wednesday, December 22, 2021 9:50 AM
To: Napoli, Kelly <Kelly.Napoli@fpl.com>
Subject: RE: FPL Clarifying MFL Questions

Good Morning Kelly,

I left you a voice message on Monday; however, you may already be out of the office for the holidays. I was out of the office most of last week, and because I am going to be out of the office until after the New Year starting this afternoon, I did not want your email to go unanswered.

I am happy to schedule a meeting with you and your colleagues and with District MFLs and Regulatory staff in January. However, as I mentioned in the past, we are doing additional work related to responding to the peer review panel comments, which will most likely result in a revision to the proposed minimum flows for the Little Manatee River. We will still be doing work in January, so we won't be in the position to discuss the proposed minimum flows. If you still want to meet in January, please provide some dates in mid- to late January, and I will get a meeting setup.

You are welcome to submit comments any time, and I am happy to post them to the peer review web forum (but you can do that as well). Note that topics such as the Emergency Diversion Schedule

and how the Cooling Pond is operated under the current permit are regulatory issues and are not considered by the peer review panel during their review of our methods and results related to the proposed minimum flows.

If you would rather wait until we have completed our additional work, I would be happy to reach out to you to set up a meeting to present the revised (should they be) proposed minimum flows for the Little Manatee River (and the meeting will include regulatory staff in case you have any questions related to your current permit). As I have mentioned before, we should have our work completed and be through the peer review process sometime around April to May.

Please let me know how you would like to proceed.

Merry Christmas and Happy New Year,

Kym

Kym Rouse Holzwart, M.S.
Certified Senior Ecologist
Senior Environmental Scientist
Environmental Flows and Levels Section
Natural Systems & Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604
1-800-423-1476, ext. 4295
352-796-7211, ext. 4295
kym.holzwart@swfwmd.state.fl.us

From: Napoli, Kelly <Kelly.Napoli@fpl.com>
Sent: Tuesday, December 14, 2021 12:58 PM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Subject: RE: FPL Clarifying MFL Questions

[EXTERNAL SENDER] Use caution before opening.

Hey Kym,

Thank you for the information. FPL would like to provide the Peer Review team and the District some comments in order to highlight how we operate the Cooling Pond as the only existing legal user of the Little Manatee River.

Also, we would be interested in meeting with you and the Regulatory staff sometime in January to discuss these comments. When you have a moment, I would really appreciate if you could send me the applicable emails to schedule this meeting with.

Thank you!
Kelly Napoli, EI
Environmental Specialist II

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 Please consider the environment before printing this email

From: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Sent: Thursday, December 2, 2021 9:18 AM
To: Napoli, Kelly <Kelly.Napoli@fpl.com>
Subject: RE: FPL Clarifying MFL Questions

Hey Kelly,

I am glad you emailed since I wanted to let you know about some schedule changes in the peer review process for the Little Manatee River proposed minimum flows that have occurred this week:

1. The peer review period is being extended since the District needs time to do work to respond to the peer review panel comments. Therefore, the Dec. 15th and Jan. 5th meetings of the peer review panel have been cancelled (and that should come out in the public noticing very soon and the District's webpage has been updated).
2. Once our work is done and we have completed the draft responses to the peer review panel's comments, we will schedule public meetings with the peer review panel, which will probably occur in March.
3. As I have mentioned in the past, once we are through the peer review process, we will set up a meeting with you to present the proposed minimum flows (probably around the April-May timeframe).

I am happy to forward your email to the appropriate person in our Regulatory department or provide their email to discuss the items you have listed below, just let me know. Note that Regulatory staff are not involved in the development of minimum flows. However, once minimum flows are adopted, they use them as one of their tools when reviewing Water Use Permits. Feel free to give me a call if you have any questions.

Best regards,
Kym

Kym Rouse Holzwart, M.S.
Certified Senior Ecologist
Senior Environmental Scientist
Environmental Flows and Levels Section

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kym.holzward@swfwmd.state.fl.us

From: Napoli, Kelly <Kelly.Napoli@fpl.com>
Sent: Thursday, December 2, 2021 9:00 AM
To: Kym Holzward <Kym.Holzward@swfwmd.state.fl.us>
Subject: RE: FPL Clarifying MFL Questions

[EXTERNAL SENDER] Use caution before opening.

Good morning Kym!

FPL would like to meet with SWFWMD regulatory staff to discuss two items prior to the next Peer Review Meeting, if possible. Are there any times on December 14th that you and your staff would be available for a meeting?

The items we would like to discuss include the following:

- The District's evaluation of FPL's current Emergency Diversion Schedule (EDS)
- The District's delineation of the Upper and Lower Little Manatee River

Thank you!

Kelly Napoli, EI
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Please consider the environment before printing this email

From: Kym Holzward <Kym.Holzward@swfwmd.state.fl.us>
Sent: Friday, October 22, 2021 7:02 AM
To: Napoli, Kelly <Kelly.Napoli@fpl.com>
Subject: Re: FPL Clarifying MFL Questions

Hey Kelly,

Thanks for taking the time to meet with us yesterday, and I hope my presentation answered your questions (feel free to give me a call if you want to discuss further). Below is the link that has the info (and Teams meeting links) to all of the peer review panel meetings for the Little Manatee River recommended minimum flows. You can get to the WebForum (where the panel does their work in between meetings), if you click on Little Manatee River under the MFL Peer Review on the upper right side of the page.

Happy Friday,
Kym

<https://www.swfwmd.state.fl.us/projects/mfls/mfls-public-meetings>

[MFLs Public Meetings | WaterMatters.org](https://www.swfwmd.state.fl.us/projects/mfls/mfls-public-meetings)

Information on upcoming and recent public meetings on the District's Minimum Flows and Levels Program will be consolidated on this page.

www.swfwmd.state.fl.us

From: Napoli, Kelly <Kelly.Napoli@fpl.com>
Sent: Thursday, October 21, 2021 4:09 PM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Subject: RE: FPL Clarifying MFL Questions

[EXTERNAL SENDER] Use caution before opening.

Thanks for the meeting today Kym! Whenever you have a chance, could you please send me the Peer Review Meeting Invites for December 15th and January 5th?

Thank you!
Kelly Napoli, EI
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C. 561.335.6659



 Please consider the environment before printing this email

From: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Sent: Thursday, October 21, 2021 11:47 AM
To: Napoli, Kelly <Kelly.Napoli@fpl.com>
Subject: RE: FPL Clarifying MFL Questions

Thanks!

From: Napoli, Kelly <Kelly.Napoli@fpl.com>
Sent: Thursday, October 21, 2021 11:05 AM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Subject: FPL Clarifying MFL Questions

[EXTERNAL SENDER] Use caution before opening.

Good morning Kym,

Thanks for the call. I have attached a draft document of our clarifying MFL questions. Thank you for the opportunity to discuss these with you and your team this afternoon.

Thank you!

Kelly Napoli, EI
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 Please consider the environment before printing this email



February 18th, 2022

Southwest Florida Water Management District
Natural Systems & Restoration Bureau
Environmental Flows and Levels Section
2379 Broad Street
Brooksville, FL 34604

Re: Comments on Proposed Minimum Flow and Level for the Little Manatee River

Ms. Kym Rouse-Holzwardt,

Florida Power & Light (FPL) owns and operates the Manatee Power Plant in Manatee County, FL, which withdraws water from the Little Manatee River to supply its cooling pond. This plant has been in operation since the 1970s and supports the generation of clean, reliable power. Recently, the Southwest Florida Water Management District (SWFWMD) issued a Draft Minimum Flow and Level (MFL) for Little Manatee River. As a regulated public service utility dependent on sharing access to water, we recognize the integrity and management of Florida's surface waters are important in providing for navigation, flood protection, water supply, recreation, and environmental needs. FPL appreciates the opportunity to be part of the MFL review process and submits the following comments to the District for consideration in the next version of the Draft Little Manatee River MFL.

Operational Background Information

The FPL Manatee Power Plant has an existing authorized water allocation from the Little Manatee River and is dependent on this allocation for year-round operation. FPL is currently the only permitted diversion from the Little Manatee River. The FPL withdrawal from the Little Manatee River occurs approximately 3.5 river miles upstream of the Wimauma gage (USGS Station 301). At FPL's withdrawal point, the river bed and water slope begin to reduce considerably, indicating that FPL's withdrawals have minimal, if any, impacts on the Upper Little Manatee River and primarily impact the Lower Little Manatee River. Water withdrawn from the river is stored in a 3,800-acre cooling pond that was constructed in the early 1970s. An intake bay and pump station were constructed adjacent to the Little Manatee River to divert and withdraw water from the river in order to manage the water levels within the cooling pond. Water levels within the cooling pond must be maintained within a specific range to ensure reliable operation of the power plant and for dam safety. Specifically, there must be enough water in the cooling pond to maintain high enough water levels throughout a drought year. If the water levels drop below a certain level, the pumps that withdraw water for the power plant cannot operate properly, thus impacting the plant's ability to generate reliable electricity. Additionally, the cooling pond has a maximum water level specification to ensure safe operation of the dam. The importance of maintaining the water within a specified range requires FPL to strategically make surface water withdrawals from the Little Manatee River to ensure operational reliability and safety.

The amount of water withdrawn is determined based on the pond water level, evaporation rate, weather forecast, and permitted diversion schedule. Evaporation accounts for the majority of the water loss experienced in the cooling pond. The primary drivers of evaporation include the heat load from sun, heat load from the power plant, and winds which increase evaporation by replacing saturated air with drier air. Seepage from the cooling pond is captured and returned to the cooling pond. Rainfall makes up for some of these losses, but strategic surface water withdrawals are critical to maintaining the pond at safe and operational levels. In addition, FPL employs the water conservation measures identified in the May 2017 Water Conservation Plan submittal, which was submitted to SWFWMD in accordance with Condition H of the Site Certification. FPL continuously identifies and executes water conservation

measures. For example, in 2020, FPL replaced 27,500 feet of cooling pond swale pipe in order to increase the volume of groundwater and surface water seepage captured and returned directly into the cooling pond.

Regulatory Background Information

FPL's allocation is permitted via the Site Certification (PA 02-44D), Section III, Part K Diversion Schedules (Regular and Emergency). This allocation was obtained after a lengthy hydrobiological evaluation. As required by the 2003 Site Certification Condition J, FPL submitted a Hydrobiological Monitoring Program on September 25th, 2003 to both the Florida Department of Environmental Protection and the SWFWMD. The Interpretative Report for the Hydrobiological Monitoring Program was submitted on September 29th, 2009 (Attachment A). These reports include thirty-two years of withdrawal data recording and five years of water quality analyses, habitat mapping, salinity trend analyses, color infra-red aerial photography, tidal stage analysis, and an ecological evaluation of the Little Manatee River downstream of FPL withdrawals. The interpretive report concluded that there have been no adverse effects on the ecology of the Little Manatee River or its estuary from the historic withdrawals for the Manatee Power Plant. Hydraulic analyses indicate that the effects of withdrawals under the diversion schedules associated with the Manatee Power Plant on water levels, water flows, and salinity in the Little Manatee River are all within the natural variability of the river.

The Regular Diversion Schedule (RDS) provides:

1. FPL shall permanently implement the Regular Diversion Schedule (RDS) for withdrawals of water from the Little Manatee River with the following limitations:

- a) Withdrawals shall not occur when Little Manatee River flow, as measured at FPL's gauging station (at the point of diversion), is less than 40 cubic feet per second (cfs) (25.9 mgd)*
- b) The maximum authorized diversion is 190 cfs (122.8 mgd)*
- c) Withdrawals shall be limited to not greater than 10% of the Little Manatee River flow as measured at FPL's gauging station*
- d) In no case shall the diversion reduce the flow in the Little Manatee River below the point of diversion to less than 40 cfs*

In addition to the RDS, the FPL Manatee Power Plant's Site Certification permits an Emergency Diversion Schedule (EDS) that allows the plant to withdraw water when the cooling pond needs to restore water levels to those acceptable for safe and reliable operations. The EDS has provided critically needed water during drought years. The current EDS provides:

2. FPL is authorized to implement an emergency diversion schedule (EDS) in the event the water level in the cooling pond falls below 62.00 ft. N.G.V.D. subject to the following limitations:

- a) Withdrawals shall not occur when Little Manatee River flow, as measured at FPL's gauging station (at the point of diversion), is less than 40 cfs (25.9 mgd).*
- b) The maximum authorized diversion is 190 cfs (122.8 mgd).*
- c) EDS withdrawals shall be limited according to the Table below*
- d) In no case shall the diversion reduce the flow in the Little Manatee River below the point of diversion to less than 40 cfs.*
- e) The river diversion schedule shall revert from the EDS to the RDS upon cooling pond water levels reaching an elevation of 63.00 ft N.G.V.D.*

| Little Manatee River Flow in cfs As Measured at the FPL Gauging Station | Maximum Allowed Diversion in cfs |
|----------------------------------------------------------------------------|----------------------------------|
| $Q_{riv} < 40$ | 0 |
| $40 \leq Q_{riv} < 60$ | $0.85 Q_{riv} - 34.0$ |
| $60 \leq Q_{riv} < 100$ | $0.325 Q_{riv} - 2.5$ |
| $100 \leq Q_{riv} < 150$ | $0.52 Q_{riv} - 22.0$ |
| $150 \leq Q_{riv} < 200$ | $0.74 Q_{riv} - 55.0$ |
| $200 \leq Q_{riv} < 400$ | $0.485 Q_{riv} - 4.0$ |
| $400 \leq Q_{riv}$ | 190 |

Note: Q_{riv} is the Little Manatee River Flow in cfs as measured at the FPL gauging station.

Finalization of the MFL for the Little Manatee River may require modification of the Manatee Power Plant's Site Certification to ensure the diversion schedules are consistent with the MFL and provide FPL the ability to safely and reliably operate. FPL's initial impression of the MFL is that, for years with average and above average rainfall, the proposed diversion limits for the Upper LMR will provide slightly more water availability. However, for drought years and multi-drought years, FPL is concerned that the proposed diversion limits for the Upper LMR will provide less water availability than the combined water availability under the RDS and EDS. Based on FPL's drought experience, an EDS will be required.

If FPL's diversion schedules are modified upon the publication of the final MFL, FPL requires an updated EDS along with an updated RDS. To maintain safe and reliable operations, FPL utilized the EDS 13.1% of total days between 2004 and 2021. Retaining an EDS is critical in reducing the potential for power plant shut down; as a public utility service provider, FPL must maintain reliable operation. More specifically, an EDS is critical to enabling the site to fill the cooling pond when levels are critically low (NGVD 62 feet). Low levels in the cooling pond occur when dry conditions, combined with the plant's heat load, increase evapotranspiration rates faster than FPL can fill the cooling pond with the current diversion schedules.

In addition to a low limit for cooling pond safety, there is a limit to how high the cooling pond can be filled due to the risk of multiple hurricanes (wind driven waves causing a dam failure due to overtopping) or persistent high water (causing a piping failure of the dam). Due to the potential for very large rainfall from multiple tropical storms, the cooling pond level is raised gradually to a peak stage near the end of the hurricane season. The long dry season, combined with the relatively small flows available for diversion, result in large fluctuations in the cooling pond's water level. The existing water demands of the power plant regularly use most of the available storage capacity of Manatee's cooling pond. The multi-year droughts that occur regularly in Florida can and do lower the pond by more than five feet. For example, near the end of the 1999-2001 drought, the cooling pond reduced to an elevation that only provided one foot of storage above when pumping would no longer be possible, which affects the reliability of power generation. Based on preliminary assessments, FPL expects that an EDS with lower diversion rates and wider operation ranges could address the need for water during drought years.

Comments

COMMENT 1: IMPLEMENTATION OF THE DRAFT LITTLE MANATEE RIVER MFL

The Little Manatee River is approximately 40 miles long from its origins to its mouth in Tampa Bay. FPL's Little Manatee River withdrawal point is located at 27°38'17.63"N and 82°19'38.62"W, which is approximately 3.5 river miles upstream of the Wimauma gage (USGS Station 301) and 18.5 miles above the mouth of the river. At FPL's withdrawal point, the river bed and water slope begin to reduce considerably as compared to the upper reach, indicating that FPL's withdrawals have minimal, if any, impacts on the Upper Little Manatee River. From its mouth

to approximately river mile 12, the vegetation is mangroves, salt marsh, and tidal marsh. From river mile 12 and above, the river is generally freshwater with freshwater bottom land stream swamp vegetation. Water flows and levels exhibit significant variability.

The USGS Station 301 was chosen as the delineation factor between the Upper and Lower Little Manatee River. It is unclear how this location was determined to be the delineation point. FPL believes that multiple factors, in addition to the flow measurement, should be included in the justification. As can be seen in Figure 6-5 below, the slope of the Upper Little Manatee River is about 2.5 feet per mile until river mile 19.5, approximately a mile upstream of FPL's withdrawal. The bed slope for the remaining 19 miles to Tampa Bay is a fraction of a foot per mile. The rise of the riverbed prevents FPL withdrawals from affecting the Upper Manatee River and demonstrates that FPL's withdrawals primarily impact the Lower Manatee River. **As FPL's withdrawals will not have substantive impact on the Upper Little Manatee river, FPL requests that the MFL include flexibility so the District may consider applying the Lower Little Manatee River MFL criteria when updating FPL's diversion schedule.** Based on the proposed criteria, FPL expects that the water availability of the Lower LMR would provide enough water to operate reliably and minimize the need to use the EDS.

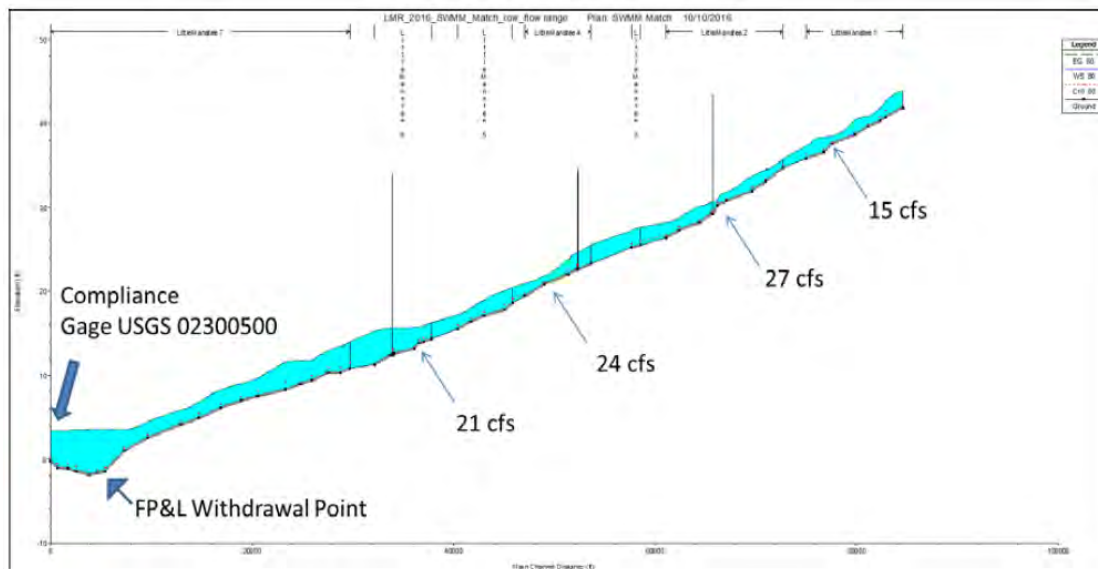


Figure 6-5. Water-surface profile of the main stem of the Upper Little Manatee River with critical shoals for fish passage denoted by arrows and labeled with reach specific flow requirements necessary to maintain hydrologic depth of 0.6 ft (0.18 m) (from JEI 2018a).

Modifying the diversion schedule in accordance with the Lower Little Manatee MFL flow blocks will allow FPL to continue its withdrawal operation without impact to the river or plant reliability. The current RDS permitted in the Site Certification meets the flow regime outlined in the Upper and Lower Little Manatee River flow blocks. Additionally, a diversion schedule consistent with the flow regime outlined for the Lower Little Manatee River would reduce FPL's dependence on the EDS to less than 1 in 10 years. However, if the Upper Little Manatee River flow regime is utilized to modify FPL's diversion schedule, FPL would be heavily reliant upon the EDS during drought years (FPL anticipates the EDS would be utilized every 1 in 5 years). Additionally, based on the Draft Upper Little Manatee River MFL, FPL's current EDS exceeds the available water if FPL must operate under the Upper Little Manatee River flow blocks. Currently, the diversion rates for the EDS range from 28% of the Little Manatee River flows (when the river is > 60 cfs) to 47% of the Little Manatee River flows (when the river is >200 cfs). The Upper Little Manatee MFL only allows 20% withdrawal when the flow is <72 cfs, 13% withdrawal when the flow is <174 cfs, and 11% withdrawal when the flow is >174 cfs. During drought years, when the cooling pond is at a low stage, FPL would be better protected if the Lower Little Manatee River MFL criteria was implemented in the diversion schedule. And, the Hydrobiological Monitoring Program showed effects of withdrawals under the diversion schedules are all within the natural variability of the river. Table 1 below demonstrates the difference in available withdrawals compared to FPL's current EDS.

Florida Power & Light Company

Table 1: Allowable Withdrawals

| Little Manatee River Flow | Current EDS Allowable Withdrawals | Lower Little Manatee River MFL Allowable Withdrawals | Upper Little Manatee River MFL Allowable Withdrawals |
|---------------------------|-----------------------------------|------------------------------------------------------|------------------------------------------------------|
| <35 cfs | 0 | 0 | 0 |
| >35 cfs and < 72 cfs | 0 to 28.8% | 20% | 20% |
| > 72 cfs and < 174 cfs | ~28.3 to 41.7% | 30% | 13% |
| > 174 cfs | ~41.7 to 47.5% | 30% | 11% |

FPL politely requests that the District staff consider FPL's need to withdraw water from the Little Manatee River in order to ensure dam safety and reliable operation of the Manatee Power Plant. Applying the Lower Little Manatee River criteria would reduce, though not eliminate, reliance on the EDS. **FPL also requests that, if the District agrees that FPL withdrawals only impact the Lower Little Manatee River, the District consider including this information in the Draft MFL.** Any regulatory revisions now or in the long term which may reduce the existing authorized water allocation to the cooling pond could have significant repercussions on FPL's ability to safely and reliably provide power.

COMMENT 2: DRAFT MFL SUMMARY TABLE CLARIFICATION

FPL recommends revisions to Table 6-9 to provide regulatory clarity for implementation. Specifically, the last row of the table states that no surface water withdrawals are permitted when flows are less than or equal to 35 cfs for both the upper and lower Little Manatee River; however, Block 1 criteria for flows less than or equal to 35 cfs states "90% percent of the flow on the previous day." Based on the last row of the current MFL Table 6-9, no diversion should be allowed for flows below 35 cfs (Block 1 flows). The following tables demonstrate two scenarios that are the result of the conflicting information for Block 2 flows. The first scenario demonstrates if withdrawals occur solely based on the previous day's average flow. The second scenario demonstrates if withdrawals are based on the previous day's average flow and the 35 cfs withdrawal restriction. Additionally, the criteria should be clear on which portions of the flow are reserved, protected, retained for the river and which flows are available.

Scenario 1

| Flow in LMR at US 301 | 20% of the previous day's LMR Flow at US 301 | LMR Flow - 20% withdrawn |
|-----------------------|----------------------------------------------|--------------------------|
| (cfs) | (cfs) | (cfs) |
| 35 | 7 | 28 |
| 36 | 7.2 | 28.8 |
| 37 | 7.4 | 29.6 |
| 38 | 7.6 | 30.4 |
| 39 | 7.8 | 31.2 |
| 40 | 8 | 32 |
| 41 | 8.2 | 32.8 |
| 42 | 8.4 | 33.6 |
| 43 | 8.6 | 34.4 |
| 44 | 8.8 | 35.2 |
| 45 | 9 | 36 |
| 46 | 9.2 | 36.8 |
| 47 | 9.4 | 37.6 |
| 48 | 9.6 | 38.4 |
| 49 | 9.8 | 39.2 |
| 50 | 10 | 40 |

Scenario 2

| Flow in LMR at US 301 | Allowed Diversion to Maintain LMR above 35 cfs | Flow in LMR at US301 after Max Diversion Allowed |
|-----------------------|------------------------------------------------|--------------------------------------------------|
| (cfs) | (cfs) | (cfs) |
| 35 | 0 | 35 |
| 36 | 1 | 35 |
| 37 | 2 | 35 |
| 38 | 3 | 35 |
| 39 | 4 | 35 |
| 40 | 5 | 35 |
| 41 | 6 | 35 |
| 42 | 7 | 35 |
| 43 | 8 | 35 |
| 44 | 8.8 | 35.2 |
| 45 | 9 | 36 |
| 46 | 9.2 | 36.8 |
| 47 | 9.4 | 37.6 |
| 48 | 9.6 | 38.4 |
| 49 | 9.8 | 39.2 |
| 50 | 10 | 40 |

Given the two conflicting scenarios illustrated above, FPL recommends the following adjustments to Table 6.9 in order to establish regulatory clarity:

| TABLE 6-9 Minimum Flow and Level (MFL) Criteria for Little Manatee River (LMR) | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------|-------------------------------------------------------|------------------------------------------|
| River Reach | Flow Block 1 (≤ 35 cfs) | Flow Block 2 (> 35 cfs & ≤ 72 cfs) | Flow Block 3A (>72 cfs & ≤ 174 cfs) | Flow Block 3B (> 174 cfs) |
| Upper LMR Headwater to US301 Highway | All flow reserved for LMR River | 80% of flow reserved for Upper LMR River | 87% of flow reserved for Upper LMR River | 89% of flow reserved for Upper LMR River |
| | No flow available for other uses | 20% of flow available for other uses | 13% of flow available for other uses | 11% of flow available for other uses |
| Lower LMR US301 Highway to Tampa Bay | All flow reserved for LMR River | 80% of flow reserved for Lower LMR River | 70% of flow reserved for Lower LMR River | 70% of flow reserved for Lower LMR River |
| | No flow available for other uses | 20% of flow available for other uses | 30% of flow available for other uses | 30% of flow available for other uses |
| Notes No withdrawals from the Upper Little Manatee River or Lower Little Manatee River allowed when the flow at US301 is equal to or below 35 cfs. For Block 2 the withdrawals will be limited to 20% of the total flow, up until the river flow is 35 cfs. Withdrawals will be based on the flow at US301 as measured by the USGS Site 02300500 at 2400 (midnight). | | | | |

FPL continues to analyze the site's water needs with the water availability prescribed by this Draft MFL and looks forward to continuing to coordinate with the SWFWMD on development and implementation of the MFL. If you have any questions or need more information, please feel free to contact Kelly Napoli via phone at 561-694-4015 or via email at Kelly.Napoli@fpl.com

Best regards,



Danielle Hall
 FPL Environmental Services Manager
 561-691-2406

Attachment A

SA
DATABASE
Updated



FPL

Database Updated Florida Power & Light Company, 19050 State Road 62, Parrish, Florida 34219

September 29, 2009

FILE OF RECORD
NO. _____

CT 305547

Mr. Michael s. Flannery
Senior Environmental Scientist
Southwest Florida Water Management District
2379 Broad Street
Brooksville, Florida 34609-6899

Re: Florida Power & Light Manatee Plant
Hydrobiological Monitoring Program Interpretive Report
PA-02-44 XXXIII J2.d(3)a(2)

Dear Mr. Flannery:

Enclosed please find the revised Interpretive Report for the
Hydrobiological Monitoring Program, Florida Power & Light
Company's Manatee Plant expansion.

If you have any questions, please call me at (941) 776-5278.

Sincerely,

Mary Maxwell
Environmental Specialist

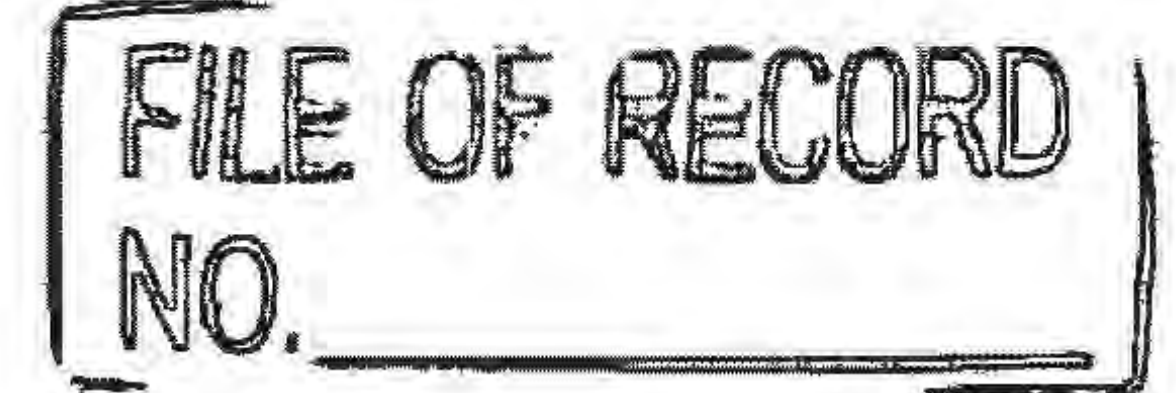
Enclosure

CC: Matthew Miller, SWFWMD, Sarasota
File



Review of FP&L Little Manatee River Hydrobiological Monitoring Program
Interpretive Report

Prepared by Sid Flannery, Southwest Florida Water Management District, August 26, 2009



Comments listed below by Page (P), paragraph (PAR), Line (L)

P6 , par 2 - Citation for HSW (2008) needs to be consistent with citation for Watson et al. (2008) in the references. Also, alphabetize the references on page 40.

P 9, par 2 - the text says the initial diversion schedule was based on stage, but Appendix A also shows a diversion schedule based on flows dated November 12, 1975. That is the one I used. This previous, flow based diversion scheduled needs to be referenced in the text or it seems like FP&L was being regulated only on stage for a number of years.

P 13, par 4, - Was maximum daily stage considered as a variable in the regression of maximum salinity? It seems that this would be a better predictor than mean stage. However, maximum stage could be affected by high flows, particularly at I-75. Similarly, mean stage could be affected by high flows, but at I-75 the station would likely be fresh. Did the regression for I-75 have a threshold flow at which the station became fresh? Would FP&L provide scatter plots of the data with the fitted regression lines and confidence intervals shown for the regressions of mean and maximum salinity at US 41 and I-75.

P 16 – The citation for SWFWMD (2002) is not in the References, what report of paper was that?

P 17, the Citation for Flannery (1991) should be for Flannery et al. (1991)

P 23. The figure appears to be average monthly withdrawals, not daily withdrawals. Daily withdrawals would have been more informative.



FILE OF RECORD
NO. _____

*Interpretive Report for the
Hydrobiological Monitoring Program
Florida Power and Light Company's
Manatee Plant Expansion*

Submitted to: Southwest Florida Water Management District
6750 Fruitville Road
Sarasota, Florida 34240

Prepared for: Florida Power & Light Company
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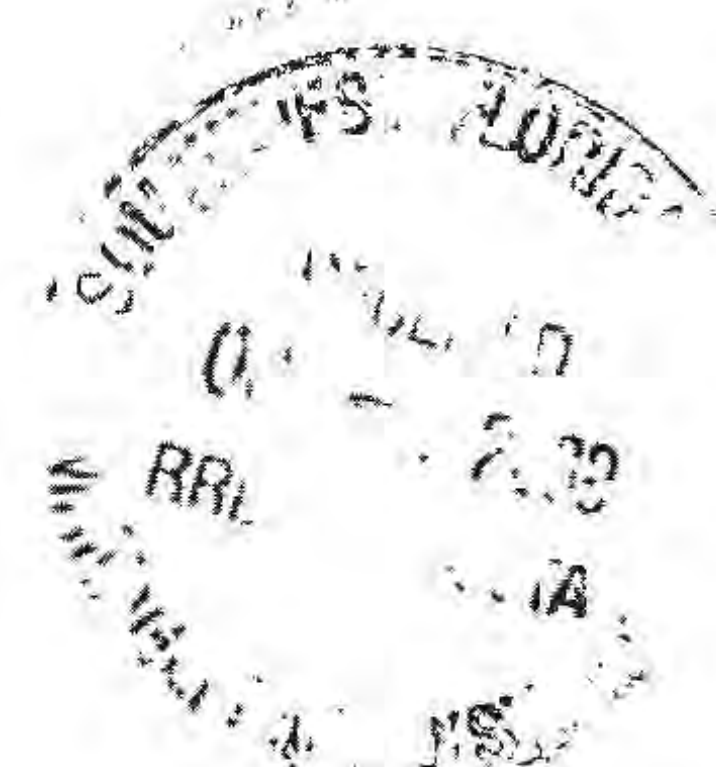
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1.0 Introduction

Florida Power & Light Company (FPL) is required to develop and implement a hydrobiological monitoring program (HBMP) for their Manatee Plant Expansion Project. The HBMP is required by Conditions of Certification for the Manatee Unit 3 Expansion Project, Final Order No. PA 02-44. The specific conditions requiring the HBMP were provided by the Southwest Florida Water Management District (District) to address potential concerns related to water withdrawal from the Little Manatee River.

Conditions of Certification Condition J.2 and J.3 require submission of data and interpretive reports. This report is submitted in compliance with that permit condition.

This interpretive report is required to provide the water quality monitoring data since the previous data report (April 2007), results of the update aerial photography and habitat mapping, and salinity trend analyses. This report reflects the results of agreements reached at a meeting with District staff and subsequent approval of the report outline by the District. The report contains data collected through Water Year 2008 (WY 2008, ending September 30, 2008).



2.0 Methodology

2.1 Water Quality Monitoring, Data Management and Equipment Maintenance

Two fixed specific conductance recording stations and one tide stage recording station are required by Conditions J.2.a and J.2.b. These stations were located in the lower tidal river channel near the US 41 bridge and near the I-75 bridge (See Figure 2.1-1).

Monitoring Station Mobilization

Vanasse Hangen Brustlin, Inc. (VHB) obtained permission to access two private residential docks for the purpose of installing the monitoring equipment. The U.S. 41 station had previously been utilized by the U.S. Geological Survey (USGS) to perform similar monitoring. Subsequent to obtaining site access permission, the required monitoring equipment was assembled and installed in September 2004. Provided below is a list of the monitoring equipment installed at each station.

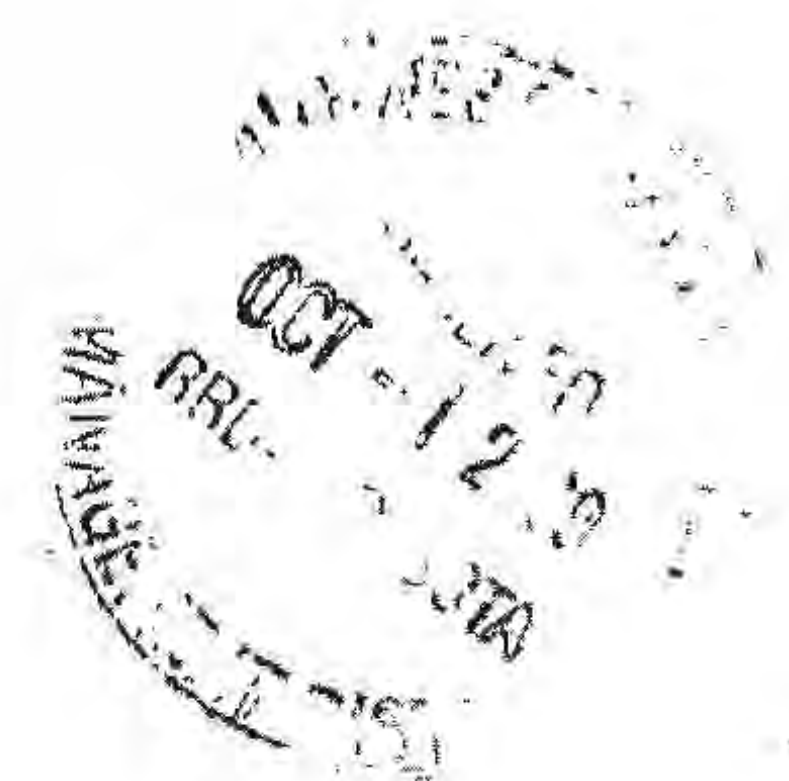
Equipment List for Each Site

- | | |
|-------------------------------|----------------------|
| ▪ In-Situ pressure transducer | ▪ Nema enclosure |
| ▪ MP 9000 sonde | ▪ Staff Gauge |
| ▪ 2" PVC pipe | ▪ Anti-fouling Paint |
| ▪ 2" Galvanized pipe | ▪ Lock |

Initial calibration of the monitoring equipment provided for the collection of stage, temperature, and conductance data at 15-minute increments using one In-Situ MP Troll 9000 data logger at each site. Two AA batteries power the logger. The loggers date and time stamp each stage, temperature, and conductance value. Stage data are collected using the In-Situ pressure transducer which is a part of the Troll 9000. Temperature and conductance data are collected using In-Situ MP Troll 9000. The sondes probes were placed at what was determined to generally be mid-depth in the water column. The Troll 9000 units were subsequently replaced with YSI sondes after repeated problems.

Each data logger is housed within a Nema enclosure and locked to prevent vandalism. Two-inch PVC pipe is used to house and protect the sondes units as well as the stage pressure transducer. All equipment subject to inundation by salt water was treated with clear anti-fouling paint to reduce or eliminate the potential for marine fouling. A staff gauge was also installed along the outside edge of the monitoring unit as a visual check to make sure that the stage unit is functioning properly and reading accurately. After installation, the sonde units were calibrated against an *in situ* measurement by using a YSI multi-parameter meter.

Although Condition J.2.b. only required that a "continuous tide stage recorder shall also be installed near one of the specific conductance recorders", stage tide recorders have been installed at both stations. This will allow much better salinity modeling



for the two locations and will prevent the need to extrapolate the stage data from a single location possibly several miles away from the actual salinity readings.

Monitoring Data Collection

At each station, automated specific conductance and temperature measurements are made using the In-Situ MP Troll 9000/YSI Sondes (salinity recorders). Specific conductance and temperature measurements are made at 15 minutes intervals. A continuous tide stage recorder also measures the tide elevation every 15 minutes at each station. The automated data is date and time stamped and stored in the data logger. The survey of the sites has been completed and stage data are been reported as NGVD (1988).

Monitoring Data Management

Monthly site visits are conducted to download the stage, temperature and conductance data from the data logger at both sites. Data are downloaded from the MP Troll 9000/YSI Sonde using a laptop computer or similar device (i.e., PDA). The downloaded data files are then transported to the office for processing. Raw stage, temperature and conductance data are entered into an Excel spreadsheet with the recorded date and time stamp. Raw data are corrected as necessary based upon the field calibration results (shift adjustment). Specific conductance values are converted to salinity internally by the MP Troll 9000/YSI Sonde.

The stage, temperature, conductivity and salinity data are reduced to mean, minimum and maximum values for each day. The daily value data are tabled to show the mean, minimum and maximum for each day. The 15-minute data are retained and will be provided upon request as these files are lengthy. The daily data are also summarized to calculate the mean, minimum and maximum for each month.

Monitoring Equipment Calibration and Maintenance

Conditions of Certification Condition J.2.c. requires the tide and salinity recorders be regularly maintained and calibrated to referenced standards to ensure data accuracy. The tide and salinity recorders are visited monthly for maintenance and calibration purposes. Initial readings are made of all instruments on arrival at the site. Staff gauges and inside gauges have been established at each site along with "reference points" and "reference marks" to verify that the proper tide stage value is recorded. Temperature and conductance values are taken with a calibrated YSI multi-parameter probe and recorded on arrival at the site. These initial readings are compared with recorder values. Temperature and conductivity sensors are placed in standard solutions and these values are also recorded. The sensors are cleaned and recalibrated if necessary. A final reading is taken and recorded following cleaning of the sensors and before departing the site. These field values are used to apply shift adjustments to the recorded data, if applicable.

Monthly maintenance is also conducted to remove any marine fouling or debris from around the instrumentation. When any equipment is non-functional, it is repaired or replaced promptly in order to limit the amount of lost data. Any replacement equipment is calibrated and coated with anti-fouling paint as done during the initial setup at the site.



2.2 Habitat Mapping Photography, Vegetative Mapping and Analysis

Color Infrared Aerial Photography

Conditions of Certification Condition J.2.d. of the final order requires the acquisition and analysis of color infrared aerial photography of the Little Manatee River. The photography and analysis of the Little Manatee River is limited to the estuarine portion of the river between river miles 3 and 11. In particular, the wetland vegetation located with the 100-year floodplain within this portion of the river is of concern. Figure 2.1-1 depicts the approximate limits of the color infrared aerial photography and vegetative mapping.

The photography has a minimum scale of 1" = 1,000', with 60% forward overlap (to allow for stereoscopic viewing), and shall be georeferenced for scale with all previous and subsequent photography to the same references.

For digital mapping purposes, each 9" x 9" transparency frame was scanned at 600 dpi or better using a flatbed high quality scanner. Digital images were then georectified by image matching using U.S. Geological Survey digital ortho-rectified quarter quadrangles aerial photographs (USGS DOQQs) as the source of geodata. Image georectification was performed using ENVI remote sensing software to achieve a root mean square error (RMSE) of less than 1 meter for each georectified image. The resulting images will be archived as both individual frames in geotiff format, and as a digital mosaic image of the combined frames for the study area. Tonal balancing and enhancements to contrast were performed as-needed to improve the appearance and interpretability of the photomosaic. The digital mosaic was used in the subsequent vegetation mapping task based on visual interpretation combined with ground truthing of areas in the field.

The baseline photography was obtained in October 2004. The Photography evaluated in this report was obtained in November 2007.

Vegetation Mapping

The baseline habitat mapping (VHB, 2005) over the color infrared aerial photography imagery and the November 2007 photography were used to update the vegetation map. The *Florida Land Use, Cover and Forms Classification System* (FLUCFCS) (FDOT, 1999) habitat designation had been superimposed within the limits of the vegetative review area (i.e., the wetland vegetation within the 100-year floodplain of the Little Manatee River from river miles 3 to 11) during the baseline mapping effort.

VHB's biologist conducted a field-reconnaissance of the area of the Little Manatee River between river miles 3 and 11 to verify the species composition of major plant communities located along the river. Using the existing baseline mapping as a starting point, the high resolution infrared aerial photography was used to field-verify and refine existing habitat designations. Distinct communities of more discrete diagnostic plant assemblages were located and described along with any other conspicuous indicator species. Field data collection was conducted on December 19 and 20, 2007.



The refined habitat mapping from the field reconnaissance was then digitized into GIS in a system compatible with the District's GIS system. Subsequent to the field mapping effort, during the interpretive report meeting with District staff, the District indicated the availability of historic mapping for the Little Manatee River. The original mapping was performed by the Florida Marine Research Institute (1997) and showed broad wetland habitat types. These habitat maps were further refined within a District Technical Report (2002) that documented the plant species composition at 72 shoreline sites. This report also mapped the habitats by dominant species, and/or with a species overlay, that served to refine the FLUCFCS habitats to level VI.

Using the field notes generated during the 2005 and 2007 field reconnaissance, VHB revised the habitat maps for these time periods. The baseline and 2007 updated habitat maps were refined to provide the dominant species information similar to the District's technical report (2002).

2.3 Salinity Trend Analyses

Statistical analyses of salinity were conducted using data from two continuously recording stage and water quality stations. The upstream station (referred to as I-75) is located just below the I-75 bridge at about river mile 7 (11.2 km) and the downstream station (referred to as US 41) is located near US 41 just below river mile 3 (4.8 km). The USGS gage which records stage (ft in NGVD) and flow (Q as cubic ft per sec (CFS)) is located at the US 301 bridge near river mile 15 (river km 24). Data considered in this report from the two water quality stations span three water years (WYs 2006-2008). Collection of new data is continuing in WY 2009. The salinity variates analyzed for this report included daily average and daily maximum salinity (expressed as parts per thousand (ppt)).

A combination of graphical analysis, multiple linear regression (MLR), and time series analysis methods were used to analyze data. The software Statistica version 6.0 was used to perform all statistical analyses and data manipulation.

Data available from the I-75 and US 41 monitoring sites spanned the period from October 1, 2005 through September 30, 2008. FPL provided data on the daily quantities of water that were withdrawn at the FPL Manatee Plant site, which is located between river miles 18 and 19. Data on flow in the Little Manatee River for USGS Station 02300500 near Wimauma (near river mile 15) were obtained directly from the USGS online. Salinity data at this site (specific conductance) extended only to 1982. However, the 1973-1982 salinity was reviewed and the site was confirmed to be a freshwater site with salinities always < 0.5 ppt during this period of record.

The continuous recorder data from the I-75 and US 41 sites collected at 15-min intervals was processed to obtain mean, maximum and minimum salinity values for each day. Data were missing for the I-75 station from May 10 until July 23, 2006, but data during this period were available for the US 41 station and regression equations were identified and developed to permit the estimation of mean and maximum daily salinity data for the I-75 site, as described in the August 2006 Emergency Diversion Salinity report (VHB, 2006). Similarly, flow data were missing for three dates in



June-July, 2006 and were estimated by time series methods using antecedent flow and rainfall data. No missing data were present in the period after July 23, 2006.

Multiple linear regression was used to model the relationships between station salinity statistics and one or more independent variables, to permit the prediction of salinity. These were used to assess the potential impact of the actual FPL withdrawals by comparing the observed and modeled daily salinity means and maxima for flow values with FPL withdrawals versus the salinity model predictions for flow values if no FPL withdrawals had occurred. In addition, model based predictions of the location of the 2 psu (practical salinity unit) isohalines were made for the withdrawal and no-withdrawal scenarios. This modeling was based on isohaline MLR models (coefficients and parameters) recently developed by Watson et al. (2008) for the District based on extensive synthesis and analysis of a large dataset collected by multiple agencies.

A table of the variables defined in the Statistica datafile was exported to excel format and is reproduced for reference (Table 2.3-1). Variables included date of collection, salinity means and maxima for each site, stage, flow (Q) at Wimauma, FPL withdrawals as daily CFS values, lag flows of up to three days, 3-day and 6-day prior moving averages (MAV3 and MAV6) of flow, and the natural logarithm transform of flow, its lags, and the moving average flow values.

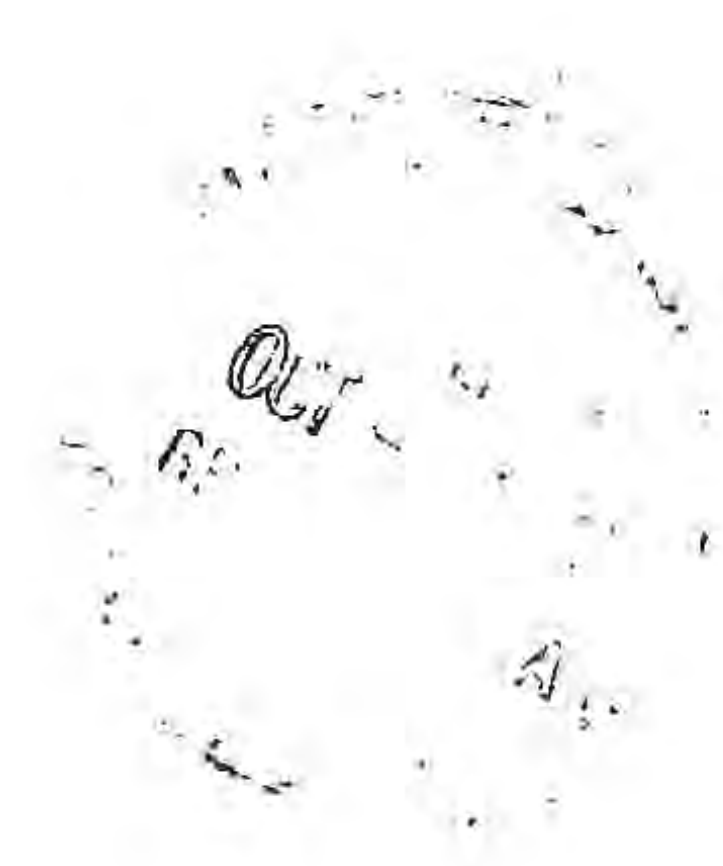
Variables derived from statistical models included the daily predicted mean and maximum salinity values for each station, as well as the predicted daily location (in river km) of the 2 ppt isohaline.

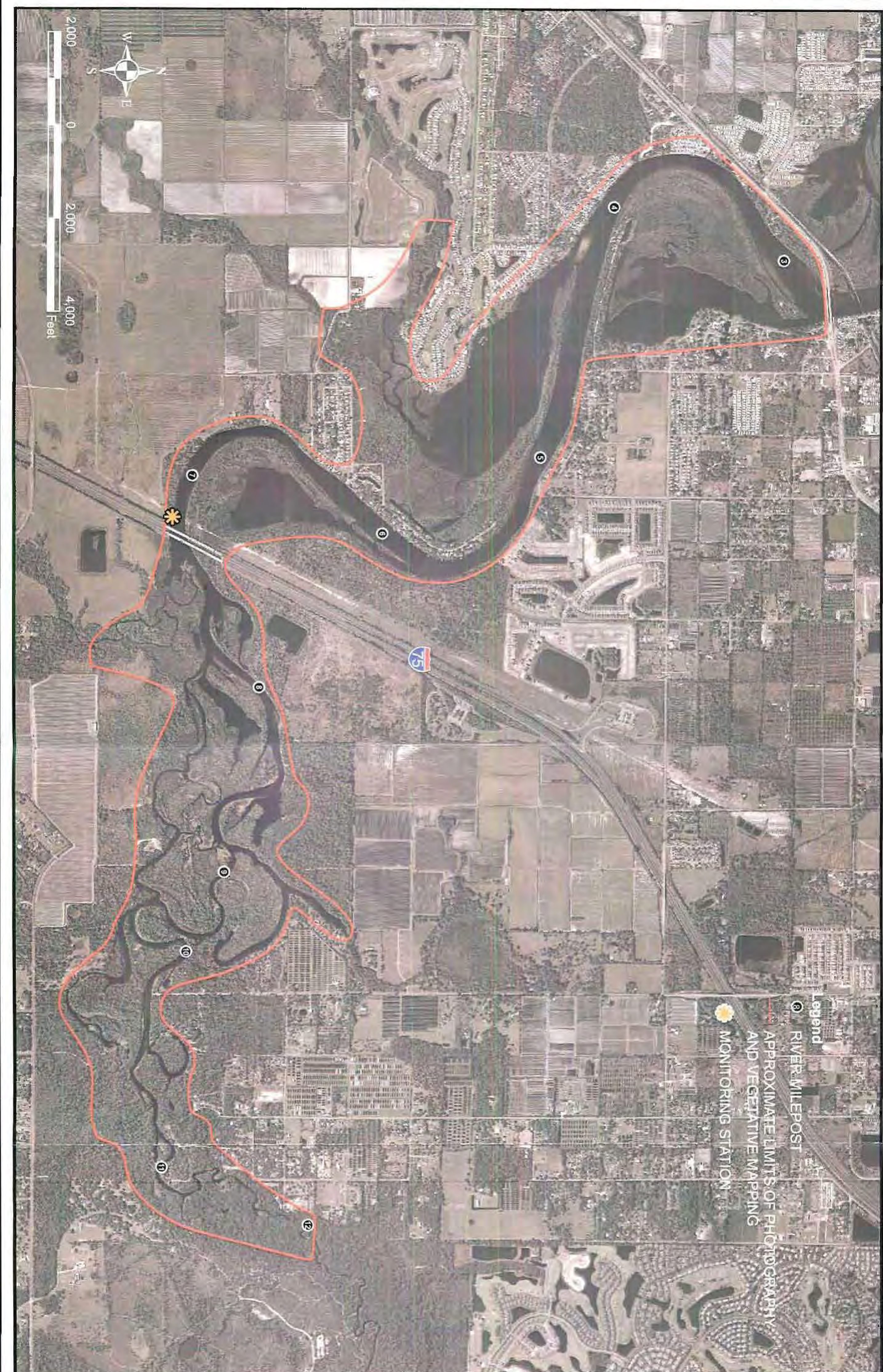
MLR modeling explored all logical available potential independent values. Forward stepwise-regression was used. Variable selection was confirmed by examination of best-subsets regression. Nonsignificant variables did not explain a significant amount of total variance and thus were not retained in the final predictive models.



Table 2.3-1. Database variables used in salinity analyses.

| Variable | Variable No. | Formula or Variable Description | Comment |
|------------------------|--------------|-------------------------------------|------------------------------------|
| Date | 1 | Date in VHB Database | |
| MeanSalinity_I75 | 2 | | |
| MaxSalinity_I75 | 3 | | |
| MeanSalinity_US41 | 4 | | |
| MaxSalinity_US41 | 5 | | |
| MO | 6 | Calendar Month | |
| DAY | 7 | Calendar Day of Month | |
| YR | 8 | Calendar Year | |
| USGSDate | 9 | | |
| Q_Wimauma | 10 | Flow (CFS) near Wimauma | |
| Ln(Q) | 11 | =log(Q_Wimauma) | |
| fplwithdrawal_cfs | 12 | FPL daily withdrawal average in CFS | |
| lag1_MeanSalinity_I75 | 13 | | not used |
| lag1_Ln(Q) | 14 | lag1 of LN(Q) | |
| MeanSalinity_I75_1 | 15 | lag 1 mean salinity I75 | not used |
| MaxSalinity_I75_1 | 16 | lag 1 max salinity I75 | not used |
| MeanSalinity_US41_1 | 17 | lag 1 mean salinity US41 | not used |
| MaxSalinity_US41_1 | 18 | lag 1 max salinity US41 | not used |
| LN(Q)_2 | 19 | lag2 of LN(Q) | |
| LN(Q)_3 | 20 | lag3 of LN(Q) | |
| LN(Q)_MAV3 | 21 | ln of 3 day prior moving average Q | |
| LN(Q)_MAV6 | 22 | ln of 6 day prior moving average Q | |
| ISO_2_RKM | 23 | =25.306-3.187*V21 | |
| Q_NOFPL | 24 | =V10+V12 | Expected flow if no FPL withdrawal |
| Ln(Q_NOFPL) | 25 | =log(Q_NOFPL) | |
| lag1_InQNOFPL | 26 | lag1 of Ln(Q_NOFPL) | |
| lag2_InQNOFPL | 27 | | |
| lag3_InQNOFPL | 28 | | |
| lag1_MaxSalinity_I75 | 29 | | not used |
| lag1_MeanSalinity_US41 | 30 | | not used |
| lag1_MaxSalinity_US41 | 31 | | not used |
| PredMaxI75_NoFPL | 32 | = -6.694*V48+2.485*V46+16.015 | |
| PreMeanI75_NoFPL | 33 | = -5.4673*V48+2.1798*V46+9.31 | |
| PredMaxUS41_NoFPL | 34 | = -3.841*V48+0.702*V47+32.749 | |
| PredMeanUS41_NoFPL | 35 | = -5.948*V48+0.649*V47+35.469 | |
| PredMaxI75_wFPL | 36 | = -6.694*V22+2.485*V46+16.015 | |
| PredMeanI75_wFPL | 37 | = -5.4673*V22+2.1798*V46+9.31 | |
| PredMaxUS41_wFPL | 38 | = -3.841*V22+0.702*V47+32.749 | |
| PredMeanUS41_wFPL | 39 | = -5.948*V22+0.649*V47+35.469 | |
| InQ_NoFPL_MAV3 | 40 | =log(Q_NOFPL); 3 pt.prior mov.aver. | |
| ISO_2_RKM_NOFPL | 41 | =25.306-3.187*V40 | |
| FLOW_DIFF | 42 | =V24-V10 | |
| PROPFLOW_DIVERTED | 43 | =V42/V24 | |
| SCENARDIF_I75MEAN | 44 | =V37-V33 | |
| SCENARDIF_I75MAX | 45 | =V36-V32 | |
| MeanStage_FT_I75 | 46 | Mean Daily Stage at I75 | |
| MeanStage_FT_US41 | 47 | Mean Daily Stage at US41 | |
| InQ_NoFPL_MAV6 | 48 | log(Q_NOFPL); 6 pt.prior mov.aver. | |





Date: 06/09

Revision:

Figure 2.1-1
Hydrobiological Monitoring
Program Study Area
Hillsborough County, Florida

Vanasse Hangen Brustlin, Inc.



8043 Cooper Creek Blvd.
Suite 201
University Park, Florida 34201

3.0 Results

3.1 Withdrawals

Make-up water for the cooling pond associated with the FPL Manatee Plant is withdrawn from the surface waters of the Little Manatee River. The rate of surface water withdrawal from the river is derived from a diversion schedule.

3.1.1 Diversion Schedule History

The initial permit for withdrawals from the Little Manatee River the FPL Manatee Power Plant was granted on April 17, 1973. The permit and Plan of Diversion was amended on November 12, 1975. The permit authorizing the plant contained a diversion schedule (Exhibit B) for withdrawals from the Little Manatee River based upon river flow. A copy of the initial and amended diversion schedule is provided in Appendix A.

In association with the Manatee Plant Expansion Project permitting in 2004, the District and FPL agreed to a revised diversion schedule. Page 72 of the permit conditions (attached in Appendix A) provides a narrative description of the new diversion schedules. The diversion schedule was implemented beginning in October 2004 and is referred to as the regular diversion schedule (RDS). The regular diversion schedule is based upon the flow. However, during emergency conditions (when the level of the cooling pond falls below 62 feet mean sea level (msl)) withdrawals are based on the calculations shown in the Condition of Certification until the cooling pond exceeds 63 ft msl. The emergency diversion schedule (EDS) allows FPL to withdraw (depending upon river flows) up to 190 cubic feet per second (cfs) as long as the river flow is not reduced below 40 cfs. Table A-1 (Appendix A) provides the permitted diversion quantities under both the RDS and EDS based upon river stage/discharge at the plant. The stage/discharge relationship at the plant, and diversion curves, are updated annually.

Since implementation of the HBMP and RDS, FPL has converted to the EDS two times through WY 2008. The initial EDS withdrawals occurred between June 13 and July 27, 2006. Specifically, June 13-22, 26, 27 and July 3-27, 2006) (VHB, 2006). FPL implemented withdrawals according to the emergency diversion schedule a second time beginning June 14, 2007. Diversion according to the EDS spanned June 14, 2007 to July 28, 2008, and occurred from June 14 – October 31, January 20 – April 14, 2008, and June 12 – July 28, 2008 (VHB, 2008).



3.1.2 Period-of Record Withdrawals

Figure 3.1-1 depicts FPL's daily average (million gallons per day, mgd) withdrawals for each month in the Little Manatee River for the available period-of-record (December 1, 1976 to September 30, 2008). Additional river withdrawals may have occurred prior to December 1, 1976 because Flannery, et. al. (1991) note that "large non-metered withdrawals from the river by Florida Power and Light Corporation occurred during that year". There were also gaps in the District's withdrawal database for August to November 1995, January 1996, May 1997 and from July to November 1997.

Daily average withdrawals ranged from 55.0 to 0 mgd and averaged 6.1 mgd over the period-of-record. Under the initial diversion schedule, daily withdrawals had a mean of 6.3 mgd.

The mean and median daily average withdrawals for the period-of-record are shown in Figure 3.1.2. Peak withdrawals have generally occurred during the months of July, August and September.

3.1.3 Withdrawals under HBMP Monitoring Program

The HBMP Monitoring period began October 2004 and continued through the end of WY 2008. The implementation of river withdrawals pursuant to the regular diversion schedule began at the start of HBMP monitoring (October 2004).

Figure 3.1-3 depicts FPL's average daily withdrawals by month since conversion to the RDS and includes the two periods of withdrawal according to the EDS. Withdrawals under the RDS (including the two EDS periods) average 4.7 mgd per day and ranged from 33.8 to 0 mgd. The mean and median HBMP period withdrawals by month are shown in Figure 3.1-4.

Peak withdrawals occur during times of high river flow because the permitted withdrawal volume increases with increasing river flow volume. As expected, river flow is generally highest during the wet season (June – September).

3.2 Water Quality

Data downloads, calibration, and maintenance have been conducted monthly since station establishment. Table 3.2-1 provides a list of the dates of field calibration, maintenance and data downloads, along with associated comments since the last data report. The baseline and initial data reports provided the results from establishment through December 2006 and this report provides data subsequent to the initial data report through September 2008.

Since replacement of the originally installed Troll sondes with YSI sondes in 2006, data collection has been much more consistent. There was a stage calibration problem in March 2007, but otherwise no data collection issues were observed. There was some on-going maintenance items and some vandalism, but data collection occurred uninterrupted.



The daily value tables for US 41 and I-75 stations are provided in Appendices B and C, respectively.

The maximum, mean and minimum daily values for each parameter and site have been graphed for the period of record. The stage, temperature and salinity data for US 41 and I-75 are depicted on Figures 3.2-1 through 3.2-3 and 3.2-4 through 3.2-6, respectively.

The average daily mean salinity and the average daily salinity range are listed for each water year in Table 3.2-2. As expected, the average daily mean salinity at the US 41 site is higher than at the I-75 site. In most water years the daily mean salinity at US 41 average over 10 parts per thousand (ppt) more than at I-75. The observed daily range in salinity at the US 41 site was also consistently higher than at the I-75 site, but the daily range at both sites is substantial. The daily range is generally greatest at both sites when river flows is lower and mean average daily salinity is higher.

3.3 Habitat Mapping

3.3.1 Vegetative Mapping Results for 2007 Photography

The color infra-red aerial photography and mapping of vegetative communities in the Little Manatee River estuary with the 100-year flood plain between river mile 3 and river mile 11 was completed on December 20, 2007. False Color Infra-red aerial photography (November 2007) at a minimum scale of 1" = 1,000', with a 60% stereo overlap and geo-referenced for scale was utilized in conjunction with field reconnaissance of the river to identify the distribution of major plant communities such as mangroves, salt marshes, brackish marshes and freshwater aquatic and floodplain communities. Within these communities more discrete diagnostic plant assemblages were also located and described, when possible, to identify discreet or individual stands of species or mixtures of species such as red mangrove (*Rhizophora mangel*), black needlerush (*Juncus roemerianus*), sawgrass (*Cladium jamaicense*), cattails (*Typha* spp.), leather ferns (*Acrostichum* spp.), or other conspicuous indicator species. The field reconnaissance for the second mapping event was completed by December 20, 2007.

Results of the (2004) and subsequent habitat mapping efforts are provided in attached Figure 3.3-1 and Figure 3.3-2, respectively. Acreage values of each habitat type as determined during the 2007 habitat mapping efforts are:

Mangrove – 16.5 acres

Salt Marsh – leather fern – 267.8 acres

Salt Marsh – black needle rush – 263.8 acres

Freshwater marsh – cattail – 3.6 acres

Freshwater marsh – pennywort - 0.3 acres

Freshwater marsh – saw grass – 0.2 acres

Bottomland hardwoods – 254.0 acres



3.3.2 Comparison of Baseline and 2007 Mapping Results

Table 3.3.1 provides a summary of the baseline and 2007 vegetative mapping effort. Comparison of the results of the two habitat mapping efforts reveals that acreage values for the mapped habitats were unchanged with the exception of cattail, which increased in cover from 1.5 acres in 2004, to 3.6 acres in 2007, and increase in cover of 2.1 acres. This increase in cover was noted between river miles 8 and 10, and consisted of narrow bands of cattail (approximately 10 feet wide average) aligned along the river banks at the water's edge. The species composition and overall acreage remained unchanged for all areas previously mapped.

3.3.3 Vegetative Mapping Discussion

The vegetative composition and habitat community type remained constant over the nearly three-year period. None of the habitat areas mapped in March 2005 changed during the subsequent survey in December 2007. As such, these communities appear very stable and do not reflect any change in river salinity.

The only observed change was the addition of a narrow cattail strip along portions of the river in the upper third of the mapping area. This strip appears to represent the expansion of vegetation along the deep edge or a new strip of vegetation in formerly unvegetated areas.

Since there was no vegetative change, per se, the new strip of cattail does not appear to reflect any change in salinity. This new deeper vegetation fringe is believed to reflect the below average rainfall and lower river levels in this portion of the river. Lower river levels may have allowed cattail, which are opportunistic, to colonize previously unvegetated and possibly too deep areas. As normal rainfall and higher river stages return, it will be interesting to note if this cattail fringe persists.

3.4 Salinity Trend Analyses

In this section a summary of the observed salinity data and independent stream variables for each monitoring site, as well as the predicted values based on the statistically derived models, are presented. Data is first presented using the streamflow with FPL withdrawals reflected in the data. Since withdrawals are taken just upstream of the USGS gaging station near Wimauma, it was assumed that observations at the gage would reflect the effect of withdrawals by FPL. Based on the flows that would have been measured at the USGS station if no FPL withdrawals had taken place, additional model predictions are presented. To obtain this adjusted Q value, the FPL withdrawal was added to the USGS Q value for each daily record. Finally, the model predicted location of the 2 ppt isohaline is considered with and without FPL withdrawals and the results are discussed.



3.4.1 Observed Salinity Trends Based on Actual FPL Withdrawals

Basic Statistics for key variables over the WY 2006 – WY 2008 period are shown in Table 3.4-1. Observed mean daily salinity at I-75 and US 41 are graphed in Figure 3.4-1. Maximum observed salinities are shown in Figure 3.4-2. Graphical and statistical analyses revealed a strong inverse, non-linear relationship between streamflow and salinity for both sites, and the need to ln-transform Q to obtain a more linear relationship for use in MLR analyses. Models of salinity parameters based on observed Q values recorded at the USGS gage near Wimauma represent salinity and flow values in which the FPL withdrawal effects are included (actual FPL withdrawals).

3.4.2 Predicted Salinity Trends Based on Actual FPL Withdrawals

The final MLR models for mean salinity at I-75 and US 41 are shown in Tables 3.4-2 and 3.4-3. The natural logarithm of the 6 day prior moving average flow (Q_MAV6) was the most important predictor of mean salinity in both models (standardized regression coefficients (Betas) were approximately 0.93). Mean stage at the respective gage was also included in the model and was of positive sign (higher stages were associated with greater salinity values after adjusting for the effect of moving average flow on salinity). A summary of the best subsets regression for mean and maximum salinity at I-75 and US 41 is provided in Appendix D.

Multiple R values were relatively high (.89 and .91 for the I-75 and US 41 sites) and explained 78% and 82% percent of the total variation in salinity. Figure 3.4-3 and 3.4-4 show the observed and expected (modeled) mean salinity for I-75 and US 41, respectively. Other models were examined using best subsets regression (all site results appended). The models selected, which use a single variable to represent flow (LN(Q_MAV6), and one other variable (site stage), are believed best because they explain most of the variation that is possible to explain with the use of a more complex model with greater numbers of variables. The more complex models yield improbable signs of estimated coefficients (some lag Q terms are positive), and other indications of overfitting of the MLR model. Use of multiple lagged flow terms in particular may present multicollinearity problems.

The final MLR models for maximum salinity at I-75 and US 41 are shown in Tables 3.4-4 and 3.4-5. The natural logarithm of the 6 day prior moving average flow (LN(Q_MAV6) was the most important predictor of mean salinity in both maximum salinity models. Maximum stage at the respective gage was also included in the model and was of positive sign (higher stages were associated with greater salinity values after adjusting for the effect of moving average flow on salinity). A summary of the best subsets regression for mean and maximum salinity at I-75 and US 41 is provided in Appendix D.

Multiple R values for the maximum salinity models of .91 and .78 were obtained for the I-75 and US 41 sites, respectively, and explained 78% and 60% percent of the total variation in maximum salinity. Figure 3.4-5 and 3.4-6 show the observed and expected (modeled) maximum salinity for I-75 and US 41, respectively.



3.4.3 Predicted Salinity Trends for Baseline Conditions (No FPL Withdrawals)

Predictions of the salinity values for baseline conditions (defined as the flow conditions that would be expected if no withdrawals from the river by FPL had occurred) were made by substituting the expected baseline river flow values for each day in each MLR model equation described above. Daily total withdrawals by FPL were converted to a cubic ft per second (CFS) value and added to the USGS gage recorded flow value to obtain the baseline flow. The 6-day prior moving average baseline flow was then computed in Statistica (time series module) and ln-transformed. This variate was then input to the MLR model equations to predict the mean and maximum salinities at the I-75 and US 41 stations. Figures 3.4-7 through 3.4-10 show the model predicted mean and maximum salinity values at I-75 and US 41 with and without (baseline) water withdrawals by FPL. These graphs suggest that the expected salinity increases over baseline due to FPL withdrawals are relatively small and generally of short duration. For example, at I-75 the median difference in modeled mean daily salinity for those days in which FPL withdrew water (n=239 days) was 0.80 ppt, with a maximum of 2.38 ppt. For maximum modeled salinity, the median difference was 1.03 ppt, with a maximum of 3.05 ppt.

3.4.4 Predicted 2 PPT Isohaline Based on Actual FPL Withdrawals

The locations of the 2 psu (practical salinity unit) isohaline were predicted for each day under the withdrawal and no-withdrawal scenarios. This modeling was based on isohaline MLR models (coefficients and parameters) recently developed by Watson et al., for the District.

The predictive equation for the 2 psu isohaline is given by:

Position of the 2 psu isohaline (in river km) = $25.306 - 3.187 \cdot \ln(\text{MAV3}(Q))$
where $\ln(\text{MAV3}(Q))$ is the natural logarithm of the three day prior moving average of flow(Q) reported for the USGS gage site near Wimauma, and 25.306 is the intercept.

Figure 3.4-11 shows the location of the 2 psu isohaline for the study period.

3.4.5 Predicted 2 PSU Isohaline for Baseline Conditions (No FPL Withdrawals)

The location of the 2 psu isohaline if no FPL withdrawals had occurred was predicted by using the expected baseline flow value (explained previously). The predicted values are graphed in Figure 3.4-12 along with the estimated 2 PSU isohaline locations associated with the FPL withdrawals (actual observed flows) for comparison. The difference in the isohaline location attributable to FPL withdrawals reached maximum values of about 0.8 km in 2006, 1.6 in 2007, and 1.5 in 2008 (Figure 3.4-13).



3.4.6 Scatter Plots

Scatter plots of salinity versus flow at the I-75 site are provided in Appendix E. The observed mean and maximum salinity at I-75 were plotted against the discharge at the Wimauma gage and the maximum salinity was plotted against the ln-transformed discharge at the Wimauma gage. Inspection of the data indicates that flows above 600 CFS result in fresh water conditions (<2 ppt salinity) at I-75.

Summary of stepwise regression for mean and maximum salinity at I-75 and US 41 are provided as output tables in Appendix E. The output table shows that for mean salinity at I-75 the mean stage is entered before maximum stage in the model, and that the change in explained variation is about 72.6% for the streamflow variable at Step 1, 5% with mean stage at Step 2, and just 0.2% at Step 3 for maximum stage. Redundancy analysis indicated a problem due to the association between mean and maximum stage, therefore maximum stage was not retained in the final model and there was little loss of explanatory power as a result.

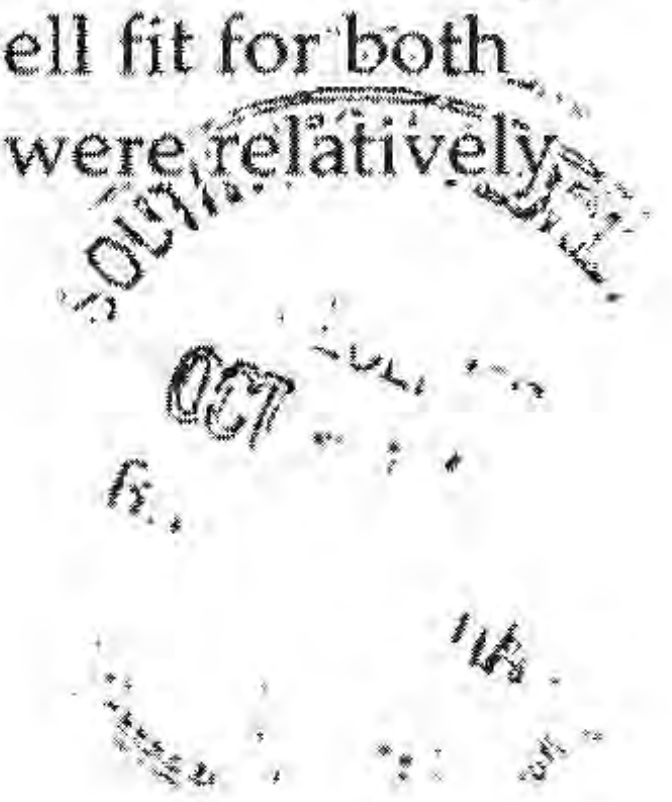
The output table shows that for maximum salinity at I-75 the maximum stage is entered before mean stage in the model, and that the change in explained variation is about 68% for the streamflow variable at Step 1, 9.9% with max. stage at Step 2, and just 0.8% at Step 3 for addition of mean stage. Again, redundancy analysis indicated a problem due to the association between mean and maximum stage, therefore mean stage was not retained in the final model and there was little loss of explanatory power as a result.

The output table for mean and maximum salinity at the US 41 station were not as clear. For mean salinity, the maximum stage is entered before mean stage in the model, and that the change in explained variation is about 81% for the streamflow variable at Step 1, 1.6% with max. stage at Step 2, and just 0.4% at Step 3 for addition of mean stage. For maximum salinity at US 41, the maximum stage and mean stage were essentially the same, with the change in explained variation is about 55% for the streamflow variable at Step 1, 5.0% with max. stage at Step 2, and just 5.3% at Step 3 for addition of mean stage.

Partial regression residual scatter plots are designed to show the relationship between two parameters, after the variable effects of all other predictors have been removed (i.e. are held constant). Included in Appendix E are scatter plots with fitted regression lines and 95% confidence intervals for the predicted and observed mean and maximum salinity at I-74 and US 41. Partial residual plots in which the effects of mean stage on salinity are removed, showing the relationship between transformed streamflow and the model residuals is provided for both sites in Appendix E. Also provided in Appendix E are partial residual plots in which the effects of streamflow are removed, showing the relationship between mean stage and the model residuals. The same partial residual plots were prepared for maximum stage.

3.4.7 Salinity Trend Analysis Discussion

Mean and maximum salinity recorded at the fixed location stations at I-75 and US 41 were successfully modeled as a function of river flow and stage, with flow being primary factor governing salinity. Mean salinity was relatively well fit for both stations by the MLR predictive equations, with multiple R values were relatively



high (.89 and .91 for the I-75 and US 41 sites), and explained 78% and 82% percent of the total variation in salinity. Maximum salinity was also modeled yielding multiple R values of .91 and .78 for the I-75 and US 41 sites, and explained 78% and 60% percent of the total variation in maximum salinity.

Graphical comparison of the model predicted salinities with and without the FPL withdrawals suggests that the change in salinities associated with the reduced flows are relatively minor and short-lived, reflecting the permit withdrawal conditions and the tendency to make larger withdrawals when river flow is at relatively high values and salinities are lower.

At I-75 the median difference in modeled mean daily salinity for those days in which FPL withdrew water (n=239 days) was 0.80 ppt, with a maximum of 2.38 ppt. For maximum modeled salinity, the median difference was 1.03 ppt, with a maximum of 3.05 ppt.

The difference in the modeled 2 psu isohaline location attributable to FPL withdrawals reached maximum values of about 0.8 km in 2006, 1.6 in 2007, and 1.5 in 2008. However the median differences were 0.38, 0.52, and 0.27 km for these years. Inspection of the predicted locations of the isohalines over time suggests the impacts would be relatively minor and short-lived. The 2 psu isohaline locations were predicted for the antecedent 32-year period from October 1973 - September 2005 for which USGS flow data are available for the Little Manatee River, using the equation given in Section 3.4.4. The 2 psu isohaline locations observed during the study withdrawal periods are well within the natural range of this isohaline during the prior 32 years.

3.5 Ecological Evaluation of Lower River Relative to FPL Withdrawals

The Little Manatee River is a tributary to the Tampa Bay estuary. An estuary is an area where fresh water mix and are characterized by salinity gradients. The lower portion of the Little Manatee River is also estuarine in nature and has pronounced salinity gradients from the mouth up to approximately river mile 11. The flora and fauna present within this portion of the river tend to become established at various locations based upon their preferred salinity or salinity range tolerance. The volume of fresh water is a primary factor affecting water quality and salinity in a tidal river (Clewett et al., 2002). Significant changes in the salinity of the river can result in a shift of the flora and fauna in response to the change in the salinity gradient.

The District requires FPL to conduct the HBMP to assess the effect, if any, of their river withdrawals. Should FPL's withdrawals be ecologically significant, then a dramatic and/or persistent shift in the salinity regime would be observed. This would be reflected by the abundance and distribution of plant communities, with species preferring fresh water or low salinity conditions being displaced with species more tolerable of higher salinity levels.

The mean daily withdrawals over the past four waters years (4.7 mgd) under the HBMP is approximately 75% of that observed prior to the HBMP (6.3 mgd). The implementation of the regular diversion schedule is at least partly responsible for this difference. The observed maximum mean daily withdrawal for a month under the HBMP time period (33.8 mgd) is also less than the pre-HBMP period (55.0 mgd).

This reduction in withdrawal was anticipated with the change from the initial diversion schedule to the RDS.

The results of the vegetation mapping indicate no change. The vegetation community size and location and the species composition of those communities did not change between the two analysis periods. Some new areas of cattail appeared between river miles 8 and 10 within previously unvegetated areas. The District's Technical Report titled *An Analysis of Vegetation-Salinity Relationships in Seven Tidal Rivers on the Coast of West-Central Florida* indicates that southern cattail (*Typha domingensis*) is common "along riverbanks in freshwater and oligohaline zones". This species is also known to colonize disturbed sites and was theorized to reflect current salinity conditions rather than long-term salinity regimes. The presence of cattail in the upper portion of the Little Manatee River estuary is appropriate since low salinities should occur here and this species is characteristic of freshwater to low salinity conditions. As stated earlier, this new fringe of cattail may reflect its colonization of newly suitable bottom areas from the lower water levels associated with reduced rainfall.

The salinity trend analyses and comparison of the predicted 2 ppt isohaline location under withdrawal and no withdrawal scenarios show that FPLs withdrawals are likely resulting in changes to the salinity in the river. Importantly, however, is that these changes in salinity are relatively minor and are short-lived. The largest predicted changes are associated with the larger withdrawals which are also associated with higher river discharges. When viewed on a wider scale the predicted changes in the 2 ppt isohaline are well within the typical salinity fluctuation in the river in about the middle of the typical range. It also is pertinent that the salinity level ranges widely on a daily basis. Since the predicted changes are small, short in duration, occur duration about the mid salinity range, and are within a typical daily fluctuation range, they do not appear to be significant. It should also be noted that historic Little Manatee River stream flow has been supplemented (particularly during April and May) from agricultural irrigation runoff (Flannery et al., 1991).

The flora and fauna within the estuary are usually tolerant of fairly wide and rapid changes in salinity from tides and large storm flow events. As such, changes in salinity would need to be persistent and/or large to displace the established communities. As documented herein, the predicted changes have not been persistent or intense and the vegetative communities show no change since the start of the HBMP. Under the HBMP the RDS also allows less water to be withdrawn than under the pre-HBMP diversion schedule. The RDS would be expected to result in smaller magnitude changes in the predicted 2 ppt isohaline and a more natural fluctuation of the salinity gradient.

In summary, the predicted changes in salinity associated with FPL withdrawals have been small and occur over a short time period. The predicted changes are also well within the normal salinity fluctuation in the river and are not expected to adversely impact the flora or fauna. The lack of change to the vegetation communities supports the conclusion of no adverse impact to the Little Manatee River estuary.

Table 3.2-1. Dates of Field Calibration, Maintenance and Data Download

| <u>Date</u> | <u>Comments</u> |
|-------------------|-------------------------------------------------------------------------|
| January 10, 2007 | No problems |
| February 5, 2007 | No problems |
| March 2, 2007 | Depth would not recalibrate. |
| March 6, 2007 | Depth properly recalibrated. |
| April 2, 2007 | No problems |
| May 3, 2007 | No problems |
| June 8, 2007 | No problems |
| June 28, 2007 | No problems |
| July 25, 2007 | Dock temporarily removed, oysters cleaned from inside stilling well. |
| September 4, 2007 | No problems |
| October 1, 2007 | I-75: access box damaged, lock removed, no noticeable damage to device. |
| October 2, 2007 | I-75: new lock installed. |
| October 29, 2007 | No problems |
| December 3, 2007 | No problems |
| January 17, 2008 | No problems |
| February 1, 2008 | No problems |
| March 7, 2008 | No problems |
| April 4, 2008 | No problems |
| May 8, 2008 | No problems |
| June 11, 2008 | Seal on back cap of US-41 sonde broke during cleaning. Replaced. |
| July 23, 2008 | No problems |
| July 30, 2008 | No problems |
| September 4, 2008 | No problems |

Table 3.2-2. Average Daily Mean Salinity and Average Daily Salinity Range by Water Year at I-75 and US 41 Sites

| <u>Water Year</u> | <u>Average Daily Mean Salinity</u> | | <u>Average Daily Salinity Range</u> | |
|-------------------|------------------------------------|-------------|-------------------------------------|-------------|
| | <u>US 41</u> | <u>I-75</u> | <u>US 41</u> | <u>I-75</u> |
| 2005* | 13.67 | 2.19 | 8.49 | 4.28 |
| 2006* | 16.64 | 3.43 | 11.50 | 6.44 |
| 2007 | 18.06 | 7.40 | 12.32 | 8.93 |
| 2008 | 15.86 | 6.24 | 16.61 | 7.40 |

* Water Years 2005 and 2006 are missing data for at least part of the year.

Table 3.3-1. Habitat Acreages Documented during the March 2005 and December 2007 Mapping Events

| Habitat Type | Habitat Code | Dominant Species | 2004 | 2007 | Differences |
|----------------------|--------------|-------------------------------------|-------|-------|-------------|
| Mangrove | 612 | | 16.5 | 16.5 | 0.0 |
| Saltmarsh | 642 | Leather fern (<i>Arcostichum</i>) | 267.8 | 267.8 | 0.0 |
| Saltmarsh | 642 | Black needlerush (<i>Juncus</i>) | 263.8 | 263.8 | 0.0 |
| Freshwater marsh | 641 | Cattail (<i>Typha</i>) | 1.5 | 3.6 | 2.1 |
| Freshwater marsh | 641 | Pennywort (<i>Hydrocotyle</i>) | 0.3 | 0.3 | 0.0 |
| Freshwater marsh | 641 | Sawgrass (<i>Cladium</i>) | 0.2 | 0.2 | 0.0 |
| Bottomland Hardwoods | 615 | | 254.0 | 254.0 | 0.0 |

Table 3.4-1. Basic Statistics for key variables recorded in the WY 2006 - WY 2008 period.

| Variable | Valid N | Mean | Median | Mode | Minimum | Maximum | Percentile 10 | Percentile 90 | Range | Std.Dev. |
|-------------------|---------|---------|--------|----------|---------|----------|---------------|---------------|----------|----------|
| MeanSalinity_I75 | 1096 | 7.003 | 6.420 | .1800000 | 0.100 | 22.325 | 0.280 | 14.900 | 22.225 | 5.484 |
| MaxSalinity_I75 | 1096 | 11.459 | 11.455 | .2100000 | 0.000 | 29.800 | 0.480 | 21.020 | 29.800 | 6.992 |
| MeanSalinity_US41 | 1044 | 16.867 | 17.691 | 19.11000 | 1.100 | 29.307 | 7.420 | 24.520 | 28.207 | 6.247 |
| MaxSalinity_US41 | 1044 | 23.570 | 24.630 | 21.80000 | 4.470 | 32.240 | 16.970 | 28.750 | 27.770 | 4.748 |
| Q Wimauma | 1092 | 105.358 | 60.000 | 35.00000 | 6.400 | 1470.000 | 17.000 | 242.000 | 1463.600 | 146.515 |
| Ln(Q) | 1092 | 4.133 | 4.094 | 3.555348 | 1.856 | 7.293 | 2.833 | 5.489 | 5.437 | 0.972 |
| LN(Q) MAV3 | 1094 | 4.155 | 4.116 | 2.639057 | 1.877 | 7.180 | 2.890 | 5.557 | 5.303 | 0.958 |
| LN(Q) MAV6 | 1091 | 4.186 | 4.154 | 2.650892 | 1.951 | 7.024 | 2.953 | 5.575 | 5.073 | 0.938 |
| ISO 2 RKM | 1094 | 12.064 | 12.187 | 16.89532 | 2.422 | 19.324 | 7.596 | 16.094 | 16.902 | 3.054 |
| MeanStage FT_I75 | 1021 | -0.150 | -0.120 | .0100000 | -1.780 | 1.480 | -0.660 | 0.320 | 3.260 | 0.394 |
| MeanStage FT_US41 | 1031 | -0.221 | -0.230 | -.060000 | -1.640 | 3.700 | -0.810 | 0.310 | 5.340 | 0.527 |
| MaxStage FT_I75 | 1021 | 0.873 | 0.890 | .8900000 | -0.750 | 2.470 | 0.330 | 1.420 | 3.220 | 0.444 |
| MaxStage FT_US41 | 1031 | 0.770 | 0.780 | .9800000 | -1.040 | 5.670 | 0.120 | 1.390 | 6.710 | 0.575 |

Table 3.4-2. Multiple Linear Regression Summary for Mean Salinity I-75.

| | | | | | | | |
|--------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|-------------------|----------|---------|
| | | Dependent Variable: MeanSalinity_I75 R= .88311672 R²= .77989515 Adjusted R²= .77946059 F(2,1013)=1794.7 p<0.0000 Std.Error of estimate: 2.3827 | | | | | |
| N=1016 | | Beta | Std. Err. of Beta | B | Std. Err. of B | t(1013) | p-level |
| | Intercept | | | 29.36688 | 0.387459 | 75.7935 | 0.00 |
| | LN(Q) MAV6 | -0.924593 | 0.015443 | -5.26977 | 0.088021 | -59.8698 | 0.00 |
| | MeanStage FT_I75 | 0.242948 | 0.015443 | 3.12799 | 0.198836 | 15.7315 | 0.00 |



Table 3.4-3. Multiple Linear Regression Summary for Mean Salinity US 41.

| N=974 | Dependent Variable: MeanSalinity_US41 R= .90561755 R ² = .82014314 Adjusted R ² = .81977269 F(2,971)=2213.9 p<0.0000 Std.Error of estimate: 2.6602 | | | | | |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|------------------|----------|----------|
| | Beta | Std.Err. of Beta | B | Std.Err. of B | t(971) | p-level |
| | Intercept | | 41.76591 | 0.385111 | 108.4516 | 0.000000 |
| | LN(Q) MAV6 | -0.912463 | 0.013733 | -5.89448 | -66.4413 | 0.000000 |
| | MeanStage FT_US41 | 0.072480 | 0.013733 | 0.85752 | 5.2776 | 0.000000 |

Table 3.4-4. Multiple Linear Regression Summary for Maximum Salinity I-75.

| N=1016 | Dependent Variable: MaxSalinity_I75 R= .88432798 R ² = .78203597 Adjusted R ² = .78160564 F(2,1013)=1817.3 p<0.0000 Std.Error of estimate: 3.1601 | | | | | |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|------------------|----------|---------|
| | Beta | Std.Err. of Beta | B | Std.Err. of B | t(1013) | p-level |
| | Intercept | | 35.33253 | 0.489896 | 72.1225 | 0.00 |
| | LN(Q) MAV6 | -0.890694 | 0.014972 | -6.76578 | -59.4887 | 0.00 |
| | MaxStage FT_I75 | 0.322011 | 0.014972 | 4.90012 | 21.5068 | 0.00 |

Table 3.4-5. Multiple Linear Regression Summary for Maximum Salinity US 41.

| N=974 | Dependent Variable: MaxSalinity_US41 R= .77757325 R ² = .60462015 Adjusted R ² = .60380578 F(2,971)=742.43 p<0.0000 Std.Error of estimate: 3.0447 | | | | | |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|------------------|----------|----------|
| | Beta | Std.Err. of Beta | B | Std.Err. of B | t(971) | p-level |
| | Intercept | | 37.71342 | 0.447826 | 84.2144 | 0.000000 |
| | LN(Q) MAV6 | -0.748828 | 0.020182 | -3.73426 | -37.1038 | 0.000000 |
| | MaxStage FT_US41 | 0.222896 | 0.020182 | 1.87379 | 11.0443 | 0.000000 |

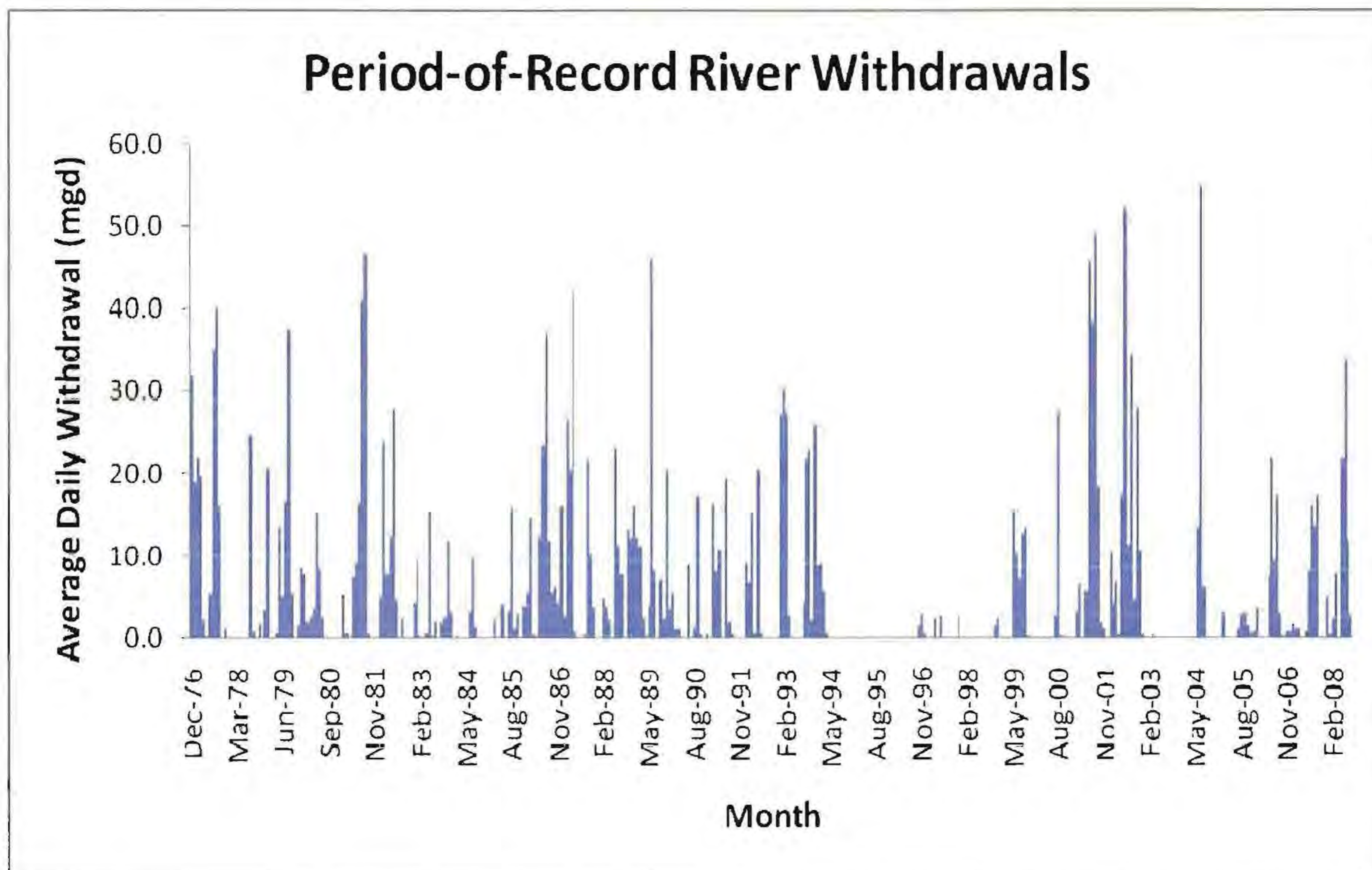


Figure 3.1-1 Average Daily Withdrawals (mgd) from the Little Manatee River for the Period-of-Record (December 1976 – October 2008)

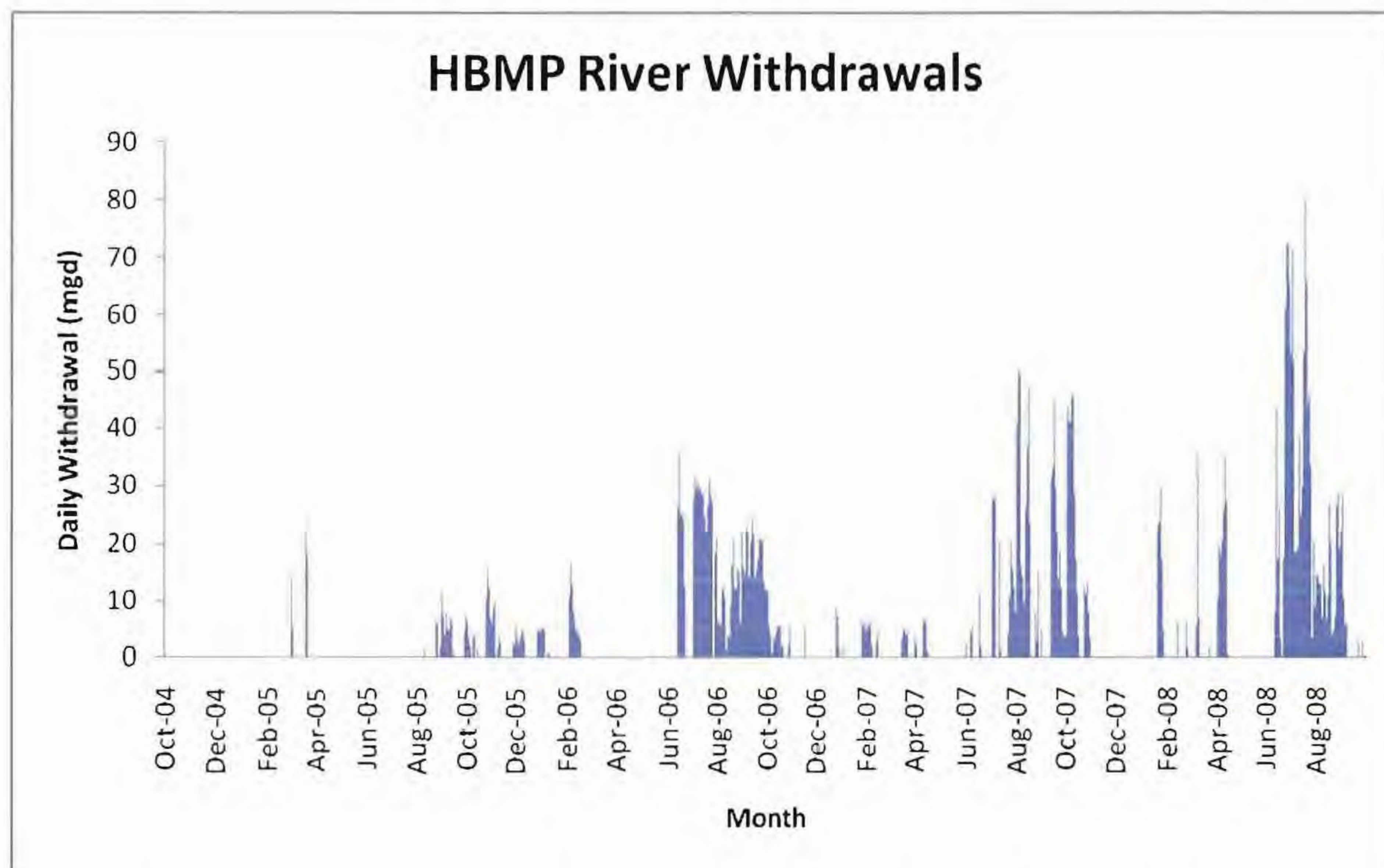


Figure 3.1-3 Daily Withdrawals (mgd) from the Little Manatee River during the Hydrobiological Monitoring Program (WY 2005 to WY 2008)

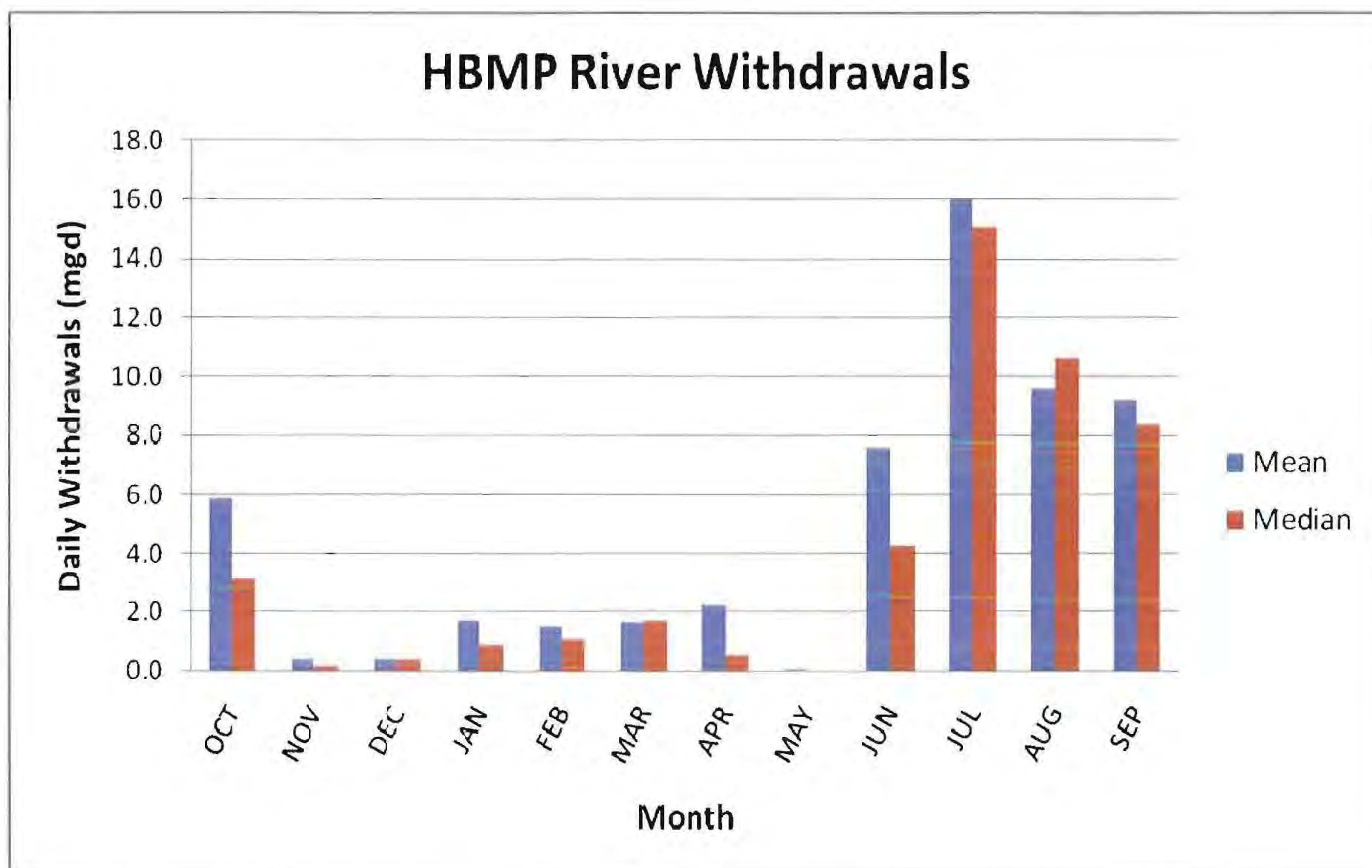


Figure 3.1-4 Mean and Median Average Daily Withdrawals from the Little Manatee River by Month during the Hydrobiological Monitoring Program

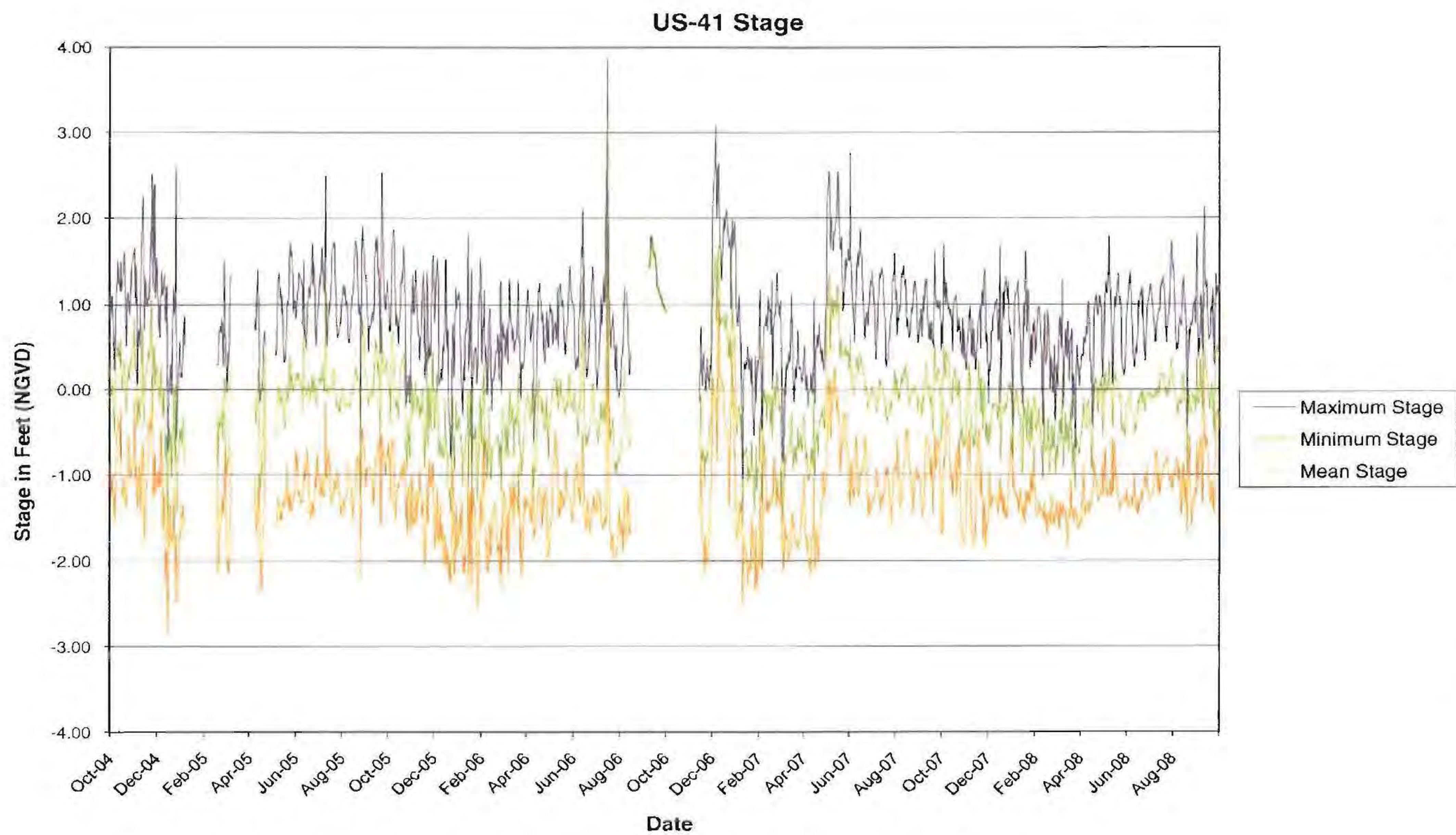


Figure 3.2-1 Maximum, Minimum and Mean Stage for the Period-of-Record for the US 41 Gage

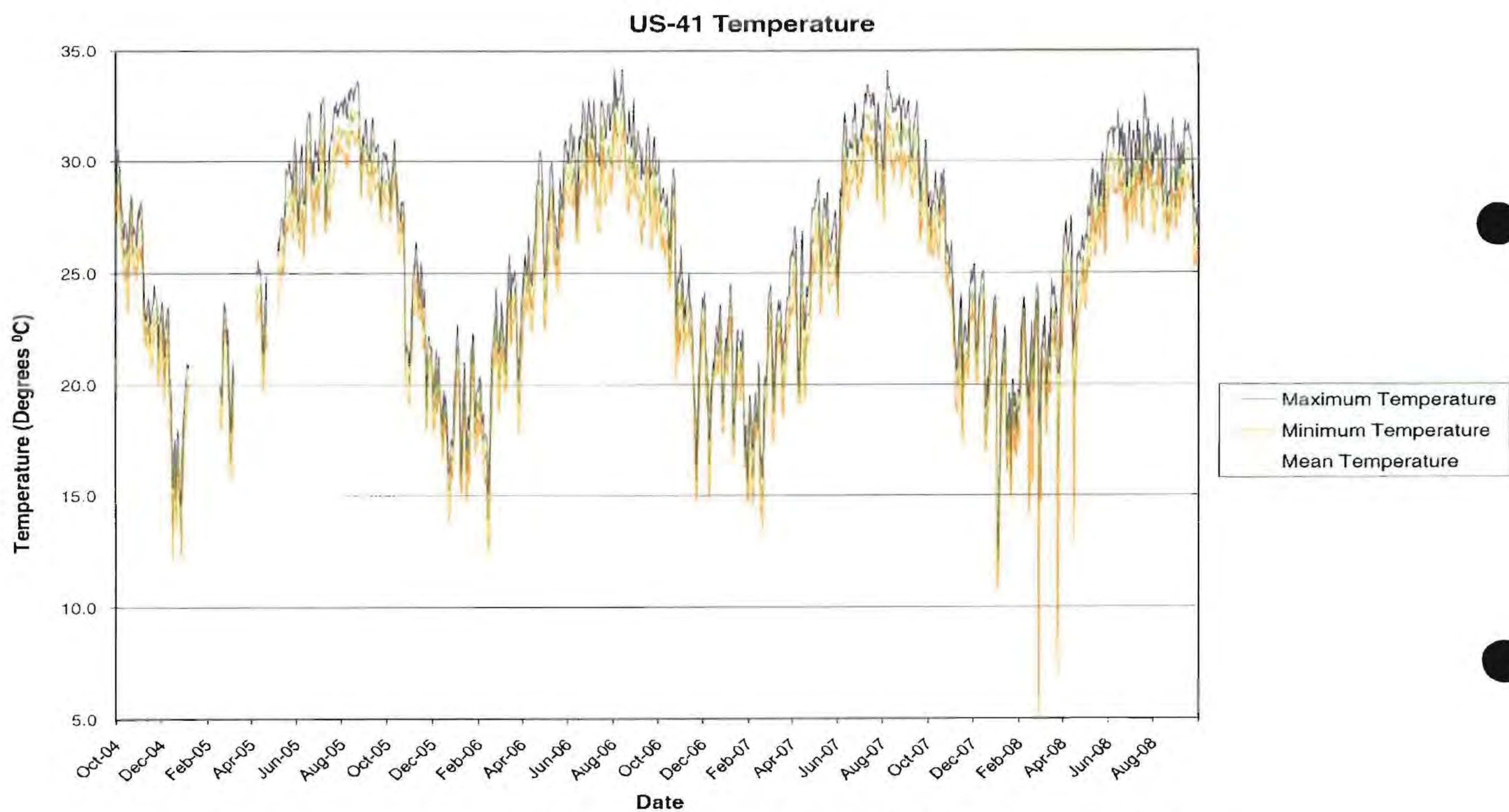


Figure 3.2-2 Maximum, Minimum and Mean Temperature for the Period-of-Record for the US 41 Gage

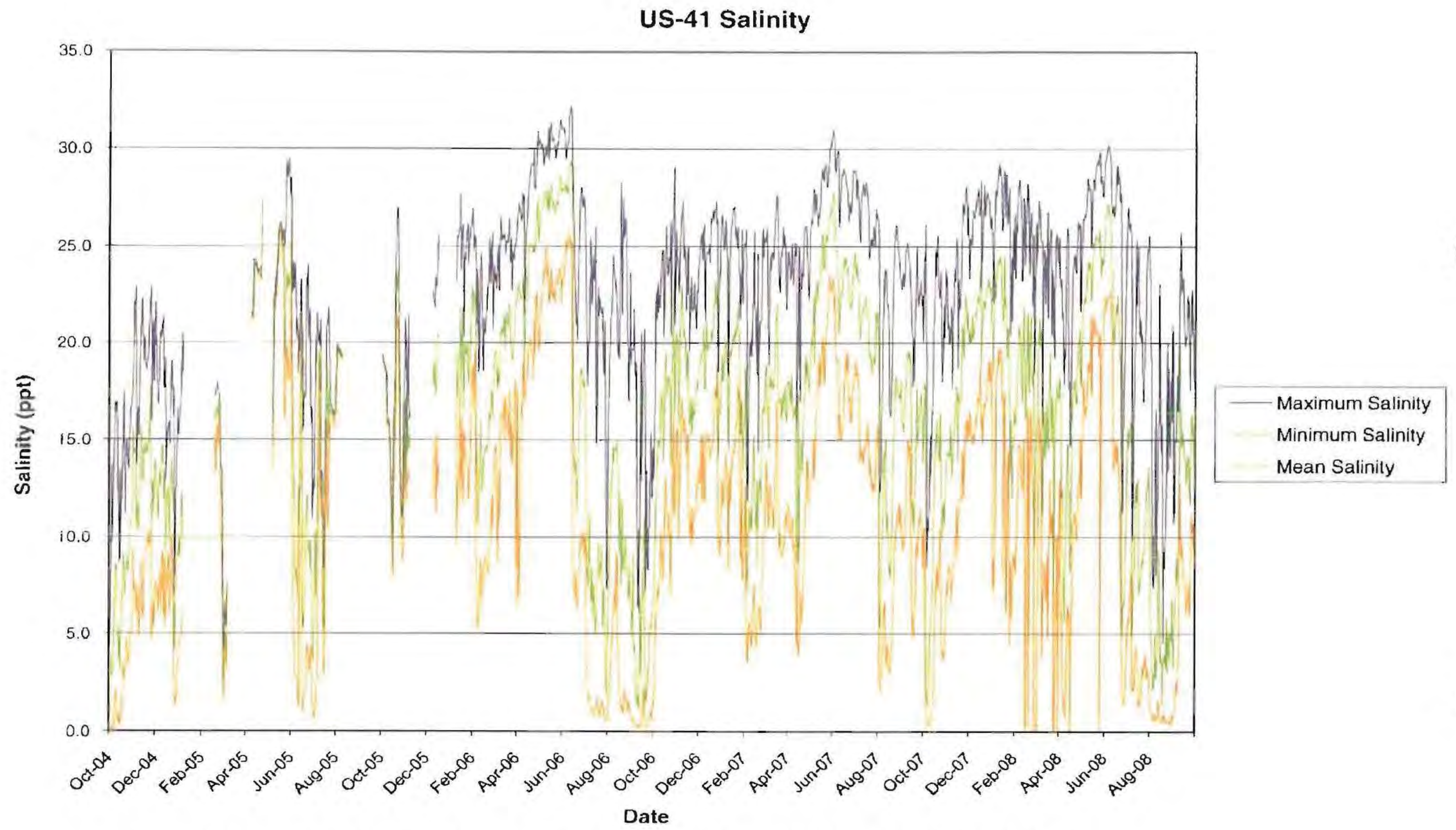


Figure 3.2-3 Maximum, Minimum and Mean Salinity for the Period-of-Record for the US 41 Gage

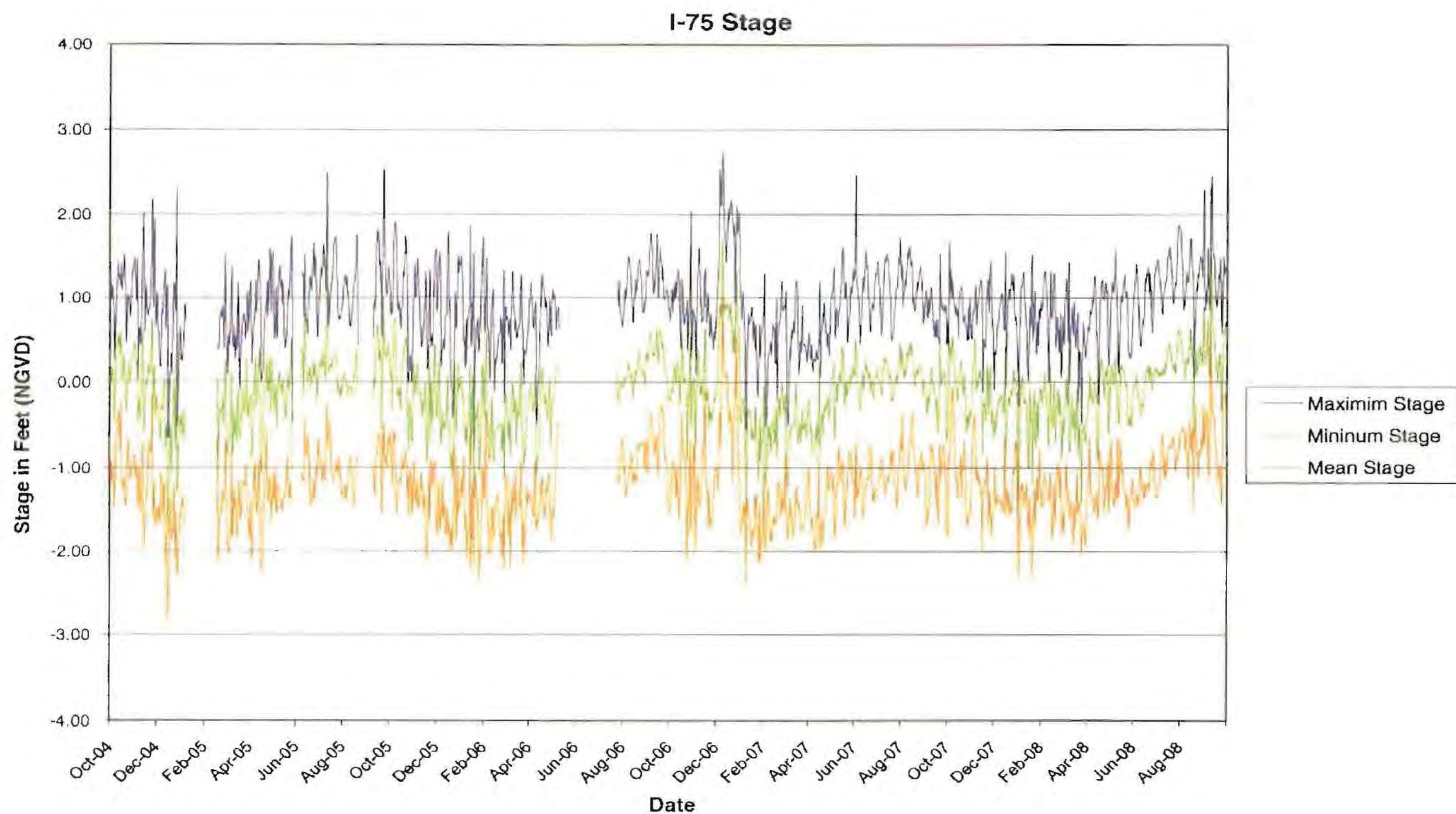


Figure 3.2-4 Maximum, Minimum and Mean Stage for the Period-of-Record for the I-75 Gage

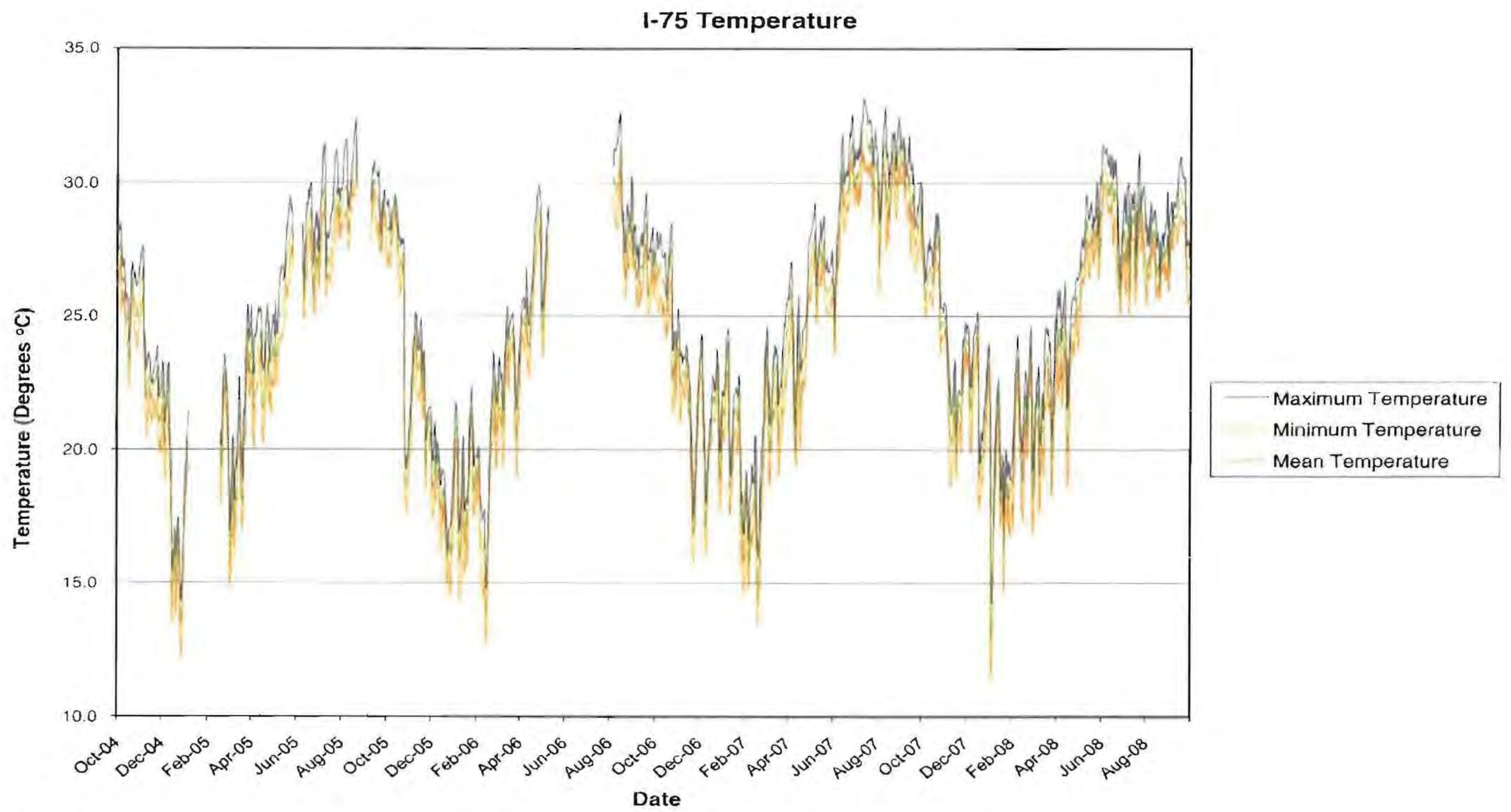


Figure 3.2-5 Maximum, Minimum and Mean Temperature for the Period-of-Record for the I-75 Gage

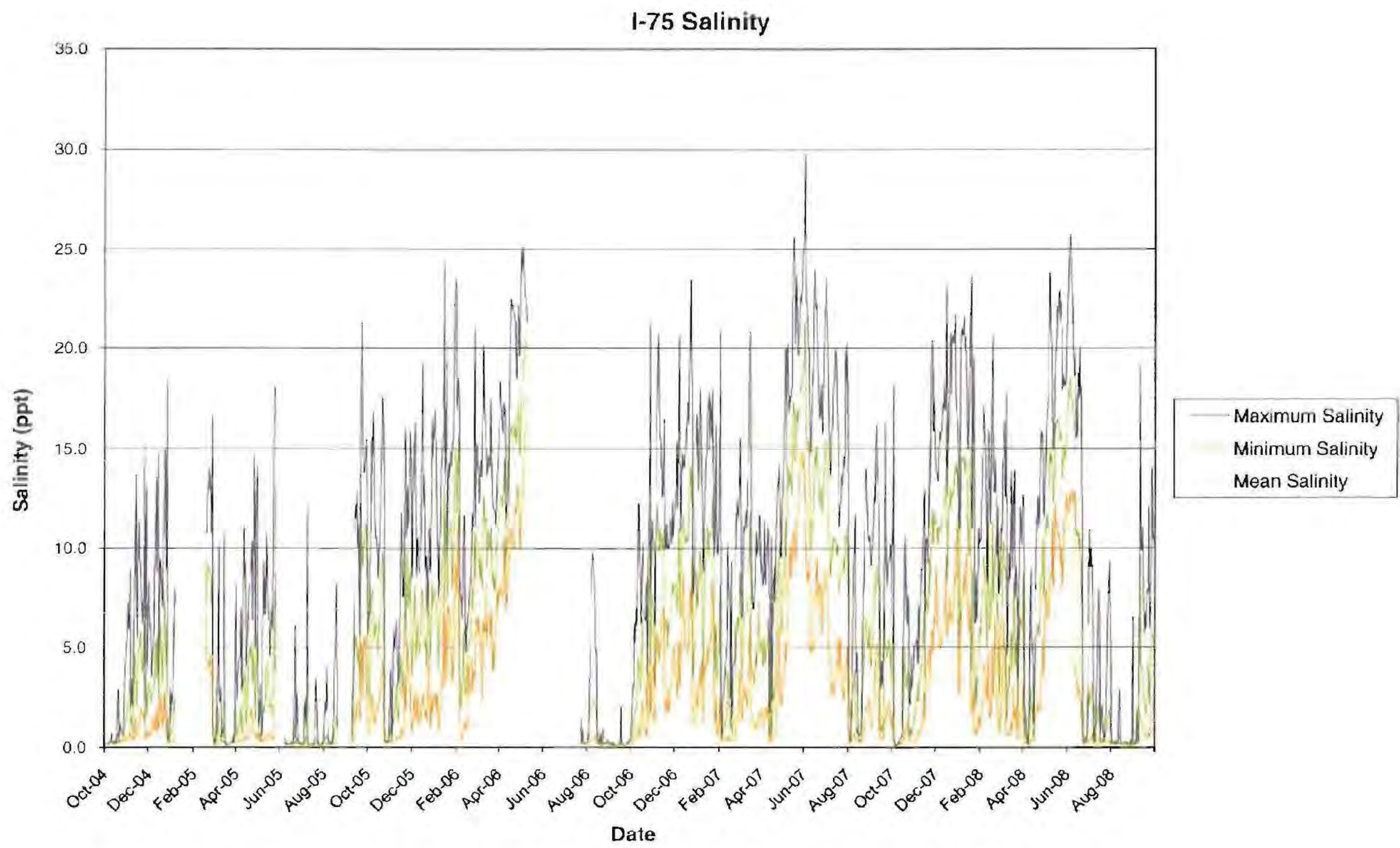
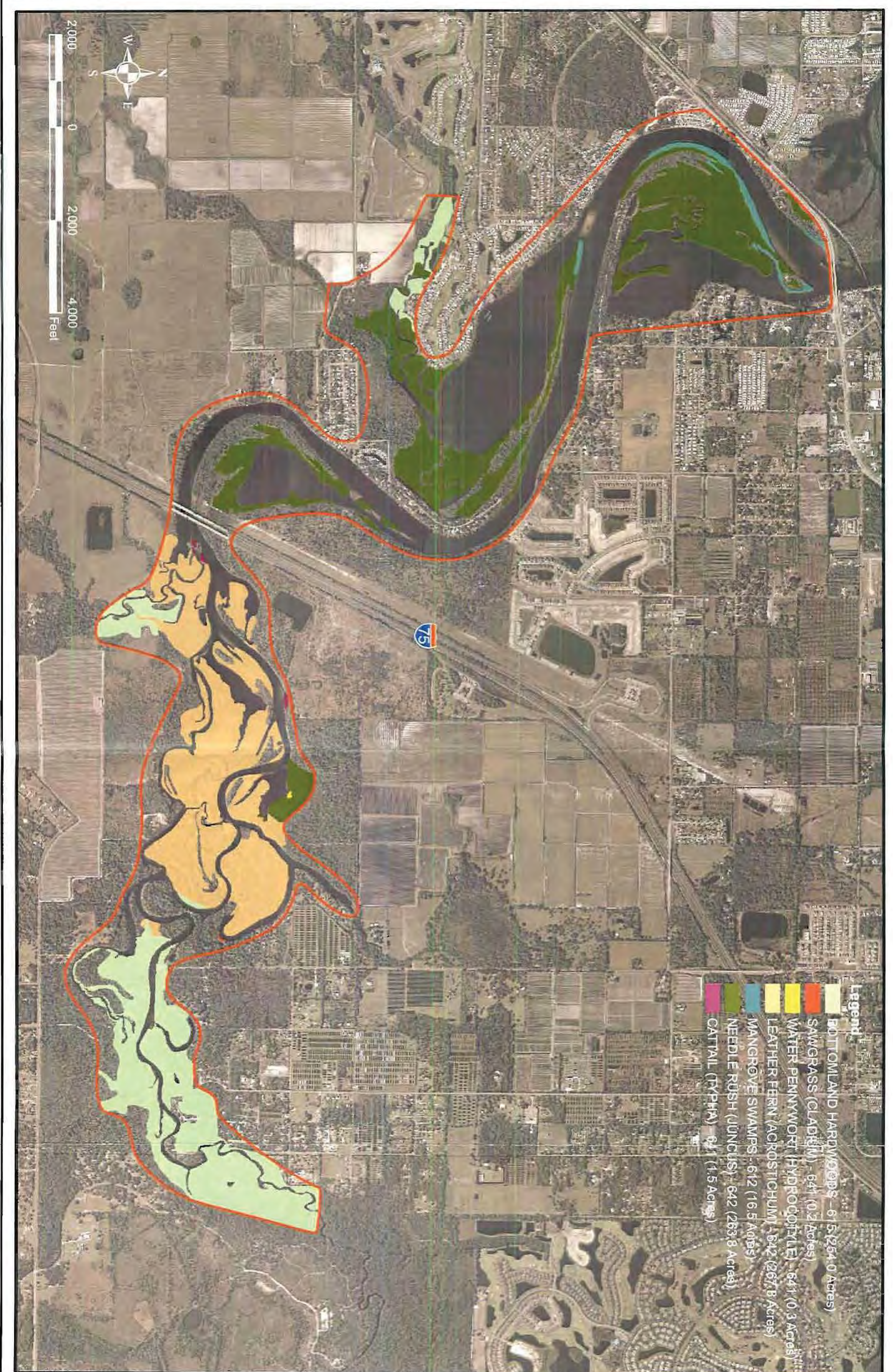


Figure 3.2-6 Maximum, Minimum and Mean Salinity for the Period-of-Record for the I-75 Gage



Date: 06/09

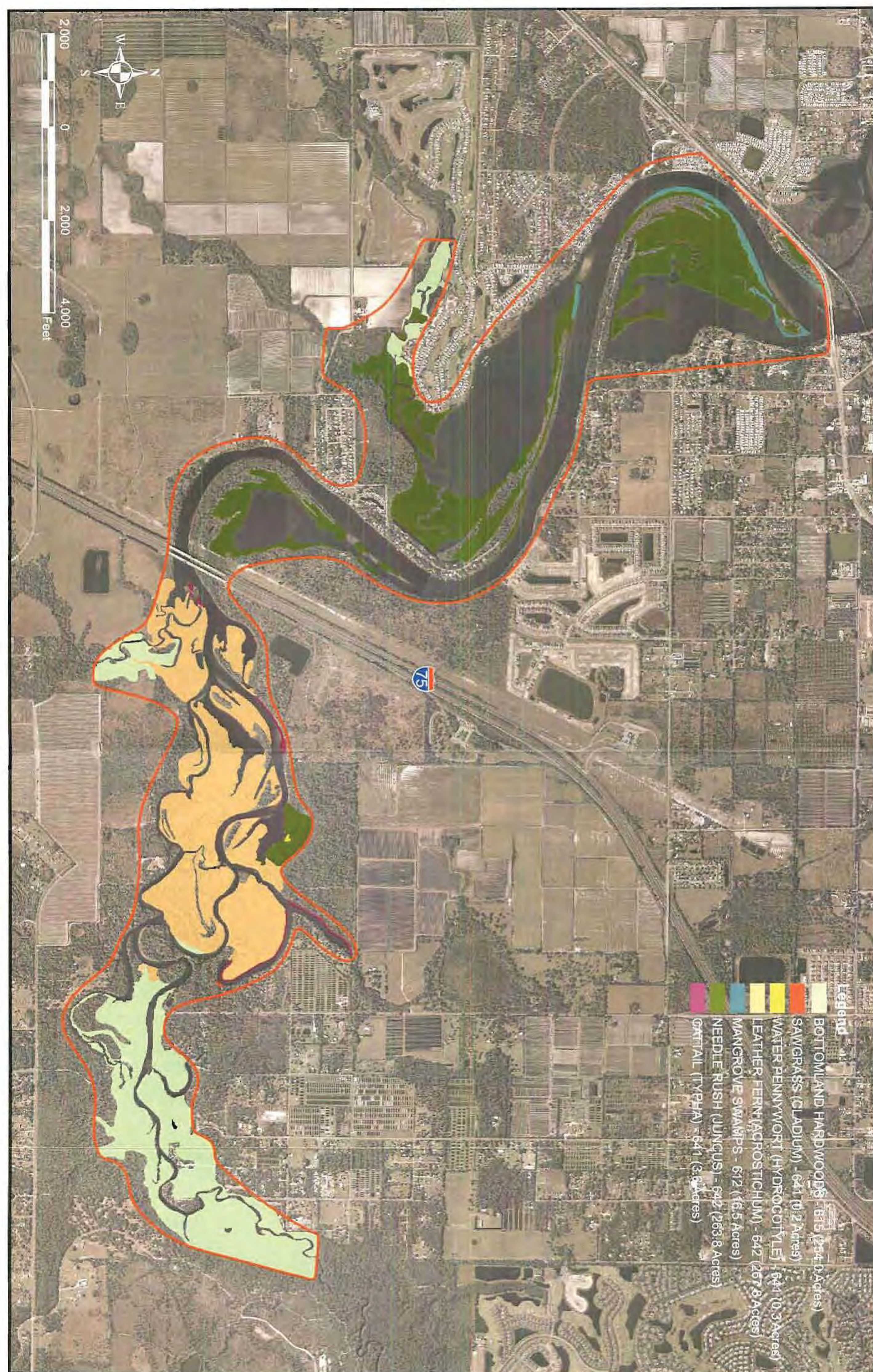
Revision:

Figure 3.3-1
Habitat Map of the
Little Manatee River, 2004
Hillsborough County, Florida

Vanasse Hangen Brustlin, Inc.

8043 Cooper Creek Blvd.
Suite 201
University Park, FL 34201





Date: 06/09

Revision:

Figure 3.3-2
Habitat Map of the
Little Manatee River, 2007
Hillsborough County, Florida

Vanasse Hangen Brustlin, Inc.

8043 Cooper Creek Blvd.
Suite 201
University Park, FL 34201



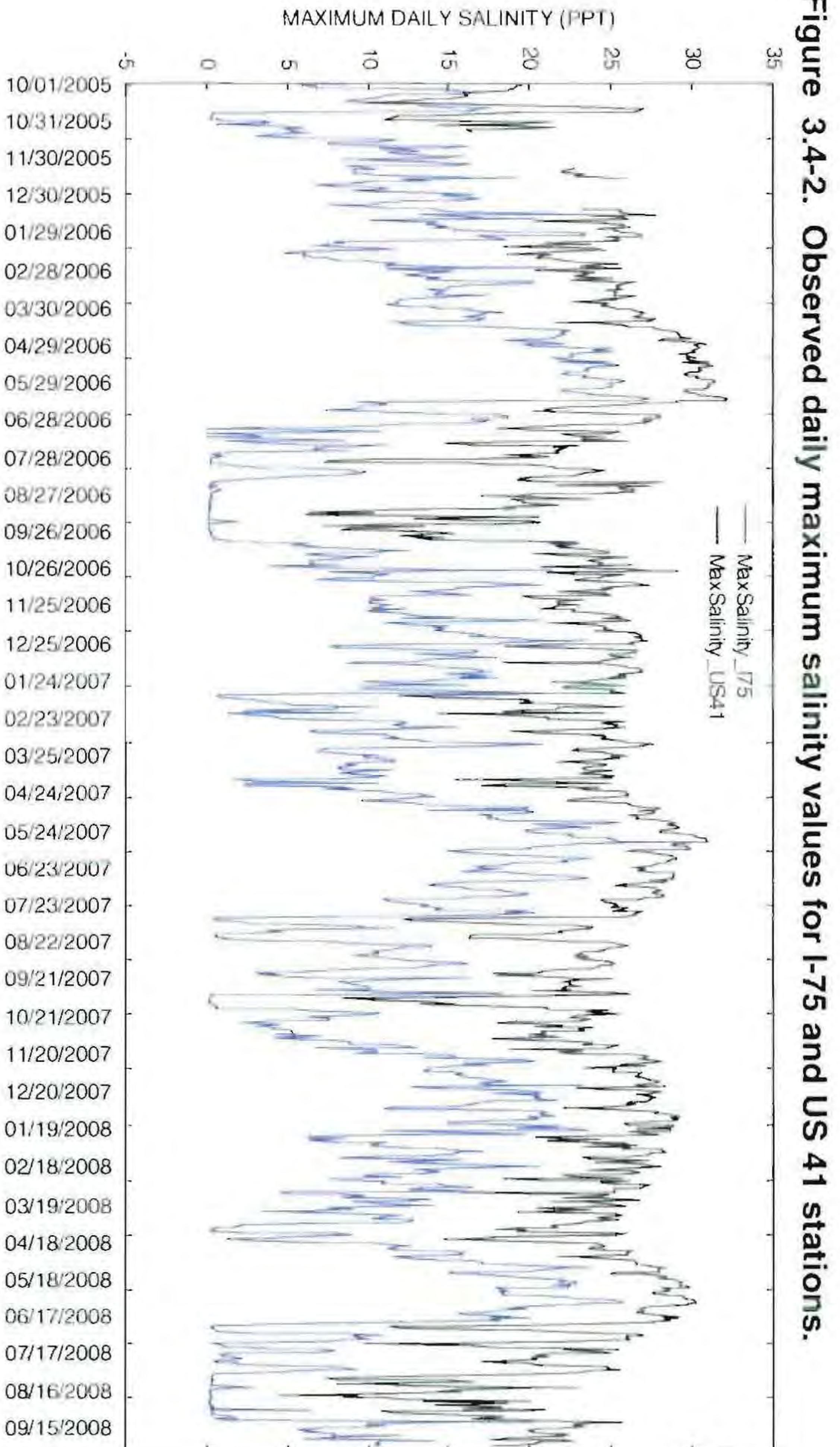
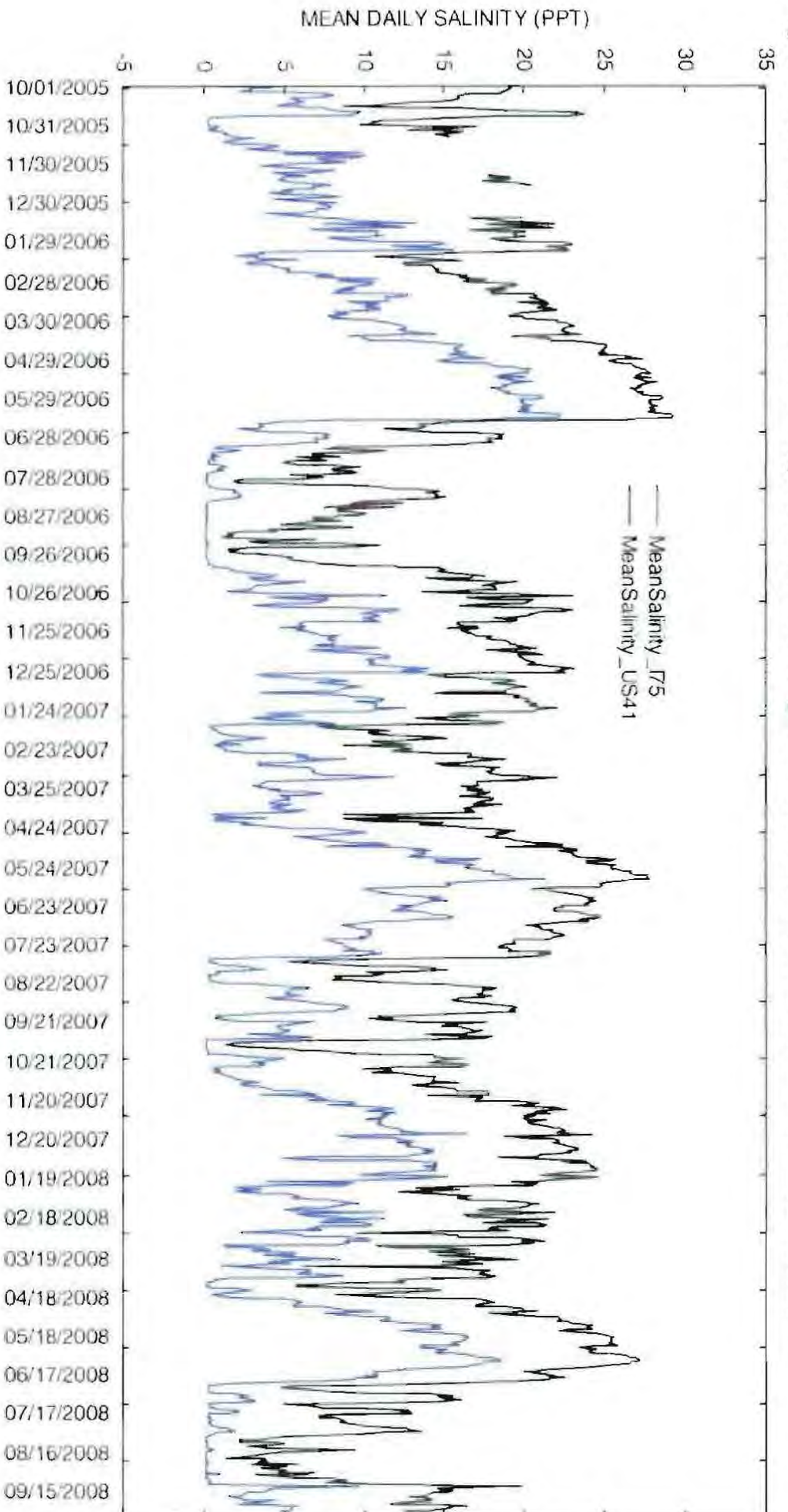


Figure 3.4-5. Observed and expected (modeled) maximum salinity for I-75.

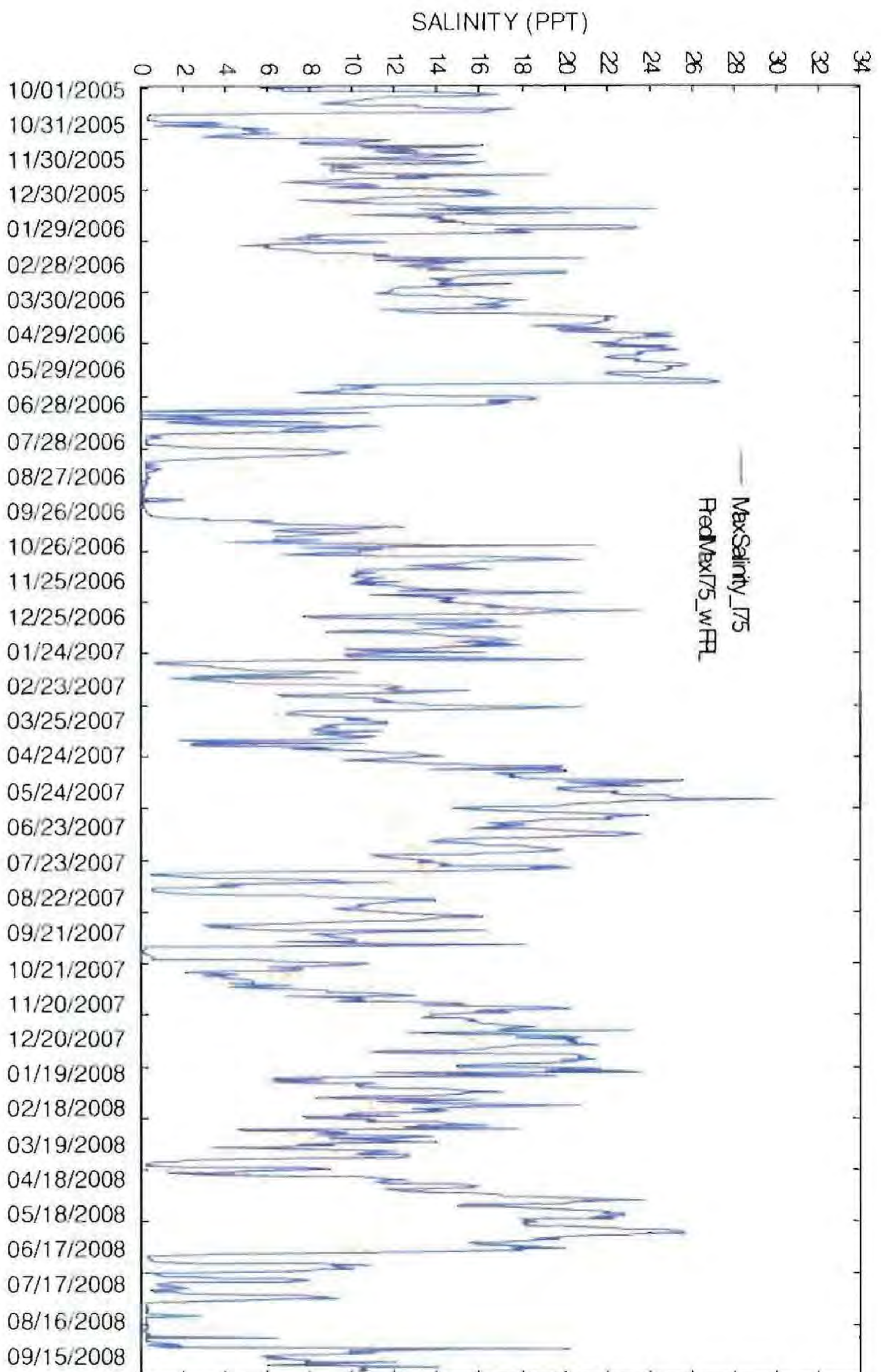
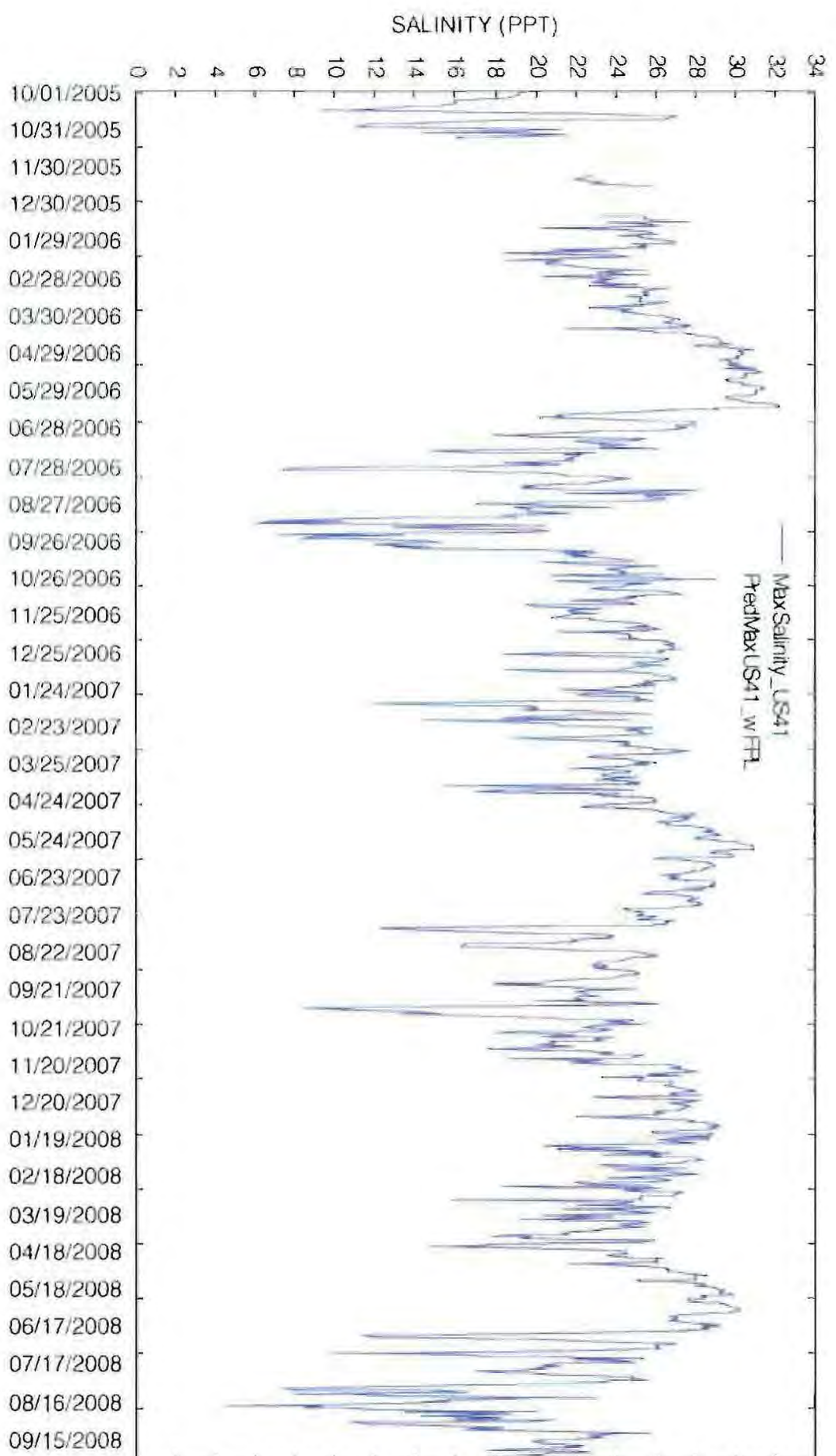


Figure 3.4-6. Observed and expected (modeled) maximum salinity for US 41.





Line Plot (LMarston_MLR_Dataset_WV2009D.sta 57v*1372c)

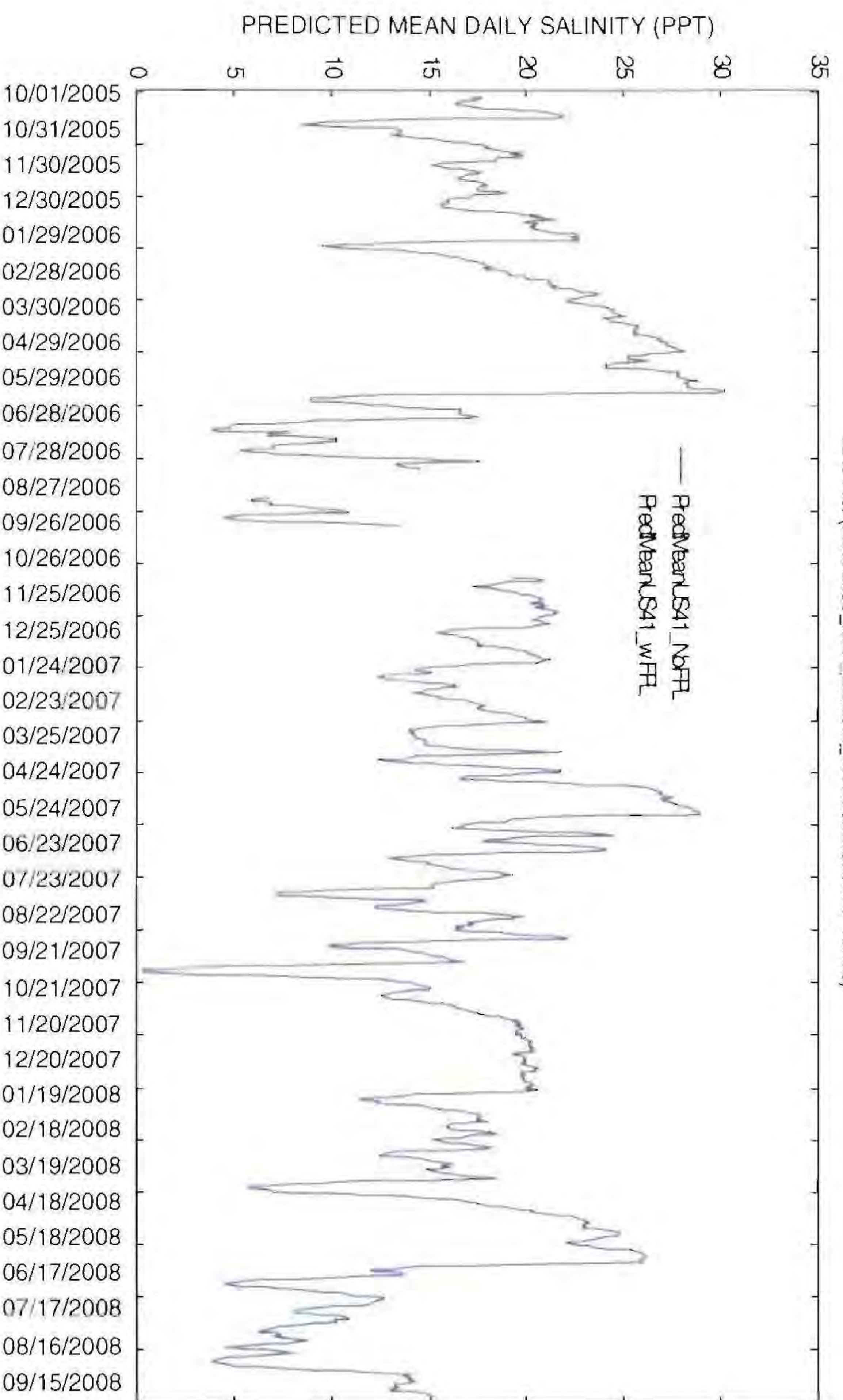


Figure 3.4-9. Model predicted maximum daily salinity at I-75 with and without FPL withdrawals.

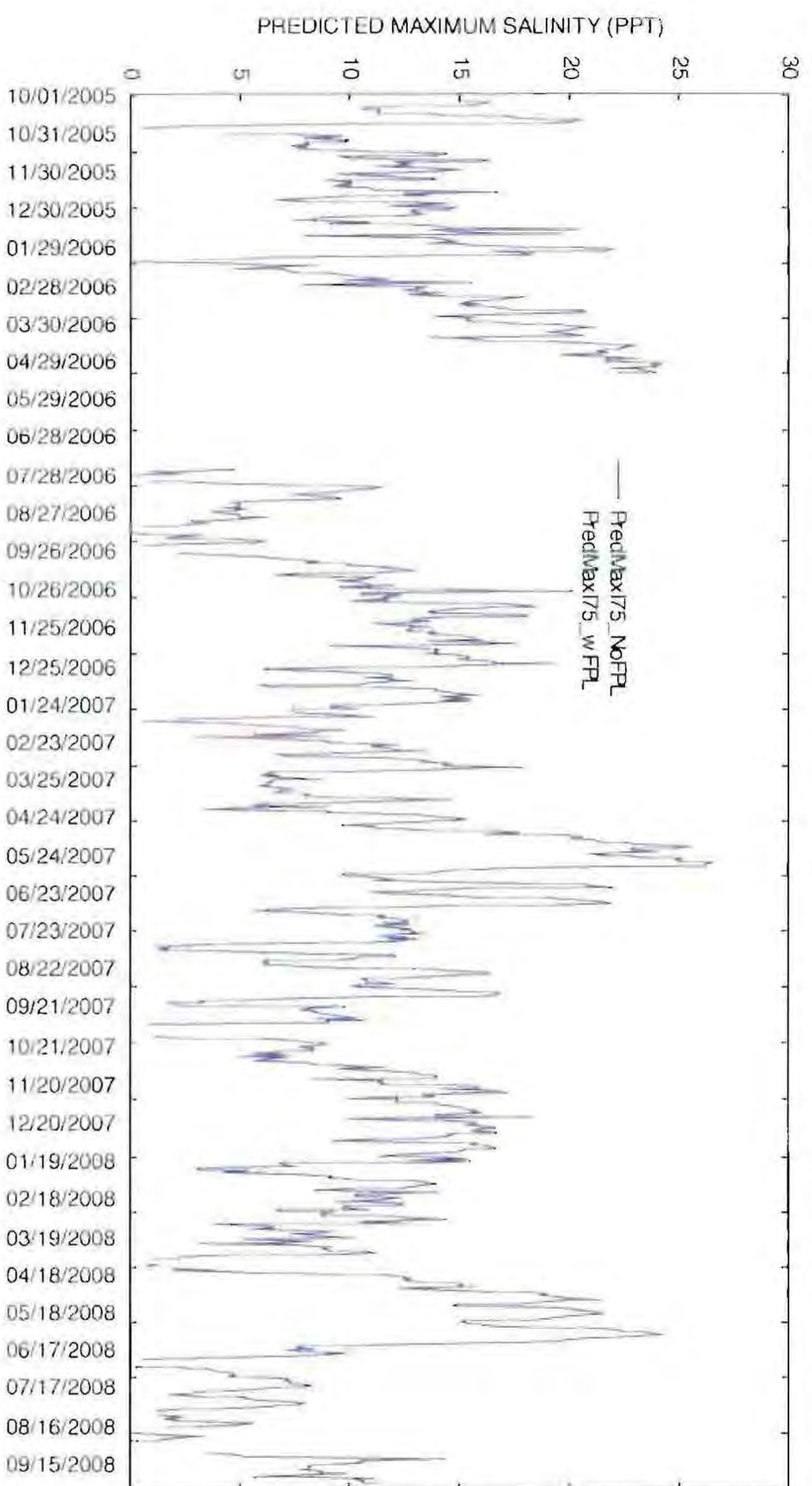


Figure 3.4-10. Model predicted maximum daily salinity at US 41 with and without FPL withdrawals.

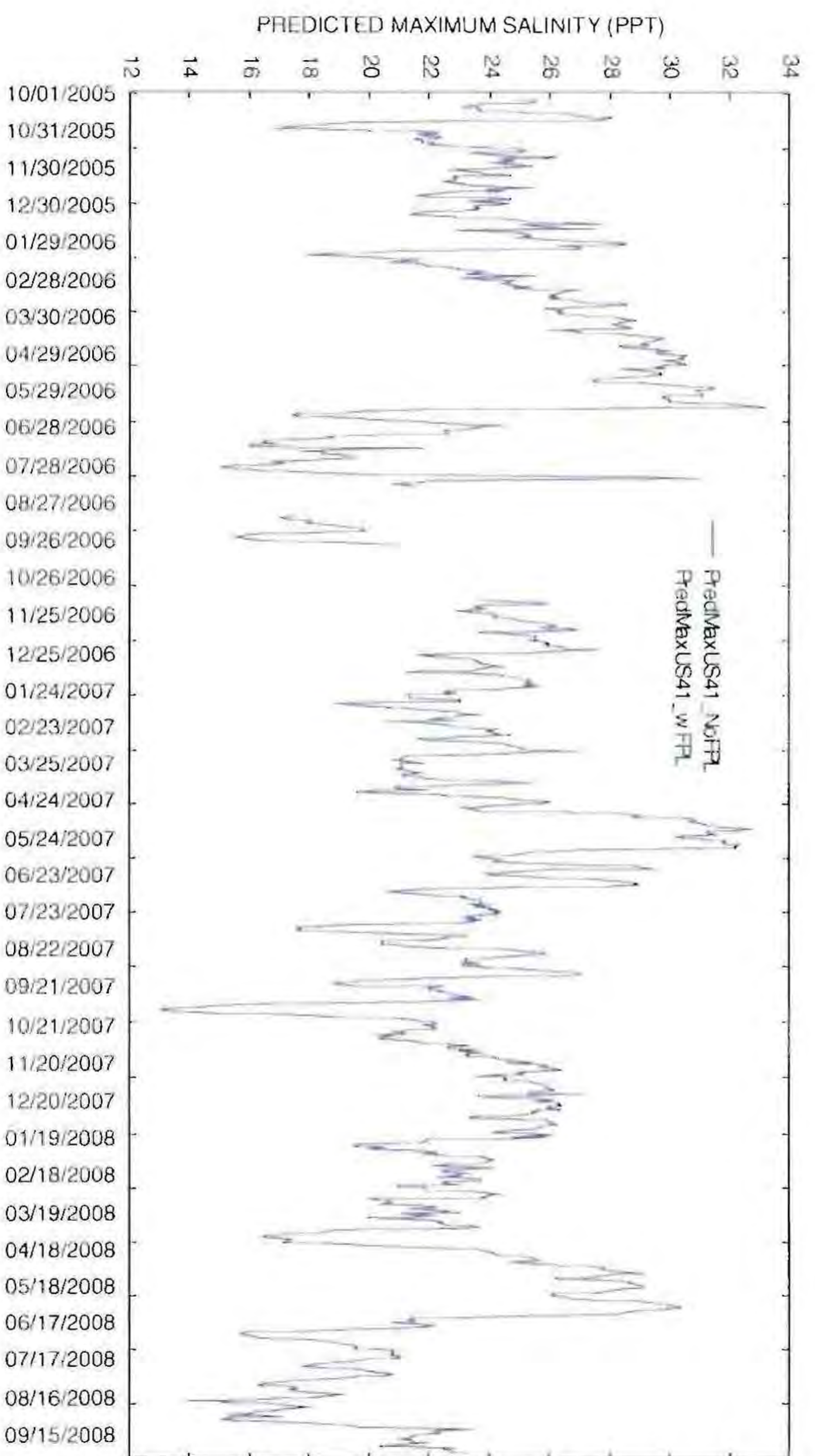


Figure 3.4-11. Predicted 2 psu isohaline position (river km) in Little Manatee River based on actual FPL withdrawals for study period (actual USGS flow also shown using scaling on right hand axis).

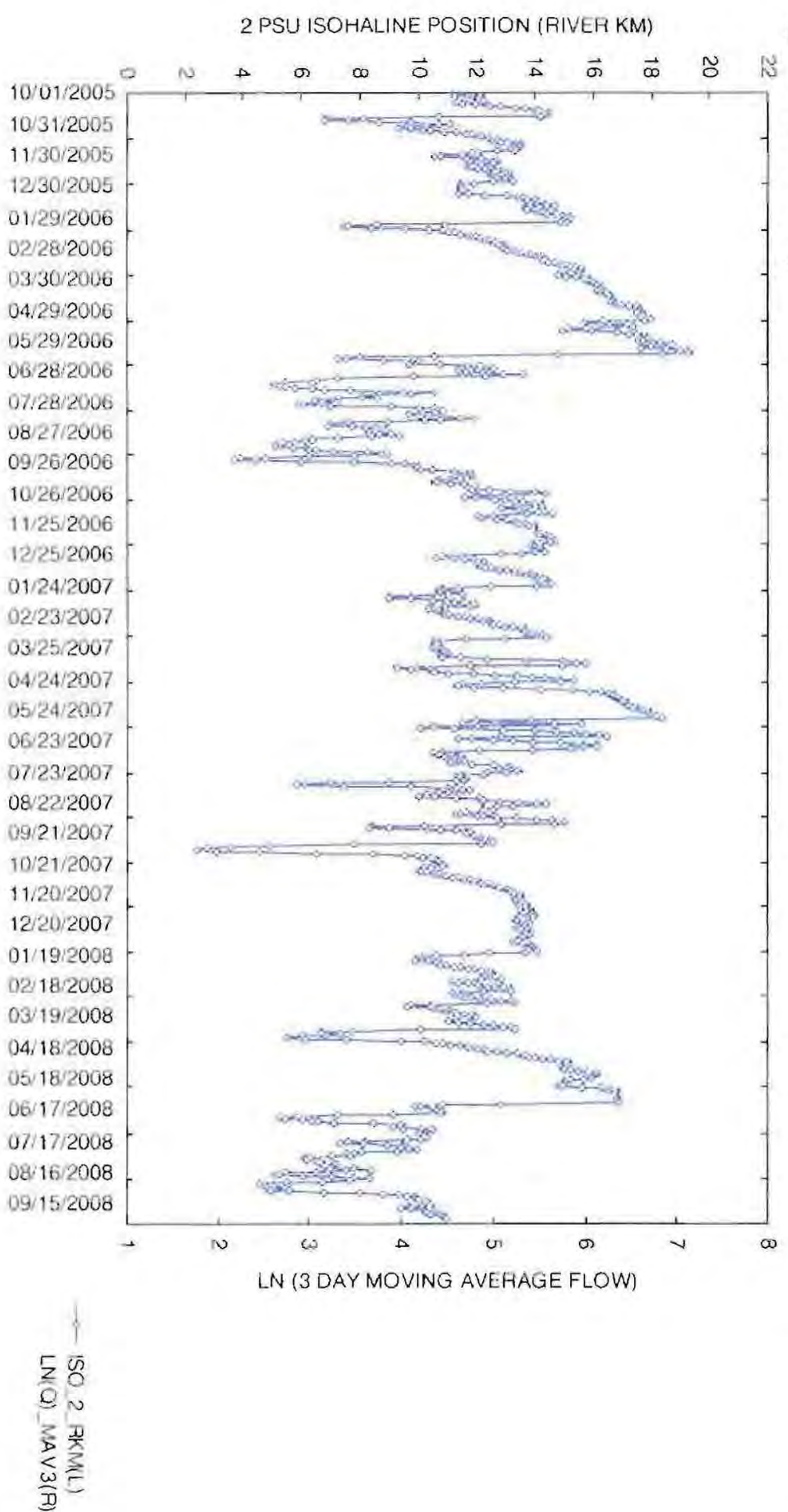
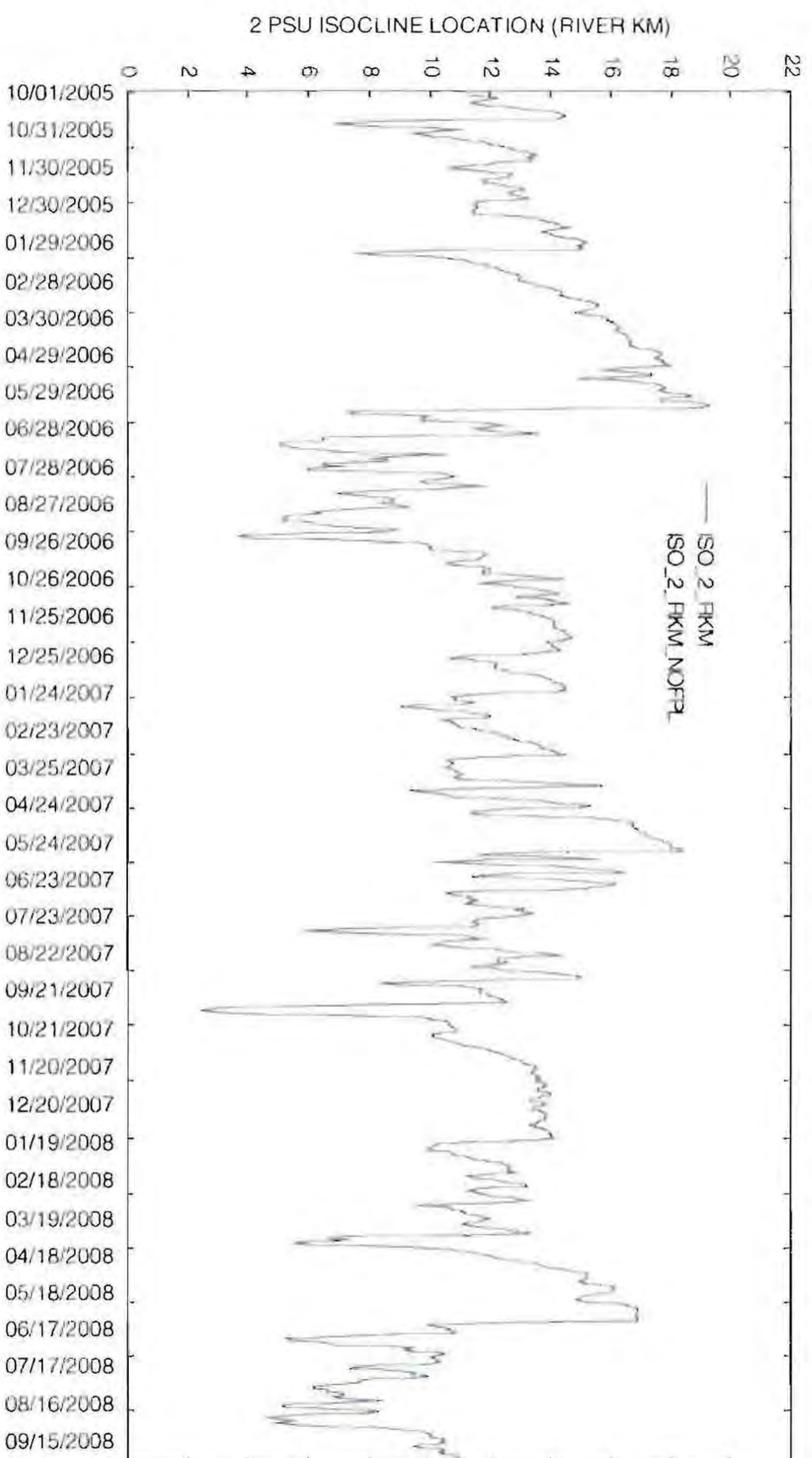
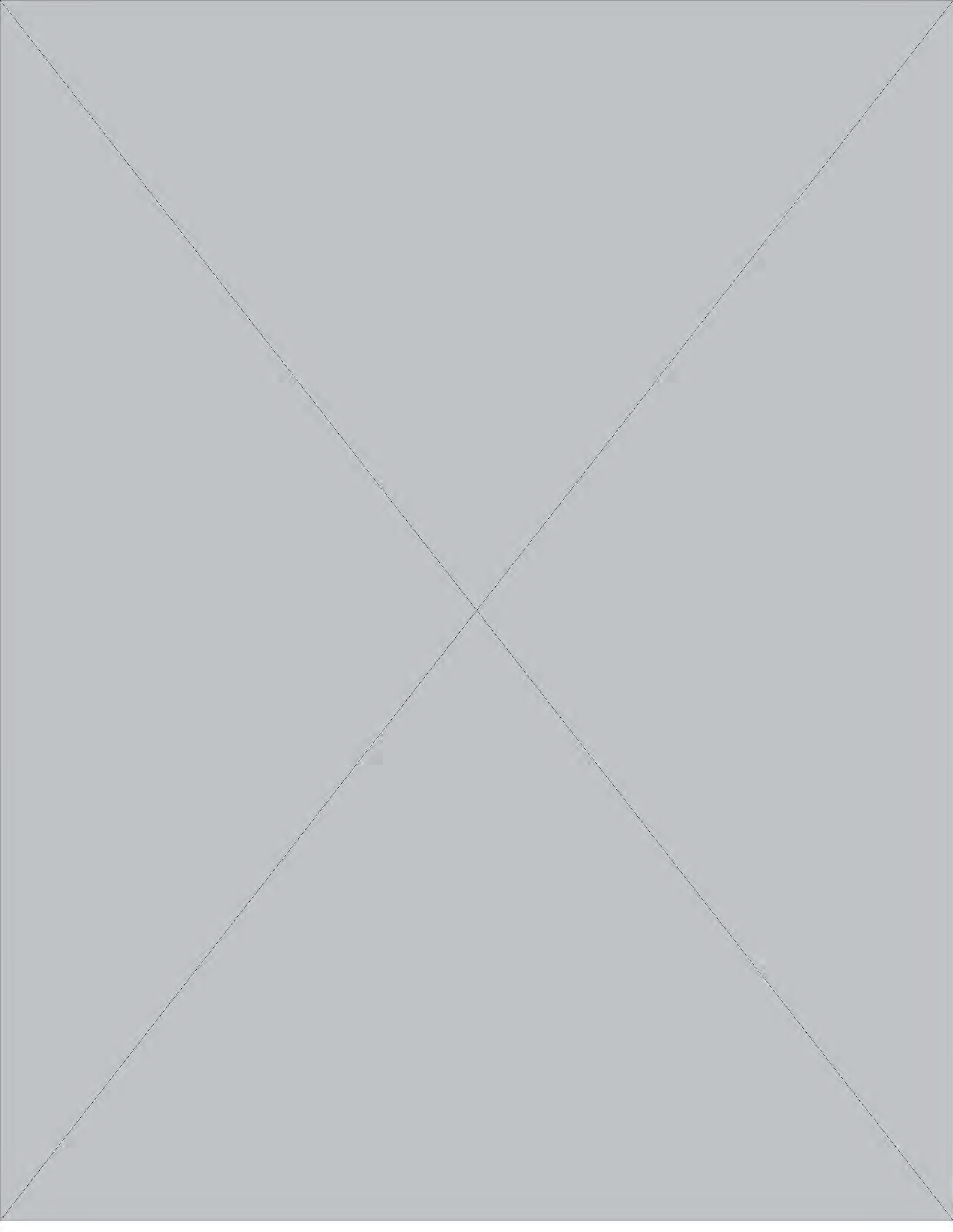
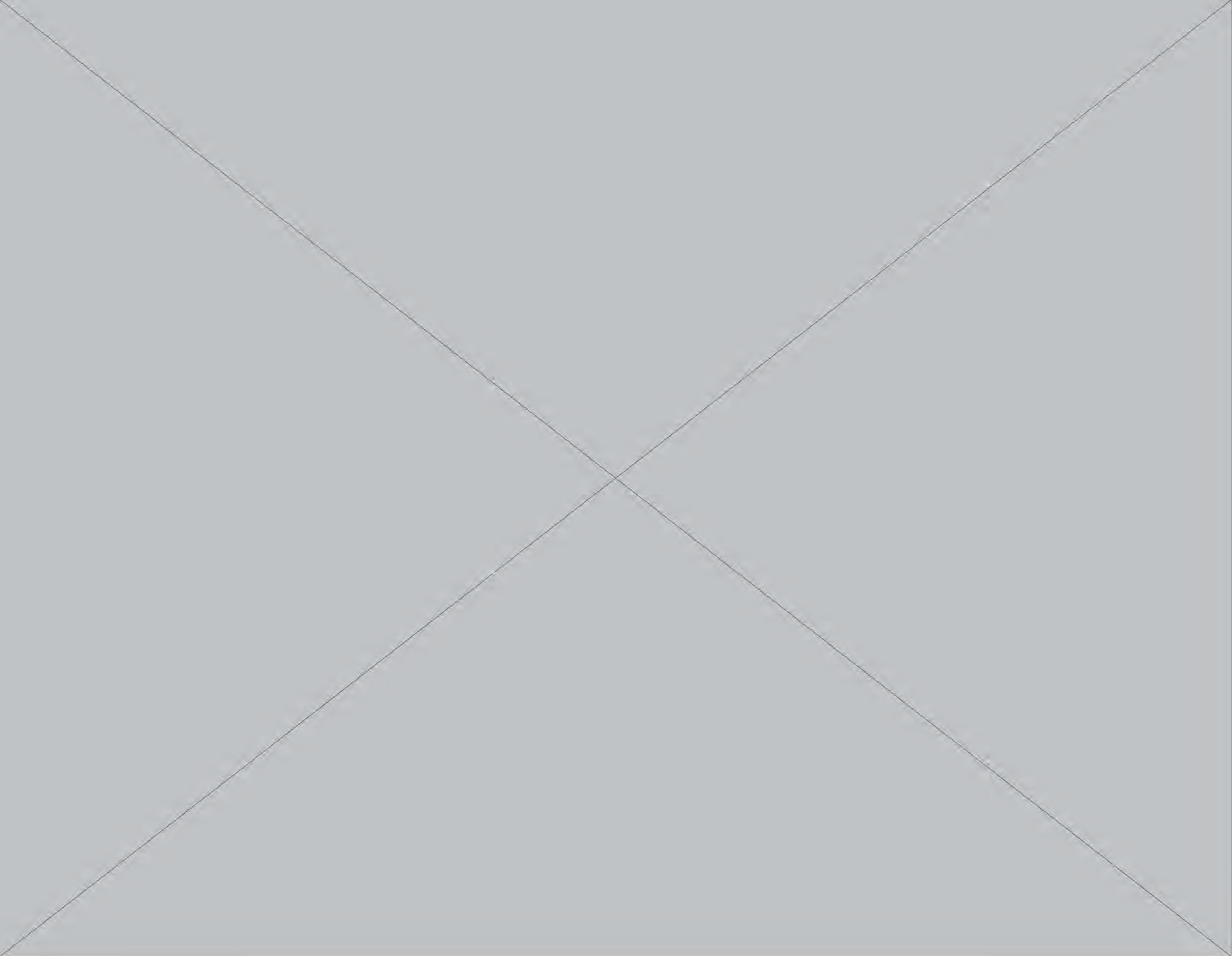


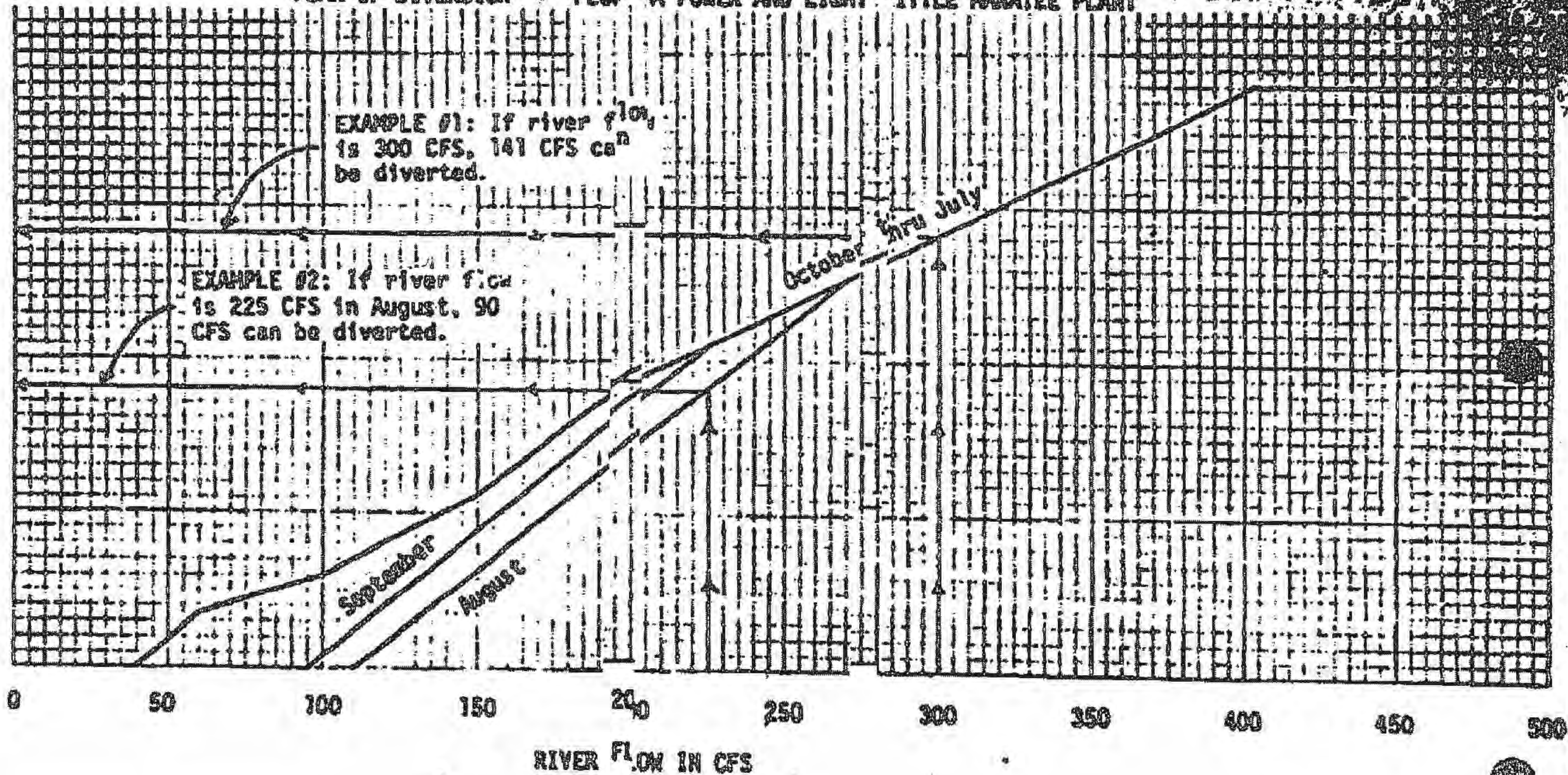
Figure 3.4-12. Predicted 2 psu isohaline positions (river km) in Little Manatee River for actual FPL withdrawals versus baseline (no withdrawals) for study period.







PLAN OF DIVERSION - FLOW AND LIGHT LITTLE MANATEE PLANT



DIVERSION RESTRICTIONS

The plan for diversion restrictions as set forth on the above curve would employ a pumping station with a maximum capacity of 190 CFS. The company is authorized to divert that amount of "flow available for diversion" which is indicated by the point on the appropriate curves corresponding to the "river flow" occurring in the Little Manatee River at the point of diversion at the time the diversion takes place. The allowable diversion rate will be determined by the solid curve labeled, "October thru July" in all months except August and September. In no case shall the diversion reduce the river flow to less than 40 CFS. During August and September diversions would be restricted to 80 percent of the river flow in excess of the monthly average minimum flow (112 CFS being the monthly average minimum flow for August and 97 CFS being the monthly average minimum flow for September) or to the October thru July curve, whichever is

Amended Curve

Plant Expansion Permit Conditions

1. On October 1, 2004, FPL shall permanently implement the Regular diversion schedule (RDS) for withdrawals of water from the Little Manatee River with the following limitations:

Withdrawals shall not occur when Little Manatee River flow, as measured at FPL's gauging station (at the point of diversion), is less than 40 cfs (25.9 mgd).

The maximum authorized diversion is 190 cfs (122.8 mgd)

Withdrawals shall be limited to not greater than 10% of the Little Manatee River flow as measured at FPL's gauging station.

In no case shall the diversion reduce the flow in the Little Manatee River below the point of diversion to less than 40 cfs.

2. As of October 1, 2004, FPL is authorized to implement an emergency diversion schedule (EDS) in the event the water level in the cooling pond falls below 62.00 ft N.G.V.D. subject to the following limitations:

a. Withdrawals shall not occur when Little Manatee River flow, as measured at FPL's gauging station (at the point of diversion), is less than 40 cfs (25.9 mgd).

b. The maximum authorized diversion is 190 cfs (122.8 mgd).

c. EDS withdrawals shall be limited according to the Table below:

| Little Manatee River Flow in cfs As Measured at the FPL Gauging Station | Maximum Allowed Diversion in cfs |
|----------------------------------------------------------------------------|----------------------------------|
| $Q_{riv} < 40$ | 0 |
| 40 $Q_{riv} < 60$ | $0.85 Q_{riv} - 34.0$ |
| 60 $Q_{riv} < 100$ | $0.325 Q_{riv} - 2.5$ |
| 100 $Q_{riv} < 150$ | $0.52 Q_{riv} - 22.0$ |
| 150 $Q_{riv} < 200$ | $0.74 Q_{riv} - 55.0$ |
| 200 $Q_{riv} < 400$ | $0.485 Q_{riv} - 4.0$ |
| 400 Q_{riv} | 190 |

Note: Q_{riv} is the Little Manatee River Flow in cfs as measured at the FPL gauging station.

d. In no case shall the diversion reduce the flow in the Little Manatee River below the point of diversion to less than 40 cfs.

The river diversion schedule shall revert from the EDS to the RDS upon cooling pond water levels reaching an elevation of 63.00 ft N.G.V.D.



Table A-1 FPL Manatee Plant Regular and Emergency Diversion Schedules

| FPL PMT Gauge Station | River Flow | River Flow | Regular Diversion Curve (10% of River Flow) | Emergency Diversion Curve | Emergency Diversion Curve |
|-----------------------|------------|------------|---------------------------------------------|---------------------------|---------------------------|
| River Stage (NGVD) | gpm | cfs | gpm | cfs | gpm |
| 10.0 | 17,778 | 39.6 | 0 | 0 | 0 |
| 10.1 | 18,886 | 42.1 | 1,889 | 2 | 793 |
| 10.2 | 20,057 | 44.7 | 2,006 | 4 | 1,788 |
| 10.3 | 21,292 | 47.4 | 2,129 | 6 | 2,838 |
| 10.4 | 22,590 | 50.3 | 2,259 | 9 | 3,941 |
| 10.5 | 23,952 | 53.4 | 2,395 | 11 | 5,099 |
| 10.6 | 25,377 | 56.5 | 2,538 | 14 | 6,310 |
| 10.7 | 26,865 | 59.9 | 2,687 | 17 | 7,575 |
| 10.8 | 28,417 | 63.3 | 2,842 | 18 | 8,114 |
| 10.9 | 30,033 | 66.9 | 3,003 | 19 | 8,639 |
| 11.0 | 31,712 | 70.7 | 3,171 | 20 | 9,184 |
| 11.1 | 33,455 | 74.5 | 3,345 | 22 | 9,751 |
| 11.2 | 35,261 | 78.6 | 3,526 | 23 | 10,338 |
| 11.3 | 37,130 | 82.7 | 3,713 | 24 | 10,945 |
| 11.4 | 39,063 | 87.0 | 3,906 | 26 | 11,573 |
| 11.5 | 41,060 | 91.5 | 4,106 | 27 | 12,222 |
| 11.6 | 43,120 | 96.1 | 4,312 | 29 | 12,892 |
| 11.7 | 45,243 | 100.8 | 4,524 | 30 | 13,652 |
| 11.8 | 47,430 | 105.7 | 4,743 | 33 | 14,789 |
| 11.9 | 49,681 | 110.7 | 4,968 | 36 | 15,960 |
| 12.0 | 51,995 | 115.8 | 5,199 | 38 | 17,163 |
| 12.1 | 54,372 | 121.1 | 5,437 | 41 | 18,399 |
| 12.2 | 56,813 | 126.6 | 5,681 | 44 | 19,669 |
| 12.3 | 59,318 | 132.2 | 5,932 | 47 | 20,971 |
| 12.4 | 61,886 | 137.9 | 6,189 | 50 | 22,306 |
| 12.5 | 64,517 | 143.7 | 6,452 | 53 | 23,674 |
| 12.6 | 67,212 | 149.7 | 6,721 | 56 | 25,076 |
| 12.7 | 69,970 | 155.9 | 6,997 | 60 | 27,092 |
| 12.8 | 72,792 | 162.2 | 7,279 | 65 | 29,180 |
| 12.9 | 75,677 | 168.6 | 7,568 | 70 | 31,315 |
| 13.0 | 78,626 | 175.2 | 7,863 | 75 | 33,498 |
| 13.1 | 81,639 | 181.9 | 8,164 | 80 | 35,727 |
| 13.2 | 84,714 | 188.7 | 8,471 | 85 | 38,003 |
| 13.3 | 87,854 | 195.7 | 8,785 | 90 | 40,326 |
| 13.4 | 91,057 | 202.9 | 9,106 | 94 | 42,367 |
| 13.5 | 94,323 | 210.2 | 9,432 | 98 | 43,951 |
| 13.6 | 97,653 | 217.6 | 9,765 | 102 | 45,566 |
| 13.7 | 101,046 | 225.1 | 10,105 | 105 | 47,212 |
| 13.8 | 104,503 | 232.8 | 10,450 | 109 | 48,888 |



Table A-1 FPL Manatee Plant Regular and Emergency Diversion Schedules (Continued)

| FPL PMT Gauge Station | River Flow | River Flow | Regular Diversion Curve (10% of River Flow) | Emergency Diversion Curve | Emergency Diversion Curve |
|-----------------------|------------|------------|---------------------------------------------|---------------------------|---------------------------|
| River Stage (NGVD) | gpm | cfs | gpm | cfs | gpm |
| 13.9 | 108,023 | 240.7 | 10,802 | 113 | 50,596 |
| 14.0 | 111,607 | 248.7 | 11,161 | 117 | 52,334 |
| 14.1 | 115,254 | 256.8 | 11,525 | 121 | 54,103 |
| 14.2 | 118,965 | 265.1 | 11,896 | 125 | 55,902 |
| 14.3 | 122,739 | 273.5 | 12,274 | 129 | 57,733 |
| 14.4 | 126,576 | 282.0 | 12,658 | 133 | 59,594 |
| 14.5 | 130,478 | 290.7 | 13,048 | 137 | 61,486 |
| 14.6 | 134,442 | 299.5 | 13,444 | 141 | 63,409 |
| 14.7 | 138,470 | 308.5 | 13,847 | 146 | 65,363 |
| 14.8 | 142,562 | 317.6 | 14,256 | 150 | 67,347 |
| 14.9 | 146,717 | 326.9 | 14,672 | 155 | 69,363 |
| 15.0 | 150,936 | 336.3 | 15,094 | 159 | 71,409 |
| 15.1 | 155,218 | 345.8 | 15,522 | 164 | 73,485 |
| 15.2 | 159,563 | 355.5 | 15,956 | 168 | 75,593 |
| 15.3 | 163,973 | 365.3 | 16,397 | 173 | 77,731 |
| 15.4 | 168,445 | 375.3 | 16,845 | 178 | 79,901 |
| 15.5 | 172,981 | 385.4 | 17,298 | 183 | 82,101 |
| 15.6 | 177,581 | 395.6 | 17,758 | 188 | 84,331 |
| 15.7 | 182,244 | 406.0 | 18,224 | 190 | 85,278 |
| 15.8 | 186,970 | 416.6 | 18,697 | 190 | 85,278 |
| 15.9 | 191,760 | 427.2 | 19,176 | 190 | 85,278 |
| 16.0 | 196,614 | 438.1 | 19,661 | 190 | 85,278 |
| 16.1 | 201,531 | 449.0 | 20,153 | 190 | 85,278 |
| 16.2 | 206,511 | 460.1 | 20,651 | 190 | 85,278 |
| 16.3 | 211,555 | 471.3 | 21,156 | 190 | 85,278 |
| 16.4 | 216,663 | 482.7 | 21,666 | 190 | 85,278 |
| 16.5 | 221,834 | 494.2 | 22,183 | 190 | 85,278 |
| 16.6 | 227,068 | 505.9 | 22,707 | 190 | 85,278 |
| 16.7 | 232,366 | 517.7 | 23,237 | 190 | 85,278 |
| 16.8 | 237,727 | 529.7 | 23,773 | 190 | 85,278 |
| 16.9 | 243,152 | 541.7 | 24,315 | 190 | 85,278 |
| 17.0 | 248,641 | 554.0 | 24,864 | 190 | 85,278 |
| 17.1 | 254,193 | 566.3 | 25,419 | 190 | 85,278 |
| 17.2 | 259,808 | 578.9 | 25,981 | 190 | 85,278 |
| 17.3 | 265,487 | 591.5 | 26,549 | 190 | 85,278 |
| 17.4 | 271,229 | 604.3 | 27,123 | 190 | 85,278 |
| 17.5 | 277,035 | 617.2 | 27,703 | 190 | 85,278 |
| 17.6 | 282,904 | 630.3 | 28,290 | 190 | 85,278 |

| FPL PMT Gauge Station | River Flow | River Flow | Regular Diversion Curve (10% of River Flow) | Emergency Diversion Curve | Emergency Diversion Curve |
|-----------------------|------------|------------|---------------------------------------------|---------------------------|---------------------------|
| River Stage (NGVD) | gpm | cfs | gpm | cfs | gpm |
| 17.7 | 288,837 | 643.5 | 28,884 | 190 | 85,278 |
| 17.8 | 294,833 | 656.9 | 29,483 | 190 | 85,278 |
| 17.9 | 300,893 | 670.4 | 30,089 | 190 | 85,278 |
| 18.0 | 307,016 | 684.0 | 30,702 | 190 | 85,278 |
| 18.1 | 313,203 | 697.8 | 31,320 | 190 | 85,278 |
| 18.2 | 319,453 | 711.7 | 31,945 | 190 | 85,278 |
| 18.3 | 325,767 | 725.8 | 32,577 | 190 | 85,278 |
| 18.4 | 332,144 | 740.0 | 33,214 | 190 | 85,278 |
| 18.5 | 338,585 | 754.4 | 33,858 | 190 | 85,278 |
| 18.6 | 345,089 | 768.9 | 34,509 | 190 | 85,278 |
| 18.7 | 351,657 | 783.5 | 35,166 | 190 | 85,278 |
| 18.8 | 358,288 | 798.3 | 35,829 | 190 | 85,278 |
| 18.9 | 364,983 | 813.2 | 36,498 | 190 | 85,278 |
| 19.0 | 371,741 | 828.2 | 37,174 | 190 | 85,278 |
| 19.1 | 378,562 | 843.4 | 37,856 | 190 | 85,278 |
| 19.2 | 385,448 | 858.8 | 38,545 | 190 | 85,278 |
| 19.3 | 392,396 | 874.3 | 39,240 | 190 | 85,278 |
| 19.4 | 399,408 | 889.9 | 39,941 | 190 | 85,278 |
| 19.5 | 406,484 | 905.6 | 40,648 | 190 | 85,278 |
| 19.6 | 413,623 | 921.6 | 41,362 | 190 | 85,278 |
| 19.7 | 420,826 | 937.6 | 42,083 | 190 | 85,278 |
| 19.8 | 428,092 | 953.8 | 42,809 | 190 | 85,278 |
| 19.9 | 435,421 | 970.1 | 43,542 | 190 | 85,278 |
| 20.0 | 442,814 | 986.6 | 44,281 | 190 | 85,278 |
| 20.1 | 450,271 | 1,003.2 | 45,027 | 190 | 85,278 |
| 20.2 | 457,791 | 1,020.0 | 45,779 | 190 | 85,278 |
| 20.3 | 465,374 | 1,036.9 | 46,537 | 190 | 85,278 |
| 20.4 | 473,021 | 1,053.9 | 47,302 | 190 | 85,278 |
| 20.5 | 480,732 | 1,071.1 | 48,073 | 190 | 85,278 |
| 20.6 | 488,506 | 1,088.4 | 48,851 | 190 | 85,278 |
| 20.7 | 496,343 | 1,105.9 | 49,634 | 190 | 85,278 |
| 20.8 | 504,244 | 1,123.5 | 50,424 | 190 | 85,278 |
| 20.9 | 512,208 | 1,141.2 | 51,221 | 190 | 85,278 |
| 21.0 | 520,236 | 1,159.1 | 52,024 | 190 | 85,278 |
| 21.1 | 528,328 | 1,177.1 | 52,833 | 190 | 85,278 |
| 21.2 | 536,483 | 1,195.3 | 53,648 | 190 | 85,278 |
| 21.3 | 544,701 | 1,213.6 | 54,470 | 190 | 85,278 |
| 21.4 | 552,983 | 1,232.0 | 55,298 | 190 | 85,278 |
| 21.5 | 561,328 | 1,250.6 | 56,133 | 190 | 85,278 |

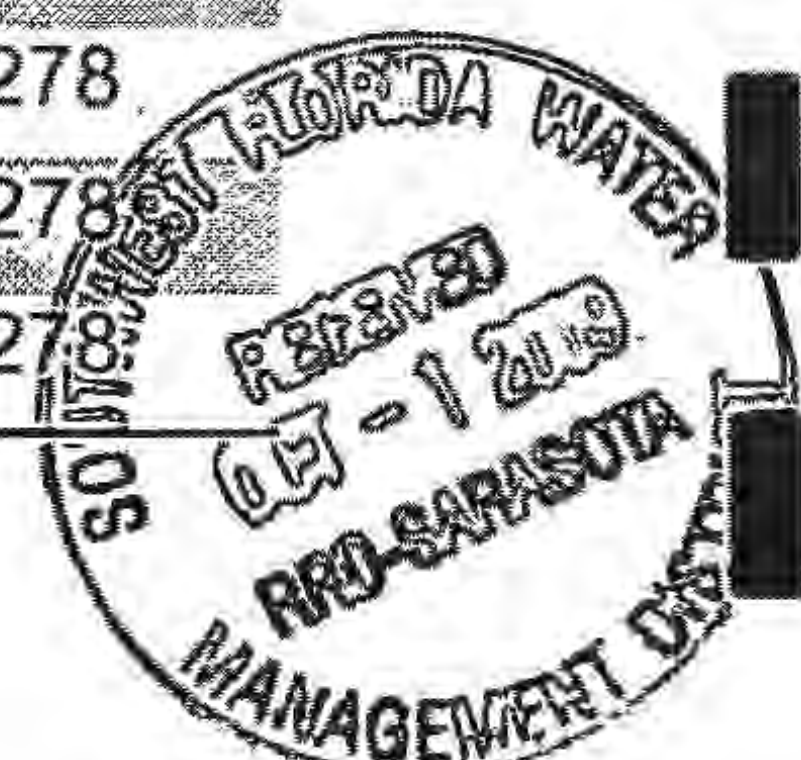


Table A-1 FPL Manatee Plant Regular and Emergency Diversion Schedules (Continued)

| FPL PMT Gauge Station | River Flow | River Flow | Regular Diversion Curve (10% of River Flow) | Emergency Diversion Curve | Emergency Diversion Curve |
|-----------------------|------------|------------|------------------------------------------------|---------------------------|---------------------------|
| River Stage (NGVD) | gpm | cfs | gpm | cfs | gpm |
| 21.6 | 569,737 | 1,269.4 | 56,974 | 190 | 85,278 |
| 21.7 | 578,209 | 1,288.3 | 57,821 | 190 | 85,278 |
| 21.8 | 586,745 | 1,307.3 | 58,675 | 190 | 85,278 |
| 21.9 | 595,345 | 1,326.4 | 59,534 | 190 | 85,278 |
| 22.0 | 604,007 | 1,345.7 | 60,401 | 190 | 85,278 |
| 22.1 | 612,734 | 1,365.2 | 61,273 | 190 | 85,278 |
| 22.2 | 621,523 | 1,384.8 | 62,152 | 190 | 85,278 |
| 22.3 | 630,377 | 1,404.5 | 63,038 | 190 | 85,278 |
| 22.4 | 639,293 | 1,424.3 | 63,929 | 190 | 85,278 |
| 22.5 | 648,274 | 1,444.4 | 64,827 | 190 | 85,278 |
| 22.6 | 657,317 | 1,464.5 | 65,732 | 190 | 85,278 |
| 22.7 | 666,425 | 1,484.8 | 66,642 | 190 | 85,278 |
| 22.8 | 675,595 | 1,505.2 | 67,560 | 190 | 85,278 |
| 22.9 | 684,829 | 1,525.8 | 68,483 | 190 | 85,278 |
| 23.0 | 694,127 | 1,546.5 | 69,413 | 190 | 85,278 |
| 23.1 | 703,488 | 1,567.4 | 70,349 | 190 | 85,278 |
| 23.2 | 712,913 | 1,588.4 | 71,291 | 190 | 85,278 |
| 23.3 | 722,401 | 1,609.5 | 72,240 | 190 | 85,278 |
| 23.4 | 731,953 | 1,630.8 | 73,195 | 190 | 85,278 |
| 23.5 | 741,568 | 1,652.2 | 74,157 | 190 | 85,278 |
| 23.6 | 751,246 | 1,673.8 | 75,125 | 190 | 85,278 |
| 23.7 | 760,989 | 1,695.5 | 76,099 | 190 | 85,278 |
| 23.8 | 770,794 | 1,717.3 | 77,079 | 190 | 85,278 |
| 23.9 | 780,663 | 1,739.3 | 78,066 | 190 | 85,278 |
| 24.0 | 790,596 | 1,761.4 | 79,060 | 190 | 85,278 |
| 24.1 | 800,592 | 1,783.7 | 80,059 | 190 | 85,278 |
| 24.2 | 810,651 | 1,806.1 | 81,065 | 190 | 85,278 |
| 24.3 | 820,774 | 1,828.7 | 82,077 | 190 | 85,278 |
| 24.5 | 841,211 | 1,874.2 | 84,121 | 190 | 85,278 |
| 24.6 | 851,524 | 1,897.2 | 85,152 | 190 | 85,278 |

SOUTHERN
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Daily Value Tables for the US 41 Site

US 41 Site
Daily Value Tables
9/23/09

Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-----|-------|-------|-------|-------|-------|-------|------|------|------|------|------|
| 1 | - | - | 0.59 | 1.02 | 1.02 | 0.99 | 0.42 | 0.89 | 1.51 | 1.39 | 1.05 | 0.73 |
| 2 | - | - | 0.79 | 0.88 | 1.18 | 1.06 | 0.53 | 1.01 | 2.77 | 1.32 | 1.17 | 0.90 |
| 3 | - | - | 0.86 | 0.76 | 0.49 | 0.20 | 0.10 | 2.27 | 1.50 | 1.09 | 0.64 | 0.95 |
| 4 | - | - | 0.87 | 0.91 | -0.47 | -0.46 | 0.00 | 2.31 | 1.21 | 1.00 | 0.78 | 0.63 |
| 5 | - | - | 0.55 | 1.12 | -0.36 | -0.84 | 0.17 | 2.55 | 1.06 | 0.69 | 0.82 | 0.84 |
| 6 | - | - | 0.98 | 0.88 | 0.12 | -0.81 | -0.12 | 2.39 | 0.91 | 0.35 | 0.99 | 1.10 |
| 7 | - | - | 1.17 | 0.62 | 0.72 | 0.06 | -0.21 | 1.65 | 0.79 | 0.45 | 0.92 | 0.91 |
| 8 | - | - | 0.14 | 0.38 | 0.75 | -0.07 | -0.03 | 1.98 | 0.56 | 0.70 | 1.09 | 1.19 |
| 9 | - | - | -0.74 | -0.61 | 0.76 | 0.29 | -0.03 | 1.99 | 0.91 | 1.02 | 1.37 | 1.31 |
| 10 | - | - | -0.23 | -1.04 | 0.88 | 0.31 | 0.00 | 1.83 | 1.11 | 1.17 | 1.32 | 1.28 |
| 11 | - | - | 0.15 | -0.20 | 0.80 | 0.23 | 0.20 | 1.63 | 1.44 | 1.37 | 1.46 | 1.04 |
| 12 | - | - | 0.21 | 0.33 | 0.71 | 0.43 | 0.02 | 1.83 | 1.60 | 1.31 | 1.42 | 0.83 |
| 13 | - | -0.07 | 0.20 | 0.24 | 1.09 | 0.31 | -0.05 | 1.86 | 1.44 | 1.43 | 1.22 | 0.62 |
| 14 | - | -0.14 | 0.30 | 0.25 | 0.96 | 0.37 | 0.27 | 2.01 | 1.57 | 1.40 | 1.30 | 0.59 |
| 15 | - | 0.59 | 0.25 | 0.34 | 0.93 | 1.14 | 1.09 | 2.03 | 1.87 | 1.31 | 1.18 | 0.79 |
| 16 | - | 0.74 | 0.64 | 0.50 | 0.95 | 0.79 | 0.40 | 2.51 | 1.87 | 1.17 | 0.73 | 0.58 |
| 17 | - | 0.14 | 0.64 | 0.46 | 0.65 | 0.83 | -0.17 | 2.54 | 1.56 | 0.91 | 0.83 | 0.80 |
| 18 | - | 0.04 | 0.81 | 0.23 | 1.29 | 0.17 | 0.44 | 2.20 | 1.56 | 0.83 | 0.66 | 0.55 |
| 19 | - | 0.40 | 0.76 | 0.37 | 0.01 | -0.14 | 0.50 | 1.67 | 1.14 | 0.30 | 0.61 | 0.57 |
| 20 | - | 0.44 | 0.87 | 0.26 | 0.59 | -0.02 | 0.65 | 1.64 | 1.01 | 0.27 | 0.67 | 0.50 |
| 21 | - | 0.21 | 0.98 | 0.06 | 0.86 | 0.26 | 0.51 | 1.79 | 0.66 | 0.34 | 0.84 | 1.63 |
| 22 | - | -0.02 | 1.00 | 0.38 | 0.90 | 0.13 | 0.78 | 1.46 | 0.61 | 0.35 | 0.97 | 1.15 |
| 23 | - | 0.12 | 1.70 | -0.12 | 0.89 | 0.34 | 0.66 | 0.93 | 0.85 | 0.57 | 0.92 | 1.02 |
| 24 | - | 0.37 | 0.93 | -0.45 | 1.35 | 0.70 | 0.43 | 0.98 | 0.92 | 0.65 | 1.09 | 0.96 |
| 25 | - | 0.16 | 0.66 | -0.54 | 1.37 | 0.26 | 0.47 | 1.15 | 0.85 | 0.85 | 1.19 | 0.98 |
| 26 | - | 0.09 | 0.27 | -0.17 | 1.01 | 0.24 | 0.32 | 1.28 | 0.76 | 0.89 | 1.28 | 1.06 |
| 27 | - | 0.02 | -0.26 | 0.41 | 1.01 | 0.26 | 0.48 | 1.54 | 0.98 | 0.90 | 1.22 | 0.95 |
| 28 | - | 0.29 | 0.41 | -0.14 | 0.87 | 0.27 | 0.31 | 1.45 | 1.10 | 1.31 | 1.12 | 0.98 |
| 29 | - | 0.22 | 0.57 | 0.14 | | 0.12 | 0.21 | 1.45 | 1.27 | 1.28 | 0.92 | 1.04 |
| 30 | - | 0.55 | 1.11 | 0.34 | | 0.08 | 0.36 | 1.65 | 1.23 | 1.60 | 0.55 | 0.47 |
| 31 | - | | 1.21 | 0.32 | | 0.25 | | 1.51 | | 1.44 | 0.59 | |
| Max | - | 0.74 | 1.70 | 1.12 | 1.37 | 1.14 | 1.09 | 2.55 | 2.77 | 1.60 | 1.46 | 1.63 |
| Min | - | -0.14 | -0.74 | -1.04 | -0.47 | -0.84 | -0.21 | 0.89 | 0.56 | 0.27 | 0.55 | 0.47 |
| Mean | - | 0.23 | 0.59 | 0.26 | 0.76 | 0.25 | 0.29 | 1.74 | 1.22 | 0.96 | 1.00 | 0.90 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
 Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007
 Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | - | - | -1.29 | -1.41 | -1.90 | -1.33 | -0.98 | -1.12 | -1.30 | -1.28 | -0.96 | -1.00 |
| 2 | - | - | -1.52 | -1.74 | -1.24 | -0.93 | -1.29 | -1.04 | -1.38 | -1.30 | -0.92 | -1.08 |
| 3 | - | - | -1.67 | -1.71 | -1.65 | -1.72 | -1.59 | -0.89 | -0.79 | -1.26 | -0.52 | -1.29 |
| 4 | - | - | -1.82 | -1.60 | -2.04 | -1.85 | -1.79 | 0.05 | -1.01 | -1.25 | -0.77 | -1.46 |
| 5 | - | - | -2.31 | -1.56 | -2.10 | -2.11 | -1.72 | -0.04 | -1.21 | -1.15 | -1.10 | -1.50 |
| 6 | - | - | -1.92 | -1.32 | -1.11 | -2.03 | -1.91 | 0.14 | -1.17 | -0.96 | -1.28 | -1.35 |
| 7 | - | - | -1.69 | -1.40 | -0.58 | -1.52 | -1.77 | -0.48 | -1.28 | -0.90 | -1.37 | -1.37 |
| 8 | - | - | -2.27 | -1.30 | -0.64 | -1.72 | -1.98 | -0.57 | -1.06 | -1.06 | -1.40 | -0.98 |
| 9 | - | - | -2.31 | -1.84 | -0.81 | -1.76 | -2.05 | -0.26 | -0.62 | -1.14 | -1.28 | -0.57 |
| 10 | - | - | -1.78 | -2.54 | -0.97 | -1.66 | -2.03 | 0.03 | -0.53 | -1.20 | -1.23 | -0.53 |
| 11 | - | - | -1.34 | -1.93 | -1.43 | -1.75 | -2.19 | -0.05 | -0.67 | -1.28 | -0.91 | -0.61 |
| 12 | - | - | -1.33 | -1.71 | -1.28 | -2.00 | -1.70 | 0.24 | -0.97 | -1.43 | -0.83 | -0.61 |
| 13 | - | -1.45 | -0.96 | -1.86 | -1.43 | -1.92 | -1.70 | 0.26 | -1.26 | -1.27 | -0.83 | -0.71 |
| 14 | - | -1.42 | -1.17 | -1.90 | -1.33 | -1.89 | -1.73 | -0.15 | -1.21 | -1.21 | -0.67 | -0.78 |
| 15 | - | -1.20 | -1.45 | -1.97 | -1.31 | -1.83 | -0.84 | -0.27 | -1.19 | -1.24 | -0.46 | -0.89 |
| 16 | - | -0.70 | -1.70 | -2.12 | -1.25 | -1.42 | -1.92 | -0.10 | -0.97 | -1.31 | -0.50 | -1.06 |
| 17 | - | -1.64 | -1.54 | -2.29 | -1.36 | -1.42 | -2.09 | -0.17 | -0.99 | -1.15 | -0.48 | -0.80 |
| 18 | - | -1.72 | -1.64 | -2.05 | -1.31 | -1.62 | -1.82 | -0.30 | -0.94 | -1.02 | -0.80 | -1.25 |
| 19 | - | -1.85 | -1.77 | -2.04 | -1.31 | -1.56 | -1.64 | -0.64 | -0.92 | -0.89 | -0.91 | -1.47 |
| 20 | - | -1.82 | -1.78 | -2.12 | -0.93 | -1.61 | -1.78 | -0.97 | -0.93 | -1.01 | -0.95 | -1.24 |
| 21 | - | -2.18 | -1.59 | -2.02 | -0.78 | -1.75 | -2.00 | -0.78 | -0.60 | -0.90 | -1.01 | -0.50 |
| 22 | - | -1.68 | -1.42 | -1.47 | -0.84 | -1.77 | -1.93 | -0.62 | -0.55 | -0.96 | -1.17 | -0.79 |
| 23 | - | -2.00 | -1.35 | -1.68 | -1.14 | -1.87 | -1.62 | -0.66 | -0.62 | -1.08 | -1.37 | -0.93 |
| 24 | - | -1.96 | -1.46 | -1.65 | -1.36 | -1.78 | -1.55 | -0.38 | -0.73 | -1.32 | -1.42 | -0.77 |
| 25 | - | -2.00 | -0.63 | -1.94 | -1.10 | -1.82 | -1.49 | -0.26 | -1.18 | -1.35 | -1.22 | -0.57 |
| 26 | - | -1.80 | -1.28 | -2.31 | -1.05 | -1.83 | -1.30 | -0.33 | -1.44 | -1.41 | -1.09 | -0.59 |
| 27 | - | -1.73 | -1.66 | -2.35 | -1.26 | -1.77 | -0.95 | -0.30 | -1.25 | -1.62 | -0.99 | -0.65 |
| 28 | - | -1.48 | -1.34 | -1.58 | -1.33 | -1.61 | -0.96 | -0.55 | -1.47 | -1.20 | -0.91 | -0.92 |
| 29 | - | -1.20 | -1.42 | -2.31 | | -1.54 | -1.26 | -0.73 | -1.43 | -1.05 | -0.89 | -1.04 |
| 30 | - | -1.14 | -1.63 | -2.09 | | -1.40 | -1.21 | -0.76 | -1.33 | -0.93 | -1.06 | -1.70 |
| 31 | - | | -1.54 | -2.11 | | -1.20 | | -0.89 | | -0.88 | -0.99 | |
| Max | - | -0.70 | -0.63 | -1.30 | -0.58 | -0.93 | -0.84 | 0.26 | -0.53 | -0.88 | -0.46 | -0.50 |
| Min | - | -2.18 | -2.31 | -2.54 | -2.10 | -2.11 | -2.19 | -1.12 | -1.47 | -1.62 | -1.42 | -1.70 |
| Mean | - | -1.61 | -1.57 | -1.87 | -1.24 | -1.68 | -1.63 | -0.41 | -1.03 | -1.16 | -0.98 | -0.97 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | - | - | -0.29 | -0.15 | -0.52 | -0.18 | -0.28 | -0.14 | 0.23 | 0.05 | -0.06 | -0.13 |
| 2 | - | - | -0.32 | -0.54 | -0.32 | -0.28 | -0.31 | -0.04 | 0.67 | 0.02 | 0.17 | -0.14 |
| 3 | - | - | -0.42 | -0.48 | -0.85 | -0.99 | -0.64 | 0.55 | 0.34 | -0.08 | 0.08 | -0.19 |
| 4 | - | - | -0.78 | -0.30 | -1.32 | -1.23 | -0.81 | 1.24 | 0.14 | -0.11 | -0.02 | -0.34 |
| 5 | - | - | -1.01 | -0.18 | -1.05 | -1.55 | -0.73 | 1.32 | 0.04 | -0.14 | -0.13 | -0.24 |
| 6 | - | - | -0.52 | -0.23 | -0.44 | -1.43 | -1.00 | 1.34 | 0.01 | -0.18 | -0.05 | -0.06 |
| 7 | - | - | -0.47 | -0.36 | 0.01 | -0.82 | -1.07 | 0.42 | -0.06 | -0.28 | -0.12 | -0.15 |
| 8 | - | - | -1.24 | -0.42 | -0.01 | -0.90 | -1.06 | 0.78 | -0.07 | -0.24 | -0.01 | 0.02 |
| 9 | - | - | -1.36 | -1.09 | -0.16 | -0.76 | -1.05 | 1.07 | 0.08 | -0.04 | 0.15 | 0.21 |
| 10 | - | - | -0.81 | -1.64 | -0.04 | -0.75 | -0.93 | 1.10 | 0.20 | 0.06 | 0.07 | 0.32 |
| 11 | - | - | -0.44 | -1.23 | -0.38 | -0.74 | -0.70 | 0.85 | 0.37 | 0.13 | 0.21 | 0.13 |
| 12 | - | - | -0.55 | -0.73 | -0.15 | -0.74 | -0.68 | 1.05 | 0.39 | 0.04 | 0.24 | 0.11 |
| 13 | - | -0.71 | -0.46 | -0.77 | -0.08 | -0.72 | -0.89 | 1.05 | 0.18 | 0.09 | 0.13 | 0.02 |
| 14 | - | -0.67 | -0.50 | -0.74 | -0.04 | -0.67 | -0.68 | 0.98 | 0.23 | 0.04 | 0.25 | 0.03 |
| 15 | - | -0.42 | -0.56 | -0.68 | -0.23 | -0.41 | 0.04 | 0.87 | 0.35 | 0.02 | 0.31 | -0.10 |
| 16 | - | -0.07 | -0.53 | -0.85 | -0.43 | -0.24 | -0.90 | 1.23 | 0.47 | -0.11 | 0.18 | -0.19 |
| 17 | - | -0.79 | -0.42 | -1.12 | -0.32 | -0.64 | -0.99 | 1.23 | 0.29 | -0.09 | 0.16 | -0.07 |
| 18 | - | -0.83 | -0.39 | -0.89 | -0.06 | -0.96 | -0.68 | 0.99 | 0.34 | -0.07 | -0.10 | -0.41 |
| 19 | - | -0.77 | -0.60 | -0.99 | -0.62 | -0.82 | -0.50 | 0.45 | 0.22 | -0.29 | -0.17 | -0.50 |
| 20 | - | -0.68 | -0.56 | -1.04 | -0.13 | -0.69 | -0.54 | 0.34 | 0.17 | -0.38 | -0.14 | -0.31 |
| 21 | - | -1.12 | -0.34 | -0.90 | -0.04 | -0.67 | -0.77 | 0.62 | 0.19 | -0.33 | -0.05 | 0.59 |
| 22 | - | -0.78 | -0.05 | -0.58 | 0.05 | -0.87 | -0.52 | 0.56 | -0.04 | -0.37 | 0.01 | 0.30 |
| 23 | - | -0.85 | -0.08 | -0.96 | -0.20 | -0.75 | -0.36 | 0.40 | 0.03 | -0.31 | -0.05 | 0.11 |
| 24 | - | -0.75 | -0.29 | -0.99 | -0.02 | -0.44 | -0.41 | 0.43 | 0.04 | -0.22 | 0.02 | 0.09 |
| 25 | - | -0.82 | 0.04 | -1.28 | 0.22 | -0.70 | -0.28 | 0.43 | -0.10 | -0.18 | 0.03 | 0.19 |
| 26 | - | -0.68 | -0.47 | -1.45 | 0.13 | -0.66 | -0.33 | 0.41 | -0.26 | -0.14 | 0.06 | 0.23 |
| 27 | - | -0.63 | -0.96 | -1.05 | -0.05 | -0.57 | -0.20 | 0.51 | -0.15 | -0.27 | 0.01 | 0.26 |
| 28 | - | -0.40 | -0.61 | -0.67 | -0.25 | -0.52 | -0.31 | 0.41 | -0.12 | 0.02 | -0.02 | 0.09 |
| 29 | - | -0.41 | -0.38 | -1.19 | | -0.65 | -0.42 | 0.39 | -0.07 | 0.01 | -0.09 | -0.09 |
| 30 | - | -0.31 | -0.28 | -0.93 | | -0.73 | -0.49 | 0.45 | -0.06 | 0.24 | -0.26 | -0.63 |
| 31 | - | | -0.16 | -0.96 | | -0.40 | | 0.34 | | 0.23 | -0.11 | |
| Max | - | -0.07 | 0.04 | -0.15 | 0.22 | -0.18 | 0.04 | 1.34 | 0.67 | 0.24 | 0.31 | 0.59 |
| Min | - | -1.12 | -1.36 | -1.64 | -1.32 | -1.55 | -1.07 | -0.14 | -0.26 | -0.38 | -0.26 | -0.63 |
| Mean | - | -0.65 | -0.51 | -0.82 | -0.26 | -0.73 | -0.62 | 0.70 | 0.14 | -0.09 | 0.02 | -0.03 |

SOUTH FLORIDA
OCT 10 2007
Rt. 1

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|-------|-------|-------|-------|-------|------|------|------|-------|------|
| 1 | 0.79 | 0.25 | -0.17 | 0.31 | 0.42 | 0.13 | 0.24 | 0.51 | 1.01 | 1.21 | 1.45 | 1.82 |
| 2 | 0.54 | 0.23 | 0.28 | -0.32 | 0.46 | 0.02 | 0.41 | 0.94 | 1.03 | 1.24 | 1.17 | 0.74 |
| 3 | 1.72 | 0.56 | 0.31 | -0.43 | 0.53 | 0.52 | 0.40 | 1.15 | 1.16 | 1.22 | 0.97 | 0.37 |
| 4 | 1.10 | 0.57 | 0.21 | 0.62 | 0.95 | 0.78 | 0.39 | 1.27 | 1.28 | 1.06 | 0.74 | 0.60 |
| 5 | 1.31 | 0.81 | 0.68 | 1.08 | 0.94 | 0.86 | 0.62 | 1.13 | 1.39 | 1.00 | 0.46 | 0.47 |
| 6 | 1.01 | 0.90 | 0.69 | 1.13 | 0.98 | 0.49 | 0.60 | 1.13 | 1.23 | 0.82 | 0.55 | 1.13 |
| 7 | 1.25 | 0.98 | 0.89 | 1.15 | 0.82 | 0.62 | 0.55 | 1.39 | 0.90 | 0.77 | 0.47 | 0.96 |
| 8 | 1.10 | 0.48 | 0.89 | 1.21 | 0.65 | 1.31 | 0.73 | 1.80 | 0.74 | 0.56 | 0.72 | 0.57 |
| 9 | 0.94 | 0.41 | 0.94 | 1.28 | 0.45 | -0.21 | 0.65 | 1.36 | 0.39 | 0.57 | 0.86 | 0.41 |
| 10 | 0.98 | 0.84 | 1.03 | 0.94 | -0.05 | 0.17 | 0.99 | 1.07 | 0.27 | 0.80 | 0.78 | 1.99 |
| 11 | 0.89 | 0.37 | 0.99 | 0.85 | -0.41 | 0.54 | 1.03 | 0.82 | 0.26 | 0.83 | 0.77 | 2.13 |
| 12 | 0.95 | 0.71 | 1.07 | 0.62 | 0.54 | 0.71 | 0.83 | 0.18 | 0.39 | 0.89 | 0.76 | 1.32 |
| 13 | 0.83 | 0.43 | 0.65 | 0.50 | 0.90 | 0.46 | 0.33 | 0.05 | 0.52 | 0.95 | 1.21 | 1.20 |
| 14 | 0.86 | 0.25 | 0.57 | 0.00 | 0.35 | 0.36 | 0.35 | 0.39 | 0.42 | 0.93 | 1.32 | 1.27 |
| 15 | 0.45 | 0.23 | 0.63 | -0.18 | 0.30 | 0.80 | 0.05 | 0.97 | 0.64 | 1.22 | 1.24 | 0.93 |
| 16 | 0.94 | 0.56 | 1.71 | 0.41 | 0.37 | 0.55 | -0.42 | 1.08 | 1.05 | 1.21 | 0.95 | 0.72 |
| 17 | 1.07 | 0.57 | -0.14 | 1.02 | 0.95 | 0.09 | 0.01 | 0.97 | 0.97 | 1.27 | 0.87 | 0.59 |
| 18 | 1.07 | 0.81 | 0.40 | 0.74 | 0.80 | 0.58 | 0.80 | 1.15 | 1.12 | 1.33 | 0.67 | 0.63 |
| 19 | 1.12 | 0.90 | 0.77 | 1.63 | 0.59 | 0.62 | 1.06 | 1.24 | 1.10 | 1.23 | -0.43 | 0.64 |
| 20 | 1.02 | 0.98 | 1.15 | 1.50 | -0.01 | 0.71 | 1.07 | 1.36 | 1.21 | 1.17 | 0.17 | 0.97 |
| 21 | 0.68 | 0.48 | 0.83 | 0.67 | 0.16 | -0.35 | 1.12 | 1.13 | 0.85 | 0.94 | 0.35 | 0.91 |
| 22 | 0.69 | 1.15 | 1.24 | 0.96 | 0.39 | 0.18 | 0.98 | 0.99 | 1.18 | 0.71 | 0.71 | 1.20 |
| 23 | 0.84 | 1.15 | 1.23 | 1.19 | 0.29 | 0.16 | 0.87 | 1.09 | 0.77 | 0.55 | 0.65 | 0.73 |
| 24 | 0.75 | 0.98 | 1.33 | 1.00 | -0.05 | -0.08 | 0.89 | 0.98 | 0.48 | 0.71 | 0.79 | 0.29 |
| 25 | 0.56 | 1.27 | 1.18 | 0.32 | 0.07 | -0.70 | 1.10 | 0.32 | 0.33 | 0.87 | 0.76 | 0.62 |
| 26 | 0.48 | 1.42 | 1.07 | 0.25 | 0.52 | 0.16 | 1.10 | 0.24 | 0.44 | 0.88 | 0.79 | 1.35 |
| 27 | 0.41 | 1.27 | 1.27 | 0.64 | -0.40 | 0.52 | 0.98 | 0.20 | 0.77 | 1.14 | 1.00 | 1.10 |
| 28 | 0.84 | 0.56 | 0.81 | 0.33 | -0.24 | 0.34 | 0.97 | 0.16 | 0.99 | 1.39 | 1.00 | 1.21 |
| 29 | 0.37 | 0.66 | 0.67 | 0.79 | 0.31 | 0.21 | 0.27 | 0.23 | 1.05 | 1.75 | 1.06 | 1.16 |
| 30 | 0.71 | 0.30 | 0.71 | 0.68 | | 0.04 | 0.14 | 0.43 | 1.09 | 1.66 | 0.78 | 1.29 |
| 31 | 0.43 | | 0.58 | 0.83 | | 0.26 | | 0.77 | | 1.44 | 1.42 | |
| Max | 1.72 | 1.42 | 1.71 | 1.63 | 0.98 | 1.31 | 1.12 | 1.80 | 1.39 | 1.75 | 1.45 | 2.13 |
| Min | 0.37 | 0.23 | -0.17 | -0.43 | -0.41 | -0.70 | -0.42 | 0.05 | 0.26 | 0.55 | -0.43 | 0.29 |
| Mean | 0.86 | 0.70 | 0.79 | 0.70 | 0.40 | 0.35 | 0.64 | 0.85 | 0.83 | 1.04 | 0.81 | 0.98 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | -1.64 | -1.69 | -1.49 | -0.63 | -1.17 | -1.38 | -1.58 | -1.18 | -1.26 | -1.28 | -1.04 | -0.62 |
| 2 | -1.66 | -1.18 | -0.92 | -1.18 | -1.44 | -1.49 | -1.44 | -0.73 | -1.34 | -1.25 | -0.99 | -1.08 |
| 3 | -0.77 | -0.86 | -1.11 | -0.93 | -1.47 | -1.57 | -1.23 | -0.69 | -1.40 | -1.24 | -0.92 | -0.89 |
| 4 | -0.92 | -0.61 | -1.37 | -1.08 | -1.46 | -1.62 | -1.15 | -1.05 | -1.37 | -1.24 | -0.90 | -0.80 |
| 5 | -0.77 | -0.57 | -1.38 | -1.16 | -1.46 | -1.30 | -0.88 | -1.24 | -1.35 | -1.23 | -0.80 | -0.60 |
| 6 | -0.61 | -0.46 | -1.25 | -1.24 | -1.32 | -1.46 | -1.49 | -1.26 | -1.29 | -1.20 | -0.82 | -0.57 |
| 7 | -0.30 | -0.81 | -1.29 | -1.21 | -1.39 | -1.48 | -1.42 | -1.24 | -1.26 | -1.04 | -1.08 | -1.04 |
| 8 | -0.25 | -1.24 | -1.24 | -1.29 | -1.40 | -1.34 | -1.41 | -1.23 | -1.30 | -0.90 | -0.90 | -1.34 |
| 9 | -0.28 | -1.66 | -1.23 | -1.25 | -1.44 | -1.33 | -1.33 | -1.06 | -1.37 | -0.72 | -0.94 | -1.25 |
| 10 | -0.40 | -1.68 | -1.24 | -1.45 | -1.42 | -1.46 | -1.34 | -1.20 | -0.98 | -0.73 | -1.25 | 0.35 |
| 11 | -0.83 | -1.81 | -1.27 | -1.29 | -1.47 | -1.44 | -1.39 | -1.26 | -1.08 | -0.97 | -1.42 | -0.14 |
| 12 | -1.07 | -1.78 | -1.33 | -1.26 | -1.51 | -1.40 | -1.44 | -0.58 | -1.25 | -1.19 | -1.47 | -0.54 |
| 13 | -1.05 | -1.77 | -1.41 | -1.13 | -1.31 | -1.55 | -1.31 | -1.18 | -1.28 | -0.98 | -0.94 | -0.69 |
| 14 | -1.11 | -1.69 | -1.48 | -1.39 | -1.55 | -1.71 | -1.38 | -1.20 | -1.41 | -1.23 | -0.86 | -0.56 |
| 15 | -1.24 | -1.18 | -1.19 | -1.40 | -1.45 | -1.85 | -1.29 | -0.60 | -1.46 | -1.16 | -1.09 | -0.66 |
| 16 | -0.97 | -0.86 | -1.00 | -1.50 | -1.54 | -1.49 | -1.24 | -0.66 | -1.30 | -1.04 | -1.30 | -0.85 |
| 17 | -0.95 | -0.61 | -1.32 | -1.34 | -1.72 | -1.43 | -1.19 | -1.04 | -1.42 | -0.97 | -1.04 | -0.99 |
| 18 | -0.90 | -0.57 | -1.26 | -1.49 | -1.47 | -1.49 | -0.83 | -1.02 | -1.31 | -0.95 | -1.30 | -1.19 |
| 19 | -0.71 | -0.46 | -1.15 | -1.56 | -1.42 | -1.04 | -0.88 | -1.17 | -1.29 | -0.89 | -1.70 | -1.33 |
| 20 | -1.27 | -0.81 | -1.44 | -1.18 | -1.49 | -1.40 | -0.98 | -1.26 | -1.20 | -0.90 | -1.00 | -1.13 |
| 21 | -0.95 | -1.24 | -1.26 | -1.25 | -1.58 | -1.48 | -1.04 | -1.31 | -1.31 | -0.85 | -0.97 | -1.08 |
| 22 | -0.91 | -0.96 | -1.48 | -1.31 | -1.23 | -1.41 | -1.13 | -1.41 | -1.23 | -0.85 | -0.53 | -1.12 |
| 23 | -0.57 | -1.30 | -1.42 | -1.19 | -1.24 | -1.56 | -1.27 | -1.38 | -1.10 | -0.83 | -1.17 | -1.39 |
| 24 | -0.81 | -1.76 | -1.41 | -1.21 | -1.37 | -1.43 | -1.31 | -1.32 | -1.05 | -0.77 | -1.44 | -1.45 |
| 25 | -1.24 | -1.41 | -1.51 | -1.34 | -1.56 | -1.40 | -1.26 | -1.33 | -1.02 | -0.87 | -1.60 | -0.98 |
| 26 | -1.68 | -1.28 | -1.37 | -0.98 | -1.58 | -1.43 | -1.22 | -1.31 | -1.16 | -1.08 | -1.44 | -0.34 |
| 27 | -1.66 | -1.56 | -1.02 | -1.14 | -1.45 | -1.47 | -1.22 | -1.32 | -0.89 | -1.03 | -1.32 | -0.29 |
| 28 | -1.68 | -1.85 | -0.97 | -1.23 | -1.47 | -1.63 | -1.00 | -1.29 | -1.09 | -1.00 | -1.33 | -0.25 |
| 29 | -1.81 | -1.56 | -0.90 | -1.01 | -1.29 | -1.62 | -0.87 | -1.27 | -1.20 | -0.99 | -1.17 | -0.36 |
| 30 | -1.78 | -1.58 | -0.53 | -0.65 | | -1.57 | -1.23 | -1.30 | -1.24 | -1.17 | -1.14 | -0.47 |
| 31 | -1.77 | | -0.70 | -1.17 | | -1.53 | | -1.16 | | -1.12 | -1.23 | |
| Max | -0.25 | -0.46 | -0.53 | -0.63 | -1.17 | -1.04 | -0.83 | -0.58 | -0.89 | -0.72 | -0.53 | 0.35 |
| Min | -1.81 | -1.85 | -1.51 | -1.56 | -1.72 | -1.85 | -1.58 | -1.41 | -1.46 | -1.28 | -1.70 | -1.45 |
| Mean | -1.05 | -1.23 | -1.22 | -1.21 | -1.44 | -1.48 | -1.23 | -1.14 | -1.24 | -1.02 | -1.13 | -0.79 |

SOUTH COAST
OCT - 2008

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | -0.46 | -0.65 | -0.69 | -0.18 | -0.19 | -0.67 | -0.51 | -0.30 | -0.17 | -0.09 | 0.11 | 0.36 |
| 2 | -0.44 | -0.41 | -0.41 | -0.82 | -0.50 | -0.82 | -0.53 | 0.11 | -0.16 | -0.05 | 0.03 | -0.18 |
| 3 | 0.54 | -0.12 | -0.46 | -0.71 | -0.50 | -0.59 | -0.43 | 0.20 | -0.16 | -0.06 | -0.02 | -0.18 |
| 4 | 0.36 | 0.04 | -0.59 | -0.31 | -0.42 | -0.40 | -0.31 | 0.17 | -0.12 | -0.13 | -0.08 | -0.07 |
| 5 | 0.32 | 0.09 | -0.34 | -0.21 | -0.33 | -0.35 | -0.09 | -0.01 | -0.02 | -0.08 | -0.11 | 0.07 |
| 6 | 0.13 | 0.33 | -0.27 | -0.12 | -0.22 | -0.62 | -0.38 | -0.04 | -0.10 | -0.10 | -0.20 | 0.37 |
| 7 | 0.45 | 0.10 | -0.15 | -0.01 | -0.39 | -0.47 | -0.44 | -0.01 | -0.21 | -0.06 | -0.32 | 0.07 |
| 8 | 0.39 | -0.27 | -0.21 | -0.05 | -0.56 | 0.17 | -0.46 | 0.35 | -0.30 | -0.10 | -0.15 | -0.20 |
| 9 | 0.35 | -0.47 | -0.19 | -0.12 | -0.68 | -0.91 | -0.44 | 0.23 | -0.31 | -0.06 | -0.10 | -0.25 |
| 10 | 0.37 | -0.45 | -0.17 | -0.32 | -0.86 | -0.85 | -0.16 | 0.04 | -0.34 | 0.02 | -0.12 | 1.06 |
| 11 | 0.14 | -0.69 | -0.18 | -0.28 | -1.04 | -0.53 | -0.13 | 0.02 | -0.52 | -0.05 | -0.19 | 1.13 |
| 12 | -0.02 | -0.59 | -0.20 | -0.30 | -0.50 | -0.27 | -0.15 | -0.22 | -0.52 | -0.09 | -0.19 | 0.44 |
| 13 | -0.04 | -0.62 | -0.34 | -0.30 | -0.14 | -0.57 | -0.36 | -0.46 | -0.41 | 0.05 | 0.14 | 0.24 |
| 14 | -0.17 | -0.65 | -0.36 | -0.74 | -0.71 | -0.64 | -0.49 | -0.41 | -0.48 | -0.05 | 0.19 | 0.23 |
| 15 | -0.18 | -0.41 | -0.06 | -0.99 | -0.71 | -0.42 | -0.91 | 0.06 | -0.35 | 0.12 | 0.15 | 0.14 |
| 16 | 0.12 | -0.12 | 0.31 | -0.91 | -0.74 | -0.40 | -0.94 | 0.23 | -0.13 | 0.15 | -0.15 | -0.01 |
| 17 | 0.15 | 0.04 | -0.87 | 0.04 | -0.56 | -0.76 | -0.68 | 0.11 | -0.16 | 0.18 | -0.12 | -0.09 |
| 18 | 0.24 | 0.09 | -0.61 | -0.33 | -0.35 | -0.48 | -0.15 | 0.13 | -0.06 | 0.22 | -0.28 | -0.17 |
| 19 | 0.28 | 0.33 | -0.25 | -0.22 | -0.84 | -0.14 | 0.06 | 0.09 | -0.08 | 0.16 | -1.03 | -0.25 |
| 20 | -0.04 | 0.10 | -0.20 | -0.30 | -0.97 | -0.45 | 0.14 | 0.08 | 0.00 | 0.17 | -0.38 | -0.06 |
| 21 | -0.06 | -0.27 | -0.20 | -0.61 | -0.73 | -0.98 | 0.12 | -0.05 | -0.19 | 0.03 | -0.19 | 0.03 |
| 22 | -0.10 | 0.14 | -0.30 | -0.23 | -0.48 | -0.67 | 0.01 | -0.11 | -0.06 | -0.04 | 0.01 | 0.09 |
| 23 | 0.11 | -0.20 | -0.17 | -0.08 | -0.42 | -0.63 | -0.17 | -0.08 | -0.02 | -0.09 | -0.28 | -0.27 |
| 24 | 0.05 | -0.48 | -0.17 | -0.29 | -0.71 | -0.85 | -0.28 | -0.08 | -0.13 | 0.02 | -0.29 | -0.55 |
| 25 | -0.31 | -0.05 | -0.23 | -0.70 | -0.68 | -1.18 | -0.02 | -0.50 | -0.27 | -0.01 | -0.27 | -0.19 |
| 26 | -0.63 | 0.09 | -0.12 | -0.35 | -0.42 | -0.71 | 0.06 | -0.48 | -0.24 | -0.09 | -0.16 | 0.35 |
| 27 | -0.47 | -0.20 | 0.06 | -0.24 | -0.82 | -0.59 | 0.03 | -0.50 | -0.08 | 0.11 | -0.05 | 0.38 |
| 28 | -0.45 | -0.59 | 0.03 | -0.62 | -1.01 | -0.61 | 0.17 | -0.40 | -0.07 | 0.25 | -0.11 | 0.52 |
| 29 | -0.69 | -0.40 | 0.00 | -0.28 | -0.69 | -0.67 | -0.29 | -0.52 | -0.03 | 0.39 | -0.09 | 0.48 |
| 30 | -0.59 | -0.57 | 0.09 | -0.06 | | -0.78 | -0.58 | -0.56 | -0.06 | 0.34 | -0.25 | 0.36 |
| 31 | -0.62 | | -0.17 | -0.10 | | -0.68 | | -0.34 | | 0.14 | 0.04 | |
| Max | 0.54 | 0.33 | 0.31 | 0.04 | -0.14 | 0.17 | 0.17 | 0.35 | 0.00 | 0.39 | 0.19 | 1.13 |
| Min | -0.69 | -0.69 | -0.87 | -0.99 | -1.04 | -1.18 | -0.94 | -0.56 | -0.52 | -0.13 | -1.03 | -0.55 |
| Mean | -0.04 | -0.23 | -0.24 | -0.35 | -0.59 | -0.60 | -0.28 | -0.10 | -0.19 | 0.04 | -0.14 | 0.13 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Temperature, Water (Deg. C°), Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 29.7 | 26.2 | 23.5 | 22.0 | 18.3 | 24.1 | 25.7 | 28.3 | 25.4 | 31.0 | 30.3 | 31.9 |
| 2 | 30.2 | 25.3 | 23.8 | 21.5 | 19.6 | 24.5 | 26.1 | 28.2 | 24.8 | 31.0 | 29.5 | 32.0 |
| 3 | 29.4 | 24.7 | 24.2 | 22.4 | 19.3 | 24.1 | 26.8 | 28.4 | 26.3 | 31.5 | 30.4 | 32.2 |
| 4 | 28.6 | 24.1 | 23.6 | 23.0 | 18.6 | 22.6 | 27.1 | 29.0 | 27.6 | 30.9 | 31.8 | 32.5 |
| 5 | 28.2 | 23.0 | 21.6 | 23.0 | 17.3 | 21.1 | 26.6 | 29.1 | 28.8 | 32.1 | 32.3 | 32.7 |
| 6 | 28.2 | 23.5 | 21.2 | 24.3 | 17.1 | 19.5 | 25.7 | 29.2 | 28.4 | 31.5 | 32.7 | 32.2 |
| 7 | 28.8 | 23.1 | 20.9 | 24.5 | 18.1 | 20.1 | 23.1 | 28.1 | 29.2 | 32.5 | 33.7 | 31.5 |
| 8 | 28.8 | 23.9 | 20.1 | 24.5 | 18.9 | 20.8 | 21.4 | 25.9 | 30.6 | 33.0 | 34.1 | 30.6 |
| 9 | 28.3 | 23.9 | 17.6 | 23.0 | 19.4 | 21.7 | 20.8 | 25.4 | 30.8 | 33.1 | 33.2 | 30.2 |
| 10 | 28.2 | 24.0 | 17.5 | 19.9 | 19.7 | 22.4 | 19.9 | 26.4 | 31.8 | 32.6 | 33.4 | 30.1 |
| 11 | 27.9 | 24.5 | 19.0 | 18.2 | 18.7 | 23.2 | 23.1 | 27.3 | 32.2 | 33.4 | 33.4 | 30.9 |
| 12 | 28.1 | 25.0 | 19.6 | 18.6 | 18.3 | 23.3 | 25.0 | 27.6 | 32.1 | 33.5 | 32.9 | 31.5 |
| 13 | 28.5 | 23.9 | 20.1 | 19.7 | 19.1 | 23.8 | 26.3 | 28.3 | 31.5 | 33.3 | 33.0 | 31.8 |
| 14 | 28.1 | 23.5 | 20.8 | 20.6 | 21.1 | 23.3 | 26.9 | 28.3 | 30.7 | 33.0 | 32.8 | 32.2 |
| 15 | 26.8 | 23.4 | 21.1 | 21.1 | 20.4 | 23.5 | 25.4 | 27.6 | 30.2 | 33.0 | 32.2 | 32.0 |
| 16 | 26.6 | 22.6 | 20.6 | 22.5 | 17.4 | 23.8 | 23.5 | 27.4 | 30.6 | 32.4 | 32.3 | 32.8 |
| 17 | 26.1 | 22.2 | 21.6 | 22.5 | 16.5 | 22.6 | 22.5 | 28.2 | 30.8 | 32.7 | 32.4 | 32.7 |
| 18 | 27.4 | 20.9 | 22.1 | 21.9 | 16.7 | 21.4 | 22.9 | 28.6 | 31.0 | 33.0 | 32.4 | 31.6 |
| 19 | 28.2 | 19.9 | 22.6 | 22.0 | 15.8 | 21.0 | 23.6 | 27.8 | 30.5 | 33.1 | 32.2 | 31.1 |
| 20 | 29.0 | 18.9 | 22.4 | 21.9 | 17.0 | 21.9 | 24.4 | 26.5 | 30.8 | 32.5 | 32.5 | 28.8 |
| 21 | 29.5 | 17.4 | 21.9 | 21.5 | 19.0 | 21.9 | 24.0 | 26.5 | 30.6 | 33.0 | 32.8 | 29.1 |
| 22 | 29.7 | 16.4 | 22.0 | 22.2 | 20.0 | 22.0 | 24.4 | 26.2 | 31.9 | 31.7 | 32.6 | 28.2 |
| 23 | 29.2 | 17.8 | 23.0 | 22.5 | 20.4 | 23.2 | 24.5 | 25.8 | 31.8 | 31.0 | 32.5 | 29.1 |
| 24 | 27.4 | 19.1 | 23.6 | 22.2 | 20.1 | 23.5 | 24.9 | 26.6 | 31.9 | 30.0 | 33.0 | 29.5 |
| 25 | 23.0 | 20.2 | 23.5 | 20.2 | 20.7 | 23.9 | 25.5 | 26.9 | 32.7 | 31.6 | 32.3 | 29.5 |
| 26 | 23.7 | 21.1 | 22.6 | 18.1 | 21.4 | 24.0 | 27.1 | 27.0 | 32.3 | 32.7 | 30.7 | 29.6 |
| 27 | 24.4 | 21.6 | 20.3 | 17.2 | 23.6 | 24.0 | 27.8 | 27.3 | 31.1 | 32.4 | 32.2 | 30.0 |
| 28 | 24.9 | 22.8 | 19.2 | 18.2 | 24.1 | 25.2 | 27.9 | 27.6 | 30.4 | 31.4 | 32.5 | 31.0 |
| 29 | 24.7 | 23.0 | 19.5 | 17.4 | | 25.6 | 27.8 | 27.8 | 30.2 | 31.7 | 32.7 | 30.8 |
| 30 | 24.6 | 23.9 | 21.0 | 15.8 | | 25.9 | 27.8 | 26.7 | 31.0 | 31.4 | 32.8 | 29.8 |
| 31 | 25.1 | | 22.1 | 17.0 | | 26.0 | | 25.9 | | 30.5 | 32.1 | |
| Max | 30.2 | 26.2 | 24.2 | 24.5 | 24.1 | 26.0 | 27.9 | 29.2 | 32.7 | 33.5 | 34.1 | 32.8 |
| Min | 23.0 | 16.4 | 17.5 | 15.8 | 15.8 | 19.5 | 19.9 | 25.4 | 24.8 | 30.0 | 29.5 | 28.2 |
| Mean | 27.5 | 22.3 | 21.4 | 20.9 | 19.2 | 23.0 | 24.9 | 27.4 | 30.3 | 32.1 | 32.4 | 30.9 |

Q. 10/10/07
R. 10/10/07

Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
 Temperature, Water (Deg. C°), Water Year October 2006 to September 2007
 Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.8 | 23.5 | 22.4 | 21.1 | 16.0 | 22.5 | 23.2 | 25.0 | 23.8 | 29.1 | 28.9 | 29.7 |
| 2 | 28.3 | 24.3 | 22.4 | 20.7 | 18.2 | 22.9 | 23.7 | 25.5 | 23.1 | 29.3 | 28.0 | 30.0 |
| 3 | 27.5 | 23.7 | 23.0 | 20.4 | 18.5 | 22.1 | 24.0 | 25.8 | 23.9 | 29.0 | 27.2 | 30.2 |
| 4 | 27.2 | 22.2 | 21.6 | 21.7 | 17.2 | 20.8 | 24.6 | 26.3 | 25.2 | 29.8 | 28.7 | 30.2 |
| 5 | 26.2 | 21.3 | 19.7 | 21.5 | 15.6 | 18.5 | 25.1 | 26.8 | 26.2 | 29.4 | 29.8 | 30.3 |
| 6 | 26.1 | 21.8 | 19.1 | 22.0 | 14.5 | 17.3 | 22.9 | 27.2 | 27.4 | 30.6 | 31.0 | 29.7 |
| 7 | 26.2 | 22.3 | 19.5 | 23.1 | 15.4 | 17.8 | 21.0 | 25.9 | 26.7 | 30.2 | 31.0 | 29.2 |
| 8 | 26.8 | 22.3 | 17.2 | 22.9 | 16.4 | 18.5 | 19.4 | 23.2 | 27.3 | 30.9 | 31.8 | 28.7 |
| 9 | 26.3 | 22.1 | 15.0 | 19.8 | 17.3 | 19.5 | 19.3 | 23.3 | 28.0 | 31.1 | 31.6 | 28.8 |
| 10 | 25.7 | 22.1 | 15.0 | 17.4 | 18.0 | 20.6 | 19.2 | 24.2 | 29.1 | 31.3 | 31.0 | 28.2 |
| 11 | 26.1 | 22.6 | 16.4 | 16.7 | 17.5 | 21.3 | 19.3 | 25.2 | 29.5 | 31.0 | 31.2 | 28.5 |
| 12 | 26.4 | 22.9 | 18.0 | 17.0 | 17.8 | 21.7 | 21.4 | 25.9 | 30.0 | 30.8 | 30.3 | 29.3 |
| 13 | 26.6 | 22.2 | 19.2 | 18.1 | 18.0 | 22.1 | 22.6 | 26.1 | 29.7 | 31.1 | 29.7 | 29.3 |
| 14 | 26.1 | 21.5 | 19.8 | 19.0 | 18.9 | 22.3 | 23.5 | 26.4 | 28.2 | 31.1 | 30.1 | 29.2 |
| 15 | 25.6 | 21.5 | 20.2 | 19.6 | 17.5 | 21.8 | 23.6 | 25.8 | 27.7 | 30.5 | 29.8 | 30.1 |
| 16 | 24.5 | 21.8 | 20.2 | 20.4 | 15.4 | 22.7 | 21.0 | 25.3 | 28.3 | 30.8 | 29.1 | 30.3 |
| 17 | 24.2 | 20.8 | 20.2 | 21.0 | 14.2 | 20.7 | 19.3 | 26.0 | 28.2 | 30.2 | 29.8 | 30.5 |
| 18 | 24.7 | 19.6 | 21.0 | 20.9 | 14.6 | 19.5 | 20.0 | 26.5 | 28.8 | 30.7 | 30.0 | 30.0 |
| 19 | 26.0 | 18.9 | 21.1 | 20.6 | 13.4 | 18.5 | 21.2 | 26.3 | 29.2 | 30.8 | 30.5 | 28.4 |
| 20 | 26.8 | 16.8 | 20.9 | 20.2 | 14.0 | 19.4 | 22.2 | 24.1 | 29.0 | 31.0 | 30.2 | 26.8 |
| 21 | 27.4 | 15.3 | 20.5 | 19.3 | 15.8 | 19.9 | 22.1 | 24.1 | 28.9 | 31.1 | 30.4 | 26.4 |
| 22 | 27.9 | 14.7 | 20.7 | 20.2 | 17.7 | 20.2 | 22.0 | 24.4 | 29.2 | 29.8 | 30.1 | 27.5 |
| 23 | 27.2 | 15.0 | 21.3 | 21.5 | 18.5 | 20.8 | 22.0 | 24.4 | 29.6 | 30.0 | 30.0 | 26.9 |
| 24 | 22.0 | 16.1 | 22.0 | 20.0 | 18.5 | 21.6 | 22.7 | 24.5 | 29.8 | 28.1 | 30.2 | 27.4 |
| 25 | 20.2 | 17.6 | 22.3 | 18.0 | 19.0 | 22.0 | 23.5 | 24.6 | 30.1 | 28.1 | 29.7 | 27.6 |
| 26 | 21.0 | 18.8 | 20.3 | 16.4 | 20.3 | 22.2 | 23.9 | 24.6 | 29.8 | 29.6 | 29.5 | 27.6 |
| 27 | 21.7 | 20.3 | 18.2 | 16.2 | 21.3 | 22.8 | 25.2 | 24.6 | 29.1 | 29.8 | 28.8 | 28.0 |
| 28 | 23.5 | 20.4 | 17.8 | 17.2 | 22.1 | 22.5 | 25.9 | 24.9 | 28.6 | 29.9 | 29.5 | 28.4 |
| 29 | 21.0 | 21.1 | 18.2 | 15.6 | | 23.5 | 25.4 | 25.4 | 28.3 | 29.8 | 30.2 | 29.1 |
| 30 | 22.4 | 21.7 | 19.5 | 14.8 | | 23.3 | 25.2 | 25.2 | 28.6 | 29.5 | 30.5 | 27.9 |
| 31 | 21.9 | | 20.7 | 14.8 | | 23.4 | | 24.4 | | 29.4 | 30.3 | |
| Max | 28.3 | 24.3 | 23.0 | 23.1 | 22.1 | 23.5 | 25.9 | 27.2 | 30.1 | 31.3 | 31.8 | 30.5 |
| Min | 20.2 | 14.7 | 15.0 | 14.8 | 13.4 | 17.3 | 19.2 | 23.2 | 23.1 | 28.1 | 27.2 | 26.4 |
| Mean | 25.2 | 20.5 | 19.8 | 19.3 | 17.2 | 21.0 | 22.5 | 25.2 | 28.0 | 30.1 | 29.9 | 28.8 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Temperature, Water (Deg. C°), Water Year October 2006 to September 2007
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 28.9 | 24.4 | 22.9 | 21.8 | 17.1 | 23.2 | 24.4 | 26.5 | 24.5 | 30.1 | 29.7 | 31.0 |
| 2 | 29.0 | 24.7 | 23.1 | 21.2 | 19.2 | 23.7 | 24.8 | 26.8 | 24.0 | 30.0 | 28.7 | 31.2 |
| 3 | 28.4 | 24.2 | 23.6 | 21.4 | 18.9 | 23.1 | 25.5 | 27.2 | 24.9 | 30.2 | 28.5 | 31.2 |
| 4 | 27.8 | 23.0 | 23.1 | 22.4 | 17.8 | 21.5 | 25.9 | 27.6 | 26.3 | 30.3 | 29.9 | 31.4 |
| 5 | 27.2 | 22.3 | 20.8 | 22.4 | 16.4 | 19.7 | 25.9 | 27.9 | 27.4 | 30.6 | 31.0 | 31.5 |
| 6 | 27.2 | 22.7 | 20.1 | 23.2 | 15.8 | 18.7 | 24.3 | 28.1 | 27.9 | 31.0 | 31.9 | 30.9 |
| 7 | 27.6 | 22.7 | 20.3 | 23.9 | 16.8 | 19.0 | 21.9 | 26.8 | 27.9 | 31.4 | 32.1 | 30.2 |
| 8 | 27.9 | 23.1 | 18.6 | 23.9 | 17.7 | 19.8 | 20.4 | 24.4 | 28.6 | 32.0 | 32.4 | 29.6 |
| 9 | 27.5 | 23.1 | 16.4 | 21.4 | 18.4 | 20.5 | 19.9 | 24.4 | 29.2 | 32.1 | 32.1 | 29.4 |
| 10 | 27.1 | 23.2 | 16.4 | 18.4 | 18.7 | 21.5 | 19.5 | 25.3 | 30.2 | 32.1 | 32.1 | 29.4 |
| 11 | 27.1 | 23.6 | 17.7 | 17.4 | 18.1 | 22.2 | 20.4 | 26.1 | 30.5 | 32.0 | 32.1 | 29.7 |
| 12 | 27.3 | 23.9 | 18.8 | 17.8 | 18.0 | 22.5 | 22.9 | 26.5 | 30.9 | 32.0 | 31.5 | 30.4 |
| 13 | 27.7 | 23.1 | 19.6 | 18.8 | 18.5 | 22.9 | 24.0 | 27.0 | 30.4 | 32.1 | 31.4 | 30.6 |
| 14 | 27.4 | 22.4 | 20.1 | 19.8 | 19.9 | 22.6 | 24.8 | 27.1 | 29.3 | 32.0 | 31.4 | 30.8 |
| 15 | 26.2 | 22.2 | 20.5 | 20.4 | 18.9 | 22.7 | 24.8 | 26.5 | 29.0 | 31.8 | 30.9 | 31.1 |
| 16 | 25.5 | 22.4 | 20.4 | 21.4 | 16.9 | 23.2 | 21.8 | 26.3 | 29.3 | 31.5 | 30.6 | 31.4 |
| 17 | 25.1 | 21.5 | 20.9 | 21.7 | 15.4 | 21.9 | 20.8 | 27.0 | 29.3 | 31.4 | 31.1 | 31.5 |
| 18 | 25.8 | 20.4 | 21.5 | 21.4 | 15.4 | 20.2 | 21.4 | 27.5 | 29.8 | 31.8 | 31.2 | 31.0 |
| 19 | 26.9 | 19.4 | 21.8 | 21.3 | 14.7 | 19.8 | 22.4 | 26.9 | 29.8 | 31.8 | 31.3 | 29.3 |
| 20 | 27.8 | 18.3 | 21.7 | 21.0 | 15.5 | 20.5 | 23.2 | 25.5 | 30.0 | 31.7 | 31.4 | 27.6 |
| 21 | 28.4 | 16.7 | 21.3 | 20.5 | 17.3 | 20.9 | 23.1 | 25.3 | 29.8 | 31.8 | 31.8 | 27.5 |
| 22 | 28.8 | 15.6 | 21.5 | 21.4 | 18.8 | 21.2 | 23.2 | 25.3 | 30.4 | 30.9 | 31.5 | 27.7 |
| 23 | 28.4 | 16.5 | 22.3 | 22.1 | 19.4 | 21.9 | 23.1 | 25.2 | 30.7 | 30.4 | 31.2 | 27.7 |
| 24 | 23.9 | 17.7 | 22.9 | 21.3 | 19.3 | 22.6 | 23.5 | 25.4 | 30.8 | 29.0 | 31.0 | 28.2 |
| 25 | 21.8 | 18.9 | 22.9 | 19.1 | 19.6 | 22.8 | 24.4 | 25.5 | 31.3 | 29.5 | 30.5 | 28.5 |
| 26 | 22.5 | 20.0 | 21.6 | 17.1 | 20.7 | 23.0 | 25.2 | 25.5 | 30.9 | 30.7 | 30.1 | 28.6 |
| 27 | 23.3 | 21.0 | 19.3 | 16.7 | 22.2 | 23.3 | 26.2 | 25.7 | 29.9 | 30.9 | 30.2 | 28.9 |
| 28 | 24.1 | 21.7 | 18.4 | 17.7 | 23.1 | 23.7 | 26.7 | 26.0 | 29.5 | 30.7 | 30.9 | 29.6 |
| 29 | 23.4 | 22.1 | 18.8 | 16.4 | | 24.4 | 26.3 | 26.3 | 29.3 | 30.6 | 31.5 | 29.9 |
| 30 | 23.6 | 22.5 | 20.2 | 15.5 | | 24.4 | 26.4 | 25.9 | 29.7 | 30.5 | 31.8 | 29.0 |
| 31 | 23.6 | | 21.4 | 16.0 | | 24.4 | | 25.1 | | 30.0 | 31.3 | |
| Max | 29.0 | 24.7 | 23.6 | 23.9 | 23.1 | 24.4 | 26.7 | 28.1 | 31.3 | 32.1 | 32.4 | 31.5 |
| Min | 21.8 | 15.6 | 16.4 | 15.5 | 14.7 | 18.7 | 19.5 | 24.4 | 24.0 | 29.0 | 28.5 | 27.5 |
| Mean | 26.4 | 21.4 | 20.6 | 20.1 | 18.2 | 22.0 | 23.6 | 26.2 | 29.0 | 31.1 | 31.1 | 29.8 |

07/10/07
07/10/07
07/10/07

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Temperature, Water (Deg. C°), Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 28.9 | 26.0 | 24.6 | 23.7 | 19.6 | 19.3 | 25.8 | 26.6 | 31.3 | 30.9 | 29.3 | 29.0 |
| 2 | 27.9 | 26.5 | 25.3 | 20.9 | 19.8 | 20.6 | 26.5 | 26.7 | 31.3 | 30.9 | 30.3 | 30.0 |
| 3 | 28.4 | 25.2 | 25.4 | 14.0 | 21.2 | 21.8 | 26.7 | 26.5 | 31.2 | 29.2 | 31.3 | 30.7 |
| 4 | 28.5 | 24.7 | 24.1 | 12.6 | 22.5 | 21.6 | 27.1 | 27.5 | 31.4 | 30.3 | 30.8 | 30.8 |
| 5 | 28.6 | 23.7 | 21.4 | 14.4 | 22.9 | 22.7 | 27.3 | 28.0 | 31.4 | 31.3 | 30.2 | 29.6 |
| 6 | 27.2 | 23.0 | 21.8 | 16.6 | 23.3 | 22.1 | 26.3 | 27.5 | 31.5 | 31.4 | 30.7 | 30.3 |
| 7 | 28.0 | 22.0 | 22.0 | 18.6 | 23.8 | 23.1 | 26.1 | 27.5 | 31.4 | 30.8 | 31.7 | 30.8 |
| 8 | 28.1 | 21.3 | 23.2 | 20.1 | 23.9 | 22.3 | 25.9 | 27.9 | 30.5 | 30.0 | 31.2 | 30.8 |
| 9 | 28.5 | 20.6 | 23.7 | 20.6 | 23.5 | 20.0 | 26.3 | 28.5 | 31.5 | 30.3 | 30.5 | 30.2 |
| 10 | 28.9 | 20.9 | 24.1 | 21.3 | 22.3 | 20.0 | 26.6 | 29.4 | 31.3 | 31.5 | 30.6 | 29.8 |
| 11 | 29.6 | 21.7 | 24.3 | 21.6 | 21.0 | 21.1 | 26.8 | 29.6 | 31.4 | 31.8 | 31.1 | 29.8 |
| 12 | 28.9 | 22.2 | 24.6 | 22.0 | 20.0 | 22.3 | 27.6 | 29.5 | 31.5 | 30.8 | 30.7 | 31.5 |
| 13 | 28.7 | 23.0 | 24.9 | 22.6 | 20.3 | 21.7 | 26.2 | 28.9 | 31.5 | 30.0 | 29.7 | 31.8 |
| 14 | 28.3 | 23.7 | 24.9 | 22.2 | 19.2 | 21.2 | 23.4 | 28.7 | 32.3 | 31.5 | 28.9 | 31.3 |
| 15 | 28.1 | 24.1 | 25.1 | 19.8 | 19.7 | 22.9 | 21.5 | 28.3 | 31.7 | 30.7 | 29.3 | 31.4 |
| 16 | 27.6 | 22.9 | 24.4 | 17.9 | 21.1 | 24.7 | 21.6 | 28.7 | 30.3 | 29.4 | 29.9 | 31.4 |
| 17 | 28.3 | 20.3 | 22.0 | 18.6 | 21.7 | 24.6 | 22.8 | 29.5 | 31.3 | 29.1 | 31.2 | 31.7 |
| 18 | 29.2 | 21.6 | 18.9 | 18.6 | 22.9 | 24.0 | 23.3 | 29.1 | 31.5 | 30.6 | 30.5 | 31.5 |
| 19 | 29.5 | 22.3 | 19.2 | 19.7 | 22.4 | 24.2 | 24.2 | 28.4 | 30.7 | 31.7 | 28.0 | 31.1 |
| 20 | 29.1 | 22.8 | 19.2 | 19.2 | 20.8 | 24.4 | 25.7 | 27.9 | 31.7 | 32.6 | 28.0 | 31.1 |
| 21 | 28.5 | 22.5 | 20.4 | 17.0 | 20.8 | 24.0 | 25.7 | 29.1 | 30.3 | 33.0 | 28.6 | 30.9 |
| 22 | 29.7 | 21.9 | 19.5 | 18.1 | 22.8 | 23.2 | 25.9 | 28.4 | 30.2 | 32.3 | 28.6 | 30.4 |
| 23 | 29.5 | 22.0 | 20.8 | 20.2 | 22.9 | 23.7 | 25.7 | 29.3 | 31.2 | 31.7 | 28.4 | 29.8 |
| 24 | 28.5 | 22.0 | 21.7 | 20.2 | 23.3 | 23.0 | 25.5 | 30.4 | 31.1 | 30.0 | 28.8 | 29.0 |
| 25 | 26.5 | 23.0 | 22.2 | 19.6 | 24.4 | 20.5 | 26.0 | 30.3 | 29.9 | 31.3 | 30.7 | 27.7 |
| 26 | 26.4 | 24.0 | 22.1 | 19.0 | 24.5 | 20.5 | 26.4 | 28.7 | 28.8 | 31.9 | 31.3 | 27.7 |
| 27 | 25.9 | 24.6 | 22.4 | 19.6 | 24.1 | 21.2 | 26.7 | 27.6 | 29.2 | 30.9 | 32.0 | 27.8 |
| 28 | 26.2 | 24.5 | 23.0 | 18.6 | 19.5 | 22.6 | 26.1 | 29.7 | 30.5 | 31.3 | 31.6 | 27.1 |
| 29 | 26.0 | 25.1 | 23.7 | 18.1 | 18.2 | 23.9 | 26.0 | 29.9 | 31.1 | 30.4 | 31.0 | 27.3 |
| 30 | 25.2 | 24.7 | 23.9 | 19.0 | | 24.3 | 26.3 | 30.5 | 31.8 | 29.8 | 30.2 | 27.8 |
| 31 | 25.9 | | 24.0 | 19.7 | | 24.2 | | 30.6 | | 30.4 | 28.6 | |
| Max | 29.7 | 26.5 | 25.4 | 23.7 | 24.5 | 24.7 | 27.6 | 30.6 | 32.3 | 33.0 | 32.0 | 31.8 |
| Min | 25.2 | 20.3 | 18.9 | 12.6 | 18.2 | 19.3 | 21.5 | 26.5 | 28.8 | 29.1 | 28.0 | 27.1 |
| Mean | 28.0 | 23.1 | 22.8 | 19.2 | 21.8 | 22.4 | 25.6 | 28.7 | 31.0 | 30.9 | 30.1 | 30.0 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Temperature, Water (Deg. C°), Water Year October 2007 to September 2008
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 26.1 | 24.4 | 22.9 | 21.1 | 18.2 | 17.2 | 22.9 | 23.5 | 28.5 | 28.8 | 27.0 | 27.1 |
| 2 | 26.2 | 24.3 | 23.0 | 14.0 | 17.4 | 14.7 | 24.1 | 23.4 | 28.9 | 28.3 | 26.7 | 27.8 |
| 3 | 25.8 | 23.5 | 23.3 | 10.9 | 19.0 | 19.0 | 24.6 | 24.1 | 28.9 | 27.5 | 27.4 | 28.4 |
| 4 | 27.5 | 22.5 | 21.1 | 10.8 | 20.2 | 20.8 | 24.4 | 24.6 | 29.2 | 27.1 | 28.2 | 28.9 |
| 5 | 26.5 | 21.8 | 20.4 | 12.1 | 21.0 | 20.8 | 24.9 | 25.7 | 29.3 | 28.1 | 27.9 | 28.4 |
| 6 | 26.0 | 21.3 | 20.0 | 14.2 | 21.0 | 21.1 | 24.6 | 25.4 | 29.3 | 28.9 | 27.9 | 27.5 |
| 7 | 25.7 | 21.3 | 20.3 | 16.2 | 21.9 | 21.1 | 24.0 | 25.2 | 29.2 | 28.9 | 28.7 | 28.8 |
| 8 | 25.8 | 19.3 | 21.4 | 17.8 | 22.9 | 19.4 | 23.9 | 25.7 | 28.9 | 27.9 | 30.0 | 29.2 |
| 9 | 26.1 | 18.9 | 21.8 | 18.3 | 22.2 | 17.7 | 23.2 | 26.5 | 28.7 | 27.3 | 29.1 | 28.9 |
| 10 | 26.6 | 18.7 | 22.4 | 19.1 | 20.5 | 18.0 | 23.6 | 27.2 | 28.5 | 28.2 | 28.8 | 28.1 |
| 11 | 27.1 | 19.4 | 22.7 | 19.6 | 19.4 | 19.1 | 23.9 | 27.9 | 28.7 | 29.4 | 29.3 | 28.2 |
| 12 | 26.7 | 19.6 | 22.7 | 20.2 | 19.1 | 20.3 | 24.8 | 27.3 | 28.5 | 29.5 | 28.8 | 28.3 |
| 13 | 26.4 | 20.5 | 22.9 | 21.2 | 19.1 | 20.0 | 23.3 | 26.5 | 28.8 | 28.9 | 28.5 | 28.7 |
| 14 | 26.2 | 21.5 | 23.7 | 19.8 | 18.0 | 19.7 | 21.1 | 25.9 | 28.5 | 28.9 | 27.4 | 29.0 |
| 15 | 25.6 | 22.0 | 23.7 | 17.5 | 14.2 | 19.6 | 19.8 | 25.7 | 29.7 | 29.3 | 27.2 | 29.1 |
| 16 | 25.9 | 19.0 | 22.0 | 16.1 | 15.3 | 22.0 | 12.7 | 26.1 | 29.0 | 28.0 | 27.5 | 29.5 |
| 17 | 26.3 | 17.4 | 18.1 | 16.6 | 19.8 | 22.2 | 18.8 | 27.0 | 28.6 | 27.0 | 27.6 | 29.3 |
| 18 | 27.3 | 18.9 | 16.9 | 18.1 | 21.1 | 22.0 | 19.7 | 27.5 | 29.2 | 27.0 | 27.9 | 29.1 |
| 19 | 28.0 | 19.9 | 17.2 | 18.3 | 21.0 | 21.9 | 20.9 | 27.3 | 28.9 | 27.7 | 26.7 | 28.8 |
| 20 | 28.0 | 20.5 | 17.9 | 16.1 | 15.5 | 22.6 | 22.5 | 26.9 | 28.9 | 28.8 | 26.4 | 28.7 |
| 21 | 27.2 | 20.9 | 18.8 | 14.9 | 18.7 | 21.6 | 22.5 | 26.5 | 28.3 | 29.9 | 26.8 | 28.9 |
| 22 | 27.3 | 21.2 | 18.9 | 14.9 | 19.8 | 21.3 | 23.3 | 27.7 | 27.6 | 30.0 | 27.1 | 29.2 |
| 23 | 27.6 | 21.1 | 18.9 | 17.3 | 21.8 | 21.0 | 23.3 | 27.1 | 28.3 | 29.5 | 27.6 | 28.1 |
| 24 | 26.6 | 20.2 | 19.9 | 19.1 | 21.9 | 20.6 | 23.5 | 27.8 | 28.4 | 28.9 | 27.0 | 26.9 |
| 25 | 25.5 | 20.8 | 20.3 | 17.9 | 22.5 | 6.9 | 23.6 | 28.4 | 27.3 | 28.6 | 27.5 | 25.3 |
| 26 | 24.3 | 21.5 | 20.8 | 16.9 | 23.1 | 14.4 | 24.1 | 27.0 | 26.5 | 29.8 | 28.8 | 25.2 |
| 27 | 25.0 | 22.5 | 20.5 | 17.8 | 19.6 | 18.4 | 24.3 | 25.9 | 26.3 | 29.2 | 28.5 | 25.3 |
| 28 | 24.6 | 23.1 | 21.4 | 17.0 | 5.0 | 19.9 | 25.2 | 25.8 | 27.5 | 29.5 | 28.3 | 25.9 |
| 29 | 24.6 | 23.0 | 22.1 | 16.7 | 8.9 | 21.3 | 24.8 | 26.8 | 28.0 | 28.5 | 28.5 | 26.2 |
| 30 | 24.0 | 23.8 | 22.8 | 17.3 | | 22.5 | 23.5 | 27.5 | 28.3 | 27.9 | 27.8 | 26.1 |
| 31 | 23.9 | | 23.2 | 18.4 | | 21.7 | | 27.5 | | 27.6 | 26.9 | |
| Max | 28.0 | 24.4 | 23.7 | 21.2 | 23.1 | 22.6 | 25.2 | 28.4 | 29.7 | 30.0 | 30.0 | 29.5 |
| Min | 23.9 | 17.4 | 16.9 | 10.8 | 5.0 | 6.9 | 12.7 | 23.4 | 26.3 | 27.0 | 26.4 | 25.2 |
| Mean | 26.1 | 21.1 | 21.0 | 17.0 | 18.9 | 19.6 | 22.9 | 26.4 | 28.5 | 28.5 | 27.9 | 28.0 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
 Temperature, Water (Deg. C°), Water Year October 2007 to September 2008
 Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.6 | 25.2 | 23.7 | 23.2 | 19.0 | 18.3 | 24.2 | 24.5 | 29.6 | 29.5 | 28.3 | 27.9 |
| 2 | 27.1 | 25.3 | 23.9 | 17.7 | 18.8 | 19.1 | 25.1 | 24.7 | 30.0 | 29.1 | 28.2 | 28.6 |
| 3 | 27.0 | 24.3 | 24.1 | 12.4 | 20.1 | 20.3 | 25.5 | 25.1 | 30.0 | 28.3 | 29.0 | 29.3 |
| 4 | 27.9 | 23.4 | 22.5 | 11.9 | 21.2 | 21.1 | 25.7 | 25.9 | 30.3 | 28.5 | 29.1 | 29.7 |
| 5 | 27.8 | 22.6 | 20.8 | 13.3 | 22.0 | 21.6 | 25.9 | 26.6 | 30.3 | 29.5 | 28.8 | 29.0 |
| 6 | 26.5 | 22.1 | 20.9 | 15.3 | 22.4 | 21.6 | 25.5 | 26.4 | 30.3 | 29.9 | 29.2 | 29.1 |
| 7 | 26.7 | 21.7 | 21.2 | 17.3 | 23.0 | 21.9 | 24.9 | 26.3 | 30.1 | 29.5 | 30.3 | 30.0 |
| 8 | 26.8 | 20.4 | 22.3 | 18.8 | 23.4 | 21.2 | 24.6 | 26.7 | 29.6 | 29.1 | 30.7 | 30.2 |
| 9 | 27.1 | 19.9 | 22.8 | 19.7 | 22.6 | 19.1 | 24.5 | 27.4 | 29.5 | 28.6 | 29.7 | 29.5 |
| 10 | 27.6 | 19.9 | 23.3 | 20.4 | 21.3 | 19.1 | 24.7 | 28.2 | 29.6 | 29.9 | 29.7 | 28.8 |
| 11 | 28.2 | 20.6 | 23.5 | 20.8 | 20.3 | 20.0 | 25.1 | 28.7 | 29.9 | 30.5 | 30.0 | 28.9 |
| 12 | 28.0 | 21.2 | 23.8 | 21.3 | 19.4 | 21.2 | 26.0 | 28.3 | 29.9 | 30.2 | 29.7 | 29.4 |
| 13 | 27.7 | 21.8 | 24.0 | 22.1 | 19.7 | 20.9 | 25.1 | 27.4 | 29.8 | 29.4 | 29.0 | 29.9 |
| 14 | 27.4 | 22.7 | 24.3 | 20.9 | 18.8 | 20.5 | 22.4 | 26.9 | 30.3 | 29.8 | 28.3 | 30.1 |
| 15 | 27.1 | 23.2 | 24.5 | 18.6 | 18.6 | 21.0 | 20.5 | 26.7 | 30.4 | 29.6 | 28.0 | 30.3 |
| 16 | 27.0 | 20.8 | 23.6 | 17.1 | 19.6 | 23.0 | 19.3 | 27.2 | 29.4 | 28.7 | 28.4 | 30.5 |
| 17 | 27.4 | 19.0 | 20.0 | 17.3 | 20.8 | 23.4 | 20.2 | 27.9 | 29.6 | 28.1 | 28.9 | 30.5 |
| 18 | 28.3 | 20.1 | 17.7 | 18.2 | 22.0 | 22.9 | 21.2 | 28.2 | 30.1 | 28.4 | 28.8 | 30.4 |
| 19 | 28.9 | 21.0 | 17.9 | 18.9 | 21.8 | 22.9 | 22.5 | 27.8 | 29.7 | 29.3 | 27.4 | 30.2 |
| 20 | 28.5 | 21.3 | 18.4 | 18.0 | 19.9 | 23.3 | 23.8 | 27.3 | 30.1 | 30.4 | 27.1 | 30.0 |
| 21 | 27.9 | 21.4 | 19.5 | 15.9 | 19.7 | 22.7 | 24.1 | 27.7 | 29.4 | 31.1 | 27.5 | 30.0 |
| 22 | 28.2 | 21.5 | 19.3 | 16.7 | 21.2 | 21.8 | 24.6 | 28.0 | 28.8 | 31.2 | 27.8 | 29.8 |
| 23 | 28.3 | 21.6 | 19.9 | 18.9 | 22.4 | 22.2 | 24.6 | 28.0 | 29.4 | 30.5 | 28.1 | 28.9 |
| 24 | 27.4 | 21.1 | 20.8 | 19.7 | 22.7 | 22.1 | 24.5 | 28.9 | 29.5 | 29.4 | 28.0 | 28.0 |
| 25 | 25.8 | 22.0 | 21.2 | 18.7 | 23.5 | 16.0 | 24.7 | 29.2 | 28.9 | 29.9 | 28.9 | 26.6 |
| 26 | 25.3 | 22.9 | 21.5 | 18.0 | 23.9 | 18.4 | 25.1 | 27.8 | 27.5 | 30.5 | 29.6 | 26.3 |
| 27 | 25.5 | 23.7 | 21.5 | 18.8 | 22.0 | 19.8 | 25.4 | 26.7 | 27.9 | 30.3 | 29.7 | 26.6 |
| 28 | 25.4 | 23.8 | 22.2 | 17.9 | 14.7 | 21.1 | 25.7 | 27.2 | 28.8 | 30.2 | 29.6 | 26.6 |
| 29 | 25.4 | 24.2 | 22.9 | 17.6 | 16.0 | 22.4 | 25.4 | 28.0 | 29.3 | 29.8 | 29.6 | 26.7 |
| 30 | 24.8 | 24.1 | 23.4 | 18.2 | | 23.3 | 24.7 | 28.6 | 29.7 | 29.1 | 29.0 | 26.9 |
| 31 | 25.0 | | 23.6 | 18.9 | | 23.5 | | 28.8 | | 28.8 | 27.8 | |
| Max | 28.9 | 25.3 | 24.5 | 23.2 | 23.9 | 23.5 | 26.0 | 29.2 | 30.4 | 31.2 | 30.7 | 30.5 |
| Min | 24.8 | 19.0 | 17.7 | 11.9 | 14.7 | 16.0 | 19.3 | 24.5 | 27.5 | 28.1 | 27.1 | 26.3 |
| Mean | 27.1 | 22.1 | 21.9 | 18.1 | 20.7 | 21.2 | 24.2 | 27.3 | 29.6 | 29.6 | 28.8 | 29.0 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 21900 | 36420 | 36320 | 38640 | 34090 | 38060 | 37820 | 41810 | 47260 | 50130 | 44300 | 39810 |
| 2 | 23900 | 36530 | 38190 | 37310 | 35220 | 38950 | 38230 | 42930 | 45740 | 47830 | 36140 | 40940 |
| 3 | 35110 | 35420 | 38460 | 35690 | 29430 | 36950 | 37760 | 43230 | 45380 | 49910 | 21810 | 41210 |
| 4 | 36260 | 33440 | 38760 | 37190 | 20060 | 30240 | 38390 | 44990 | 46490 | 48770 | 23050 | 40130 |
| 5 | 33790 | 36400 | 34490 | 38470 | 16700 | 27310 | 40680 | 46750 | 48730 | 48470 | 24730 | 40950 |
| 6 | 36960 | 37510 | 36320 | 37850 | 20190 | 29250 | 36980 | 46840 | 49240 | 44700 | 30310 | 42650 |
| 7 | 35080 | 38560 | 36560 | 37520 | 27590 | 34810 | 34050 | 43230 | 49920 | 43730 | 36120 | 42460 |
| 8 | 35940 | 39310 | 32130 | 37130 | 27410 | 34310 | 33930 | 42680 | 43570 | 46370 | 40540 | 42740 |
| 9 | 34730 | 37390 | 28150 | 27160 | 28760 | 35990 | 35350 | 43280 | 43360 | 48450 | 42810 | 42720 |
| 10 | 36290 | 35440 | 31890 | 28990 | 27830 | 36730 | 34220 | 43070 | 46200 | 48820 | 42460 | 42040 |
| 11 | 38050 | 36660 | 32990 | 33100 | 29690 | 36860 | 36430 | 41900 | 47550 | 49150 | 43320 | 42290 |
| 12 | 38470 | 36360 | 34520 | 35320 | 32450 | 38760 | 24900 | 42770 | 49500 | 48560 | 40280 | 41870 |
| 13 | 38710 | 32620 | 34700 | 36530 | 35630 | 39800 | 28150 | 43020 | 48830 | 49650 | 40280 | 40630 |
| 14 | 32780 | 32810 | 35650 | 37940 | 31550 | 39580 | 34510 | 44300 | 48710 | 50160 | 40440 | 37000 |
| 15 | 34090 | 36830 | 34270 | 38790 | 31430 | 41210 | 39360 | 45050 | 48750 | 50530 | 37730 | 36600 |
| 16 | 37520 | 37320 | 37520 | 39350 | 27470 | 40960 | 28200 | 46150 | 48910 | 49740 | 31050 | 32300 |
| 17 | 39120 | 29410 | 37880 | 39590 | 24400 | 39260 | 25270 | 47390 | 48890 | 48860 | 30040 | 36530 |
| 18 | 37490 | 29270 | 38810 | 36810 | 31280 | 33720 | 35970 | 47270 | 49220 | 48400 | 29860 | 32590 |
| 19 | 37320 | 31300 | 39000 | 37120 | 19510 | 33080 | 34960 | 45870 | 48260 | 44650 | 33970 | 36590 |
| 20 | 37450 | 32450 | 38100 | 36570 | 24590 | 32830 | 36750 | 46010 | 48020 | 43390 | 36890 | 37530 |
| 21 | 38970 | 28890 | 38230 | 34900 | 29460 | 35900 | 36100 | 46380 | 45830 | 44690 | 40540 | 40530 |
| 22 | 38880 | 27680 | 38380 | 36900 | 30380 | 36130 | 40050 | 46030 | 44490 | 43150 | 42930 | 37600 |
| 23 | 42080 | 28090 | 39490 | 35410 | 30620 | 37810 | 39910 | 44110 | 46310 | 43930 | 43830 | 36490 |
| 24 | 31880 | 30520 | 38460 | 34310 | 36240 | 39420 | 39880 | 44210 | 46340 | 42000 | 45150 | 37940 |
| 25 | 35750 | 29990 | 39220 | 29660 | 36700 | 38420 | 40260 | 44290 | 45990 | 43350 | 44970 | 38130 |
| 26 | 37120 | 30230 | 33090 | 31480 | 35520 | 39250 | 38830 | 45090 | 47410 | 44040 | 43980 | 39690 |
| 27 | 38740 | 30710 | 26400 | 34250 | 38210 | 38260 | 39030 | 46210 | 48900 | 43600 | 43720 | 38820 |
| 28 | 42300 | 32860 | 31940 | 30200 | 38020 | 37050 | 37040 | 46680 | 48710 | 47110 | 43810 | 37600 |
| 29 | 31740 | 33760 | 33460 | 28960 | | 34130 | 36050 | 47590 | 48570 | 46040 | 43610 | 39020 |
| 30 | 33910 | 36170 | 37770 | 31940 | | 35460 | 38560 | 48120 | 49130 | 46880 | 42670 | 34730 |
| 31 | 37040 | | 38820 | 32210 | | 38630 | | 47320 | | 45450 | 41150 | |
| Max | 42300 | 39310 | 39490 | 39590 | 38210 | 41210 | 40680 | 48120 | 49920 | 50530 | 45150 | 42740 |
| Min | 21900 | 27680 | 26400 | 27160 | 16700 | 27310 | 24900 | 41810 | 43360 | 42000 | 21810 | 32300 |
| Mean | 35786 | 33678 | 35805 | 35074 | 29658 | 36423 | 35921 | 44986 | 47474 | 46791 | 38145 | 39004 |

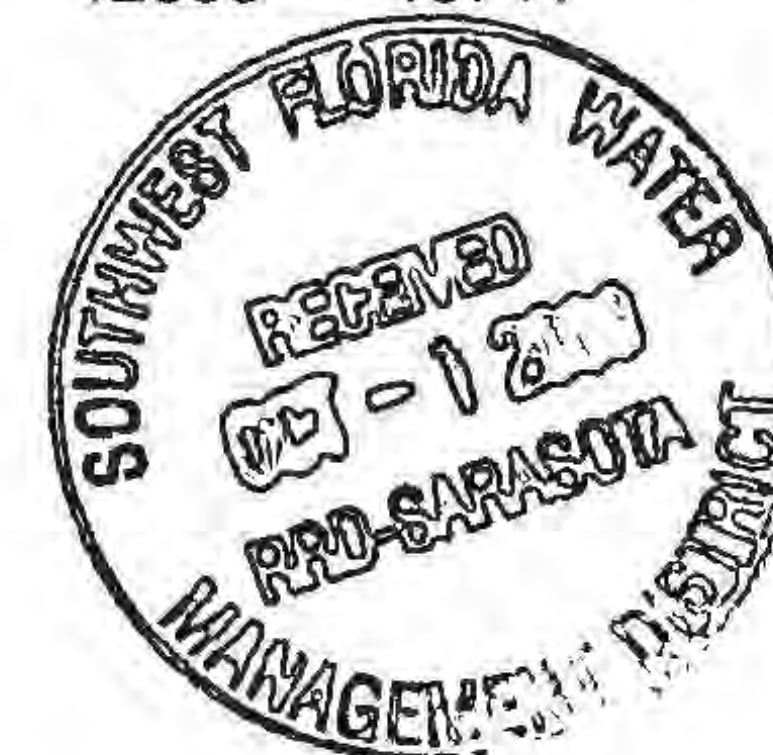


Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 3050 | 24860 | 21060 | 20350 | 15140 | 18060 | 19170 | 20970 | 36620 | 34030 | 25940 | 19920 |
| 2 | 2540 | 24330 | 20430 | 18550 | 18790 | 22600 | 19760 | 22490 | 33830 | 32600 | 16580 | 19120 |
| 3 | 5740 | 20320 | 21020 | 18230 | 10960 | 20340 | 17740 | 22930 | 35150 | 32500 | 6210 | 18000 |
| 4 | 9480 | 15520 | 24270 | 19810 | 7550 | 18320 | 17470 | 23070 | 31920 | 33470 | 4660 | 19000 |
| 5 | 10940 | 18160 | 18380 | 22150 | 5410 | 15800 | 17840 | 23610 | 31600 | 31220 | 4350 | 19020 |
| 6 | 11600 | 22180 | 20040 | 22950 | 5360 | 16060 | 18070 | 26330 | 32350 | 30390 | 5390 | 20690 |
| 7 | 13010 | 26000 | 23120 | 21950 | 7870 | 18840 | 17800 | 22500 | 31990 | 25460 | 7410 | 21050 |
| 8 | 12280 | 26040 | 18950 | 21890 | 8500 | 18990 | 14610 | 22420 | 32470 | 27920 | 9270 | 24970 |
| 9 | 12650 | 25170 | 16830 | 18540 | 7490 | 17600 | 15020 | 26220 | 26410 | 27380 | 11870 | 27070 |
| 10 | 13960 | 23820 | 19470 | 12310 | 7480 | 17820 | 14900 | 28530 | 29380 | 26860 | 13270 | 26570 |
| 11 | 17630 | 25200 | 22360 | 19030 | 6510 | 18150 | 12940 | 29050 | 28740 | 27520 | 13170 | 25340 |
| 12 | 15500 | 25290 | 22070 | 16860 | 8070 | 16600 | 11750 | 30080 | 28190 | 26290 | 7140 | 26940 |
| 13 | 15880 | 23160 | 22730 | 18560 | 9560 | 17810 | 8030 | 32270 | 27200 | 27810 | 6830 | 23780 |
| 14 | 13380 | 22810 | 22380 | 19660 | 11810 | 19560 | 7650 | 30060 | 28470 | 27330 | 8340 | 18360 |
| 15 | 14040 | 23110 | 22090 | 20900 | 10000 | 22410 | 17010 | 30190 | 28200 | 27910 | 8980 | 12590 |
| 16 | 18830 | 23820 | 21090 | 21950 | 8600 | 26830 | 6490 | 31930 | 31150 | 27750 | 6310 | 10330 |
| 17 | 21370 | 18550 | 21600 | 21970 | 6770 | 23270 | 7270 | 33500 | 31700 | 28520 | 6170 | 11990 |
| 18 | 20700 | 16300 | 21950 | 22320 | 6380 | 18020 | 7950 | 34080 | 33340 | 29520 | 6250 | 9570 |
| 19 | 18580 | 15300 | 22840 | 23960 | 6230 | 16430 | 12050 | 31730 | 34240 | 28350 | 7600 | 11030 |
| 20 | 18830 | 16040 | 22900 | 24020 | 9070 | 15000 | 10530 | 29550 | 32660 | 24840 | 8880 | 12540 |
| 21 | 19090 | 13930 | 24660 | 23630 | 9000 | 16130 | 9340 | 31860 | 34480 | 26950 | 11140 | 17950 |
| 22 | 17080 | 16160 | 26910 | 27170 | 9670 | 14860 | 11060 | 33530 | 31500 | 25090 | 13340 | 16760 |
| 23 | 17720 | 14270 | 27360 | 26430 | 8470 | 14450 | 14210 | 33410 | 30550 | 23620 | 15250 | 16380 |
| 24 | 11400 | 15880 | 27070 | 25570 | 7980 | 14560 | 16560 | 33310 | 31670 | 22530 | 18250 | 18680 |
| 25 | 16220 | 16410 | 29320 | 21540 | 12120 | 14980 | 18960 | 36130 | 29780 | 23940 | 19640 | 20120 |
| 26 | 19130 | 17260 | 20210 | 15090 | 14850 | 15030 | 19390 | 36450 | 29300 | 23970 | 19830 | 19690 |
| 27 | 23530 | 17900 | 14360 | 12690 | 15840 | 16230 | 23380 | 38220 | 31250 | 23110 | 21040 | 20760 |
| 28 | 25830 | 19560 | 14400 | 18690 | 16520 | 17990 | 24170 | 37380 | 31290 | 24680 | 21780 | 19250 |
| 29 | 17960 | 21080 | 13570 | 11020 | | 18330 | 20930 | 37150 | 32370 | 27320 | 22610 | 19120 |
| 30 | 18940 | 21240 | 13950 | 10870 | | 17390 | 20620 | 37270 | 32350 | 27840 | 20460 | 15640 |
| 31 | 23510 | | 17300 | 12980 | | 18880 | | 37150 | | 28660 | 22180 | |
| Max | 25830 | 26040 | 29320 | 27170 | 18790 | 26830 | 24170 | 38220 | 36620 | 34030 | 25940 | 27070 |
| Min | 2540 | 13930 | 13570 | 10870 | 5360 | 14450 | 6490 | 20970 | 26410 | 22530 | 4350 | 9570 |
| Mean | 15497 | 20322 | 21119 | 19730 | 9714 | 17979 | 15089 | 30431 | 31338 | 27593 | 12585 | 18741 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41

Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007

Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 11600 | 30870 | 28890 | 29180 | 25650 | 28990 | 28490 | 31620 | 42800 | 42720 | 33570 | 30000 |
| 2 | 12980 | 30690 | 29510 | 26960 | 25710 | 29640 | 28980 | 32430 | 41030 | 40700 | 27550 | 29130 |
| 3 | 15730 | 27470 | 29890 | 27060 | 18500 | 26600 | 28140 | 33160 | 40330 | 41860 | 13160 | 28860 |
| 4 | 19870 | 24250 | 30180 | 29520 | 12960 | 24200 | 27860 | 34750 | 39900 | 41770 | 10290 | 28380 |
| 5 | 20220 | 29260 | 28800 | 30670 | 10310 | 21380 | 30410 | 36430 | 40690 | 40380 | 10680 | 29660 |
| 6 | 23750 | 31600 | 28700 | 30370 | 11460 | 21810 | 27430 | 37850 | 41290 | 38370 | 15020 | 32230 |
| 7 | 24850 | 33810 | 30110 | 29720 | 16390 | 26270 | 24730 | 31290 | 40940 | 36330 | 18950 | 31720 |
| 8 | 24460 | 33030 | 24990 | 29690 | 16010 | 25790 | 23830 | 33890 | 37840 | 36960 | 23550 | 33800 |
| 9 | 24120 | 31640 | 23710 | 23500 | 15160 | 26760 | 24350 | 36260 | 35390 | 38330 | 27040 | 34320 |
| 10 | 25630 | 30370 | 27000 | 20720 | 16720 | 26900 | 23570 | 36970 | 37470 | 38320 | 26710 | 34190 |
| 11 | 28290 | 30950 | 28870 | 25290 | 15230 | 27000 | 24960 | 35980 | 38510 | 39490 | 28500 | 33710 |
| 12 | 27180 | 30680 | 27710 | 27130 | 19740 | 27520 | 18520 | 37450 | 40270 | 39340 | 22410 | 34760 |
| 13 | 27090 | 28780 | 28230 | 27330 | 21630 | 28660 | 14730 | 37890 | 39730 | 40040 | 19430 | 33370 |
| 14 | 22840 | 27760 | 28850 | 28420 | 20970 | 29780 | 20600 | 38020 | 40150 | 40270 | 21320 | 28280 |
| 15 | 24690 | 29710 | 29240 | 29690 | 17850 | 32020 | 27970 | 37780 | 40480 | 40500 | 19700 | 22230 |
| 16 | 29300 | 29210 | 29190 | 30340 | 14950 | 33820 | 13920 | 40860 | 41580 | 39220 | 15550 | 20640 |
| 17 | 30300 | 24090 | 29830 | 30050 | 15510 | 29610 | 15670 | 41930 | 41160 | 39040 | 16570 | 22350 |
| 18 | 28830 | 23500 | 30720 | 30780 | 17290 | 25150 | 21570 | 41600 | 42260 | 38970 | 15300 | 19380 |
| 19 | 28020 | 23620 | 30260 | 30140 | 11920 | 24820 | 23270 | 39030 | 41840 | 35380 | 17460 | 21330 |
| 20 | 29120 | 24060 | 30970 | 30350 | 16580 | 25120 | 22880 | 38010 | 41120 | 35220 | 20690 | 23430 |
| 21 | 30010 | 20820 | 32380 | 30660 | 17960 | 25580 | 21290 | 39930 | 41430 | 35550 | 25380 | 29870 |
| 22 | 30070 | 22780 | 34130 | 32620 | 18960 | 24230 | 24710 | 40400 | 39180 | 34370 | 27720 | 26170 |
| 23 | 28810 | 21840 | 34130 | 31400 | 17490 | 25290 | 26700 | 39820 | 39560 | 33130 | 29110 | 25590 |
| 24 | 21300 | 23050 | 33490 | 30500 | 21050 | 26880 | 28250 | 40220 | 39010 | 31970 | 32750 | 27260 |
| 25 | 26620 | 23300 | 34150 | 25370 | 24190 | 25580 | 30860 | 40760 | 38840 | 33020 | 32700 | 28640 |
| 26 | 28880 | 24660 | 26520 | 21120 | 24830 | 26710 | 29670 | 41100 | 38860 | 34390 | 32010 | 29370 |
| 27 | 32810 | 25400 | 20530 | 23230 | 25340 | 27840 | 31360 | 42160 | 40160 | 34050 | 31240 | 30530 |
| 28 | 34440 | 27140 | 21890 | 23590 | 26190 | 27620 | 30570 | 42260 | 40520 | 38250 | 31530 | 29900 |
| 29 | 25140 | 26850 | 23530 | 18270 | | 25980 | 29600 | 43070 | 41150 | 37240 | 31700 | 28510 |
| 30 | 27770 | 28170 | 25640 | 20530 | | 25640 | 29100 | 43720 | 42310 | 38240 | 31600 | 24620 |
| 31 | 30830 | | 28150 | 21040 | | 28860 | | 43070 | | 37040 | 32910 | |
| Max | 34440 | 33810 | 34150 | 32620 | 26190 | 33820 | 31360 | 43720 | 42800 | 42720 | 33570 | 34760 |
| Min | 11600 | 20820 | 20530 | 18270 | 10310 | 21380 | 13920 | 31290 | 35390 | 31970 | 10290 | 19380 |
| Mean | 25663 | 27312 | 28716 | 27266 | 18448 | 26840 | 25133 | 38378 | 40193 | 37757 | 23939 | 28408 |

US Manatee River
OCT - 10-10-07
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4A

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 39070 | 37000 | 36850 | 36850 | 32680 | 34090 | 37200 | 38430 | 49700 | 45590 | 39670 | 33520 |
| 2 | 39980 | 33110 | 39770 | 30390 | 36730 | 36440 | 36490 | 40660 | 50670 | 45950 | 34290 | 19450 |
| 3 | 41570 | 33430 | 39440 | 28990 | 37000 | 39430 | 37030 | 41380 | 51230 | 43900 | 34400 | 21710 |
| 4 | 33970 | 31940 | 36760 | 32400 | 40110 | 39080 | 34650 | 42690 | 52330 | 44740 | 24280 | 27080 |
| 5 | 32930 | 32640 | 38440 | 34370 | 40220 | 38620 | 34810 | 43230 | 52240 | 45990 | 15810 | 26490 |
| 6 | 15130 | 34760 | 38180 | 35880 | 40630 | 36900 | 31940 | 44050 | 52240 | 45060 | 13860 | 31460 |
| 7 | 19270 | 34390 | 39130 | 37810 | 40280 | 37630 | 29210 | 44620 | 51560 | 39330 | 15670 | 29620 |
| 8 | 18350 | 28550 | 39220 | 38960 | 40760 | 37170 | 31690 | 46550 | 50080 | 24960 | 27520 | 29570 |
| 9 | 24410 | 33240 | 39940 | 39410 | 38360 | 23260 | 31110 | 46280 | 46760 | 17820 | 29860 | 36610 |
| 10 | 26930 | 34580 | 40740 | 39300 | 33550 | 32110 | 40270 | 47120 | 44890 | 29010 | 15170 | 42920 |
| 11 | 23980 | 37470 | 41060 | 40200 | 34280 | 35540 | 41880 | 47520 | 45620 | 32070 | 19860 | 40620 |
| 12 | 28740 | 36630 | 41530 | 40120 | 37810 | 36340 | 41270 | 42120 | 45920 | 36880 | 23190 | 38850 |
| 13 | 28100 | 39790 | 40480 | 40470 | 37900 | 32670 | 28120 | 41160 | 44580 | 43240 | 39430 | 40370 |
| 14 | 34860 | 39100 | 40420 | 37160 | 33280 | 35190 | 27150 | 43700 | 45500 | 37700 | 34230 | 41290 |
| 15 | 35410 | 38660 | 41370 | 34930 | 36050 | 39790 | 24160 | 44930 | 47360 | 41100 | 27210 | 39080 |
| 16 | 39940 | 30050 | 42590 | 37050 | 38830 | 33310 | 21470 | 46020 | 49090 | 42350 | 25690 | 37140 |
| 17 | 38160 | 36700 | 31500 | 38120 | 40490 | 36190 | 27990 | 46060 | 47850 | 36570 | 28650 | 36110 |
| 18 | 41150 | 34530 | 33670 | 36010 | 40100 | 37610 | 34110 | 47850 | 50000 | 35680 | 22190 | 35900 |
| 19 | 42760 | 34750 | 36020 | 39500 | 37550 | 38580 | 36450 | 47130 | 47970 | 38020 | 8520 | 35590 |
| 20 | 38800 | 37100 | 38390 | 39310 | 33730 | 39000 | 38100 | 47240 | 49570 | 36890 | 16420 | 38250 |
| 21 | 37440 | 41160 | 37220 | 33020 | 35980 | 31490 | 38360 | 48240 | 46560 | 38050 | 15090 | 36800 |
| 22 | 37130 | 42320 | 37010 | 35960 | 37520 | 34820 | 38000 | 47830 | 47470 | 33930 | 18830 | 38230 |
| 23 | 39820 | 41940 | 38410 | 36970 | 37560 | 34600 | 37690 | 49040 | 39380 | 31370 | 21510 | 32320 |
| 24 | 38690 | 41500 | 38900 | 35550 | 33690 | 31330 | 39320 | 51020 | 27880 | 32160 | 33830 | 29700 |
| 25 | 31240 | 43010 | 38990 | 28770 | 35510 | 27670 | 41500 | 48380 | 20560 | 33840 | 23780 | 35270 |
| 26 | 29020 | 43540 | 39110 | 30770 | 39730 | 34480 | 41330 | 47530 | 21260 | 36180 | 32890 | 36980 |
| 27 | 31900 | 43100 | 38570 | 33050 | 28780 | 37090 | 41940 | 46050 | 30500 | 41060 | 27900 | 34240 |
| 28 | 34910 | 40090 | 38120 | 29070 | 28640 | 37750 | 41670 | 45350 | 33910 | 42810 | 26000 | 33370 |
| 29 | 32540 | 42220 | 38420 | 34840 | 35140 | 36980 | 34950 | 44840 | 38100 | 42780 | 32900 | 30650 |
| 30 | 37640 | 39710 | 40270 | 32850 | | 38590 | 35980 | 46680 | 42920 | 43750 | 28850 | 29640 |
| 31 | 36390 | | 39480 | 36900 | | 39220 | | 47920 | | 41260 | 35780 | |
| Max | 42760 | 43540 | 42590 | 40470 | 40760 | 39790 | 41940 | 51020 | 52330 | 45990 | 39670 | 42920 |
| Min | 15130 | 28550 | 31500 | 28770 | 28640 | 23260 | 21470 | 38430 | 20560 | 17820 | 8520 | 19450 |
| Mean | 33233 | 37234 | 38710 | 35645 | 36651 | 35580 | 35195 | 45536 | 44123 | 38066 | 25590 | 33961 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41

Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008

Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1 | 18670 | 11370 | 25030 | 26220 | 13400 | 230 | 19850 | 21350 | 39090 | 7800 | 3570 | 1890 |
| 2 | 18790 | 13320 | 26940 | 10730 | 12020 | 190 | 21290 | 25710 | 38050 | 10640 | 2580 | 1430 |
| 3 | 13320 | 12370 | 26120 | 11590 | 14700 | 16830 | 13230 | 28900 | 38860 | 10850 | 2370 | 1740 |
| 4 | 7170 | 14840 | 23750 | 11410 | 16650 | 21990 | 9980 | 28220 | 39300 | 10200 | 2020 | 2380 |
| 5 | 3100 | 14230 | 22390 | 9710 | 20190 | 24630 | 10520 | 27450 | 39270 | 12390 | 1760 | 4450 |
| 6 | 1020 | 14500 | 23090 | 23070 | 23180 | 22840 | 4610 | 28230 | 39030 | 14730 | 1290 | 5240 |
| 7 | 850 | 13950 | 22410 | 25190 | 23420 | 22440 | 3510 | 27600 | 38980 | 15290 | 1390 | 4030 |
| 8 | 630 | 11570 | 23320 | 26410 | 23560 | 13030 | 2580 | 29720 | 39310 | 7620 | 2040 | 5290 |
| 9 | 720 | 12970 | 23990 | 28420 | 22380 | 5970 | 1900 | 31810 | 37670 | 4250 | 1500 | 7450 |
| 10 | 1270 | 13470 | 25500 | 27860 | 19880 | 9780 | 1430 | 31390 | 35810 | 4590 | 1370 | 23020 |
| 11 | 1220 | 14900 | 25950 | 29380 | 19040 | 11510 | 4860 | 32300 | 35620 | 4350 | 1340 | 18660 |
| 12 | 1450 | 14720 | 27700 | 29550 | 19380 | 13580 | 9140 | 36240 | 30400 | 4800 | 1540 | 16750 |
| 13 | 1820 | 16910 | 27310 | 29920 | 22360 | 12400 | 11420 | 29630 | 24480 | 8130 | 3450 | 17980 |
| 14 | 2510 | 18500 | 27430 | 27290 | 17590 | 10760 | 9890 | 28710 | 25890 | 8600 | 2700 | 17320 |
| 15 | 3870 | 19520 | 29020 | 23440 | 300 | 11570 | 9710 | 34530 | 26640 | 8070 | 1300 | 16080 |
| 16 | 9540 | 15200 | 28540 | 11580 | 320 | 14770 | 80 | 36180 | 26720 | 7170 | 1360 | 15260 |
| 17 | 11150 | 18370 | 23060 | 24090 | 10870 | 8100 | 5980 | 34880 | 25220 | 3050 | 1260 | 15160 |
| 18 | 14020 | 18920 | 22820 | 24400 | 25190 | 15450 | 12480 | 35920 | 26830 | 2730 | 1060 | 13780 |
| 19 | 16140 | 20190 | 20960 | 22760 | 21660 | 20570 | 16820 | 34750 | 25190 | 2670 | 1060 | 12030 |
| 20 | 13670 | 20000 | 22740 | 10190 | 410 | 17320 | 18010 | 34320 | 25060 | 2970 | 1850 | 13270 |
| 21 | 14070 | 20850 | 24390 | 8870 | 22220 | 16240 | 18630 | 34850 | 22240 | 4240 | 1280 | 13310 |
| 22 | 15880 | 23830 | 24180 | 17780 | 24960 | 17850 | 18920 | 34350 | 20890 | 6790 | 1830 | 14390 |
| 23 | 18680 | 23060 | 24880 | 21070 | 24010 | 16300 | 18140 | 32880 | 13900 | 5710 | 1140 | 12210 |
| 24 | 17280 | 20200 | 25670 | 15810 | 21390 | 14550 | 16440 | 34350 | 8440 | 6470 | 1040 | 11020 |
| 25 | 11120 | 23930 | 26380 | 6850 | 20470 | 50 | 17730 | 35270 | 5250 | 7290 | 1320 | 14130 |
| 26 | 7480 | 26160 | 27690 | 12050 | 18700 | 110 | 20450 | 330 | 3360 | 6800 | 1250 | 19110 |
| 27 | 7030 | 26160 | 28900 | 12980 | 17330 | 6890 | 21210 | 30980 | 3470 | 8080 | 1010 | 17680 |
| 28 | 7530 | 24540 | 28020 | 8670 | 180 | 15160 | 23180 | 31860 | 2980 | 5520 | 750 | 18660 |
| 29 | 6690 | 26320 | 28220 | 10910 | 200 | 16020 | 24920 | 32600 | 3430 | 5830 | 1340 | 16690 |
| 30 | 7850 | 25760 | 30100 | 13540 | | 9290 | 19590 | 35810 | 5370 | 6230 | 1220 | 15420 |
| 31 | 9260 | | 26500 | 12980 | | 210 | | 38160 | | 5020 | 820 | |
| Max | 18790 | 26320 | 30100 | 29920 | 25190 | 24630 | 24920 | 38160 | 39310 | 15290 | 3570 | 23020 |
| Min | 630 | 11370 | 20960 | 6850 | 180 | 50 | 80 | 330 | 2980 | 2670 | 750 | 1430 |
| Mean | 8510 | 18354 | 25581 | 18539 | 16412 | 12472 | 12883 | 30945 | 24892 | 7061 | 1607 | 12194 |

OCT
R.
14

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
 Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008
 Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 28570 | 23180 | 32060 | 32120 | 22840 | 22300 | 29120 | 30870 | 44850 | 24910 | 17710 | 11290 |
| 2 | 30230 | 23730 | 33080 | 25340 | 22910 | 22900 | 28530 | 33730 | 45700 | 27480 | 11190 | 6230 |
| 3 | 29310 | 23520 | 31890 | 25020 | 24560 | 27500 | 23300 | 35180 | 46100 | 25490 | 10620 | 9220 |
| 4 | 20530 | 23310 | 30730 | 28250 | 27220 | 30000 | 20360 | 36040 | 46820 | 26160 | 7980 | 12190 |
| 5 | 13350 | 23370 | 31310 | 27460 | 29910 | 31600 | 21120 | 36210 | 46860 | 28530 | 6430 | 14580 |
| 6 | 3490 | 25890 | 29780 | 29560 | 31690 | 29720 | 15380 | 36810 | 46060 | 28370 | 4350 | 16370 |
| 7 | 3200 | 23870 | 30340 | 32050 | 31390 | 30980 | 12690 | 37230 | 45710 | 26410 | 4550 | 14350 |
| 8 | 2640 | 21520 | 31090 | 33420 | 31270 | 27530 | 9880 | 39260 | 44850 | 16380 | 8660 | 15710 |
| 9 | 4340 | 23320 | 32450 | 34290 | 29420 | 16090 | 9840 | 40000 | 43150 | 9290 | 9460 | 20320 |
| 10 | 8780 | 23830 | 33380 | 34530 | 26550 | 17790 | 17770 | 39980 | 41100 | 12670 | 5310 | 34160 |
| 11 | 9790 | 25450 | 34120 | 35430 | 25100 | 22070 | 22560 | 40990 | 41280 | 13980 | 5910 | 30860 |
| 12 | 11220 | 25680 | 34710 | 35480 | 29810 | 24870 | 24770 | 38700 | 37580 | 17010 | 8240 | 26160 |
| 13 | 12990 | 28660 | 34340 | 35820 | 31230 | 21340 | 20770 | 36900 | 35970 | 22840 | 16960 | 26850 |
| 14 | 14900 | 28580 | 34770 | 32350 | 25230 | 21360 | 19180 | 36870 | 35250 | 21490 | 15880 | 28100 |
| 15 | 19540 | 28590 | 36540 | 29410 | 22950 | 25440 | 14620 | 39750 | 37240 | 23190 | 9200 | 27580 |
| 16 | 24250 | 22940 | 37210 | 28360 | 24030 | 24560 | 12630 | 41290 | 37920 | 23060 | 6720 | 26170 |
| 17 | 24580 | 28070 | 27260 | 32866 | 29120 | 23180 | 17330 | 41640 | 37290 | 15850 | 7370 | 25870 |
| 18 | 26740 | 27520 | 28140 | 30280 | 32230 | 27630 | 23260 | 42690 | 39270 | 13070 | 5290 | 24980 |
| 19 | 28190 | 27530 | 29630 | 31172 | 28640 | 30090 | 26100 | 42060 | 37700 | 13610 | 2720 | 23310 |
| 20 | 25660 | 27390 | 30750 | 28633 | 25370 | 26860 | 28040 | 41640 | 37850 | 15380 | 7190 | 25590 |
| 21 | 24740 | 31210 | 31360 | 25420 | 29420 | 23350 | 28740 | 41970 | 34040 | 16710 | 6730 | 25300 |
| 22 | 24490 | 33310 | 30760 | 27921 | 31490 | 26320 | 28700 | 41920 | 32760 | 17050 | 7490 | 25510 |
| 23 | 28690 | 31880 | 31890 | 28369 | 31550 | 26150 | 27490 | 42280 | 25930 | 16210 | 6330 | 22200 |
| 24 | 27310 | 30800 | 33120 | 24809 | 27790 | 22520 | 27090 | 43600 | 16460 | 16990 | 10490 | 20600 |
| 25 | 20360 | 34600 | 33490 | 19256 | 27850 | 9100 | 30060 | 41880 | 10820 | 17250 | 5770 | 24570 |
| 26 | 16960 | 35750 | 34400 | 22444 | 29860 | 21680 | 31950 | 38930 | 8920 | 18540 | 9720 | 27380 |
| 27 | 19350 | 34690 | 34190 | 22707 | 23380 | 24560 | 32260 | 39880 | 12030 | 22160 | 7920 | 26280 |
| 28 | 19680 | 33060 | 34030 | 17350 | 13520 | 26800 | 33630 | 39990 | 11930 | 22720 | 6930 | 25710 |
| 29 | 17630 | 34350 | 34390 | 20668 | 19100 | 26740 | 30090 | 40150 | 14590 | 23250 | 9780 | 23880 |
| 30 | 19970 | 32770 | 35050 | 20830 | | 26870 | 28520 | 40890 | 19350 | 24300 | 8800 | 21730 |
| 31 | 21390 | | 32460 | 23732 | | 26810 | | 42830 | | 20850 | 12310 | |
| Max | 30230 | 35750 | 37210 | 35820 | 32230 | 31600 | 33630 | 43600 | 46860 | 28530 | 17710 | 34160 |
| Min | 2640 | 21520 | 27260 | 17350 | 13520 | 9100 | 9840 | 30870 | 8920 | 9290 | 2720 | 6230 |
| Mean | 18802 | 27946 | 32539 | 28237 | 27084 | 24668 | 23193 | 39425 | 33846 | 20039 | 8516 | 22102 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Salinity, parts per thousand, Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 12.94 | 24.51 | 24.27 | 26.51 | 25.01 | 25.23 | 24.54 | 25.91 | 30.99 | 28.92 | 25.59 | 22.78 |
| 2 | 14.23 | 24.23 | 25.32 | 25.83 | 25.95 | 25.96 | 24.04 | 26.35 | 30.10 | 27.43 | 21.14 | 23.43 |
| 3 | 22.01 | 23.50 | 25.56 | 24.84 | 20.87 | 24.07 | 23.28 | 26.17 | 28.93 | 28.49 | 12.29 | 23.61 |
| 4 | 22.84 | 22.79 | 25.71 | 25.14 | 14.04 | 20.56 | 23.50 | 27.02 | 28.80 | 28.12 | 12.69 | 22.90 |
| 5 | 21.23 | 25.21 | 24.44 | 26.45 | 11.89 | 18.83 | 25.15 | 27.98 | 29.53 | 27.26 | 13.39 | 23.44 |
| 6 | 23.16 | 26.23 | 25.85 | 25.70 | 14.47 | 20.52 | 23.87 | 27.86 | 29.91 | 25.68 | 16.49 | 24.82 |
| 7 | 21.57 | 26.83 | 26.23 | 24.59 | 19.96 | 24.66 | 23.00 | 26.68 | 29.89 | 25.25 | 20.08 | 24.80 |
| 8 | 22.52 | 27.40 | 22.90 | 24.24 | 19.37 | 23.79 | 23.75 | 27.70 | 26.57 | 26.55 | 22.48 | 25.16 |
| 9 | 21.80 | 26.00 | 21.15 | 18.34 | 20.18 | 24.70 | 25.26 | 27.63 | 25.98 | 27.78 | 23.88 | 25.01 |
| 10 | 23.45 | 24.38 | 24.00 | 21.21 | 19.30 | 24.67 | 24.52 | 26.93 | 27.04 | 27.89 | 23.50 | 24.41 |
| 11 | 24.68 | 25.09 | 24.77 | 24.61 | 21.32 | 24.30 | 25.15 | 26.06 | 27.82 | 28.18 | 23.80 | 24.27 |
| 12 | 24.84 | 24.64 | 24.67 | 25.87 | 23.79 | 25.60 | 15.47 | 26.66 | 28.71 | 27.57 | 22.00 | 23.52 |
| 13 | 24.84 | 21.68 | 24.63 | 26.08 | 25.88 | 26.10 | 17.42 | 26.53 | 28.62 | 27.83 | 21.85 | 22.55 |
| 14 | 20.25 | 21.87 | 25.13 | 26.60 | 21.80 | 26.65 | 21.74 | 27.36 | 28.96 | 28.13 | 22.01 | 20.92 |
| 15 | 21.92 | 24.63 | 23.99 | 26.96 | 21.72 | 27.67 | 24.98 | 28.32 | 28.95 | 28.29 | 20.59 | 20.42 |
| 16 | 24.99 | 25.01 | 26.50 | 26.85 | 20.14 | 27.46 | 18.45 | 28.86 | 28.75 | 27.86 | 16.63 | 17.75 |
| 17 | 26.09 | 19.55 | 26.21 | 27.09 | 18.37 | 26.55 | 16.97 | 29.00 | 28.47 | 27.22 | 16.24 | 20.24 |
| 18 | 24.35 | 19.97 | 26.78 | 25.41 | 24.62 | 23.82 | 24.26 | 28.56 | 28.34 | 26.73 | 16.33 | 18.03 |
| 19 | 23.48 | 22.41 | 26.95 | 25.95 | 14.39 | 22.98 | 22.86 | 28.34 | 27.97 | 24.39 | 18.83 | 21.37 |
| 20 | 23.59 | 23.43 | 26.48 | 25.60 | 18.89 | 22.64 | 23.58 | 29.08 | 27.70 | 24.56 | 20.88 | 22.88 |
| 21 | 24.46 | 21.68 | 26.87 | 24.91 | 21.08 | 24.61 | 23.42 | 29.26 | 26.72 | 25.38 | 23.11 | 25.04 |
| 22 | 24.21 | 21.67 | 26.88 | 26.01 | 21.14 | 24.53 | 25.93 | 29.08 | 26.27 | 25.06 | 24.80 | 22.52 |
| 23 | 26.34 | 21.84 | 27.34 | 24.06 | 21.09 | 25.09 | 25.95 | 28.01 | 27.23 | 25.45 | 25.41 | 21.91 |
| 24 | 20.66 | 23.10 | 26.14 | 23.36 | 25.74 | 26.05 | 26.06 | 28.07 | 27.05 | 24.97 | 26.12 | 22.50 |
| 25 | 25.41 | 21.82 | 26.42 | 21.24 | 25.93 | 25.02 | 26.05 | 28.76 | 26.71 | 26.07 | 26.03 | 22.45 |
| 26 | 26.20 | 21.43 | 22.16 | 23.77 | 24.46 | 25.60 | 24.62 | 29.36 | 27.75 | 25.74 | 25.38 | 23.22 |
| 27 | 27.08 | 20.73 | 18.51 | 25.91 | 25.45 | 25.08 | 24.27 | 30.08 | 28.91 | 25.07 | 24.91 | 22.29 |
| 28 | 29.08 | 22.79 | 23.00 | 22.42 | 25.30 | 23.79 | 22.66 | 30.12 | 28.92 | 26.95 | 24.60 | 21.91 |
| 29 | 21.00 | 22.63 | 23.77 | 22.10 | | 21.71 | 22.24 | 30.48 | 28.92 | 26.40 | 24.13 | 22.48 |
| 30 | 22.93 | 24.18 | 26.33 | 24.94 | | 22.69 | 23.68 | 30.89 | 28.79 | 26.66 | 23.31 | 20.06 |
| 31 | 25.82 | | 26.66 | 25.18 | | 24.78 | | 30.86 | | 26.45 | 23.15 | |
| Max | 29.08 | 27.40 | 27.34 | 27.09 | 25.95 | 27.67 | 26.06 | 30.89 | 30.99 | 28.92 | 26.12 | 25.16 |
| Min | 12.94 | 19.55 | 18.51 | 18.34 | 11.89 | 18.83 | 15.47 | 25.91 | 25.98 | 24.39 | 12.29 | 17.75 |
| Mean | 23.16 | 23.37 | 25.02 | 24.77 | 21.15 | 24.38 | 23.22 | 28.19 | 28.31 | 26.72 | 21.34 | 22.56 |

OCT
6

Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
 Salinity, parts per thousand, Water Year October 2006 to September 2007
 Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 1.55 | 15.64 | 13.25 | 13.06 | 10.68 | 11.23 | 11.72 | 11.98 | 23.31 | 19.17 | 14.38 | 10.36 |
| 2 | 1.27 | 15.51 | 12.77 | 11.96 | 12.68 | 14.05 | 11.63 | 12.91 | 21.74 | 18.28 | 9.07 | 9.87 |
| 3 | 3.04 | 12.91 | 13.04 | 11.68 | 7.21 | 12.91 | 10.23 | 13.17 | 22.50 | 18.32 | 3.17 | 9.26 |
| 4 | 5.27 | 9.86 | 15.34 | 12.49 | 4.91 | 11.74 | 10.07 | 13.20 | 19.67 | 18.63 | 2.24 | 9.66 |
| 5 | 6.22 | 11.78 | 11.85 | 14.04 | 3.62 | 10.45 | 10.23 | 13.45 | 19.04 | 17.43 | 2.02 | 9.68 |
| 6 | 6.69 | 14.41 | 13.10 | 14.35 | 3.58 | 10.94 | 10.56 | 15.09 | 19.01 | 16.64 | 2.52 | 10.87 |
| 7 | 7.49 | 17.14 | 15.32 | 13.47 | 5.29 | 12.75 | 11.00 | 12.99 | 19.01 | 13.87 | 3.51 | 11.26 |
| 8 | 6.88 | 17.00 | 12.87 | 13.34 | 5.65 | 12.73 | 9.24 | 13.41 | 19.13 | 14.55 | 4.47 | 13.66 |
| 9 | 7.23 | 16.29 | 11.80 | 11.89 | 4.88 | 11.52 | 9.63 | 16.20 | 15.07 | 14.34 | 5.87 | 14.96 |
| 10 | 8.04 | 15.29 | 13.75 | 8.24 | 4.82 | 11.52 | 9.72 | 17.63 | 16.38 | 14.12 | 6.59 | 14.73 |
| 11 | 10.37 | 16.11 | 15.46 | 13.60 | 4.22 | 11.51 | 8.41 | 17.65 | 15.62 | 14.50 | 6.62 | 14.18 |
| 12 | 8.95 | 16.04 | 15.30 | 11.73 | 5.24 | 10.38 | 7.25 | 18.18 | 15.27 | 13.81 | 3.50 | 14.77 |
| 13 | 9.12 | 14.41 | 15.30 | 12.85 | 6.30 | 11.19 | 4.69 | 19.36 | 15.03 | 14.68 | 3.34 | 12.84 |
| 14 | 7.69 | 14.27 | 15.14 | 13.41 | 7.72 | 12.34 | 4.36 | 17.74 | 15.78 | 14.47 | 4.10 | 9.72 |
| 15 | 8.20 | 15.04 | 14.76 | 14.13 | 6.46 | 14.39 | 9.95 | 18.03 | 15.86 | 14.90 | 4.45 | 6.34 |
| 16 | 11.40 | 15.33 | 14.01 | 14.55 | 5.77 | 17.11 | 3.85 | 19.16 | 17.74 | 14.83 | 3.10 | 5.12 |
| 17 | 13.21 | 11.98 | 14.36 | 14.30 | 4.66 | 15.10 | 4.32 | 20.07 | 18.12 | 15.46 | 3.00 | 5.96 |
| 18 | 12.55 | 10.68 | 14.38 | 14.66 | 4.40 | 12.00 | 4.74 | 20.29 | 18.97 | 15.91 | 2.98 | 4.72 |
| 19 | 11.24 | 10.17 | 14.86 | 15.78 | 4.35 | 10.95 | 7.29 | 18.73 | 19.45 | 15.02 | 3.64 | 5.69 |
| 20 | 11.22 | 10.82 | 14.87 | 15.84 | 6.24 | 9.52 | 6.23 | 17.91 | 18.46 | 13.23 | 4.25 | 6.74 |
| 21 | 11.25 | 9.61 | 16.16 | 15.77 | 6.13 | 10.29 | 5.47 | 19.72 | 19.64 | 14.02 | 5.40 | 9.82 |
| 22 | 9.89 | 11.61 | 17.67 | 17.93 | 6.35 | 9.41 | 6.58 | 20.87 | 17.73 | 13.28 | 6.61 | 9.28 |
| 23 | 10.25 | 9.93 | 17.60 | 17.17 | 5.41 | 9.09 | 8.68 | 20.86 | 17.00 | 12.79 | 7.70 | 8.96 |
| 24 | 6.92 | 10.86 | 17.23 | 17.43 | 5.08 | 8.98 | 10.19 | 20.89 | 17.20 | 12.34 | 9.55 | 10.22 |
| 25 | 10.30 | 10.94 | 18.93 | 14.50 | 7.91 | 9.29 | 11.56 | 22.75 | 15.98 | 12.83 | 10.38 | 11.05 |
| 26 | 12.19 | 11.19 | 13.09 | 10.57 | 9.59 | 9.27 | 11.80 | 23.13 | 15.95 | 12.81 | 10.64 | 10.98 |
| 27 | 15.00 | 11.41 | 9.71 | 8.88 | 10.06 | 9.97 | 14.08 | 23.59 | 17.45 | 12.32 | 11.18 | 11.53 |
| 28 | 16.47 | 12.26 | 9.82 | 13.12 | 10.31 | 11.22 | 14.04 | 22.92 | 17.62 | 13.22 | 11.47 | 10.41 |
| 29 | 11.10 | 13.25 | 9.10 | 7.78 | | 11.20 | 12.06 | 22.70 | 18.29 | 14.90 | 11.86 | 10.20 |
| 30 | 11.79 | 13.57 | 9.14 | 7.73 | | 10.54 | 11.76 | 23.14 | 18.30 | 15.21 | 10.72 | 8.34 |
| 31 | 14.86 | | 11.21 | 9.28 | | 11.53 | | 23.32 | | 15.74 | 11.68 | |
| Max | 16.47 | 17.14 | 18.93 | 17.93 | 12.68 | 17.11 | 14.08 | 23.59 | 23.31 | 19.17 | 14.38 | 14.96 |
| Min | 1.27 | 9.61 | 9.10 | 7.73 | 3.58 | 8.98 | 3.85 | 11.98 | 15.03 | 12.32 | 2.02 | 4.72 |
| Mean | 9.28 | 13.18 | 13.91 | 13.08 | 6.41 | 11.46 | 9.04 | 18.42 | 18.01 | 14.89 | 6.45 | 10.04 |

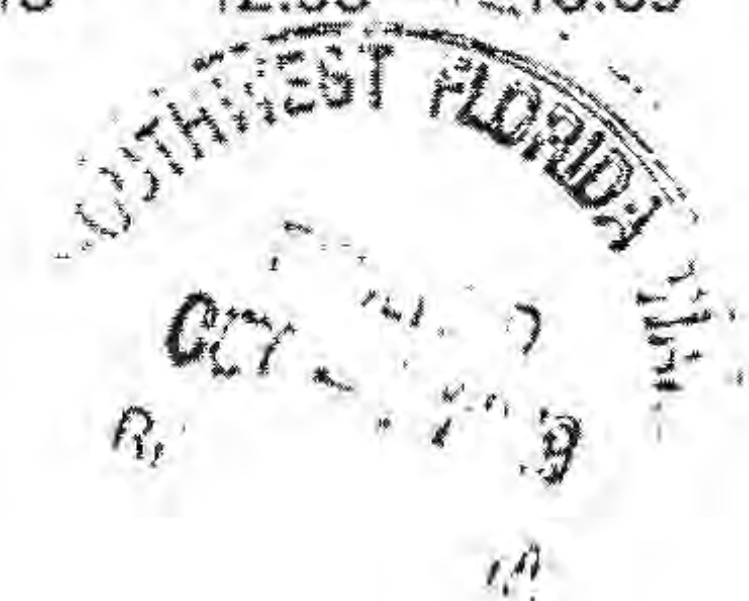


Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Salinity, parts per thousand, Water Year October 2006 to September 2007
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 6.53 | 20.21 | 18.73 | 19.42 | 18.79 | 18.65 | 17.85 | 19.11 | 27.81 | 24.68 | 19.05 | 16.44 |
| 2 | 7.36 | 19.97 | 19.05 | 18.04 | 17.98 | 18.89 | 17.99 | 19.50 | 26.87 | 23.40 | 15.66 | 15.88 |
| 3 | 9.15 | 17.84 | 19.11 | 18.04 | 12.65 | 17.00 | 17.18 | 19.81 | 25.83 | 24.05 | 7.06 | 15.73 |
| 4 | 11.86 | 15.91 | 19.53 | 19.41 | 8.82 | 15.88 | 16.82 | 20.71 | 24.77 | 23.94 | 5.30 | 15.42 |
| 5 | 12.16 | 19.81 | 19.55 | 20.23 | 7.13 | 14.48 | 18.55 | 21.68 | 24.71 | 22.91 | 5.41 | 16.13 |
| 6 | 14.44 | 21.42 | 19.84 | 19.66 | 8.12 | 15.14 | 17.16 | 22.46 | 24.87 | 21.49 | 7.70 | 17.89 |
| 7 | 15.06 | 23.04 | 20.80 | 18.87 | 11.67 | 18.46 | 16.17 | 18.80 | 24.62 | 20.11 | 9.88 | 17.78 |
| 8 | 14.74 | 22.31 | 17.63 | 18.83 | 11.11 | 17.73 | 16.13 | 21.65 | 22.26 | 20.29 | 12.39 | 19.25 |
| 9 | 14.62 | 21.30 | 17.60 | 15.43 | 10.31 | 18.15 | 16.73 | 23.20 | 20.39 | 21.06 | 14.42 | 19.63 |
| 10 | 15.76 | 20.30 | 20.28 | 14.46 | 11.39 | 17.85 | 16.29 | 23.23 | 21.32 | 21.07 | 14.21 | 19.55 |
| 11 | 17.56 | 20.57 | 21.12 | 18.39 | 10.50 | 17.63 | 16.89 | 22.18 | 21.83 | 21.83 | 15.20 | 19.11 |
| 12 | 16.77 | 20.25 | 19.64 | 19.66 | 13.99 | 17.89 | 11.46 | 22.96 | 22.75 | 21.72 | 11.84 | 19.50 |
| 13 | 16.61 | 18.87 | 19.66 | 19.34 | 15.22 | 18.55 | 8.76 | 23.05 | 22.65 | 22.06 | 10.17 | 18.56 |
| 14 | 13.82 | 18.12 | 19.92 | 19.71 | 14.09 | 19.53 | 12.41 | 23.08 | 23.45 | 22.26 | 11.23 | 15.45 |
| 15 | 15.36 | 19.58 | 20.02 | 20.38 | 12.17 | 21.03 | 17.35 | 23.20 | 23.81 | 22.48 | 10.41 | 11.85 |
| 16 | 18.78 | 19.13 | 20.04 | 20.38 | 10.54 | 22.10 | 8.69 | 25.44 | 24.36 | 21.82 | 8.11 | 10.85 |
| 17 | 19.58 | 15.81 | 20.26 | 20.06 | 11.37 | 19.68 | 10.12 | 25.75 | 24.04 | 21.74 | 8.62 | 11.82 |
| 18 | 18.30 | 15.78 | 20.65 | 20.77 | 12.97 | 17.10 | 14.12 | 25.29 | 24.52 | 21.52 | 7.92 | 10.24 |
| 19 | 17.37 | 16.27 | 20.16 | 20.34 | 8.68 | 17.02 | 14.94 | 23.85 | 24.23 | 19.33 | 9.12 | 11.79 |
| 20 | 17.86 | 17.05 | 20.77 | 20.60 | 12.20 | 17.01 | 14.41 | 23.89 | 23.70 | 19.29 | 10.98 | 13.51 |
| 21 | 18.27 | 15.15 | 22.02 | 21.08 | 12.72 | 17.17 | 13.41 | 25.30 | 23.98 | 19.49 | 13.61 | 17.68 |
| 22 | 18.19 | 17.14 | 23.19 | 22.10 | 12.98 | 16.07 | 15.74 | 25.65 | 22.27 | 19.11 | 15.09 | 15.14 |
| 23 | 17.47 | 16.06 | 22.79 | 20.86 | 11.74 | 16.52 | 17.14 | 25.29 | 22.41 | 18.53 | 16.00 | 14.79 |
| 24 | 13.59 | 16.55 | 21.99 | 20.58 | 14.48 | 17.45 | 18.05 | 25.47 | 22.01 | 18.36 | 18.18 | 15.64 |
| 25 | 18.06 | 16.24 | 22.47 | 17.71 | 16.65 | 16.39 | 19.49 | 25.79 | 21.73 | 18.90 | 18.30 | 16.43 |
| 26 | 19.49 | 16.82 | 17.51 | 15.28 | 16.67 | 17.15 | 18.28 | 26.02 | 21.88 | 19.25 | 17.96 | 16.82 |
| 27 | 22.10 | 16.98 | 13.98 | 17.12 | 16.42 | 17.85 | 19.03 | 26.68 | 23.15 | 18.94 | 17.42 | 17.42 |
| 28 | 22.96 | 18.00 | 15.32 | 16.91 | 16.73 | 17.47 | 18.32 | 26.58 | 23.57 | 21.61 | 17.35 | 16.80 |
| 29 | 16.43 | 17.60 | 16.45 | 13.27 | | 16.09 | 17.83 | 26.97 | 24.10 | 20.98 | 17.24 | 15.87 |
| 30 | 18.28 | 18.35 | 17.48 | 15.42 | | 15.87 | 17.48 | 27.65 | 24.62 | 21.62 | 17.08 | 13.79 |
| 31 | 20.53 | | 18.83 | 15.63 | | 18.07 | | 27.65 | | 21.11 | 18.06 | |
| Max | 22.96 | 23.04 | 23.19 | 22.10 | 18.79 | 22.10 | 19.49 | 27.65 | 27.81 | 24.68 | 19.05 | 19.63 |
| Min | 6.53 | 15.15 | 13.98 | 13.27 | 7.13 | 14.48 | 8.69 | 18.80 | 20.39 | 18.36 | 5.30 | 10.24 |
| Mean | 16.10 | 18.41 | 19.56 | 18.64 | 12.79 | 17.61 | 15.83 | 23.80 | 23.62 | 21.13 | 12.93 | 15.89 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River at US Highway 41

Salinity, parts per thousand, Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 24.23 | 23.43 | 23.32 | 24.13 | 23.34 | 24.40 | 23.45 | 24.74 | 29.48 | 26.71 | 23.09 | 19.71 |
| 2 | 24.86 | 20.72 | 25.38 | 22.08 | 26.23 | 25.50 | 22.89 | 26.49 | 29.67 | 27.01 | 19.42 | 10.74 |
| 3 | 26.17 | 20.96 | 25.15 | 25.20 | 25.72 | 27.40 | 23.29 | 26.38 | 29.96 | 25.91 | 19.04 | 11.58 |
| 4 | 20.14 | 19.93 | 25.12 | 27.62 | 27.99 | 27.11 | 21.26 | 26.61 | 30.22 | 26.01 | 13.08 | 15.08 |
| 5 | 19.20 | 20.43 | 26.89 | 27.90 | 28.10 | 26.86 | 21.61 | 26.56 | 30.22 | 26.21 | 8.27 | 14.89 |
| 6 | 8.42 | 21.89 | 26.73 | 27.64 | 28.43 | 25.27 | 19.52 | 27.10 | 29.97 | 25.50 | 7.39 | 18.37 |
| 7 | 10.99 | 21.64 | 26.68 | 28.20 | 27.58 | 25.22 | 17.88 | 27.54 | 29.62 | 22.20 | 8.21 | 16.63 |
| 8 | 10.33 | 17.65 | 26.43 | 28.94 | 27.32 | 25.25 | 19.72 | 28.52 | 29.16 | 14.07 | 14.97 | 16.46 |
| 9 | 13.97 | 20.86 | 27.07 | 29.31 | 25.89 | 15.80 | 19.22 | 27.90 | 27.32 | 9.85 | 16.58 | 21.21 |
| 10 | 15.28 | 21.80 | 27.46 | 28.66 | 23.21 | 22.68 | 25.41 | 27.90 | 26.70 | 16.26 | 8.03 | 25.74 |
| 11 | 13.18 | 23.81 | 27.63 | 29.08 | 23.78 | 24.84 | 25.95 | 28.01 | 26.90 | 17.74 | 10.77 | 24.21 |
| 12 | 16.44 | 23.21 | 27.99 | 28.55 | 27.47 | 24.40 | 25.18 | 25.21 | 27.09 | 20.69 | 12.70 | 22.66 |
| 13 | 16.37 | 25.44 | 26.90 | 28.17 | 26.97 | 22.03 | 17.62 | 24.95 | 26.52 | 25.42 | 23.05 | 23.20 |
| 14 | 20.88 | 24.94 | 26.61 | 25.78 | 24.01 | 24.47 | 18.04 | 27.07 | 26.86 | 21.98 | 19.82 | 23.41 |
| 15 | 21.17 | 24.63 | 27.02 | 26.03 | 25.74 | 26.81 | 16.07 | 28.34 | 27.68 | 24.00 | 15.55 | 21.80 |
| 16 | 24.82 | 18.67 | 28.41 | 28.90 | 27.09 | 21.30 | 14.67 | 28.45 | 29.13 | 25.02 | 14.39 | 20.57 |
| 17 | 23.51 | 23.28 | 22.86 | 28.76 | 28.21 | 23.46 | 19.50 | 27.94 | 28.19 | 21.30 | 15.79 | 19.82 |
| 18 | 25.06 | 21.76 | 25.22 | 26.55 | 27.88 | 25.07 | 23.29 | 29.02 | 29.13 | 20.31 | 11.89 | 20.32 |
| 19 | 25.58 | 21.91 | 26.68 | 28.66 | 25.35 | 25.87 | 24.03 | 29.10 | 28.32 | 21.20 | 4.47 | 20.21 |
| 20 | 22.90 | 23.54 | 28.20 | 28.67 | 23.56 | 25.91 | 24.44 | 29.43 | 28.60 | 20.03 | 9.27 | 22.42 |
| 21 | 22.60 | 26.40 | 27.17 | 26.11 | 26.21 | 20.40 | 24.61 | 29.29 | 27.27 | 20.47 | 8.40 | 21.38 |
| 22 | 22.37 | 27.24 | 26.56 | 27.03 | 26.78 | 23.80 | 23.87 | 29.20 | 27.69 | 18.27 | 10.62 | 22.20 |
| 23 | 23.79 | 26.97 | 27.27 | 28.02 | 25.57 | 22.75 | 23.65 | 29.67 | 22.37 | 16.97 | 12.17 | 18.74 |
| 24 | 23.04 | 26.65 | 27.79 | 25.65 | 21.93 | 20.60 | 24.93 | 29.88 | 15.10 | 18.24 | 20.04 | 17.57 |
| 25 | 19.08 | 27.73 | 27.55 | 20.36 | 22.68 | 19.23 | 26.34 | 28.21 | 11.24 | 19.59 | 13.40 | 21.97 |
| 26 | 17.99 | 28.11 | 27.40 | 22.29 | 25.68 | 25.19 | 25.98 | 28.59 | 11.97 | 20.59 | 18.64 | 22.75 |
| 27 | 19.73 | 27.78 | 27.14 | 24.41 | 18.42 | 25.67 | 26.00 | 28.27 | 17.91 | 23.76 | 15.39 | 20.66 |
| 28 | 22.00 | 25.62 | 26.18 | 21.09 | 20.95 | 25.44 | 26.11 | 27.61 | 19.54 | 24.86 | 14.14 | 20.21 |
| 29 | 20.29 | 27.14 | 25.97 | 25.90 | 26.21 | 24.17 | 21.65 | 27.58 | 22.09 | 24.74 | 18.23 | 18.43 |
| 30 | 23.88 | 25.34 | 26.53 | 23.81 | | 25.02 | 22.77 | 28.46 | 24.95 | 25.58 | 15.96 | 17.72 |
| 31 | 23.01 | | 25.88 | 26.72 | | 25.46 | | 29.26 | | 23.89 | 20.90 | |
| Max | 26.17 | 28.11 | 28.41 | 29.31 | 28.43 | 27.40 | 26.34 | 29.88 | 30.22 | 27.01 | 23.09 | 25.74 |
| Min | 8.42 | 17.65 | 22.86 | 20.36 | 18.42 | 15.80 | 14.67 | 24.74 | 11.24 | 9.85 | 4.47 | 10.74 |
| Mean | 20.04 | 23.65 | 26.55 | 26.46 | 25.46 | 24.11 | 22.30 | 27.85 | 25.70 | 21.75 | 14.31 | 19.69 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Salinity, parts per thousand, Water Year October 2007 to September 2008
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|
| 1 | 10.20 | 6.45 | 15.23 | 16.55 | 8.90 | 0.13 | 12.38 | 13.23 | 22.32 | 3.98 | 1.80 | 0.90 |
| 2 | 10.47 | 7.66 | 16.50 | 6.96 | 8.13 | 0.12 | 12.96 | 16.17 | 21.64 | 5.53 | 1.25 | 0.67 |
| 3 | 7.24 | 7.08 | 15.98 | 8.74 | 9.74 | 11.32 | 7.44 | 18.08 | 22.10 | 5.81 | 1.15 | 0.82 |
| 4 | 3.72 | 8.63 | 15.17 | 8.93 | 10.80 | 14.47 | 5.69 | 16.78 | 22.33 | 5.45 | 0.96 | 1.11 |
| 5 | 1.56 | 8.26 | 14.87 | 7.38 | 12.95 | 16.30 | 5.79 | 16.22 | 22.35 | 6.60 | 0.84 | 2.16 |
| 6 | 0.49 | 8.43 | 15.36 | 17.84 | 14.84 | 14.92 | 2.48 | 16.71 | 22.31 | 7.79 | 0.58 | 2.54 |
| 7 | 0.40 | 8.09 | 14.88 | 18.61 | 14.78 | 14.63 | 1.86 | 16.43 | 22.42 | 8.17 | 0.61 | 1.89 |
| 8 | 0.30 | 6.62 | 15.08 | 18.77 | 14.78 | 8.51 | 1.35 | 17.72 | 22.69 | 3.95 | 0.93 | 2.53 |
| 9 | 0.34 | 7.49 | 15.34 | 19.66 | 14.13 | 3.69 | 1.00 | 18.99 | 21.83 | 2.08 | 0.69 | 3.72 |
| 10 | 0.61 | 7.80 | 16.13 | 18.85 | 12.74 | 6.28 | 0.73 | 18.48 | 20.86 | 2.21 | 0.62 | 12.73 |
| 11 | 0.58 | 8.69 | 16.30 | 19.70 | 12.53 | 7.39 | 2.65 | 18.77 | 20.64 | 2.08 | 0.61 | 10.12 |
| 12 | 0.70 | 8.58 | 17.25 | 19.63 | 12.95 | 8.64 | 5.12 | 21.35 | 17.00 | 2.34 | 0.71 | 8.92 |
| 13 | 0.88 | 9.96 | 16.91 | 19.59 | 15.17 | 7.84 | 6.44 | 17.74 | 13.39 | 4.12 | 1.67 | 9.82 |
| 14 | 1.23 | 10.97 | 16.94 | 18.35 | 12.15 | 6.71 | 5.92 | 17.30 | 13.91 | 4.33 | 1.32 | 9.35 |
| 15 | 1.96 | 11.62 | 17.94 | 16.34 | 0.18 | 7.42 | 6.05 | 21.33 | 14.60 | 4.08 | 0.61 | 8.54 |
| 16 | 5.07 | 8.88 | 18.79 | 7.92 | 0.19 | 9.16 | 0.05 | 21.40 | 14.95 | 3.70 | 0.64 | 7.98 |
| 17 | 5.93 | 10.91 | 15.55 | 17.42 | 6.92 | 4.78 | 3.72 | 20.40 | 13.85 | 1.52 | 0.58 | 7.86 |
| 18 | 7.45 | 11.26 | 16.39 | 17.36 | 16.59 | 9.63 | 7.97 | 21.10 | 14.74 | 1.33 | 0.49 | 7.07 |
| 19 | 8.59 | 12.08 | 14.87 | 15.91 | 14.11 | 13.09 | 10.72 | 20.53 | 13.90 | 1.30 | 0.51 | 6.09 |
| 20 | 7.35 | 11.96 | 16.04 | 6.74 | 0.25 | 10.53 | 10.81 | 20.50 | 13.85 | 1.42 | 0.90 | 6.78 |
| 21 | 7.60 | 12.51 | 16.90 | 6.08 | 15.10 | 10.21 | 11.15 | 20.67 | 12.43 | 2.02 | 0.61 | 6.80 |
| 22 | 8.55 | 14.48 | 16.71 | 12.69 | 16.65 | 11.31 | 11.28 | 20.24 | 11.54 | 3.29 | 0.86 | 7.53 |
| 23 | 10.46 | 13.96 | 17.01 | 14.46 | 15.36 | 9.98 | 10.80 | 19.33 | 7.38 | 2.76 | 0.53 | 6.39 |
| 24 | 9.76 | 12.09 | 17.22 | 10.50 | 13.54 | 9.32 | 9.78 | 20.16 | 4.25 | 3.19 | 0.48 | 5.87 |
| 25 | 6.20 | 14.53 | 17.52 | 4.35 | 12.56 | 0.03 | 10.60 | 20.46 | 2.69 | 3.56 | 0.61 | 7.82 |
| 26 | 4.13 | 16.01 | 18.34 | 8.06 | 11.40 | 0.06 | 12.28 | 0.15 | 1.70 | 3.34 | 0.57 | 11.28 |
| 27 | 3.83 | 15.99 | 19.08 | 8.65 | 11.55 | 4.30 | 12.77 | 18.57 | 1.70 | 4.03 | 0.46 | 10.24 |
| 28 | 4.09 | 14.92 | 18.20 | 5.72 | 0.12 | 9.83 | 13.86 | 19.43 | 1.44 | 2.71 | 0.34 | 10.72 |
| 29 | 3.66 | 16.09 | 18.01 | 7.42 | 0.13 | 10.15 | 15.12 | 19.56 | 1.66 | 2.93 | 0.61 | 9.45 |
| 30 | 4.34 | 15.72 | 19.17 | 9.22 | | 5.49 | 12.04 | 21.18 | 2.66 | 3.18 | 0.57 | 8.66 |
| 31 | 5.18 | | 16.60 | 8.64 | | 0.10 | | 22.42 | | 2.53 | 0.38 | |
| Max | 10.47 | 16.09 | 19.17 | 19.70 | 16.65 | 16.30 | 15.12 | 22.42 | 22.69 | 8.17 | 1.80 | 12.73 |
| Min | 0.30 | 6.45 | 14.87 | 4.35 | 0.12 | 0.03 | 0.05 | 0.15 | 1.44 | 1.30 | 0.34 | 0.67 |
| Mean | 4.61 | 10.92 | 16.65 | 12.81 | 10.66 | 7.95 | 7.69 | 18.43 | 13.97 | 3.59 | 0.76 | 6.55 |

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River at US Highway 41
Salinity, parts per thousand, Water Year October 2007 to September 2008
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1 | 16.79 | 14.12 | 20.02 | 20.86 | 15.85 | 15.80 | 18.26 | 19.39 | 26.28 | 13.93 | 9.85 | 6.27 |
| 2 | 18.01 | 14.42 | 20.73 | 18.38 | 15.97 | 15.88 | 17.56 | 21.33 | 26.62 | 15.58 | 6.02 | 3.22 |
| 3 | 17.56 | 14.30 | 19.99 | 21.06 | 16.68 | 18.80 | 13.98 | 22.09 | 26.88 | 14.56 | 5.60 | 4.79 |
| 4 | 11.71 | 14.16 | 20.19 | 23.88 | 18.23 | 20.37 | 12.04 | 22.31 | 27.18 | 14.86 | 4.11 | 6.42 |
| 5 | 7.37 | 14.22 | 21.45 | 22.29 | 19.86 | 21.29 | 12.50 | 22.09 | 27.18 | 15.99 | 3.29 | 7.86 |
| 6 | 1.81 | 15.90 | 20.23 | 22.93 | 20.99 | 19.85 | 8.95 | 22.61 | 26.67 | 15.77 | 2.16 | 8.95 |
| 7 | 1.66 | 14.55 | 20.48 | 23.87 | 20.49 | 20.62 | 7.40 | 22.93 | 26.52 | 14.69 | 2.23 | 7.61 |
| 8 | 1.37 | 13.01 | 20.53 | 24.14 | 20.18 | 18.43 | 5.76 | 24.06 | 26.26 | 8.84 | 4.43 | 8.34 |
| 9 | 2.31 | 14.21 | 21.29 | 24.35 | 19.22 | 10.78 | 5.75 | 24.21 | 25.20 | 4.85 | 4.99 | 11.16 |
| 10 | 4.76 | 14.55 | 21.73 | 24.11 | 17.69 | 12.07 | 10.81 | 23.81 | 23.84 | 6.65 | 2.65 | 19.83 |
| 11 | 5.22 | 15.63 | 22.17 | 24.56 | 17.04 | 14.94 | 13.70 | 24.21 | 23.81 | 7.30 | 2.96 | 17.75 |
| 12 | 6.08 | 15.79 | 22.47 | 24.31 | 21.02 | 16.50 | 14.81 | 22.93 | 21.50 | 9.06 | 4.23 | 14.62 |
| 13 | 7.16 | 17.78 | 22.06 | 24.16 | 21.96 | 14.06 | 12.48 | 22.15 | 20.57 | 12.72 | 9.39 | 14.86 |
| 14 | 8.38 | 17.70 | 22.21 | 22.18 | 17.75 | 14.31 | 12.15 | 22.40 | 19.90 | 11.81 | 8.76 | 15.55 |
| 15 | 11.27 | 17.70 | 23.39 | 21.11 | 16.12 | 16.96 | 9.40 | 24.43 | 21.09 | 12.86 | 4.94 | 15.18 |
| 16 | 14.30 | 13.92 | 24.29 | 21.13 | 16.53 | 15.57 | 8.25 | 25.20 | 21.94 | 12.99 | 3.53 | 14.28 |
| 17 | 14.35 | 17.40 | 18.76 | 24.58 | 19.82 | 14.54 | 11.44 | 25.07 | 21.44 | 8.76 | 3.83 | 14.09 |
| 18 | 15.44 | 16.99 | 20.51 | 21.96 | 21.52 | 17.81 | 15.38 | 25.61 | 22.47 | 7.07 | 2.69 | 13.61 |
| 19 | 16.12 | 16.98 | 21.62 | 22.30 | 18.99 | 19.54 | 16.92 | 25.40 | 21.67 | 7.25 | 1.35 | 12.71 |
| 20 | 14.59 | 16.89 | 22.22 | 20.74 | 17.43 | 17.15 | 17.75 | 25.39 | 21.56 | 8.07 | 3.85 | 14.17 |
| 21 | 14.23 | 19.50 | 22.12 | 19.22 | 20.57 | 14.86 | 18.11 | 25.41 | 19.47 | 8.68 | 3.55 | 13.95 |
| 22 | 13.98 | 20.94 | 21.78 | 20.87 | 21.41 | 17.33 | 17.87 | 25.20 | 18.88 | 8.88 | 3.99 | 14.16 |
| 23 | 16.55 | 19.95 | 22.35 | 20.18 | 20.87 | 17.05 | 17.04 | 25.45 | 14.47 | 8.52 | 3.34 | 12.39 |
| 24 | 15.96 | 19.24 | 22.81 | 17.09 | 18.01 | 14.50 | 16.86 | 25.82 | 8.81 | 9.19 | 5.84 | 11.64 |
| 25 | 12.00 | 21.84 | 22.90 | 13.24 | 17.73 | 6.12 | 18.80 | 24.56 | 5.67 | 9.30 | 2.98 | 14.53 |
| 26 | 9.96 | 22.61 | 23.39 | 15.94 | 19.00 | 15.32 | 19.90 | 23.44 | 4.77 | 9.92 | 5.16 | 16.40 |
| 27 | 11.47 | 21.86 | 23.25 | 15.89 | 15.11 | 16.87 | 19.97 | 24.50 | 6.61 | 12.10 | 4.09 | 15.54 |
| 28 | 11.74 | 20.73 | 22.73 | 12.09 | 9.62 | 17.92 | 20.79 | 24.34 | 6.43 | 12.48 | 3.56 | 15.20 |
| 29 | 10.49 | 21.62 | 22.63 | 14.76 | 14.02 | 17.35 | 18.50 | 24.00 | 7.92 | 12.84 | 5.14 | 13.96 |
| 30 | 12.06 | 20.51 | 22.87 | 14.62 | | 17.12 | 17.71 | 24.22 | 10.59 | 13.63 | 4.63 | 12.54 |
| 31 | 12.95 | | 20.91 | 16.64 | | 17.13 | | 25.40 | | 11.61 | 6.92 | |
| Max | 18.01 | 22.61 | 24.29 | 24.58 | 21.96 | 21.29 | 20.79 | 25.82 | 27.18 | 15.99 | 9.85 | 19.83 |
| Min | 1.37 | 13.01 | 18.76 | 12.09 | 9.62 | 6.12 | 5.75 | 19.39 | 4.77 | 4.85 | 1.35 | 3.22 |
| Mean | 10.89 | 17.30 | 21.74 | 20.43 | 18.26 | 16.35 | 14.36 | 23.87 | 19.41 | 10.99 | 4.52 | 12.39 |



Daily Value Tables for the I-75 Site



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|-------|-------|-------|-------|------|------|------|------|------|------|
| 1 | 0.72 | 0.80 | 0.72 | 1.13 | 0.93 | 0.87 | 0.59 | 0.92 | 1.22 | 1.44 | 1.22 | 0.90 |
| 2 | 0.88 | 0.81 | 0.85 | 1.02 | 1.30 | 1.08 | 0.53 | 1.01 | 2.47 | 1.34 | 1.39 | 1.06 |
| 3 | 1.11 | 0.70 | 0.86 | 0.73 | 0.74 | 0.45 | 0.39 | 1.05 | 1.35 | 1.16 | 0.89 | 1.09 |
| 4 | 1.06 | 0.15 | 0.91 | 0.90 | -0.16 | -0.13 | 0.26 | 1.10 | 1.15 | 1.11 | 1.04 | 0.80 |
| 5 | 0.83 | 0.82 | 0.41 | 1.08 | -0.53 | -0.50 | 0.44 | 1.39 | 1.09 | 0.83 | 1.06 | 0.76 |
| 6 | 1.12 | 1.18 | 0.80 | 0.91 | -0.35 | -0.46 | 0.19 | 1.28 | 0.98 | 0.54 | 1.23 | 1.00 |
| 7 | 0.96 | 1.38 | 1.15 | 0.64 | 0.29 | 0.41 | 0.13 | 0.53 | 0.93 | 0.63 | 1.14 | 0.83 |
| 8 | 1.19 | 1.60 | 0.24 | 0.40 | 0.32 | 0.27 | 0.28 | 0.84 | 0.44 | 0.86 | 1.32 | 1.03 |
| 9 | 1.00 | 1.30 | -0.64 | -0.55 | 0.36 | 0.58 | 0.24 | 0.89 | 0.60 | 1.17 | 1.56 | 1.13 |
| 10 | 1.21 | 0.92 | -0.12 | -0.53 | 0.48 | 0.62 | 0.26 | 0.78 | 0.76 | 1.32 | 1.47 | 1.10 |
| 11 | 1.35 | 0.95 | 0.24 | 0.31 | 0.43 | 0.51 | 0.38 | 0.65 | 1.11 | 1.49 | 1.60 | 0.89 |
| 12 | 1.31 | 0.70 | 0.31 | 0.81 | 0.32 | 0.73 | 0.30 | 0.82 | 1.25 | 1.43 | 1.62 | 0.72 |
| 13 | 1.20 | 0.76 | 0.28 | 0.70 | 0.70 | 0.59 | 0.26 | 0.85 | 1.08 | 1.53 | 1.38 | 0.54 |
| 14 | 0.59 | 0.71 | 0.35 | 0.70 | 0.61 | 0.60 | 0.31 | 1.07 | 1.25 | 1.48 | 1.44 | 0.55 |
| 15 | 0.40 | 1.27 | 0.30 | 0.75 | 0.62 | 1.21 | 1.20 | 1.13 | 1.54 | 1.44 | 1.42 | 0.74 |
| 16 | 1.04 | 1.35 | 0.70 | 0.86 | 0.64 | 1.18 | 0.71 | 1.56 | 1.58 | 1.25 | 0.93 | 0.53 |
| 17 | 1.24 | 0.86 | 0.69 | 0.89 | 0.22 | 1.06 | 0.06 | 1.61 | 1.35 | 1.09 | 1.02 | 0.74 |
| 18 | 1.04 | 0.70 | 0.84 | 0.48 | 0.99 | 0.43 | 0.57 | 1.46 | 1.39 | 1.01 | 0.88 | 0.52 |
| 19 | 0.69 | 0.90 | 0.85 | 0.73 | -0.22 | 0.09 | 0.65 | 0.99 | 1.03 | 0.52 | 0.84 | 0.53 |
| 20 | 0.70 | 1.06 | 0.71 | 0.62 | 0.38 | 0.21 | 0.82 | 1.01 | 0.95 | 0.49 | 0.91 | 0.45 |
| 21 | 0.80 | 0.80 | 0.98 | 0.41 | 0.67 | 0.49 | 0.69 | 1.19 | 0.65 | 0.59 | 1.06 | 1.53 |
| 22 | 0.83 | 0.52 | 0.99 | 0.67 | 0.74 | 0.35 | 0.94 | 0.95 | 0.59 | 0.59 | 1.19 | 1.06 |
| 23 | 0.97 | 0.62 | 1.59 | 0.25 | 0.75 | 0.57 | 0.81 | 0.47 | 0.82 | 0.78 | 1.13 | 0.89 |
| 24 | 0.36 | 0.81 | 0.92 | -0.08 | 1.18 | 0.91 | 0.59 | 0.58 | 0.92 | 0.88 | 1.26 | 0.85 |
| 25 | 0.65 | 0.59 | 0.64 | -0.17 | 1.20 | 0.47 | 0.58 | 0.71 | 0.91 | 1.09 | 1.33 | 0.85 |
| 26 | 0.91 | 0.47 | 0.34 | 0.20 | 0.84 | 0.43 | 0.41 | 0.84 | 0.85 | 1.12 | 1.39 | 0.92 |
| 27 | 1.27 | 0.38 | -0.16 | 0.68 | 0.90 | 0.45 | 0.58 | 1.15 | 1.14 | 1.12 | 1.28 | 0.82 |
| 28 | 2.05 | 0.59 | 0.51 | 0.28 | 0.87 | 0.41 | 0.41 | 1.05 | 1.16 | 1.49 | 1.19 | 0.88 |
| 29 | 0.28 | 0.49 | 0.65 | 0.47 | | 0.33 | 0.31 | 1.13 | 1.30 | 1.41 | 1.01 | 0.91 |
| 30 | 0.39 | 0.71 | 1.11 | 0.62 | | 0.24 | 0.45 | 1.34 | 1.28 | 1.72 | 0.68 | 0.43 |
| 31 | 0.87 | | 1.20 | 0.66 | | 0.38 | | 1.22 | | 1.55 | 0.75 | |
| Max | 2.05 | 1.60 | 1.59 | 1.13 | 1.30 | 1.21 | 1.20 | 1.61 | 2.47 | 1.72 | 1.62 | 1.53 |
| Min | 0.28 | 0.15 | -0.64 | -0.55 | -0.53 | -0.50 | 0.06 | 0.47 | 0.44 | 0.49 | 0.68 | 0.43 |
| Mean | 0.94 | 0.83 | 0.62 | 0.53 | 0.54 | 0.48 | 0.48 | 1.02 | 1.10 | 1.11 | 1.18 | 0.84 |

Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | -1.52 | -0.83 | -1.18 | -1.46 | -1.77 | -1.33 | -0.98 | -1.15 | -1.16 | -1.25 | -0.77 | -0.94 |
| 2 | -1.46 | -0.72 | -1.41 | -1.75 | -1.04 | -0.84 | -1.11 | -1.05 | -1.59 | -1.23 | -0.78 | -1.06 |
| 3 | -1.20 | -1.14 | -1.59 | -1.78 | -1.48 | -1.50 | -1.40 | -1.06 | -0.68 | -1.17 | -0.35 | -1.25 |
| 4 | -0.97 | -1.97 | -1.83 | -1.69 | -1.88 | -1.59 | -1.53 | -1.19 | -1.17 | -1.14 | -0.63 | -1.67 |
| 5 | -0.95 | -1.54 | -2.23 | -1.63 | -1.97 | -1.85 | -1.61 | -1.28 | -1.35 | -1.08 | -0.98 | -1.68 |
| 6 | -0.90 | -1.39 | -1.96 | -1.40 | -1.68 | -1.76 | -1.70 | -1.06 | -1.25 | -0.92 | -1.16 | -1.50 |
| 7 | -0.93 | -1.06 | -1.69 | -1.52 | -1.26 | -1.45 | -1.60 | -1.62 | -1.31 | -0.87 | -1.27 | -1.53 |
| 8 | -1.04 | -1.27 | -2.22 | -1.43 | -1.23 | -1.35 | -1.83 | -1.84 | -1.06 | -1.02 | -1.26 | -1.14 |
| 9 | -1.28 | -1.39 | -2.34 | -1.90 | -1.37 | -1.57 | -1.89 | -1.49 | -1.09 | -1.05 | -1.10 | -0.74 |
| 10 | -1.35 | -1.49 | -1.83 | -2.40 | -1.50 | -1.50 | -1.90 | -1.17 | -0.94 | -1.13 | -1.07 | -0.71 |
| 11 | -0.96 | -1.36 | -1.39 | -1.53 | -1.88 | -1.59 | -2.02 | -1.21 | -1.09 | -1.19 | -0.86 | -0.81 |
| 12 | -1.30 | -1.31 | -1.39 | -1.35 | -1.74 | -1.84 | -1.53 | -0.85 | -1.32 | -1.31 | -0.71 | -0.77 |
| 13 | -1.29 | -0.88 | -1.03 | -1.50 | -1.89 | -1.75 | -1.53 | -0.73 | -1.58 | -1.19 | -0.65 | -0.89 |
| 14 | -1.63 | -0.74 | -1.24 | -1.55 | -1.74 | -1.75 | -1.59 | -1.06 | -1.51 | -1.14 | -0.69 | -0.96 |
| 15 | -1.25 | -0.57 | -1.49 | -1.62 | -1.64 | -1.69 | -0.84 | -1.15 | -1.51 | -1.11 | -0.41 | -1.06 |
| 16 | -0.52 | -0.08 | -1.68 | -1.78 | -1.55 | -1.26 | -1.76 | -0.95 | -1.23 | -1.16 | -0.34 | -1.29 |
| 17 | -0.35 | -0.97 | -1.54 | -1.93 | -1.66 | -1.20 | -1.96 | -0.96 | -1.24 | -1.07 | -0.39 | -1.05 |
| 18 | -0.57 | -1.12 | -1.62 | -1.72 | -1.59 | -1.42 | -1.92 | -0.93 | -1.17 | -0.91 | -0.77 | -1.46 |
| 19 | -0.83 | -1.31 | -1.77 | -1.77 | -1.61 | -1.40 | -1.59 | -1.45 | -1.10 | -0.79 | -0.89 | -1.65 |
| 20 | -0.88 | -1.28 | -1.79 | -1.83 | -1.19 | -1.49 | -1.67 | -1.71 | -1.13 | -0.95 | -0.93 | -1.46 |
| 21 | -0.89 | -1.73 | -1.63 | -1.78 | -1.21 | -1.43 | -1.90 | -1.48 | -0.77 | -0.75 | -0.98 | -0.70 |
| 22 | -1.11 | -1.22 | -1.47 | -1.31 | -1.12 | -1.65 | -1.87 | -1.28 | -0.73 | -0.87 | -1.14 | -0.99 |
| 23 | -1.24 | -1.62 | -1.36 | -1.44 | -1.41 | -1.76 | -1.58 | -1.25 | -0.75 | -0.94 | -1.31 | -1.09 |
| 24 | -2.13 | -1.63 | -1.52 | -1.30 | -1.59 | -1.70 | -1.53 | -1.03 | -0.82 | -1.21 | -1.33 | -0.92 |
| 25 | -1.57 | -1.70 | -0.55 | -1.69 | -1.33 | -1.72 | -1.48 | -0.82 | -1.24 | -1.22 | -1.10 | -0.72 |
| 26 | -1.41 | -1.57 | -1.29 | -2.05 | -1.27 | -1.74 | -1.31 | -0.84 | -1.40 | -1.23 | -0.97 | -0.76 |
| 27 | -1.06 | -1.54 | -1.73 | -2.14 | -1.47 | -1.71 | -0.97 | -0.77 | -1.24 | -1.47 | -0.87 | -0.79 |
| 28 | -0.64 | -1.33 | -1.40 | -1.41 | -1.50 | -1.54 | -0.95 | -0.94 | -1.38 | -1.28 | -0.82 | -1.04 |
| 29 | -1.77 | -1.06 | -1.46 | -2.10 | | -1.49 | -1.26 | -1.09 | -1.30 | -1.04 | -0.79 | -1.18 |
| 30 | -1.57 | -1.02 | -1.65 | -1.90 | | -1.37 | -1.22 | -1.09 | -1.33 | -0.90 | -1.03 | -1.78 |
| 31 | -0.99 | | -1.58 | -1.90 | | -1.19 | | -1.17 | | -0.63 | -0.92 | |
| Max | -0.35 | -0.08 | -0.55 | -1.30 | -1.04 | -0.84 | -0.84 | -0.73 | -0.68 | -0.63 | -0.34 | -0.70 |
| Min | -2.13 | -1.97 | -2.34 | -2.40 | -1.97 | -1.85 | -2.02 | -1.84 | -1.59 | -1.47 | -1.33 | -1.78 |
| Mean | -1.15 | -1.23 | -1.58 | -1.70 | -1.52 | -1.53 | -1.53 | -1.15 | -1.18 | -1.07 | -0.88 | -1.12 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Gage Height, Feet, NGVD 1988, Water Year October 2006 to September 2007

Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | -0.24 | 0.04 | -0.18 | -0.14 | -0.37 | -0.16 | -0.19 | -0.10 | 0.07 | 0.18 | 0.15 | 0.01 |
| 2 | -0.13 | 0.06 | -0.22 | -0.48 | -0.04 | -0.14 | -0.18 | 0.00 | 0.50 | 0.14 | 0.39 | -0.02 |
| 3 | -0.12 | -0.31 | -0.35 | -0.47 | -0.56 | -0.69 | -0.39 | 0.00 | 0.32 | 0.05 | 0.32 | -0.08 |
| 4 | -0.06 | -0.91 | -0.67 | -0.30 | -1.07 | -0.93 | -0.58 | 0.07 | 0.10 | 0.03 | 0.19 | -0.33 |
| 5 | -0.11 | -0.30 | -0.92 | -0.18 | -1.23 | -1.23 | -0.49 | 0.17 | 0.01 | -0.02 | 0.05 | -0.37 |
| 6 | 0.13 | 0.06 | -0.49 | -0.21 | -0.99 | -1.16 | -0.75 | 0.25 | 0.01 | -0.07 | 0.14 | -0.16 |
| 7 | 0.20 | 0.42 | -0.37 | -0.40 | -0.52 | -0.56 | -0.81 | -0.67 | -0.04 | -0.16 | 0.07 | -0.25 |
| 8 | 0.12 | 0.20 | -1.11 | -0.43 | -0.51 | -0.63 | -0.83 | -0.40 | -0.25 | -0.12 | 0.18 | -0.09 |
| 9 | -0.02 | 0.01 | -1.33 | -1.09 | -0.65 | -0.52 | -0.83 | -0.07 | -0.32 | 0.11 | 0.36 | 0.08 |
| 10 | 0.03 | -0.15 | -0.79 | -1.55 | -0.49 | -0.50 | -0.72 | -0.01 | -0.19 | 0.23 | 0.28 | 0.20 |
| 11 | 0.29 | -0.04 | -0.42 | -0.81 | -0.82 | -0.49 | -0.52 | -0.22 | 0.03 | 0.32 | 0.43 | 0.01 |
| 12 | 0.13 | -0.11 | -0.55 | -0.31 | -0.58 | -0.52 | -0.48 | 0.02 | 0.12 | 0.24 | 0.47 | 0.01 |
| 13 | 0.11 | -0.15 | -0.46 | -0.35 | -0.53 | -0.52 | -0.73 | 0.07 | -0.09 | 0.27 | 0.31 | -0.08 |
| 14 | -0.29 | 0.07 | -0.50 | -0.35 | -0.42 | -0.49 | -0.56 | 0.10 | -0.01 | 0.22 | 0.42 | -0.07 |
| 15 | -0.21 | 0.24 | -0.54 | -0.31 | -0.56 | -0.28 | 0.24 | -0.01 | 0.13 | 0.20 | 0.47 | -0.19 |
| 16 | 0.34 | 0.64 | -0.51 | -0.48 | -0.71 | -0.01 | -0.63 | 0.40 | 0.29 | 0.05 | 0.34 | -0.31 |
| 17 | 0.55 | -0.11 | -0.39 | -0.67 | -0.64 | -0.33 | -0.82 | 0.43 | 0.12 | 0.07 | 0.30 | -0.18 |
| 18 | 0.35 | -0.21 | -0.36 | -0.53 | -0.27 | -0.71 | -0.55 | 0.26 | 0.18 | 0.10 | 0.02 | -0.52 |
| 19 | 0.02 | -0.20 | -0.55 | -0.63 | -0.90 | -0.64 | -0.35 | -0.22 | 0.10 | -0.12 | -0.05 | -0.60 |
| 20 | 0.00 | -0.09 | -0.53 | -0.67 | -0.39 | -0.50 | -0.38 | -0.29 | 0.05 | -0.22 | -0.03 | -0.46 |
| 21 | 0.06 | -0.56 | -0.30 | -0.61 | -0.31 | -0.49 | -0.63 | 0.02 | 0.12 | -0.18 | 0.10 | 0.47 |
| 22 | 0.01 | -0.28 | -0.04 | -0.28 | -0.18 | -0.71 | -0.42 | 0.01 | -0.12 | -0.21 | 0.15 | 0.18 |
| 23 | -0.16 | -0.41 | 0.02 | -0.64 | -0.41 | -0.59 | -0.27 | -0.15 | -0.04 | -0.13 | 0.09 | 0.00 |
| 24 | -0.91 | -0.34 | -0.27 | -0.69 | -0.23 | -0.29 | -0.34 | -0.08 | 0.02 | -0.04 | 0.19 | -0.03 |
| 25 | -0.33 | -0.45 | 0.04 | -0.96 | 0.01 | -0.55 | -0.24 | -0.06 | -0.07 | 0.02 | 0.19 | 0.07 |
| 26 | -0.09 | -0.35 | -0.42 | -1.16 | -0.06 | -0.54 | -0.30 | -0.06 | -0.20 | 0.09 | 0.22 | 0.10 |
| 27 | 0.29 | -0.36 | -0.94 | -0.82 | -0.22 | -0.48 | -0.17 | 0.10 | -0.06 | -0.03 | 0.14 | 0.15 |
| 28 | 0.68 | -0.18 | -0.62 | -0.37 | -0.37 | -0.43 | -0.25 | 0.03 | 0.03 | 0.25 | 0.10 | 0.01 |
| 29 | -0.53 | -0.23 | -0.38 | -0.92 | | -0.58 | -0.34 | 0.07 | 0.06 | 0.22 | 0.05 | -0.16 |
| 30 | -0.36 | -0.18 | -0.30 | -0.69 | | -0.64 | -0.45 | 0.19 | 0.07 | 0.46 | -0.15 | -0.70 |
| 31 | -0.01 | | -0.18 | -0.70 | | -0.34 | | 0.10 | | 0.44 | 0.03 | |
| Max | 0.68 | 0.64 | 0.04 | -0.14 | 0.01 | -0.01 | 0.24 | 0.43 | 0.50 | 0.46 | 0.47 | 0.47 |
| Min | -0.91 | -0.91 | -1.33 | -1.55 | -1.23 | -1.23 | -0.83 | -0.67 | -0.32 | -0.22 | -0.15 | -0.70 |
| Mean | -0.01 | -0.14 | -0.47 | -0.59 | -0.50 | -0.54 | -0.47 | 0.00 | 0.03 | 0.08 | 0.19 | -0.11 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|-------|-------|-------|------|-------|-------|------|------|------|------|------|
| 1 | 0.73 | 0.54 | -0.09 | 0.41 | 0.84 | 0.55 | 0.44 | 0.52 | 1.04 | 1.45 | 1.84 | 2.30 |
| 2 | 0.38 | 0.50 | 0.37 | 0.09 | 0.86 | 0.44 | 0.65 | 0.91 | 1.08 | 1.44 | 1.61 | 1.21 |
| 3 | 1.68 | 0.83 | 0.33 | -0.29 | 0.92 | 0.92 | 0.65 | 1.09 | 1.19 | 1.45 | 1.40 | 0.85 |
| 4 | 1.07 | 0.80 | 0.32 | 0.72 | 1.26 | 1.05 | 0.60 | 1.20 | 1.31 | 1.29 | 1.19 | 1.07 |
| 5 | 1.36 | 0.89 | 0.66 | 1.12 | 1.31 | 1.23 | 0.86 | 1.07 | 1.41 | 1.22 | 0.86 | 0.94 |
| 6 | 0.99 | 1.08 | 0.69 | 1.12 | 1.32 | 0.92 | 0.80 | 1.07 | 1.26 | 1.08 | 0.98 | 1.59 |
| 7 | 1.24 | 1.16 | 0.82 | 1.21 | 1.16 | 0.48 | 0.84 | 1.24 | 0.99 | 1.01 | 0.91 | 1.39 |
| 8 | 1.09 | 0.66 | 0.90 | 1.27 | 1.01 | 1.44 | 0.98 | 1.59 | 0.85 | 0.83 | 1.15 | 0.97 |
| 9 | 0.94 | 0.89 | 0.93 | 1.31 | 0.83 | -0.02 | 0.92 | 1.29 | 0.52 | 0.81 | 1.32 | 0.86 |
| 10 | 0.92 | 0.92 | 1.05 | 0.98 | 0.37 | 0.38 | 1.26 | 1.04 | 0.42 | 1.06 | 1.21 | 2.24 |
| 11 | 0.81 | 1.13 | 0.99 | 0.90 | 0.01 | 0.69 | 1.26 | 0.80 | 0.44 | 1.08 | 1.18 | 2.45 |
| 12 | 0.91 | 1.15 | 1.05 | 0.70 | 0.89 | 0.90 | 1.07 | 0.23 | 0.62 | 1.15 | 1.20 | 1.62 |
| 13 | 0.79 | 1.22 | 0.67 | 0.60 | 1.32 | 0.65 | 0.56 | 0.10 | 0.74 | 1.22 | 1.68 | 1.48 |
| 14 | 0.86 | 1.17 | 0.61 | 0.16 | 0.79 | 0.56 | 0.59 | 0.44 | 0.68 | 1.20 | 1.71 | 1.51 |
| 15 | 0.53 | 1.08 | 0.65 | 0.02 | 0.75 | 0.96 | 0.45 | 0.91 | 0.86 | 1.48 | 1.70 | 1.22 |
| 16 | 0.98 | -0.11 | 1.59 | 0.48 | 0.80 | 0.72 | -0.25 | 1.03 | 1.23 | 1.49 | 1.34 | 1.00 |
| 17 | 1.08 | 0.51 | -0.06 | 0.90 | 1.29 | 0.41 | 0.19 | 0.95 | 1.16 | 1.58 | 1.31 | 0.89 |
| 18 | 1.11 | 0.47 | 0.46 | 0.66 | 1.29 | 0.59 | 0.91 | 1.13 | 1.30 | 1.61 | 1.05 | 0.96 |
| 19 | 1.14 | 0.41 | 0.83 | 1.48 | 0.96 | 0.75 | 1.10 | 1.20 | 1.28 | 1.47 | 0.05 | 0.99 |
| 20 | 1.05 | 0.42 | 1.10 | 1.52 | 0.40 | 0.82 | 1.20 | 1.28 | 1.37 | 1.39 | 0.61 | 1.28 |
| 21 | 0.72 | 0.98 | 1.10 | 0.48 | 0.57 | -0.23 | 1.21 | 1.11 | 1.05 | 1.26 | 0.78 | 1.22 |
| 22 | 0.70 | 1.21 | 0.97 | 0.72 | 0.78 | 0.36 | 1.06 | 1.01 | 1.31 | 1.03 | 1.13 | 1.47 |
| 23 | 0.79 | 1.20 | 1.21 | 1.09 | 0.67 | 0.34 | 0.97 | 1.07 | 1.09 | 0.93 | 1.08 | 1.01 |
| 24 | 0.77 | 0.82 | 1.30 | 0.96 | 0.35 | 0.18 | 0.99 | 1.01 | 0.74 | 1.03 | 1.30 | 0.57 |
| 25 | 0.62 | 1.31 | 1.17 | 0.38 | 0.48 | -0.48 | 1.18 | 0.44 | 0.57 | 1.17 | 1.25 | 0.91 |
| 26 | 0.53 | 1.45 | 1.08 | 0.33 | 0.82 | 0.39 | 1.17 | 0.34 | 0.66 | 1.15 | 1.30 | 1.49 |
| 27 | 0.49 | 1.31 | 1.28 | 0.71 | 0.05 | 0.70 | 1.06 | 0.32 | 1.04 | 1.41 | 1.50 | 1.28 |
| 28 | 0.89 | 0.65 | 0.86 | 0.43 | 0.21 | 0.54 | 1.09 | 0.28 | 1.24 | 1.67 | 1.46 | 1.36 |
| 29 | 0.50 | 0.74 | 0.73 | 0.88 | 0.78 | 0.40 | 0.37 | 0.31 | 1.34 | 1.88 | 1.47 | 1.31 |
| 30 | 0.99 | 0.41 | 0.77 | 0.76 | | 0.29 | 0.20 | 0.53 | 1.33 | 1.85 | 1.25 | 1.38 |
| 31 | 0.74 | | 0.66 | 0.96 | | 0.45 | | 0.81 | | 1.84 | 1.61 | |
| Max | 1.68 | 1.45 | 1.59 | 1.52 | 1.32 | 1.44 | 1.26 | 1.59 | 1.41 | 1.88 | 1.84 | 2.45 |
| Min | 0.38 | -0.11 | -0.09 | -0.29 | 0.01 | -0.48 | -0.25 | 0.10 | 0.42 | 0.81 | 0.05 | 0.57 |
| Mean | 0.88 | 0.86 | 0.81 | 0.74 | 0.80 | 0.56 | 0.81 | 0.85 | 1.00 | 1.31 | 1.24 | 1.29 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008

Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | -1.76 | -1.53 | -1.52 | -0.71 | -1.25 | -1.54 | -1.56 | -1.28 | -1.16 | -1.36 | -0.61 | -0.24 |
| 2 | -1.81 | -1.06 | -0.98 | -1.79 | -1.44 | -1.77 | -1.39 | -0.80 | -1.42 | -1.34 | -0.57 | -0.72 |
| 3 | -0.82 | -0.74 | -1.16 | -2.32 | -1.46 | -1.57 | -1.13 | -0.65 | -1.44 | -1.31 | -0.57 | -0.58 |
| 4 | -0.87 | -0.50 | -1.39 | -1.97 | -1.47 | -1.35 | -1.09 | -1.04 | -1.43 | -1.23 | -0.52 | -0.48 |
| 5 | -0.64 | -0.46 | -1.45 | -1.56 | -1.27 | -0.93 | -0.63 | -1.27 | -1.36 | -1.19 | -0.56 | -0.34 |
| 6 | -0.54 | -0.36 | -1.31 | -1.27 | -1.05 | -1.15 | -1.30 | -1.30 | -1.34 | -1.14 | -0.51 | -0.34 |
| 7 | -0.05 | -0.65 | -1.32 | -1.15 | -1.14 | -1.25 | -1.31 | -1.45 | -1.30 | -0.96 | -0.81 | -0.83 |
| 8 | -0.09 | -1.12 | -1.38 | -1.26 | -1.14 | -1.31 | -1.31 | -1.26 | -1.45 | -0.81 | -0.65 | -1.10 |
| 9 | -0.24 | -1.02 | -1.39 | -1.21 | -1.20 | -1.53 | -1.33 | -1.14 | -1.30 | -0.58 | -0.58 | -1.05 |
| 10 | -0.42 | -1.14 | -1.38 | -1.45 | -1.28 | -1.58 | -1.51 | -1.30 | -0.96 | -0.68 | -0.88 | 0.62 |
| 11 | -0.87 | -1.07 | -1.43 | -1.34 | -1.38 | -1.47 | -1.51 | -1.38 | -1.03 | -0.91 | -1.06 | 0.11 |
| 12 | -1.06 | -1.18 | -1.38 | -1.33 | -1.26 | -1.37 | -1.40 | -0.63 | -1.14 | -1.12 | -1.12 | -0.31 |
| 13 | -1.11 | -1.13 | -1.51 | -1.16 | -1.05 | -1.53 | -1.27 | -1.29 | -1.27 | -0.89 | -0.62 | -0.41 |
| 14 | -1.23 | -1.30 | -1.52 | -1.42 | -1.33 | -1.81 | -1.43 | -1.35 | -1.31 | -1.11 | -0.42 | -0.37 |
| 15 | -1.35 | -1.25 | -1.30 | -1.61 | -1.65 | -1.92 | -1.38 | -0.68 | -1.36 | -1.03 | -0.62 | -0.46 |
| 16 | -1.13 | -1.98 | -0.61 | -1.77 | -1.85 | -1.45 | -1.62 | -0.71 | -1.18 | -0.85 | -0.79 | -0.65 |
| 17 | -1.12 | -1.35 | -1.55 | -1.33 | -1.76 | -1.71 | -1.41 | -1.06 | -1.33 | -0.75 | -0.55 | -0.81 |
| 18 | -1.05 | -1.30 | -1.31 | -1.68 | -1.20 | -1.52 | -0.80 | -1.00 | -1.20 | -0.76 | -0.86 | -1.05 |
| 19 | -0.84 | -1.14 | -1.21 | -1.87 | -1.41 | -1.02 | -0.83 | -1.15 | -1.17 | -0.74 | -1.52 | -1.16 |
| 20 | -1.34 | -1.17 | -1.46 | -2.01 | -1.64 | -1.34 | -0.92 | -1.26 | -1.17 | -0.74 | -0.70 | -1.02 |
| 21 | -1.05 | -1.09 | -1.28 | -2.32 | -1.31 | -1.52 | -0.99 | -1.24 | -1.21 | -0.76 | -0.60 | -0.99 |
| 22 | -1.01 | -0.86 | -1.56 | -1.62 | -0.97 | -1.39 | -1.06 | -1.29 | -1.27 | -0.64 | -0.26 | -0.97 |
| 23 | -0.66 | -1.15 | -1.45 | -1.25 | -0.94 | -1.51 | -1.11 | -1.48 | -0.97 | -0.69 | -0.85 | -1.28 |
| 24 | -0.83 | -1.69 | -1.49 | -1.32 | -1.10 | -1.52 | -1.50 | -1.34 | -0.93 | -0.63 | -0.80 | -1.42 |
| 25 | -1.20 | -1.39 | -1.52 | -1.70 | -1.16 | -2.05 | -1.43 | -1.33 | -0.89 | -0.76 | -1.10 | -0.89 |
| 26 | -1.60 | -1.26 | -1.36 | -1.15 | -1.35 | -1.81 | -1.25 | -1.74 | -0.98 | -1.03 | -0.95 | -0.15 |
| 27 | -1.61 | -1.51 | -1.02 | -1.10 | -1.00 | -1.79 | -1.27 | -1.65 | -0.77 | -0.93 | -0.79 | -0.15 |
| 28 | -1.68 | -1.84 | -1.05 | -1.40 | -1.76 | -1.64 | -1.06 | -1.32 | -0.89 | -0.84 | -0.84 | -0.12 |
| 29 | -1.56 | -1.57 | -0.98 | -1.14 | -1.70 | -1.67 | -0.91 | -1.31 | -1.07 | -0.89 | -0.72 | -0.26 |
| 30 | -1.56 | -1.57 | -0.67 | -0.74 | | -1.85 | -1.52 | -1.26 | -1.33 | -0.78 | -0.63 | -0.34 |
| 31 | -1.57 | | -0.78 | -1.27 | | -1.92 | | -1.10 | | -0.76 | -0.79 | |
| Max | -0.05 | -0.36 | -0.61 | -0.71 | -0.94 | -0.93 | -0.63 | -0.63 | -0.77 | -0.58 | -0.26 | 0.62 |
| Min | -1.81 | -1.98 | -1.56 | -2.32 | -1.85 | -2.05 | -1.62 | -1.74 | -1.45 | -1.36 | -1.52 | -1.42 |
| Mean | -1.05 | -1.18 | -1.28 | -1.46 | -1.33 | -1.54 | -1.24 | -1.20 | -1.19 | -0.91 | -0.74 | -0.59 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Gage Height, Feet, NGVD 1988, Water Year October 2007 to September 2008

Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| 1 | -0.55 | -0.42 | -0.67 | -0.12 | -0.08 | -0.42 | -0.42 | -0.34 | -0.06 | 0.12 | 0.54 | 0.89 |
| 2 | -0.55 | -0.20 | -0.41 | -0.95 | -0.24 | -0.61 | -0.41 | 0.07 | -0.04 | 0.16 | 0.45 | 0.27 |
| 3 | 0.53 | 0.06 | -0.49 | -1.40 | -0.22 | -0.33 | -0.28 | 0.21 | -0.04 | 0.16 | 0.37 | 0.21 |
| 4 | 0.36 | 0.22 | -0.58 | -0.92 | -0.15 | -0.11 | -0.17 | 0.21 | 0.01 | 0.07 | 0.31 | 0.31 |
| 5 | 0.40 | 0.25 | -0.40 | -0.31 | -0.01 | 0.06 | 0.13 | 0.02 | 0.11 | 0.11 | 0.27 | 0.40 |
| 6 | 0.23 | 0.51 | -0.28 | -0.06 | 0.11 | -0.23 | -0.15 | -0.02 | 0.02 | 0.07 | 0.18 | 0.73 |
| 7 | 0.56 | 0.29 | -0.18 | 0.08 | -0.06 | -0.27 | -0.18 | -0.03 | -0.09 | 0.12 | 0.03 | 0.41 |
| 8 | 0.45 | -0.11 | -0.23 | 0.04 | -0.20 | 0.44 | -0.22 | 0.30 | -0.20 | 0.10 | 0.20 | 0.12 |
| 9 | 0.35 | 0.02 | -0.20 | 0.01 | -0.33 | -0.82 | -0.24 | 0.21 | -0.21 | 0.09 | 0.28 | 0.06 |
| 10 | 0.34 | -0.04 | -0.16 | -0.25 | -0.52 | -0.78 | 0.00 | 0.01 | -0.24 | 0.17 | 0.28 | 1.34 |
| 11 | 0.09 | 0.10 | -0.18 | -0.20 | -0.76 | -0.44 | 0.01 | -0.04 | -0.39 | 0.10 | 0.21 | 1.48 |
| 12 | -0.05 | 0.05 | -0.16 | -0.24 | -0.19 | -0.14 | 0.01 | -0.23 | -0.34 | 0.09 | 0.21 | 0.74 |
| 13 | -0.08 | 0.16 | -0.34 | -0.23 | 0.22 | -0.43 | -0.21 | -0.49 | -0.23 | 0.24 | 0.53 | 0.54 |
| 14 | -0.18 | 0.04 | -0.35 | -0.63 | -0.31 | -0.54 | -0.35 | -0.47 | -0.29 | 0.15 | 0.64 | 0.51 |
| 15 | -0.23 | -0.01 | -0.14 | -0.97 | -0.45 | -0.37 | -0.75 | 0.03 | -0.14 | 0.34 | 0.62 | 0.43 |
| 16 | 0.11 | -0.86 | 0.44 | -0.99 | -0.53 | -0.29 | -0.92 | 0.22 | 0.06 | 0.38 | 0.29 | 0.28 |
| 17 | 0.11 | -0.25 | -0.90 | -0.02 | -0.34 | -0.70 | -0.64 | 0.14 | 0.05 | 0.45 | 0.32 | 0.16 |
| 18 | 0.20 | -0.24 | -0.65 | -0.44 | 0.01 | -0.43 | -0.05 | 0.16 | 0.15 | 0.46 | 0.16 | 0.08 |
| 19 | 0.27 | -0.26 | -0.28 | -0.41 | -0.48 | -0.07 | 0.17 | 0.14 | 0.13 | 0.36 | -0.65 | 0.00 |
| 20 | -0.03 | -0.45 | -0.23 | -0.60 | -0.71 | -0.30 | 0.27 | 0.13 | 0.21 | 0.36 | 0.02 | 0.21 |
| 21 | -0.09 | -0.07 | -0.17 | -1.21 | -0.41 | -0.89 | 0.24 | 0.03 | 0.01 | 0.25 | 0.19 | 0.24 |
| 22 | -0.15 | 0.22 | -0.28 | -0.32 | -0.15 | -0.57 | 0.12 | -0.05 | 0.16 | 0.21 | 0.37 | 0.33 |
| 23 | 0.09 | -0.06 | -0.11 | -0.08 | -0.08 | -0.49 | -0.06 | -0.04 | 0.19 | 0.14 | 0.08 | -0.03 |
| 24 | 0.08 | -0.40 | -0.08 | -0.27 | -0.37 | -0.70 | -0.20 | -0.02 | 0.04 | 0.21 | 0.19 | -0.35 |
| 25 | -0.26 | 0.04 | -0.15 | -0.76 | -0.34 | -1.44 | 0.03 | -0.42 | -0.09 | 0.18 | 0.18 | 0.03 |
| 26 | -0.59 | 0.20 | -0.06 | -0.41 | -0.14 | -0.65 | 0.13 | -0.50 | -0.09 | 0.09 | 0.30 | 0.56 |
| 27 | -0.43 | -0.06 | 0.15 | -0.24 | -0.42 | -0.53 | 0.07 | -0.50 | 0.08 | 0.30 | 0.43 | 0.58 |
| 28 | -0.37 | -0.51 | 0.04 | -0.67 | -0.93 | -0.48 | 0.19 | -0.38 | 0.12 | 0.48 | 0.34 | 0.71 |
| 29 | -0.51 | -0.34 | 0.01 | -0.32 | -0.53 | -0.55 | -0.23 | -0.49 | 0.17 | 0.59 | 0.33 | 0.65 |
| 30 | -0.33 | -0.53 | 0.05 | -0.07 | | -0.70 | -0.61 | -0.51 | 0.14 | 0.64 | 0.21 | 0.52 |
| 31 | -0.40 | | -0.17 | -0.10 | | -0.67 | | -0.29 | | 0.57 | 0.41 | |
| Max | 0.56 | 0.51 | 0.44 | 0.08 | 0.22 | 0.44 | 0.27 | 0.30 | 0.21 | 0.64 | 0.64 | 1.48 |
| Min | -0.59 | -0.86 | -0.90 | -1.40 | -0.93 | -1.44 | -0.92 | -0.51 | -0.39 | 0.07 | -0.65 | -0.35 |
| Mean | -0.02 | -0.09 | -0.23 | -0.42 | -0.30 | -0.47 | -0.16 | -0.09 | -0.03 | 0.25 | 0.27 | 0.41 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Temperature, Water (Deg. C°), Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.3 | 25.3 | 23.3 | 22.2 | 18.3 | 24.1 | 25.6 | 28.1 | 25.9 | 30.9 | 30.0 | 31.5 |
| 2 | 27.8 | 24.9 | 24.1 | 22.0 | 19.1 | 24.6 | 26.3 | 28.2 | 24.6 | 30.9 | 29.1 | 31.3 |
| 3 | 28.2 | 24.6 | 24.3 | 22.2 | 19.2 | 24.3 | 26.8 | 28.5 | 25.8 | 31.3 | 28.5 | 31.3 |
| 4 | 27.9 | 23.6 | 24.2 | 22.9 | 18.4 | 23.0 | 27.1 | 28.7 | 27.0 | 30.8 | 29.1 | 31.5 |
| 5 | 27.5 | 23.5 | 22.9 | 23.0 | 17.2 | 22.3 | 26.8 | 28.8 | 28.1 | 31.3 | 29.7 | 31.7 |
| 6 | 27.7 | 23.7 | 21.7 | 24.1 | 16.6 | 21.1 | 25.8 | 29.3 | 28.0 | 31.0 | 30.5 | 31.5 |
| 7 | 28.1 | 23.2 | 21.1 | 24.4 | 17.9 | 20.9 | 24.3 | 28.2 | 28.9 | 32.1 | 31.7 | 31.1 |
| 8 | 28.0 | 23.5 | 20.8 | 24.5 | 18.3 | 21.5 | 22.9 | 26.6 | 29.3 | 32.1 | 32.2 | 30.7 |
| 9 | 27.6 | 23.4 | 18.2 | 24.2 | 18.8 | 21.7 | 22.0 | 26.1 | 29.8 | 32.3 | 32.1 | 30.4 |
| 10 | 27.3 | 23.4 | 18.0 | 20.5 | 19.5 | 22.7 | 21.0 | 27.0 | 30.6 | 32.4 | 32.6 | 30.3 |
| 11 | 27.2 | 23.6 | 19.0 | 19.6 | 18.9 | 23.5 | 20.9 | 27.4 | 31.4 | 33.1 | 32.8 | 30.6 |
| 12 | 27.3 | 23.9 | 19.7 | 19.1 | 18.8 | 23.6 | 23.5 | 27.7 | 31.8 | 33.0 | 31.5 | 31.3 |
| 13 | 27.2 | 23.8 | 19.9 | 19.7 | 19.2 | 23.9 | 24.7 | 28.4 | 31.4 | 33.0 | 30.9 | 31.8 |
| 14 | 27.4 | 23.4 | 20.2 | 20.6 | 20.5 | 23.4 | 25.8 | 28.6 | 30.6 | 32.6 | 31.2 | 30.9 |
| 15 | 26.5 | 23.2 | 21.1 | 21.2 | 20.5 | 23.8 | 25.4 | 27.7 | 30.0 | 32.6 | 30.8 | 30.5 |
| 16 | 25.9 | 23.0 | 21.0 | 22.1 | 18.7 | 23.8 | 23.7 | 28.1 | 30.1 | 32.3 | 29.8 | 30.5 |
| 17 | 25.6 | 22.4 | 21.8 | 22.1 | 16.7 | 23.5 | 22.9 | 28.4 | 30.5 | 32.2 | 30.3 | 30.8 |
| 18 | 26.5 | 22.1 | 22.5 | 22.1 | 16.3 | 21.7 | 23.1 | 28.8 | 30.5 | 32.3 | 30.7 | 30.0 |
| 19 | 27.2 | 21.2 | 22.7 | 22.3 | 16.0 | 21.7 | 23.9 | 28.0 | 30.3 | 32.3 | 30.8 | 30.0 |
| 20 | 27.7 | 20.3 | 22.5 | 22.2 | 16.7 | 22.1 | 24.5 | 26.9 | 30.4 | 32.4 | 31.5 | 29.0 |
| 21 | 28.2 | 19.2 | 22.2 | 22.0 | 18.3 | 22.4 | 24.5 | 26.7 | 31.2 | 32.2 | 31.8 | 28.5 |
| 22 | 28.5 | 17.4 | 22.4 | 22.5 | 19.4 | 22.3 | 24.6 | 26.8 | 31.8 | 31.7 | 31.8 | 28.4 |
| 23 | 28.5 | 17.9 | 23.0 | 22.8 | 20.0 | 23.2 | 24.6 | 27.1 | 31.7 | 31.5 | 31.6 | 28.5 |
| 24 | 26.8 | 18.7 | 23.7 | 22.6 | 20.5 | 23.8 | 24.8 | 26.6 | 32.0 | 30.6 | 31.9 | 28.8 |
| 25 | 23.7 | 19.5 | 23.5 | 20.8 | 20.8 | 24.1 | 24.9 | 26.7 | 32.5 | 30.9 | 31.3 | 29.2 |
| 26 | 23.9 | 20.3 | 23.1 | 19.0 | 21.2 | 24.7 | 26.1 | 26.6 | 32.3 | 31.7 | 30.5 | 29.2 |
| 27 | 24.4 | 21.0 | 21.1 | 18.0 | 23.0 | 24.6 | 27.6 | 26.9 | 31.4 | 32.0 | 31.2 | 29.7 |
| 28 | 24.4 | 22.1 | 19.9 | 18.4 | 23.9 | 25.2 | 27.8 | 27.0 | 30.6 | 31.3 | 31.7 | 30.1 |
| 29 | 24.3 | 22.5 | 20.1 | 17.7 | | 25.5 | 27.9 | 27.5 | 30.8 | 31.4 | 32.0 | 30.1 |
| 30 | 23.8 | 23.4 | 21.0 | 16.9 | | 25.6 | 28.1 | 27.1 | 31.3 | 31.1 | 32.4 | 29.8 |
| 31 | 24.5 | | 22.2 | 17.0 | | 25.7 | | 26.4 | | 30.5 | 32.2 | |
| Max | 28.5 | 25.3 | 24.3 | 24.5 | 23.9 | 25.7 | 28.1 | 29.3 | 32.5 | 33.1 | 32.8 | 31.8 |
| Min | 23.7 | 17.4 | 18.0 | 16.9 | 16.0 | 20.9 | 20.9 | 26.1 | 24.6 | 30.5 | 28.5 | 28.4 |
| Mean | 26.7 | 22.3 | 21.7 | 21.2 | 19.0 | 23.4 | 24.9 | 27.6 | 30.0 | 31.8 | 31.1 | 30.3 |

Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
 Temperature, Water (Deg. C°), Water Year October 2006 to September 2007
 Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 26.6 | 23.6 | 22.4 | 21.2 | 15.8 | 22.3 | 23.6 | 26.2 | 23.9 | 30.0 | 28.5 | 30.1 |
| 2 | 26.7 | 23.8 | 22.6 | 20.6 | 18.4 | 23.3 | 24.0 | 26.5 | 23.5 | 29.7 | 26.2 | 30.0 |
| 3 | 26.2 | 22.6 | 22.9 | 20.3 | 18.3 | 21.9 | 24.3 | 26.6 | 24.1 | 29.2 | 25.8 | 30.1 |
| 4 | 25.7 | 21.0 | 22.7 | 21.6 | 17.2 | 21.0 | 24.8 | 27.0 | 25.1 | 29.9 | 27.2 | 30.4 |
| 5 | 25.1 | 21.2 | 20.0 | 22.1 | 15.4 | 19.6 | 25.5 | 27.2 | 26.3 | 29.1 | 28.2 | 30.8 |
| 6 | 25.4 | 21.9 | 20.0 | 22.6 | 14.7 | 18.7 | 23.7 | 27.6 | 27.5 | 30.1 | 29.1 | 30.4 |
| 7 | 25.6 | 22.5 | 20.4 | 22.9 | 15.3 | 19.0 | 21.9 | 26.0 | 26.8 | 29.5 | 30.3 | 29.4 |
| 8 | 25.7 | 22.4 | 17.3 | 22.8 | 16.1 | 19.6 | 20.5 | 24.9 | 27.4 | 30.6 | 30.8 | 29.3 |
| 9 | 25.6 | 22.0 | 16.1 | 20.5 | 16.7 | 20.2 | 20.6 | 24.7 | 27.7 | 31.5 | 30.3 | 29.0 |
| 10 | 25.1 | 21.8 | 16.5 | 17.7 | 17.0 | 20.8 | 19.8 | 25.3 | 28.5 | 30.8 | 30.4 | 28.8 |
| 11 | 25.5 | 22.3 | 17.5 | 17.6 | 16.4 | 21.5 | 19.4 | 26.1 | 29.6 | 31.2 | 29.7 | 28.6 |
| 12 | 25.0 | 22.9 | 18.2 | 18.2 | 17.1 | 21.2 | 20.4 | 26.3 | 30.2 | 30.5 | 27.4 | 29.3 |
| 13 | 25.5 | 22.4 | 19.3 | 18.3 | 17.2 | 21.4 | 21.8 | 26.2 | 29.1 | 30.8 | 28.1 | 29.2 |
| 14 | 25.0 | 22.2 | 19.8 | 19.1 | 18.2 | 21.8 | 23.1 | 26.8 | 28.7 | 30.6 | 29.0 | 28.3 |
| 15 | 24.1 | 21.4 | 20.2 | 19.5 | 18.2 | 21.8 | 23.2 | 26.4 | 28.2 | 30.5 | 28.5 | 27.2 |
| 16 | 24.8 | 22.2 | 20.3 | 20.1 | 16.2 | 22.8 | 20.3 | 26.1 | 28.6 | 30.7 | 27.8 | 28.1 |
| 17 | 24.5 | 19.9 | 20.3 | 20.6 | 14.2 | 21.0 | 20.1 | 26.9 | 28.5 | 30.4 | 28.7 | 28.9 |
| 18 | 24.3 | 19.1 | 21.0 | 20.7 | 14.7 | 19.5 | 21.1 | 27.3 | 29.1 | 30.8 | 29.2 | 28.9 |
| 19 | 24.9 | 18.4 | 21.2 | 20.8 | 13.3 | 19.0 | 21.9 | 26.8 | 29.2 | 30.1 | 29.3 | 28.2 |
| 20 | 25.5 | 18.0 | 21.1 | 20.4 | 14.1 | 19.8 | 22.6 | 25.5 | 29.0 | 30.8 | 29.9 | 27.4 |
| 21 | 26.0 | 16.3 | 21.0 | 19.9 | 15.0 | 20.3 | 22.2 | 25.2 | 29.3 | 30.8 | 30.6 | 26.8 |
| 22 | 26.4 | 15.9 | 21.5 | 21.1 | 17.0 | 20.3 | 22.6 | 25.3 | 29.8 | 30.6 | 31.1 | 26.7 |
| 23 | 26.2 | 15.8 | 22.0 | 21.7 | 17.8 | 20.8 | 22.5 | 25.1 | 30.5 | 29.7 | 30.7 | 26.7 |
| 24 | 22.4 | 16.4 | 22.4 | 20.4 | 17.8 | 21.6 | 22.8 | 25.2 | 30.8 | 28.3 | 29.8 | 27.1 |
| 25 | 21.3 | 17.5 | 22.7 | 18.3 | 18.5 | 21.3 | 24.0 | 25.1 | 30.9 | 29.3 | 29.5 | 27.4 |
| 26 | 21.8 | 18.7 | 21.1 | 15.8 | 19.9 | 21.8 | 24.3 | 25.0 | 30.5 | 30.0 | 28.9 | 27.7 |
| 27 | 22.7 | 19.8 | 18.6 | 15.7 | 20.9 | 22.6 | 25.4 | 25.2 | 30.0 | 29.8 | 28.6 | 27.7 |
| 28 | 23.6 | 20.8 | 17.8 | 17.5 | 21.6 | 22.3 | 25.9 | 25.4 | 29.3 | 29.9 | 29.4 | 28.2 |
| 29 | 21.8 | 21.4 | 17.9 | 15.4 | | 23.0 | 25.7 | 25.8 | 29.3 | 29.7 | 29.7 | 28.6 |
| 30 | 22.5 | 21.8 | 18.6 | 14.9 | | 23.0 | 25.5 | 25.7 | 29.4 | 29.7 | 30.2 | 27.6 |
| 31 | 23.2 | | 20.0 | 14.5 | | 23.2 | | 25.3 | | 29.3 | 30.7 | |
| Max | 26.7 | 23.8 | 22.9 | 22.9 | 21.6 | 23.3 | 25.9 | 27.6 | 30.9 | 31.5 | 31.1 | 30.8 |
| Min | 21.3 | 15.8 | 16.1 | 14.5 | 13.3 | 18.7 | 19.4 | 24.7 | 23.5 | 28.3 | 25.8 | 26.7 |
| Mean | 24.7 | 20.5 | 20.1 | 19.4 | 16.9 | 21.2 | 22.8 | 25.9 | 28.3 | 30.1 | 29.1 | 28.6 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Temperature, Water (Deg. C°), Water Year October 2006 to September 2007
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 26.9 | 24.3 | 22.9 | 21.7 | 17.1 | 23.3 | 24.8 | 27.0 | 25.2 | 30.4 | 29.3 | 30.8 |
| 2 | 27.1 | 24.5 | 23.3 | 21.2 | 18.9 | 24.0 | 25.1 | 27.2 | 24.0 | 30.2 | 28.1 | 30.6 |
| 3 | 27.0 | 23.8 | 23.7 | 21.3 | 18.7 | 23.3 | 25.5 | 27.5 | 24.8 | 30.1 | 26.7 | 30.7 |
| 4 | 26.7 | 22.5 | 23.3 | 22.3 | 17.6 | 22.0 | 25.8 | 27.7 | 25.9 | 30.4 | 27.9 | 31.0 |
| 5 | 26.4 | 22.5 | 21.4 | 22.6 | 16.2 | 20.6 | 26.0 | 27.9 | 27.0 | 30.2 | 28.8 | 31.4 |
| 6 | 26.7 | 22.8 | 20.9 | 23.2 | 15.5 | 19.9 | 24.9 | 28.2 | 27.7 | 30.8 | 30.0 | 31.1 |
| 7 | 26.9 | 22.9 | 20.8 | 23.8 | 16.3 | 20.0 | 23.2 | 26.9 | 27.5 | 30.8 | 31.0 | 30.5 |
| 8 | 26.9 | 22.8 | 18.8 | 24.1 | 17.2 | 20.6 | 21.7 | 25.5 | 28.2 | 31.5 | 31.4 | 30.0 |
| 9 | 26.6 | 22.7 | 17.1 | 21.9 | 17.5 | 21.0 | 21.2 | 25.3 | 28.7 | 31.9 | 31.5 | 29.8 |
| 10 | 26.3 | 22.7 | 17.4 | 18.6 | 17.8 | 21.7 | 20.4 | 26.0 | 29.5 | 31.9 | 31.3 | 29.7 |
| 11 | 26.4 | 23.0 | 18.1 | 18.8 | 17.7 | 22.3 | 20.0 | 26.6 | 30.2 | 32.0 | 31.4 | 29.7 |
| 12 | 26.3 | 23.5 | 18.9 | 18.7 | 17.9 | 22.6 | 21.9 | 27.0 | 30.8 | 32.0 | 29.3 | 30.3 |
| 13 | 26.3 | 23.4 | 19.5 | 19.1 | 18.3 | 22.9 | 23.1 | 27.3 | 30.6 | 32.0 | 29.3 | 30.4 |
| 14 | 26.0 | 22.9 | 19.9 | 19.8 | 19.4 | 22.9 | 24.3 | 27.6 | 29.7 | 31.8 | 29.8 | 29.7 |
| 15 | 25.6 | 22.6 | 20.5 | 20.4 | 18.8 | 23.1 | 24.8 | 27.1 | 29.1 | 31.7 | 29.3 | 28.5 |
| 16 | 25.5 | 22.7 | 20.7 | 21.1 | 17.0 | 23.3 | 21.7 | 26.9 | 29.3 | 31.5 | 28.6 | 28.9 |
| 17 | 25.1 | 21.4 | 21.0 | 21.4 | 15.6 | 21.9 | 21.4 | 27.5 | 29.4 | 31.3 | 29.3 | 29.7 |
| 18 | 25.4 | 20.7 | 21.7 | 21.4 | 15.5 | 20.7 | 22.1 | 27.9 | 29.7 | 31.5 | 29.8 | 29.6 |
| 19 | 26.1 | 20.0 | 22.0 | 21.5 | 14.5 | 20.3 | 22.8 | 27.4 | 29.7 | 31.1 | 30.0 | 28.8 |
| 20 | 26.7 | 19.1 | 21.9 | 21.3 | 15.2 | 20.8 | 23.3 | 26.3 | 29.7 | 31.4 | 30.5 | 28.1 |
| 21 | 27.2 | 17.4 | 21.7 | 21.1 | 16.5 | 21.3 | 23.3 | 26.0 | 30.0 | 31.7 | 31.2 | 27.8 |
| 22 | 27.6 | 16.8 | 22.0 | 21.8 | 18.0 | 21.3 | 23.4 | 26.0 | 30.4 | 31.0 | 31.5 | 27.8 |
| 23 | 27.4 | 16.8 | 22.5 | 22.3 | 18.6 | 21.9 | 23.4 | 26.0 | 31.0 | 30.7 | 31.2 | 27.6 |
| 24 | 23.7 | 17.5 | 23.0 | 21.9 | 19.0 | 22.5 | 23.7 | 26.0 | 31.3 | 29.7 | 31.0 | 28.1 |
| 25 | 22.6 | 18.5 | 23.3 | 19.7 | 19.7 | 22.7 | 24.5 | 25.8 | 31.5 | 29.8 | 30.4 | 28.4 |
| 26 | 22.8 | 19.6 | 22.0 | 17.3 | 20.5 | 23.3 | 25.1 | 25.9 | 31.3 | 30.5 | 30.1 | 28.6 |
| 27 | 23.6 | 20.5 | 19.7 | 17.0 | 21.8 | 23.6 | 26.2 | 26.0 | 30.5 | 30.9 | 29.8 | 28.8 |
| 28 | 24.0 | 21.4 | 19.0 | 17.9 | 22.7 | 23.8 | 26.8 | 26.2 | 30.0 | 30.7 | 30.5 | 29.1 |
| 29 | 22.8 | 21.9 | 19.0 | 16.5 | | 24.4 | 26.8 | 26.5 | 29.8 | 30.5 | 31.0 | 29.3 |
| 30 | 23.4 | 22.4 | 19.9 | 15.8 | | 24.4 | 26.8 | 26.5 | 30.1 | 30.5 | 31.3 | 28.4 |
| 31 | 23.8 | | 21.1 | 15.9 | | 24.6 | | 25.8 | | 30.1 | 31.4 | |
| Max | 27.6 | 24.5 | 23.7 | 24.1 | 22.7 | 24.6 | 26.8 | 28.2 | 31.5 | 32.0 | 31.5 | 31.4 |
| Min | 22.6 | 16.8 | 17.1 | 15.8 | 14.5 | 19.9 | 20.0 | 25.3 | 24.0 | 29.7 | 26.7 | 27.6 |
| Mean | 25.7 | 21.5 | 20.9 | 20.4 | 17.8 | 22.3 | 23.8 | 26.7 | 29.1 | 31.0 | 30.1 | 29.4 |

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Temperature, Water (Deg. C°), Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 28.6 | 25.4 | 24.3 | 23.9 | 19.6 | 20.1 | 25.3 | 26.6 | 31.2 | 29.4 | 27.8 | 28.7 |
| 2 | 28.0 | 25.4 | 24.7 | 21.6 | 19.7 | 20.9 | 26.0 | 26.6 | 31.5 | 29.7 | 27.7 | 29.0 |
| 3 | 27.7 | 25.1 | 24.6 | 16.9 | 20.9 | 21.7 | 25.4 | 26.8 | 31.4 | 28.5 | 28.5 | 29.1 |
| 4 | 27.3 | 24.5 | 24.5 | 14.2 | 22.1 | 21.6 | 25.3 | 27.6 | 31.3 | 28.9 | 28.2 | 29.3 |
| 5 | 26.3 | 23.8 | 23.0 | 14.5 | 22.7 | 22.6 | 26.0 | 28.0 | 31.1 | 29.9 | 27.7 | 28.5 |
| 6 | 26.3 | 23.5 | 22.3 | 16.0 | 23.1 | 22.5 | 25.5 | 27.8 | 31.2 | 29.8 | 28.7 | 29.1 |
| 7 | 26.9 | 23.0 | 22.3 | 18.1 | 23.8 | 23.1 | 24.7 | 27.5 | 31.3 | 30.0 | 29.3 | 29.3 |
| 8 | 27.3 | 22.3 | 23.1 | 19.8 | 24.2 | 22.8 | 24.0 | 27.7 | 30.8 | 28.0 | 29.2 | 29.2 |
| 9 | 27.7 | 21.7 | 23.5 | 20.5 | 23.8 | 20.8 | 24.6 | 28.2 | 30.7 | 27.2 | 28.6 | 29.1 |
| 10 | 27.4 | 21.3 | 24.1 | 21.1 | 22.8 | 20.2 | 25.4 | 29.4 | 30.6 | 29.1 | 28.6 | 29.3 |
| 11 | 28.0 | 21.5 | 24.4 | 21.8 | 21.8 | 20.9 | 25.8 | 29.6 | 31.1 | 29.6 | 28.8 | 29.4 |
| 12 | 27.5 | 21.8 | 24.4 | 22.3 | 21.2 | 22.0 | 26.3 | 29.3 | 30.3 | 29.4 | 29.0 | 29.8 |
| 13 | 27.6 | 22.4 | 24.7 | 22.7 | 20.5 | 22.1 | 25.5 | 28.9 | 30.4 | 29.0 | 29.0 | 30.4 |
| 14 | 27.2 | 22.9 | 24.8 | 22.5 | 20.0 | 21.1 | 23.8 | 28.6 | 30.9 | 29.6 | 28.4 | 30.4 |
| 15 | 26.9 | 23.4 | 25.1 | 20.6 | 19.9 | 22.2 | 23.2 | 28.7 | 31.1 | 29.7 | 27.6 | 30.8 |
| 16 | 27.5 | 23.0 | 24.9 | 19.3 | 21.0 | 24.2 | 21.5 | 29.0 | 30.2 | 29.0 | 27.7 | 30.9 |
| 17 | 27.6 | 20.5 | 23.1 | 18.5 | 21.7 | 24.6 | 22.3 | 29.3 | 30.7 | 27.3 | 28.2 | 31.0 |
| 18 | 28.4 | 20.8 | 20.4 | 18.7 | 22.9 | 24.6 | 23.5 | 29.1 | 30.9 | 27.8 | 27.9 | 30.5 |
| 19 | 28.7 | 21.6 | 19.6 | 19.9 | 22.9 | 24.3 | 24.1 | 28.7 | 30.3 | 29.1 | 26.5 | 30.2 |
| 20 | 28.9 | 22.2 | 19.8 | 19.6 | 22.4 | 24.3 | 25.1 | 28.2 | 30.9 | 30.5 | 26.8 | 30.2 |
| 21 | 28.0 | 22.2 | 20.7 | 17.6 | 21.0 | 24.5 | 25.4 | 28.8 | 30.0 | 31.2 | 27.8 | 30.2 |
| 22 | 28.6 | 22.1 | 20.4 | 18.2 | 22.6 | 23.7 | 25.7 | 28.6 | 29.3 | 30.9 | 28.0 | 30.3 |
| 23 | 28.9 | 22.1 | 20.8 | 20.0 | 22.9 | 24.0 | 25.7 | 28.8 | 28.5 | 30.1 | 28.1 | 29.6 |
| 24 | 28.4 | 22.1 | 21.1 | 19.9 | 23.4 | 23.2 | 25.6 | 29.7 | 27.4 | 28.9 | 27.6 | 28.2 |
| 25 | 26.7 | 22.8 | 21.6 | 19.4 | 24.3 | 21.2 | 25.6 | 30.1 | 27.2 | 29.3 | 28.2 | 27.6 |
| 26 | 25.4 | 23.9 | 21.8 | 19.0 | 24.7 | 20.5 | 25.9 | 29.2 | 26.2 | 29.6 | 28.0 | 27.7 |
| 27 | 25.3 | 24.2 | 22.3 | 19.6 | 24.3 | 21.3 | 26.3 | 28.1 | 26.7 | 29.9 | 28.6 | 27.9 |
| 28 | 25.3 | 24.3 | 22.8 | 19.3 | 20.3 | 22.4 | 26.4 | 28.1 | 27.8 | 29.9 | 28.6 | 27.5 |
| 29 | 25.3 | 24.8 | 23.5 | 18.9 | 19.3 | 23.2 | 26.5 | 29.8 | 28.2 | 29.8 | 29.7 | 27.2 |
| 30 | 25.1 | 24.7 | 23.9 | 19.3 | | 24.9 | 26.4 | 30.3 | 29.1 | 29.2 | 28.3 | 27.2 |
| 31 | 25.5 | | 23.9 | 19.5 | | 24.5 | | 30.3 | | 28.6 | 26.9 | |
| Max | 28.9 | 25.4 | 25.1 | 23.9 | 24.7 | 24.9 | 26.5 | 30.3 | 31.5 | 31.2 | 29.7 | 31.0 |
| Min | 25.1 | 20.5 | 19.6 | 14.2 | 19.3 | 20.1 | 21.5 | 26.6 | 26.2 | 27.2 | 26.5 | 27.2 |
| Mean | 27.2 | 23.0 | 22.9 | 19.4 | 22.1 | 22.6 | 25.1 | 28.6 | 29.9 | 29.3 | 28.2 | 29.3 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Temperature, Water (Deg. C°), Water Year October 2007 to September 2008
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.2 | 24.5 | 22.9 | 21.9 | 18.1 | 17.4 | 23.1 | 23.9 | 28.9 | 27.4 | 25.7 | 26.2 |
| 2 | 26.9 | 24.3 | 23.6 | 17.5 | 17.0 | 18.1 | 23.8 | 24.1 | 29.6 | 26.5 | 25.4 | 26.7 |
| 3 | 26.4 | 23.5 | 23.5 | 12.0 | 18.6 | 19.2 | 22.0 | 24.9 | 29.6 | 25.9 | 26.1 | 27.5 |
| 4 | 25.4 | 22.8 | 22.4 | 11.4 | 19.5 | 20.9 | 22.4 | 25.6 | 30.0 | 25.8 | 26.7 | 28.1 |
| 5 | 24.9 | 21.8 | 20.5 | 12.6 | 20.7 | 20.9 | 23.2 | 26.3 | 29.9 | 26.9 | 26.4 | 27.6 |
| 6 | 25.2 | 21.2 | 20.2 | 14.0 | 21.4 | 21.1 | 23.3 | 26.5 | 29.8 | 28.0 | 26.4 | 27.5 |
| 7 | 25.4 | 20.3 | 19.9 | 16.0 | 22.1 | 21.2 | 22.5 | 26.2 | 29.4 | 27.8 | 27.5 | 28.3 |
| 8 | 25.6 | 18.7 | 21.2 | 17.7 | 22.9 | 19.4 | 21.6 | 26.4 | 29.3 | 25.1 | 28.3 | 28.6 |
| 9 | 25.6 | 18.8 | 21.7 | 18.7 | 21.8 | 17.6 | 21.9 | 26.7 | 28.9 | 25.1 | 27.4 | 28.4 |
| 10 | 25.6 | 18.7 | 22.3 | 19.3 | 20.6 | 18.1 | 22.6 | 27.2 | 28.9 | 26.7 | 27.2 | 28.4 |
| 11 | 26.0 | 19.0 | 22.6 | 20.2 | 19.7 | 19.2 | 23.1 | 27.9 | 29.2 | 28.4 | 27.8 | 28.2 |
| 12 | 25.8 | 19.5 | 23.1 | 20.8 | 19.9 | 20.4 | 23.8 | 27.8 | 28.9 | 27.8 | 27.4 | 27.7 |
| 13 | 25.9 | 20.5 | 23.0 | 21.8 | 19.7 | 20.0 | 23.3 | 27.0 | 28.9 | 27.9 | 27.4 | 28.2 |
| 14 | 25.7 | 21.2 | 23.6 | 20.4 | 17.8 | 20.0 | 21.4 | 26.6 | 29.4 | 28.0 | 26.0 | 28.6 |
| 15 | 25.2 | 21.7 | 24.2 | 18.2 | 17.3 | 19.0 | 19.6 | 26.4 | 29.0 | 27.7 | 25.6 | 28.6 |
| 16 | 25.7 | 19.3 | 22.3 | 17.1 | 18.1 | 21.5 | 18.7 | 27.2 | 27.6 | 26.2 | 26.1 | 28.7 |
| 17 | 26.1 | 19.0 | 18.1 | 17.7 | 19.5 | 21.5 | 19.1 | 27.7 | 28.3 | 25.5 | 25.9 | 28.8 |
| 18 | 27.2 | 19.8 | 17.8 | 18.3 | 21.1 | 21.9 | 20.7 | 28.0 | 28.8 | 25.8 | 26.2 | 28.7 |
| 19 | 27.9 | 20.3 | 18.4 | 18.5 | 21.0 | 22.2 | 21.9 | 27.7 | 28.2 | 26.5 | 25.6 | 28.5 |
| 20 | 26.9 | 20.3 | 18.1 | 16.9 | 19.7 | 23.1 | 23.1 | 26.9 | 28.1 | 27.5 | 25.7 | 28.5 |
| 21 | 26.7 | 20.7 | 19.0 | 14.7 | 19.7 | 21.5 | 23.2 | 27.0 | 26.9 | 28.4 | 26.3 | 28.6 |
| 22 | 26.8 | 21.1 | 18.8 | 16.2 | 20.6 | 21.9 | 23.7 | 27.6 | 26.7 | 29.2 | 26.9 | 28.3 |
| 23 | 27.0 | 21.0 | 19.2 | 17.7 | 22.0 | 21.6 | 24.1 | 27.3 | 26.1 | 28.2 | 27.3 | 27.6 |
| 24 | 26.1 | 19.9 | 20.0 | 19.1 | 22.0 | 20.7 | 23.6 | 27.9 | 26.2 | 27.5 | 26.7 | 26.8 |
| 25 | 24.5 | 21.3 | 19.9 | 17.6 | 22.5 | 18.2 | 23.9 | 28.5 | 25.5 | 27.4 | 26.6 | 26.0 |
| 26 | 23.6 | 22.2 | 20.5 | 17.2 | 23.2 | 18.9 | 24.3 | 27.6 | 25.2 | 28.4 | 27.2 | 25.9 |
| 27 | 24.3 | 23.0 | 20.7 | 18.4 | 19.8 | 19.3 | 24.3 | 26.6 | 25.0 | 28.0 | 26.3 | 25.4 |
| 28 | 24.1 | 22.8 | 21.2 | 17.0 | 17.9 | 20.4 | 25.2 | 26.3 | 26.2 | 27.0 | 26.5 | 25.7 |
| 29 | 24.1 | 23.8 | 22.1 | 16.7 | 16.8 | 21.3 | 25.1 | 26.9 | 26.6 | 26.7 | 26.9 | 25.6 |
| 30 | 24.1 | 23.8 | 22.9 | 17.8 | | 22.0 | 23.7 | 27.8 | 27.2 | 26.5 | 26.4 | 25.5 |
| 31 | 24.2 | | 23.2 | 17.7 | | 22.0 | | 28.0 | | 26.2 | 25.9 | |
| Max | 27.9 | 24.5 | 24.2 | 21.9 | 23.2 | 23.1 | 25.2 | 28.5 | 30.0 | 29.2 | 28.3 | 28.8 |
| Min | 23.6 | 18.7 | 17.8 | 11.4 | 16.8 | 17.4 | 18.7 | 23.9 | 25.0 | 25.1 | 25.4 | 25.4 |
| Mean | 25.7 | 21.2 | 21.2 | 17.4 | 20.0 | 20.3 | 22.7 | 26.8 | 28.1 | 27.1 | 26.6 | 27.6 |

Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
 Temperature, Water (Deg. C°), Water Year October 2007 to September 2008
 Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.8 | 25.0 | 23.9 | 23.5 | 19.0 | 18.8 | 24.2 | 25.3 | 29.9 | 28.3 | 26.8 | 27.2 |
| 2 | 27.4 | 24.8 | 24.1 | 19.2 | 18.7 | 19.7 | 25.0 | 25.3 | 30.3 | 28.1 | 26.3 | 27.7 |
| 3 | 26.8 | 24.4 | 24.1 | 13.8 | 19.8 | 20.5 | 23.8 | 25.8 | 30.5 | 27.1 | 27.1 | 28.2 |
| 4 | 26.3 | 23.8 | 23.3 | 12.8 | 20.9 | 21.3 | 23.9 | 26.4 | 30.6 | 27.0 | 27.2 | 28.5 |
| 5 | 25.6 | 22.9 | 21.9 | 13.7 | 21.9 | 21.7 | 24.6 | 27.0 | 30.5 | 28.1 | 26.9 | 28.1 |
| 6 | 25.6 | 22.6 | 21.5 | 15.1 | 22.4 | 21.8 | 24.4 | 27.1 | 30.4 | 28.8 | 27.3 | 28.2 |
| 7 | 26.0 | 21.8 | 21.5 | 16.9 | 23.0 | 22.2 | 23.4 | 26.9 | 30.3 | 28.9 | 28.2 | 28.8 |
| 8 | 26.2 | 20.6 | 22.2 | 18.6 | 23.4 | 21.5 | 22.6 | 27.0 | 29.9 | 27.0 | 28.8 | 28.9 |
| 9 | 26.3 | 20.4 | 22.7 | 19.5 | 22.8 | 19.1 | 22.9 | 27.4 | 29.5 | 26.0 | 28.0 | 28.7 |
| 10 | 26.6 | 20.2 | 23.2 | 20.3 | 21.6 | 19.2 | 23.7 | 28.1 | 29.6 | 28.0 | 27.8 | 28.8 |
| 11 | 26.9 | 20.4 | 23.5 | 21.0 | 20.7 | 20.0 | 24.2 | 28.6 | 30.0 | 28.8 | 28.3 | 28.7 |
| 12 | 26.8 | 20.8 | 23.8 | 21.6 | 20.3 | 20.9 | 24.9 | 28.6 | 29.6 | 28.6 | 28.2 | 28.8 |
| 13 | 26.7 | 21.4 | 24.0 | 22.2 | 20.1 | 20.8 | 24.7 | 27.8 | 29.6 | 28.4 | 28.0 | 29.3 |
| 14 | 26.5 | 22.1 | 24.2 | 21.3 | 19.0 | 20.6 | 22.7 | 27.7 | 30.0 | 28.8 | 27.4 | 29.6 |
| 15 | 26.2 | 22.5 | 24.6 | 19.7 | 18.9 | 20.7 | 20.5 | 27.6 | 30.2 | 28.9 | 26.5 | 29.8 |
| 16 | 26.6 | 20.3 | 24.3 | 18.2 | 19.8 | 22.5 | 20.1 | 27.9 | 29.5 | 27.9 | 26.8 | 29.9 |
| 17 | 26.9 | 19.8 | 20.9 | 18.0 | 20.9 | 23.0 | 20.7 | 28.3 | 29.3 | 26.3 | 26.8 | 29.8 |
| 18 | 27.8 | 20.4 | 19.1 | 18.6 | 22.0 | 23.2 | 21.8 | 28.5 | 29.9 | 26.6 | 27.0 | 29.6 |
| 19 | 28.3 | 20.9 | 19.0 | 19.0 | 22.1 | 23.3 | 22.8 | 28.3 | 29.6 | 27.6 | 26.0 | 29.3 |
| 20 | 28.0 | 21.3 | 19.1 | 18.2 | 20.8 | 23.6 | 23.8 | 27.7 | 29.6 | 28.6 | 26.2 | 29.2 |
| 21 | 27.5 | 21.6 | 19.8 | 16.0 | 20.4 | 23.0 | 24.2 | 27.8 | 29.2 | 29.4 | 26.8 | 29.3 |
| 22 | 27.7 | 21.7 | 19.7 | 17.1 | 21.4 | 22.7 | 24.6 | 28.2 | 27.9 | 29.7 | 27.3 | 29.4 |
| 23 | 28.0 | 21.7 | 19.9 | 18.8 | 22.5 | 22.5 | 24.8 | 28.0 | 27.0 | 29.0 | 27.6 | 28.6 |
| 24 | 27.3 | 21.1 | 20.5 | 19.4 | 22.6 | 22.4 | 24.6 | 28.7 | 26.5 | 28.2 | 27.2 | 27.6 |
| 25 | 25.3 | 22.0 | 20.8 | 18.4 | 23.1 | 19.7 | 24.7 | 29.1 | 26.4 | 28.4 | 27.3 | 26.9 |
| 26 | 24.5 | 22.9 | 21.2 | 18.2 | 23.9 | 19.7 | 25.0 | 28.3 | 25.6 | 28.9 | 27.6 | 26.8 |
| 27 | 24.8 | 23.6 | 21.5 | 18.8 | 22.6 | 20.2 | 25.2 | 27.4 | 25.9 | 28.8 | 27.3 | 26.9 |
| 28 | 24.8 | 23.7 | 22.1 | 18.3 | 19.0 | 21.2 | 25.8 | 27.2 | 26.8 | 28.4 | 27.4 | 26.7 |
| 29 | 24.8 | 24.2 | 22.8 | 18.2 | 18.2 | 22.2 | 25.6 | 28.1 | 27.3 | 27.9 | 28.1 | 26.6 |
| 30 | 24.6 | 24.2 | 23.4 | 18.5 | | 23.2 | 25.2 | 28.9 | 28.0 | 27.5 | 27.3 | 26.5 |
| 31 | 24.8 | | 23.6 | 18.8 | | 23.4 | | 29.1 | | 27.1 | 26.4 | |
| Max | 28.3 | 25.0 | 24.6 | 23.5 | 23.9 | 23.6 | 25.8 | 29.1 | 30.6 | 29.7 | 28.8 | 29.9 |
| Min | 24.5 | 19.8 | 19.0 | 12.8 | 18.2 | 18.8 | 20.1 | 25.3 | 25.6 | 26.0 | 26.0 | 26.5 |
| Mean | 26.4 | 22.1 | 22.1 | 18.4 | 21.1 | 21.4 | 23.8 | 27.7 | 29.0 | 28.1 | 27.3 | 28.4 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 810 | 17680 | 19920 | 25781 | 22612 | 20120 | 15930 | 21820 | 40100 | 41600 | 24520 | 18670 |
| 2 | 1150 | 17510 | 21080 | 23575 | 29200 | 24930 | 15590 | 23550 | 45340 | 39290 | 15280 | 17440 |
| 3 | 3140 | 14770 | 22740 | 19892 | 14623 | 21180 | 14360 | 25790 | 37300 | 37710 | 990 | 18720 |
| 4 | 5790 | 11820 | 25240 | 23514 | 1623 | 14600 | 15050 | 28670 | 36600 | 33440 | 890 | 19980 |
| 5 | 5550 | 20830 | 19470 | 27888 | 984 | 11280 | 20030 | 34180 | 36550 | 30120 | 1120 | 21510 |
| 6 | 10990 | 26300 | 23998 | 26000 | 1275 | 11770 | 15970 | 34190 | 34320 | 26380 | 4470 | 23680 |
| 7 | 9400 | 30360 | 30486 | 21990 | 3666 | 18670 | 13800 | 23860 | 33630 | 25290 | 6080 | 22950 |
| 8 | 12280 | 33190 | 20232 | 21044 | 4208 | 18410 | 14220 | 32090 | 29030 | 25800 | 10890 | 28380 |
| 9 | 10780 | 30580 | 15688 | 16021 | 5475 | 19380 | 16000 | 32790 | 26390 | 29460 | 18080 | 29170 |
| 10 | 15600 | 25460 | 17975 | 13537 | 6530 | 19920 | 16990 | 31020 | 26550 | 30380 | 18950 | 25900 |
| 11 | 20850 | 25650 | 20951 | 17105 | 7287 | 18520 | 16040 | 28400 | 29210 | 33130 | 22680 | 24900 |
| 12 | 19410 | 25200 | 20500 | 20266 | 8246 | 21850 | 11900 | 29670 | 33950 | 33960 | 9780 | 23860 |
| 13 | 17410 | 21830 | 21692 | 21435 | 15374 | 22760 | 3210 | 29570 | 32670 | 36160 | 7610 | 20040 |
| 14 | 12610 | 20940 | 21174 | 22376 | 12615 | 25050 | 5940 | 30520 | 37360 | 36680 | 9530 | 15110 |
| 15 | 10900 | 24190 | 21071 | 25500 | 12439 | 32330 | 17990 | 30370 | 40910 | 36210 | 5370 | 10860 |
| 16 | 14810 | 26830 | 22972 | 26200 | 9741 | 33240 | 4300 | 40160 | 40770 | 32660 | 1250 | 6010 |
| 17 | 17390 | 18320 | 23386 | 27146 | 3697 | 27840 | 4260 | 42100 | 38350 | 30320 | 1270 | 19980 |
| 18 | 14710 | 17200 | 25807 | 22829 | 13040 | 16330 | 14160 | 40870 | 39220 | 29270 | 1310 | 21510 |
| 19 | 12000 | 17180 | 26536 | 26473 | 2231 | 13030 | 13040 | 34310 | 34040 | 21040 | 1790 | 23680 |
| 20 | 11310 | 18780 | 25020 | 25638 | 4105 | 12070 | 15490 | 36320 | 33170 | 21480 | 2860 | 22950 |
| 21 | 11370 | 16930 | 28768 | 23470 | 6659 | 12150 | 12520 | 38460 | 29910 | 23330 | 9530 | 28380 |
| 22 | 11230 | 17210 | 30435 | 26880 | 6636 | 12990 | 17870 | 35930 | 29770 | 23160 | 14520 | 29170 |
| 23 | 14520 | 16950 | 35073 | 22725 | 7413 | 14780 | 19150 | 32320 | 31300 | 25550 | 16600 | 25900 |
| 24 | 7210 | 19340 | 28944 | 20854 | 15723 | 18240 | 21350 | 32300 | 32920 | 24240 | 23230 | 24900 |
| 25 | 15240 | 18740 | 28077 | 14717 | 18158 | 16420 | 22120 | 32430 | 30490 | 24840 | 25250 | 23860 |
| 26 | 18320 | 17960 | 21750 | 15752 | 19220 | 16840 | 23540 | 33800 | 28780 | 26570 | 25620 | 20040 |
| 27 | 24230 | 17310 | 12152 | 22511 | 18659 | 17660 | 22550 | 36370 | 33040 | 26010 | 23020 | 15110 |
| 28 | 34080 | 20560 | 12768 | 17242 | 18667 | 19630 | 20650 | 36030 | 35070 | 35730 | 22140 | 10860 |
| 29 | 13150 | 16920 | 14416 | 13833 | | 19540 | 16910 | 37550 | 37750 | 33200 | 20430 | 6010 |
| 30 | 17890 | 19370 | 22146 | 13688 | | 16250 | 16960 | 40100 | 39290 | 36460 | 20090 | 12750 |
| 31 | 19200 | | 25514 | 15076 | | 14760 | | 39690 | | 32420 | 20540 | |
| Max | 34080 | 33190 | 35073 | 27888 | 29200 | 33240 | 23540 | 42100 | 45340 | 41600 | 25620 | 29170 |
| Min | 810 | 11820 | 12152 | 13537 | 984 | 11280 | 3210 | 21820 | 26390 | 21040 | 890 | 6010 |
| Mean | 13333 | 20864 | 22774 | 21321 | 10361 | 18792 | 15263 | 33072 | 34459 | 30384 | 12442 | 20409 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|-------|
| 1 | 450 | 7500 | 8080 | 4994 | 2274 | 3480 | 3460 | 4820 | 23430 | 17120 | 6810 | 3170 |
| 2 | 490 | 6850 | 7110 | 3878 | 3992 | 6760 | 3070 | 6520 | 20750 | 16830 | 1000 | 2430 |
| 3 | 490 | 4780 | 6490 | 3612 | 986 | 4950 | 2330 | 6300 | 20650 | 15880 | 520 | 2140 |
| 4 | 510 | 2240 | 6140 | 4452 | 602 | 4000 | 2200 | 6640 | 15910 | 12990 | 490 | 2550 |
| 5 | 550 | 3070 | 4311 | 6078 | 552 | 2760 | 2300 | 7300 | 14850 | 9990 | 480 | 3030 |
| 6 | 560 | 5230 | 5750 | 6991 | 613 | 2490 | 3160 | 9820 | 15650 | 9380 | 610 | 4320 |
| 7 | 730 | 8940 | 8625 | 5655 | 694 | 5720 | 3610 | 8030 | 15080 | 8840 | 850 | 5110 |
| 8 | 840 | 10100 | 5056 | 7589 | 702 | 5430 | 2730 | 8080 | 16830 | 7990 | 920 | 7950 |
| 9 | 830 | 9300 | 4685 | 3779 | 631 | 4550 | 2850 | 11070 | 9280 | 6370 | 1130 | 10120 |
| 10 | 1170 | 7830 | 6624 | 2038 | 617 | 5210 | 3770 | 14010 | 10270 | 5750 | 1410 | 10020 |
| 11 | 2340 | 8940 | 8901 | 4932 | 546 | 4960 | 2130 | 14770 | 9650 | 6810 | 1610 | 8970 |
| 12 | 1690 | 9330 | 9941 | 6466 | 708 | 3760 | 1100 | 15910 | 9460 | 5270 | 680 | 9290 |
| 13 | 1560 | 11150 | 13635 | 5870 | 795 | 4830 | 640 | 18040 | 9140 | 5890 | 600 | 5830 |
| 14 | 1000 | 11820 | 12509 | 7117 | 1142 | 5490 | 670 | 15360 | 9430 | 6670 | 660 | 1550 |
| 15 | 1260 | 12130 | 11009 | 8073 | 721 | 7630 | 1560 | 15440 | 10140 | 7420 | 640 | 710 |
| 16 | 2970 | 12210 | 8213 | 8148 | 610 | 11510 | 650 | 17450 | 13960 | 8520 | 490 | 630 |
| 17 | 4530 | 5130 | 7989 | 7002 | 528 | 6880 | 610 | 18530 | 14900 | 8970 | 530 | 2550 |
| 18 | 3770 | 3940 | 8314 | 8111 | 538 | 3250 | 600 | 19570 | 16390 | 10960 | 620 | 3030 |
| 19 | 2880 | 3640 | 8084 | 8676 | 534 | 2700 | 910 | 17930 | 17850 | 8670 | 640 | 4320 |
| 20 | 2430 | 4290 | 7703 | 8987 | 612 | 2290 | 1040 | 16050 | 13310 | 7550 | 700 | 5110 |
| 21 | 2070 | 3340 | 9147 | 8836 | 611 | 2310 | 1100 | 17590 | 15220 | 11010 | 770 | 7950 |
| 22 | 1590 | 5450 | 11412 | 13373 | 651 | 2270 | 1490 | 19900 | 15480 | 10690 | 1160 | 10120 |
| 23 | 1750 | 3240 | 13285 | 11893 | 599 | 1750 | 2300 | 19880 | 15930 | 7850 | 1890 | 10020 |
| 24 | 1010 | 3960 | 11478 | 11460 | 633 | 1830 | 3330 | 22510 | 15520 | 6000 | 2930 | 8970 |
| 25 | 1640 | 3840 | 15250 | 6338 | 1243 | 2200 | 5280 | 23720 | 11170 | 5490 | 3370 | 9290 |
| 26 | 2690 | 5110 | 4616 | 1993 | 2089 | 2000 | 8180 | 24690 | 12370 | 5610 | 4010 | 5830 |
| 27 | 5710 | 5770 | 1984 | 1669 | 2270 | 2700 | 10960 | 25200 | 14990 | 4800 | 4420 | 1550 |
| 28 | 8500 | 6970 | 2151 | 4014 | 2614 | 3260 | 8400 | 24680 | 14800 | 8550 | 4420 | 710 |
| 29 | 3040 | 8340 | 2193 | 1009 | | 3210 | 4700 | 23850 | 15720 | 8380 | 4110 | 630 |
| 30 | 3540 | 9060 | 2176 | 1196 | | 3080 | 4040 | 23590 | 15290 | 8610 | 4130 | 1810 |
| 31 | 7120 | | 3382 | 1549 | | 3620 | | 24550 | | 9870 | 5320 | |
| Max | 8500 | 12210 | 15250 | 13373 | 3992 | 11510 | 10960 | 25200 | 23430 | 17120 | 6810 | 10120 |
| Min | 450 | 2240 | 1984 | 1009 | 528 | 1750 | 600 | 4820 | 9140 | 4800 | 480 | 630 |
| Mean | 2249 | 6783 | 7621 | 5993 | 1040 | 4093 | 2972 | 16187 | 14447 | 8862 | 1868 | 4990 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Conductance, (Microsiemens/cm at 25° C), Water Year October 2006 to September 2007

Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 520 | 12500 | 14070 | 14250 | 10590 | 11990 | 9570 | 12230 | 31410 | 28260 | 13510 | 9330 |
| 2 | 610 | 11580 | 13900 | 11240 | 12160 | 14810 | 8910 | 14180 | 33210 | 27460 | 7260 | 7970 |
| 3 | 810 | 8400 | 13870 | 11700 | 4050 | 11260 | 7760 | 14880 | 27940 | 25390 | 780 | 8790 |
| 4 | 1170 | 5610 | 12690 | 13830 | 900 | 8770 | 7450 | 16480 | 25950 | 22570 | 560 | 10270 |
| 5 | 1160 | 10490 | 11390 | 15930 | 670 | 6080 | 9990 | 19130 | 25740 | 20380 | 620 | 12540 |
| 6 | 2420 | 15400 | 14720 | 15380 | 780 | 6240 | 8480 | 20640 | 26630 | 19110 | 1320 | 13750 |
| 7 | 3260 | 20370 | 16920 | 14290 | 1210 | 10810 | 7360 | 13690 | 25830 | 16680 | 2300 | 14050 |
| 8 | 3560 | 19550 | 10280 | 14150 | 1380 | 11310 | 7140 | 18460 | 22850 | 16630 | 3840 | 16530 |
| 9 | 3430 | 18050 | 9690 | 8570 | 1510 | 11720 | 8460 | 22240 | 18020 | 18130 | 6420 | 16950 |
| 10 | 5360 | 16500 | 13020 | 5730 | 2140 | 11820 | 10140 | 23910 | 18300 | 18670 | 6350 | 17080 |
| 11 | 8020 | 17580 | 15770 | 9880 | 2240 | 11810 | 8660 | 22600 | 19630 | 20340 | 7800 | 15650 |
| 12 | 7800 | 18520 | 16100 | 13170 | 3560 | 11950 | 2950 | 23830 | 21460 | 19690 | 2620 | 15700 |
| 13 | 7350 | 17410 | 17500 | 14250 | 6160 | 13190 | 1080 | 23750 | 20530 | 20200 | 1610 | 13770 |
| 14 | 5180 | 16870 | 17380 | 15640 | 5730 | 15140 | 2110 | 22930 | 22480 | 20180 | 2100 | 7280 |
| 15 | 5540 | 17830 | 16550 | 17190 | 3410 | 18890 | 7110 | 22040 | 24650 | 20050 | 1280 | 2820 |
| 16 | 8630 | 18460 | 15810 | 16910 | 2150 | 19790 | 1270 | 27550 | 26370 | 18590 | 710 | 1560 |
| 17 | 11260 | 11180 | 16150 | 14930 | 1510 | 13280 | 1310 | 29350 | 25320 | 19400 | 790 | 10270 |
| 18 | 9100 | 10410 | 16800 | 16870 | 3390 | 7770 | 3700 | 28640 | 27240 | 19240 | 810 | 12540 |
| 19 | 6480 | 10580 | 16410 | 16850 | 980 | 7070 | 4810 | 24800 | 25950 | 14640 | 890 | 13750 |
| 20 | 6110 | 11040 | 16700 | 16610 | 1600 | 6550 | 5130 | 24760 | 24720 | 15730 | 1150 | 14050 |
| 21 | 5650 | 8560 | 18670 | 17030 | 1960 | 6550 | 4290 | 27880 | 24490 | 16350 | 2760 | 16530 |
| 22 | 5530 | 10980 | 21770 | 19710 | 2280 | 5560 | 6860 | 28100 | 22520 | 16840 | 6120 | 16950 |
| 23 | 5490 | 10170 | 22040 | 17210 | 2200 | 6160 | 9380 | 27110 | 23570 | 16730 | 8380 | 17080 |
| 24 | 2840 | 11590 | 19740 | 16050 | 4560 | 8510 | 12390 | 27740 | 24360 | 16540 | 12150 | 15650 |
| 25 | 7900 | 11350 | 22050 | 10890 | 8010 | 7130 | 15170 | 28140 | 23020 | 16590 | 12850 | 15700 |
| 26 | 10530 | 12050 | 12380 | 5810 | 10190 | 8650 | 17330 | 28650 | 22280 | 17890 | 12390 | 13770 |
| 27 | 14600 | 12870 | 5390 | 9000 | 10610 | 10870 | 17730 | 29830 | 24130 | 16590 | 10770 | 7280 |
| 28 | 18960 | 14410 | 6720 | 8720 | 9680 | 12760 | 15000 | 29710 | 25330 | 19930 | 10450 | 2820 |
| 29 | 7360 | 13370 | 7880 | 4510 | | 10290 | 12010 | 30340 | 25970 | 19520 | 10010 | 1560 |
| 30 | 11650 | 13550 | 9610 | 6320 | | 8580 | 10240 | 31290 | 27030 | 20750 | 10190 | 5470 |
| 31 | 13360 | | 12060 | 6680 | | 9430 | | 31310 | | 18770 | 12280 | |
| Max | 18960 | 20370 | 22050 | 19710 | 12160 | 19790 | 17730 | 31310 | 33210 | 28260 | 13510 | 17080 |
| Min | 520 | 5610 | 5390 | 4510 | 670 | 5560 | 1080 | 12230 | 18020 | 14640 | 560 | 1560 |
| Mean | 6505 | 13574 | 14646 | 12881 | 4129 | 10475 | 8126 | 24071 | 24564 | 19285 | 5518 | 11582 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1 | 19400 | 9130 | 23730 | 24050 | 15620 | 16670 | 20840 | 21130 | 38360 | 15500 | 8110 | 12080 |
| 2 | 18150 | 9120 | 22770 | 18250 | 15900 | 16480 | 20200 | 23560 | 40520 | 19850 | 760 | 480 |
| 3 | 30560 | 9500 | 22760 | 14350 | 19390 | 21710 | 13780 | 26090 | 42970 | 16610 | 820 | 440 |
| 4 | 10420 | 9620 | 21330 | 23420 | 22140 | 22470 | 4100 | 28390 | 44560 | 17090 | 510 | 570 |
| 5 | 420 | 7620 | 23100 | 25740 | 23630 | 24850 | 3270 | 28920 | 44960 | 18700 | 470 | 660 |
| 6 | 430 | 11720 | 24200 | 26660 | 26590 | 20960 | 1380 | 31050 | 42680 | 16190 | 450 | 2860 |
| 7 | 280 | 12430 | 23740 | 27240 | 24620 | 20140 | 730 | 35000 | 40560 | 14310 | 460 | 3940 |
| 8 | 280 | 7520 | 24370 | 28570 | 24270 | 27520 | 520 | 39210 | 38180 | 4020 | 790 | 780 |
| 9 | 330 | 11480 | 24930 | 30600 | 21540 | 7450 | 420 | 37460 | 34670 | 590 | 670 | 2630 |
| 10 | 400 | 12290 | 27070 | 28910 | 17100 | 7990 | 4330 | 35710 | 32570 | 1830 | 450 | 34730 |
| 11 | 480 | 15280 | 26880 | 30270 | 13270 | 12820 | 13620 | 34860 | 34500 | 2240 | 490 | 27980 |
| 12 | 800 | 15160 | 29390 | 28130 | 23490 | 15570 | 15780 | 26980 | 32120 | 4800 | 640 | 18210 |
| 13 | 830 | 17920 | 27370 | 27530 | 23300 | 13330 | 9720 | 26170 | 30000 | 8040 | 5490 | 18360 |
| 14 | 1240 | 20530 | 27210 | 23120 | 18070 | 13530 | 8950 | 28660 | 27930 | 13170 | 5730 | 20750 |
| 15 | 990 | 21580 | 28420 | 22210 | 17030 | 21620 | 6290 | 30580 | 28850 | 15040 | 560 | 16780 |
| 16 | 9940 | 11870 | 36310 | 24460 | 21360 | 20030 | 2160 | 33510 | 33140 | 12520 | 460 | 14270 |
| 17 | 11890 | 17580 | 19340 | 29720 | 29490 | 14800 | 5210 | 33680 | 30980 | 3240 | 410 | 11320 |
| 18 | 18100 | 17820 | 21840 | 26880 | 30710 | 18060 | 11620 | 37580 | 35580 | 1530 | 360 | 13050 |
| 19 | 19670 | 17640 | 23780 | 31660 | 24380 | 20960 | 16460 | 36750 | 31460 | 2250 | 380 | 11690 |
| 20 | 18550 | 15730 | 28550 | 33320 | 20010 | 22470 | 18660 | 37740 | 32500 | 3240 | 430 | 15030 |
| 21 | 12920 | 20490 | 29300 | 15400 | 19690 | 12760 | 20940 | 38730 | 23510 | 4620 | 460 | 14750 |
| 22 | 11400 | 24960 | 25980 | 22240 | 21880 | 14810 | 20080 | 36290 | 21920 | 1460 | 560 | 22450 |
| 23 | 14120 | 25250 | 29350 | 27210 | 20800 | 13560 | 18840 | 37770 | 8050 | 960 | 590 | 15020 |
| 24 | 13830 | 22050 | 30070 | 20170 | 16880 | 9990 | 20050 | 38630 | 880 | 1330 | 700 | 11190 |
| 25 | 7810 | 31240 | 29900 | 9780 | 15970 | 5740 | 24430 | 31950 | 610 | 3290 | 360 | 13330 |
| 26 | 4200 | 32570 | 30750 | 9640 | 20170 | 11850 | 26350 | 31890 | 590 | 4110 | 420 | 24130 |
| 27 | 4060 | 31970 | 32180 | 12970 | 13130 | 18700 | 26140 | 31810 | 980 | 10520 | 350 | 18630 |
| 28 | 8270 | 26000 | 27250 | 9980 | 12230 | 18360 | 26510 | 30470 | 940 | 14020 | 350 | 18770 |
| 29 | 5420 | 28260 | 26520 | 12200 | 13030 | 17670 | 20550 | 31260 | 1240 | 16200 | 890 | 18270 |
| 30 | 6960 | 26310 | 26680 | 16420 | | 17160 | 19850 | 31480 | 5300 | 17330 | 430 | 18740 |
| 31 | 7130 | | 25930 | 15400 | | 20820 | | 34300 | | 13200 | 600 | |
| Max | 30560 | 32570 | 36310 | 33320 | 30710 | 27520 | 26510 | 39210 | 44960 | 19850 | 8110 | 34730 |
| Min | 280 | 7520 | 19340 | 9640 | 12230 | 5740 | 420 | 21130 | 590 | 590 | 350 | 440 |
| Mean | 8364 | 18021 | 26484 | 22468 | 20196 | 16802 | 13393 | 32504 | 26037 | 8961 | 1102 | 13396 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008

Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|-------|-------|-------|-------|-------|------|-------|-------|------|-----|------|
| 1 | 2800 | 570 | 11600 | 16820 | 2280 | 2290 | 5640 | 8980 | 23620 | 600 | 400 | 270 |
| 2 | 3320 | 650 | 15700 | 5870 | 1720 | 3000 | 4630 | 12080 | 21970 | 800 | 320 | 270 |
| 3 | 1600 | 750 | 13840 | 3700 | 2470 | 4530 | 600 | 13740 | 21990 | 780 | 360 | 310 |
| 4 | 390 | 1180 | 10030 | 3990 | 3150 | 6960 | 450 | 12660 | 22400 | 780 | 380 | 350 |
| 5 | 230 | 1240 | 9520 | 7140 | 4600 | 10210 | 430 | 11710 | 23470 | 880 | 380 | 380 |
| 6 | 200 | 1730 | 9090 | 9510 | 6970 | 8080 | 420 | 12510 | 22830 | 1190 | 380 | 410 |
| 7 | 190 | 1470 | 7980 | 10590 | 7170 | 8060 | 400 | 11420 | 23110 | 1290 | 360 | 430 |
| 8 | 170 | 1030 | 8470 | 11230 | 6780 | 1830 | 320 | 13100 | 23360 | 370 | 390 | 470 |
| 9 | 210 | 1280 | 8700 | 13070 | 5930 | 1080 | 300 | 15430 | 22330 | 450 | 390 | 500 |
| 10 | 270 | 1490 | 9300 | 12230 | 4590 | 990 | 330 | 15310 | 23130 | 520 | 370 | 2200 |
| 11 | 310 | 1960 | 9680 | 14110 | 4070 | 1050 | 380 | 15750 | 23430 | 550 | 390 | 3630 |
| 12 | 350 | 1790 | 10950 | 14590 | 5240 | 1360 | 560 | 20660 | 12850 | 540 | 390 | 2970 |
| 13 | 370 | 2800 | 10910 | 15730 | 7850 | 1220 | 830 | 14530 | 7490 | 640 | 410 | 2830 |
| 14 | 400 | 3660 | 11050 | 11440 | 3690 | 1070 | 660 | 14480 | 7840 | 660 | 420 | 2620 |
| 15 | 410 | 5180 | 14450 | 10510 | 2300 | 1330 | 560 | 19580 | 6340 | 790 | 360 | 2360 |
| 16 | 490 | 2400 | 15510 | 8730 | 2530 | 2300 | 500 | 22100 | 6370 | 630 | 340 | 1740 |
| 17 | 680 | 4820 | 8700 | 11310 | 3840 | 1720 | 540 | 20160 | 5040 | 430 | 300 | 1600 |
| 18 | 1420 | 6060 | 9230 | 9610 | 8280 | 2460 | 1140 | 20480 | 6110 | 430 | 280 | 1240 |
| 19 | 2210 | 7480 | 10040 | 8290 | 5700 | 5380 | 2980 | 18880 | 5660 | 430 | 320 | 900 |
| 20 | 1550 | 7860 | 9720 | 4390 | 4360 | 3210 | 3350 | 18620 | 5350 | 450 | 360 | 1020 |
| 21 | 1660 | 7660 | 11820 | 2510 | 6580 | 2560 | 3800 | 18900 | 3960 | 490 | 390 | 1060 |
| 22 | 1910 | 8750 | 9920 | 3190 | 10470 | 3530 | 4140 | 17700 | 2230 | 560 | 430 | 1650 |
| 23 | 2700 | 8170 | 10320 | 4780 | 9080 | 2050 | 3750 | 16340 | 810 | 560 | 450 | 1210 |
| 24 | 2120 | 5170 | 9890 | 2010 | 5800 | 1370 | 3230 | 18030 | 420 | 550 | 310 | 1070 |
| 25 | 830 | 7840 | 10480 | 1150 | 4690 | 780 | 3950 | 18260 | 370 | 570 | 290 | 1590 |
| 26 | 550 | 10400 | 11660 | 1430 | 3500 | 950 | 5360 | 14600 | 410 | 560 | 310 | 3410 |
| 27 | 540 | 10250 | 13890 | 1460 | 2900 | 1350 | 6090 | 16260 | 470 | 560 | 260 | 3770 |
| 28 | 500 | 8470 | 13210 | 1010 | 1160 | 2660 | 7930 | 18970 | 490 | 480 | 250 | 3890 |
| 29 | 500 | 11570 | 14430 | 1160 | 1310 | 3300 | 9660 | 20050 | 490 | 510 | 300 | 3680 |
| 30 | 530 | 10760 | 18290 | 2840 | | 3360 | 6140 | 21090 | 570 | 540 | 260 | 3420 |
| 31 | 600 | | 17550 | 1640 | | 3380 | | 22890 | | 450 | 260 | |
| Max | 3320 | 11570 | 18290 | 16820 | 10470 | 10210 | 9660 | 22890 | 23620 | 1290 | 450 | 3890 |
| Min | 170 | 570 | 7980 | 1010 | 1160 | 780 | 300 | 8980 | 370 | 370 | 250 | 270 |
| Mean | 968 | 4815 | 11482 | 7292 | 4793 | 3014 | 2636 | 16622 | 10830 | 614 | 349 | 1708 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75

Conductance, (Microsiemens/cm at 25° C), Water Year October 2007 to September 2008

Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|
| 1 | 8570 | 2810 | 18850 | 20300 | 9290 | 9260 | 14730 | 14830 | 29740 | 3740 | 1200 | 1800 |
| 2 | 10330 | 3160 | 19300 | 11220 | 8450 | 9760 | 10590 | 18230 | 30870 | 5530 | 400 | 300 |
| 3 | 11910 | 3550 | 18360 | 6890 | 10630 | 13430 | 3120 | 19720 | 32000 | 4220 | 400 | 300 |
| 4 | 2320 | 4650 | 16640 | 9740 | 11980 | 16050 | 1350 | 20100 | 33070 | 4160 | 400 | 400 |
| 5 | 290 | 4300 | 17590 | 16070 | 13800 | 16450 | 1060 | 19250 | 33140 | 5740 | 400 | 400 |
| 6 | 270 | 6210 | 17300 | 18780 | 15580 | 14230 | 600 | 20160 | 31770 | 6040 | 400 | 700 |
| 7 | 220 | 5350 | 17290 | 20240 | 14800 | 14590 | 500 | 21600 | 31440 | 6310 | 300 | 700 |
| 8 | 200 | 4170 | 17240 | 20660 | 13810 | 13120 | 390 | 25240 | 30810 | 1140 | 400 | 500 |
| 9 | 250 | 5670 | 17850 | 21390 | 12370 | 2220 | 330 | 25450 | 29590 | 500 | 400 | 700 |
| 10 | 310 | 6000 | 18720 | 20670 | 9810 | 2480 | 910 | 25020 | 28690 | 740 | 400 | 15400 |
| 11 | 380 | 7170 | 19150 | 21980 | 8290 | 4220 | 3380 | 26210 | 28640 | 830 | 400 | 17400 |
| 12 | 450 | 7700 | 20210 | 22290 | 13360 | 6710 | 5340 | 24420 | 23240 | 1150 | 400 | 8100 |
| 13 | 510 | 9960 | 19990 | 22190 | 17060 | 4840 | 3650 | 21740 | 20690 | 2200 | 1200 | 7500 |
| 14 | 580 | 11280 | 20640 | 17720 | 9050 | 5980 | 3580 | 21960 | 19690 | 3640 | 1200 | 7900 |
| 15 | 650 | 12030 | 23070 | 15160 | 9190 | 9190 | 1150 | 25780 | 19860 | 4470 | 400 | 7200 |
| 16 | 2440 | 6190 | 26390 | 14220 | 10340 | 9350 | 910 | 28120 | 20080 | 3000 | 300 | 5500 |
| 17 | 4490 | 12120 | 13150 | 21393 | 14430 | 6440 | 1870 | 27840 | 18490 | 790 | 300 | 4900 |
| 18 | 7470 | 13090 | 14140 | 18904 | 17780 | 9740 | 5130 | 28770 | 19830 | 580 | 300 | 4500 |
| 19 | 9510 | 12880 | 17150 | 19327 | 12600 | 14110 | 8240 | 28310 | 17430 | 660 | 300 | 3400 |
| 20 | 8260 | 11420 | 18300 | 11963 | 11560 | 11450 | 9870 | 27990 | 17600 | 810 | 300 | 4500 |
| 21 | 5810 | 13300 | 19500 | 5630 | 14610 | 7000 | 10530 | 27920 | 13860 | 1010 | 400 | 5100 |
| 22 | 5790 | 16230 | 17970 | 13123 | 16560 | 9090 | 10560 | 26900 | 10810 | 800 | 400 | 8500 |
| 23 | 7260 | 15010 | 19180 | 12752 | 16300 | 7980 | 9850 | 26980 | 3160 | 690 | 400 | 6400 |
| 24 | 6530 | 13270 | 19340 | 7582 | 12370 | 4480 | 9680 | 27930 | 630 | 710 | 400 | 4000 |
| 25 | 2420 | 18250 | 19250 | 3145 | 10990 | 1680 | 12710 | 24350 | 450 | 920 | 300 | 6100 |
| 26 | 1120 | 19820 | 20680 | 4573 | 12520 | 5060 | 14580 | 23830 | 500 | 1090 | 300 | 10600 |
| 27 | 1230 | 19410 | 21950 | 5630 | 7650 | 8570 | 15410 | 25200 | 620 | 2200 | 200 | 10000 |
| 28 | 1890 | 17240 | 21460 | 3112 | 3900 | 10580 | 18160 | 26060 | 620 | 2900 | 200 | 10100 |
| 29 | 1270 | 20000 | 21810 | 5782 | 6410 | 10650 | 14640 | 25730 | 630 | 3200 | 300 | 9800 |
| 30 | 1910 | 19410 | 22850 | 8041 | | 10000 | 12950 | 25670 | 1270 | 4400 | 300 | 8700 |
| 31 | 2110 | | 21730 | 9042 | | 11590 | | 27550 | | 1900 | 300 | |
| Max | 11910 | 20000 | 26390 | 22290 | 17780 | 16450 | 18160 | 28770 | 33140 | 6310 | 1200 | 17400 |
| Min | 200 | 2810 | 13150 | 3112 | 3900 | 1680 | 330 | 14830 | 450 | 500 | 200 | 300 |
| Mean | 3444 | 10722 | 19260 | 13855 | 11913 | 9042 | 6859 | 24479 | 18307 | 2454 | 429 | 5713 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Salinity, parts per thousand, Water Year October 2006 to September 2007

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0.40 | 10.43 | 11.89 | 16.75 | 15.89 | 12.26 | 9.31 | 12.59 | 25.60 | 23.59 | 13.41 | 9.75 |
| 2 | 0.57 | 10.32 | 12.64 | 15.25 | 20.91 | 15.51 | 8.94 | 13.53 | 29.80 | 22.23 | 8.19 | 9.11 |
| 3 | 1.63 | 8.58 | 13.73 | 12.86 | 9.67 | 12.69 | 8.11 | 14.76 | 23.28 | 21.03 | 0.48 | 9.81 |
| 4 | 3.13 | 6.76 | 15.38 | 15.14 | 0.96 | 8.49 | 8.47 | 16.47 | 22.16 | 18.55 | 0.41 | 10.42 |
| 5 | 2.99 | 12.49 | 12.18 | 18.01 | 0.58 | 6.44 | 11.49 | 19.93 | 21.60 | 16.53 | 0.51 | 11.31 |
| 6 | 6.21 | 16.10 | 15.93 | 16.61 | 0.77 | 6.74 | 9.18 | 19.76 | 20.25 | 14.24 | 2.13 | 12.62 |
| 7 | 5.25 | 18.85 | 20.74 | 13.57 | 2.29 | 11.10 | 8.15 | 13.60 | 19.74 | 13.67 | 2.93 | 12.32 |
| 8 | 7.00 | 20.80 | 13.49 | 12.80 | 2.60 | 10.93 | 8.75 | 19.81 | 16.88 | 13.78 | 5.38 | 15.70 |
| 9 | 6.08 | 19.00 | 10.85 | 9.52 | 3.41 | 11.55 | 10.20 | 20.18 | 15.06 | 15.74 | 9.27 | 16.21 |
| 10 | 9.08 | 15.54 | 12.51 | 8.76 | 4.07 | 11.89 | 11.12 | 18.56 | 14.79 | 16.29 | 9.77 | 14.31 |
| 11 | 12.44 | 15.67 | 14.89 | 11.49 | 4.62 | 10.99 | 10.32 | 16.74 | 16.17 | 18.03 | 11.74 | 13.55 |
| 12 | 11.51 | 15.36 | 13.93 | 13.89 | 5.31 | 13.15 | 7.53 | 17.59 | 18.79 | 18.46 | 4.80 | 12.72 |
| 13 | 10.22 | 13.13 | 14.69 | 14.58 | 10.29 | 13.74 | 1.76 | 17.37 | 18.22 | 19.63 | 3.71 | 10.66 |
| 14 | 7.21 | 12.55 | 14.15 | 14.96 | 8.03 | 15.27 | 3.20 | 17.86 | 21.53 | 19.94 | 4.72 | 7.82 |
| 15 | 6.17 | 14.69 | 14.08 | 16.96 | 7.89 | 20.20 | 10.58 | 18.07 | 23.99 | 19.63 | 2.56 | 5.48 |
| 16 | 8.60 | 16.46 | 15.21 | 17.12 | 6.32 | 20.82 | 2.36 | 24.82 | 23.59 | 17.58 | 0.58 | 2.96 |
| 17 | 10.24 | 10.86 | 15.30 | 17.81 | 2.39 | 17.13 | 2.45 | 25.61 | 21.95 | 16.20 | 0.57 | 4.27 |
| 18 | 8.54 | 10.15 | 16.74 | 14.87 | 9.27 | 9.60 | 8.66 | 24.45 | 22.23 | 15.60 | 0.59 | 3.15 |
| 19 | 6.83 | 10.14 | 17.26 | 17.44 | 1.41 | 7.52 | 7.76 | 20.20 | 19.25 | 10.95 | 0.82 | 4.39 |
| 20 | 6.41 | 11.17 | 16.23 | 16.97 | 2.64 | 6.93 | 9.13 | 22.17 | 18.54 | 11.28 | 1.33 | 6.43 |
| 21 | 6.45 | 9.99 | 19.03 | 15.64 | 4.24 | 6.97 | 7.26 | 23.73 | 16.79 | 12.21 | 4.67 | 16.27 |
| 22 | 6.35 | 10.18 | 20.33 | 17.94 | 4.14 | 7.49 | 10.67 | 21.99 | 16.50 | 12.31 | 7.34 | 11.22 |
| 23 | 8.38 | 10.01 | 23.55 | 14.56 | 4.59 | 8.60 | 11.61 | 19.66 | 17.31 | 13.76 | 8.58 | 9.15 |
| 24 | 3.97 | 11.55 | 18.80 | 13.20 | 10.25 | 10.80 | 12.98 | 19.71 | 18.19 | 13.17 | 12.33 | 8.06 |
| 25 | 8.89 | 11.16 | 17.92 | 9.63 | 11.85 | 9.63 | 13.36 | 19.93 | 16.66 | 13.76 | 13.75 | 8.91 |
| 26 | 10.86 | 10.65 | 13.68 | 10.71 | 12.42 | 9.89 | 14.25 | 20.88 | 15.69 | 14.59 | 14.01 | 9.27 |
| 27 | 14.72 | 10.23 | 7.70 | 16.22 | 11.59 | 10.42 | 13.27 | 22.60 | 18.41 | 14.13 | 12.40 | 9.52 |
| 28 | 21.40 | 12.32 | 8.23 | 12.00 | 11.58 | 11.68 | 11.93 | 22.30 | 19.88 | 19.89 | 11.68 | 10.17 |
| 29 | 7.57 | 9.97 | 9.47 | 9.69 | | 11.62 | 9.57 | 23.04 | 21.73 | 18.43 | 10.61 | 10.07 |
| 30 | 10.58 | 11.53 | 14.59 | 9.74 | | 9.51 | 9.57 | 24.79 | 22.45 | 20.33 | 10.31 | 6.64 |
| 31 | 11.42 | | 16.55 | 10.82 | | 8.57 | | 24.99 | | 18.07 | 10.63 | |
| Max | 21.40 | 20.80 | 23.55 | 18.01 | 20.91 | 20.82 | 14.25 | 25.61 | 29.80 | 23.59 | 14.01 | 16.27 |
| Min | 0.40 | 6.76 | 7.70 | 8.76 | 0.58 | 6.44 | 1.76 | 12.59 | 14.79 | 10.95 | 0.41 | 2.96 |
| Mean | 7.78 | 12.55 | 14.89 | 14.05 | 6.79 | 11.23 | 9.06 | 19.93 | 19.90 | 16.57 | 6.46 | 9.74 |

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Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Salinity, parts per thousand, Water Year October 2006 to September 2007
Daily Minimum Values

| | Oct | Nov | Déc | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|------|------|------|------|------|-------|-------|------|------|------|
| 1 | 0.22 | 4.14 | 4.49 | 2.91 | 1.42 | 1.93 | 1.82 | 2.48 | 14.51 | 9.01 | 3.46 | 1.48 |
| 2 | 0.24 | 3.75 | 3.91 | 2.25 | 2.41 | 3.82 | 1.60 | 3.41 | 12.84 | 8.94 | 0.48 | 1.12 |
| 3 | 0.24 | 2.56 | 3.55 | 2.08 | 0.56 | 2.67 | 1.19 | 3.29 | 12.22 | 8.48 | 0.23 | 0.98 |
| 4 | 0.25 | 1.15 | 3.35 | 2.52 | 0.35 | 2.12 | 1.12 | 3.48 | 9.27 | 6.73 | 0.22 | 1.16 |
| 5 | 0.27 | 1.61 | 2.49 | 3.48 | 0.33 | 1.44 | 1.17 | 3.83 | 8.38 | 5.15 | 0.22 | 1.40 |
| 6 | 0.27 | 2.82 | 3.42 | 3.98 | 0.37 | 1.29 | 1.66 | 5.23 | 8.64 | 4.72 | 0.27 | 2.05 |
| 7 | 0.36 | 5.00 | 5.30 | 3.14 | 0.42 | 3.11 | 2.00 | 4.33 | 8.44 | 4.36 | 0.37 | 2.50 |
| 8 | 0.41 | 5.70 | 3.14 | 4.28 | 0.41 | 2.95 | 1.54 | 4.47 | 9.37 | 3.84 | 0.40 | 4.02 |
| 9 | 0.41 | 5.22 | 3.01 | 2.18 | 0.37 | 2.44 | 1.61 | 6.32 | 4.74 | 3.04 | 0.49 | 5.18 |
| 10 | 0.58 | 4.34 | 4.27 | 1.20 | 0.36 | 2.82 | 2.20 | 8.01 | 5.21 | 2.76 | 0.63 | 5.15 |
| 11 | 1.20 | 5.00 | 5.71 | 3.09 | 0.32 | 2.67 | 1.23 | 8.37 | 4.84 | 3.28 | 0.72 | 4.64 |
| 12 | 0.86 | 5.23 | 6.31 | 4.10 | 0.41 | 1.99 | 0.59 | 9.05 | 4.74 | 2.53 | 0.30 | 4.68 |
| 13 | 0.79 | 6.35 | 8.93 | 3.71 | 0.46 | 2.60 | 0.34 | 10.19 | 4.69 | 2.83 | 0.27 | 2.85 |
| 14 | 0.50 | 6.75 | 8.05 | 4.46 | 0.66 | 2.98 | 0.34 | 8.53 | 4.83 | 3.25 | 0.29 | 0.72 |
| 15 | 0.63 | 6.96 | 6.95 | 5.07 | 0.41 | 4.23 | 0.79 | 8.69 | 5.35 | 3.64 | 0.29 | 0.32 |
| 16 | 1.54 | 7.00 | 5.06 | 5.04 | 0.36 | 6.57 | 0.34 | 9.88 | 7.48 | 4.21 | 0.22 | 0.28 |
| 17 | 2.42 | 2.77 | 4.91 | 4.19 | 0.32 | 3.78 | 0.32 | 10.47 | 8.03 | 4.48 | 0.23 | 0.32 |
| 18 | 1.98 | 2.10 | 5.03 | 4.95 | 0.33 | 1.71 | 0.31 | 11.07 | 8.80 | 5.47 | 0.27 | 0.33 |
| 19 | 1.50 | 1.93 | 4.85 | 5.29 | 0.33 | 1.41 | 0.47 | 10.15 | 9.62 | 4.34 | 0.28 | 0.35 |
| 20 | 1.25 | 2.29 | 4.59 | 5.53 | 0.37 | 1.18 | 0.54 | 9.27 | 7.05 | 3.69 | 0.30 | 0.48 |
| 21 | 1.06 | 1.76 | 5.53 | 5.42 | 0.36 | 1.19 | 0.58 | 10.29 | 8.09 | 5.39 | 0.33 | 1.46 |
| 22 | 0.80 | 2.96 | 6.95 | 8.29 | 0.38 | 1.17 | 0.78 | 11.66 | 8.16 | 5.37 | 0.50 | 1.30 |
| 23 | 0.89 | 1.71 | 8.03 | 7.24 | 0.34 | 0.89 | 1.24 | 11.78 | 8.26 | 3.94 | 0.85 | 1.38 |
| 24 | 0.50 | 2.11 | 6.77 | 7.22 | 0.36 | 0.93 | 1.83 | 13.37 | 7.88 | 3.04 | 1.38 | 1.85 |
| 25 | 0.83 | 2.04 | 9.34 | 4.02 | 0.71 | 1.13 | 2.91 | 14.27 | 5.58 | 2.68 | 1.60 | 2.03 |
| 26 | 1.40 | 2.76 | 2.69 | 1.25 | 1.19 | 1.03 | 4.61 | 14.56 | 6.28 | 2.71 | 1.95 | 2.01 |
| 27 | 3.10 | 3.14 | 1.16 | 1.04 | 1.27 | 1.40 | 6.16 | 14.83 | 7.84 | 2.32 | 2.12 | 2.30 |
| 28 | 4.73 | 3.83 | 1.29 | 2.52 | 1.44 | 1.71 | 4.41 | 14.52 | 7.83 | 4.22 | 2.12 | 2.05 |
| 29 | 1.59 | 4.65 | 1.32 | 0.62 | | 1.68 | 2.41 | 13.91 | 8.35 | 4.21 | 1.97 | 1.63 |
| 30 | 1.86 | 5.08 | 1.28 | 0.75 | | 1.61 | 2.05 | 14.06 | 8.11 | 4.34 | 1.96 | 0.86 |
| 31 | 3.91 | | 1.98 | 0.99 | | 1.91 | | 14.77 | | 5.02 | 2.53 | |
| Max | 4.73 | 7.00 | 9.34 | 8.29 | 2.41 | 6.57 | 6.16 | 14.83 | 14.51 | 9.01 | 3.46 | 5.18 |
| Min | 0.22 | 1.15 | 1.16 | 0.62 | 0.32 | 0.89 | 0.31 | 2.48 | 4.69 | 2.32 | 0.22 | 0.28 |
| Mean | 1.18 | 3.76 | 4.63 | 3.64 | 0.61 | 2.21 | 1.61 | 9.31 | 7.85 | 4.45 | 0.88 | 1.90 |



Date Processed 10/10/07

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Salinity, parts per thousand, Water Year October 2006 to September 2007
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|------|
| 1 | 0.25 | 7.19 | 8.17 | 8.94 | 7.22 | 7.13 | 5.41 | 6.75 | 19.50 | 15.57 | 7.13 | 4.66 |
| 2 | 0.29 | 6.62 | 8.07 | 7.00 | 8.20 | 8.77 | 4.99 | 7.87 | 21.30 | 15.15 | 3.77 | 3.96 |
| 3 | 0.40 | 4.70 | 8.07 | 7.29 | 2.55 | 6.47 | 4.27 | 8.24 | 17.27 | 13.90 | 0.37 | 4.41 |
| 4 | 0.59 | 3.06 | 7.35 | 8.55 | 0.52 | 4.94 | 4.06 | 9.16 | 15.56 | 12.17 | 0.25 | 5.18 |
| 5 | 0.59 | 6.01 | 6.81 | 9.88 | 0.40 | 3.34 | 5.54 | 10.74 | 15.06 | 10.93 | 0.28 | 6.38 |
| 6 | 1.28 | 9.09 | 9.44 | 9.39 | 0.47 | 3.44 | 4.75 | 11.57 | 15.43 | 10.09 | 0.61 | 7.04 |
| 7 | 1.74 | 12.27 | 11.01 | 8.54 | 0.74 | 6.18 | 4.23 | 7.60 | 14.96 | 8.70 | 1.06 | 7.29 |
| 8 | 1.91 | 11.76 | 6.69 | 8.38 | 0.83 | 6.49 | 4.25 | 10.90 | 12.89 | 8.57 | 1.81 | 8.77 |
| 9 | 1.83 | 10.77 | 6.54 | 5.11 | 0.90 | 6.74 | 5.18 | 13.34 | 9.89 | 9.36 | 3.13 | 9.04 |
| 10 | 2.95 | 9.76 | 8.95 | 3.45 | 1.30 | 6.81 | 6.41 | 14.20 | 9.88 | 9.66 | 3.10 | 9.12 |
| 11 | 4.52 | 10.43 | 10.82 | 6.43 | 1.37 | 6.80 | 5.46 | 13.16 | 10.53 | 10.59 | 3.83 | 8.29 |
| 12 | 4.40 | 11.02 | 10.85 | 8.79 | 2.22 | 6.92 | 1.67 | 13.83 | 11.46 | 10.23 | 1.24 | 8.22 |
| 13 | 4.14 | 10.29 | 11.69 | 9.47 | 3.97 | 7.69 | 0.56 | 13.70 | 10.96 | 10.52 | 0.75 | 7.11 |
| 14 | 2.84 | 9.94 | 11.48 | 10.28 | 3.55 | 8.91 | 1.10 | 13.11 | 12.37 | 10.52 | 0.99 | 3.65 |
| 15 | 3.02 | 10.55 | 10.76 | 11.23 | 2.09 | 11.31 | 3.99 | 12.69 | 13.81 | 10.47 | 0.59 | 1.38 |
| 16 | 4.82 | 10.97 | 10.20 | 10.86 | 1.34 | 11.85 | 0.68 | 16.32 | 14.77 | 9.66 | 0.32 | 0.73 |
| 17 | 6.43 | 6.40 | 10.35 | 9.44 | 0.94 | 7.76 | 0.72 | 17.25 | 14.09 | 10.14 | 0.35 | 1.17 |
| 18 | 5.12 | 5.94 | 10.64 | 10.75 | 2.29 | 4.36 | 2.14 | 16.63 | 15.15 | 10.01 | 0.36 | 0.79 |
| 19 | 3.55 | 6.05 | 10.31 | 10.71 | 0.61 | 3.93 | 2.75 | 14.33 | 14.37 | 7.50 | 0.39 | 1.26 |
| 20 | 3.34 | 6.34 | 10.53 | 10.60 | 1.02 | 3.62 | 2.90 | 14.68 | 13.62 | 8.05 | 0.51 | 2.29 |
| 21 | 3.08 | 4.83 | 11.95 | 10.95 | 1.22 | 3.62 | 2.40 | 16.82 | 13.41 | 8.35 | 1.29 | 6.83 |
| 22 | 3.01 | 6.29 | 14.05 | 12.63 | 1.38 | 3.06 | 3.95 | 16.93 | 12.12 | 8.74 | 2.97 | 5.93 |
| 23 | 3.00 | 5.82 | 14.12 | 10.77 | 1.32 | 3.42 | 5.51 | 16.27 | 12.63 | 8.75 | 4.16 | 5.04 |
| 24 | 1.49 | 6.70 | 12.33 | 10.07 | 2.84 | 4.83 | 7.37 | 16.71 | 13.02 | 8.81 | 6.19 | 4.49 |
| 25 | 4.44 | 6.54 | 13.78 | 6.96 | 5.07 | 4.00 | 8.98 | 17.01 | 12.21 | 8.88 | 6.67 | 4.64 |
| 26 | 6.02 | 6.96 | 7.59 | 3.78 | 6.44 | 4.91 | 10.21 | 17.34 | 11.80 | 9.50 | 6.43 | 4.91 |
| 27 | 8.54 | 7.45 | 3.29 | 6.16 | 6.48 | 6.25 | 10.22 | 18.08 | 13.07 | 8.68 | 5.55 | 5.41 |
| 28 | 11.42 | 8.41 | 4.22 | 5.74 | 5.75 | 7.41 | 8.42 | 17.94 | 13.92 | 10.63 | 5.29 | 5.11 |
| 29 | 4.08 | 7.74 | 5.02 | 3.00 | | 5.85 | 6.64 | 18.23 | 14.39 | 10.40 | 5.00 | 4.39 |
| 30 | 6.70 | 7.85 | 6.09 | 4.30 | | 4.81 | 5.59 | 18.88 | 14.92 | 11.11 | 5.06 | 2.76 |
| 31 | 7.73 | | 7.57 | 4.57 | | 5.31 | | 19.16 | | 10.03 | 6.18 | |
| Max | 11.42 | 12.27 | 14.12 | 12.63 | 8.20 | 11.85 | 10.22 | 19.16 | 21.30 | 15.57 | 7.13 | 9.12 |
| Min | 0.25 | 3.06 | 3.29 | 3.00 | 0.40 | 3.06 | 0.56 | 6.75 | 9.88 | 7.50 | 0.25 | 0.73 |
| Mean | 3.66 | 7.93 | 9.31 | 8.19 | 2.61 | 6.03 | 4.68 | 14.18 | 13.81 | 10.18 | 2.76 | 5.01 |

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Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Drainage Area mi2

Little Manatee River Below I-75

Salinity, parts per thousand, Water Year October 2007 to September 2008

Daily Maximum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1 | 10.86 | 5.11 | 14.37 | 14.98 | 10.38 | 11.08 | 12.66 | 12.54 | 22.11 | 8.30 | 4.23 | 6.51 |
| 2 | 10.14 | 5.10 | 13.74 | 11.66 | 10.48 | 10.74 | 12.05 | 14.29 | 23.15 | 10.94 | 0.36 | 0.22 |
| 3 | 18.21 | 5.33 | 13.73 | 10.97 | 12.63 | 14.17 | 7.89 | 15.74 | 24.66 | 9.07 | 0.37 | 0.20 |
| 4 | 5.60 | 5.40 | 13.34 | 19.08 | 14.22 | 14.64 | 2.19 | 16.99 | 25.62 | 9.31 | 0.23 | 0.26 |
| 5 | 0.20 | 4.21 | 14.93 | 20.40 | 15.26 | 16.35 | 1.72 | 16.97 | 25.74 | 10.07 | 0.22 | 0.30 |
| 6 | 0.21 | 6.69 | 15.80 | 21.03 | 17.11 | 13.37 | 0.69 | 18.32 | 24.08 | 8.59 | 0.21 | 1.39 |
| 7 | 0.13 | 7.13 | 15.38 | 20.63 | 15.62 | 12.54 | 0.37 | 21.07 | 22.70 | 7.56 | 0.21 | 1.90 |
| 8 | 0.13 | 4.16 | 15.81 | 20.70 | 15.16 | 17.87 | 0.26 | 23.79 | 21.65 | 2.00 | 0.35 | 0.35 |
| 9 | 0.15 | 6.56 | 15.95 | 21.56 | 13.37 | 4.53 | 0.21 | 22.21 | 19.60 | 0.27 | 0.30 | 1.26 |
| 10 | 0.19 | 7.06 | 17.22 | 19.89 | 10.62 | 4.95 | 2.29 | 20.52 | 18.58 | 0.89 | 0.20 | 20.22 |
| 11 | 0.22 | 8.94 | 17.09 | 20.57 | 8.27 | 8.10 | 7.77 | 19.95 | 19.78 | 1.06 | 0.22 | 15.94 |
| 12 | 0.37 | 8.85 | 18.63 | 18.74 | 15.95 | 9.77 | 8.96 | 15.19 | 18.14 | 2.34 | 0.29 | 9.92 |
| 13 | 0.39 | 10.61 | 17.08 | 18.06 | 15.61 | 8.29 | 5.48 | 14.99 | 16.88 | 4.09 | 2.74 | 9.88 |
| 14 | 0.59 | 12.30 | 16.93 | 14.99 | 12.05 | 8.52 | 5.13 | 16.59 | 15.51 | 6.93 | 2.88 | 11.08 |
| 15 | 0.48 | 12.97 | 17.68 | 14.98 | 11.25 | 13.90 | 3.56 | 18.19 | 15.85 | 7.94 | 0.26 | 8.77 |
| 16 | 5.31 | 6.80 | 23.23 | 17.59 | 14.03 | 12.27 | 1.22 | 19.91 | 18.74 | 6.60 | 0.21 | 7.32 |
| 17 | 6.46 | 10.40 | 12.65 | 21.75 | 19.71 | 8.92 | 3.04 | 19.85 | 17.53 | 1.62 | 0.19 | 5.68 |
| 18 | 10.02 | 10.55 | 14.93 | 19.08 | 20.63 | 11.01 | 7.05 | 22.12 | 20.00 | 0.73 | 0.17 | 6.73 |
| 19 | 10.82 | 10.44 | 16.46 | 22.31 | 15.59 | 12.99 | 10.14 | 21.83 | 17.67 | 1.06 | 0.18 | 5.97 |
| 20 | 10.11 | 9.21 | 20.09 | 23.61 | 12.77 | 13.91 | 11.26 | 22.74 | 18.09 | 1.51 | 0.20 | 7.94 |
| 21 | 6.98 | 12.27 | 20.77 | 11.03 | 13.06 | 7.48 | 12.63 | 22.90 | 12.82 | 2.17 | 0.21 | 7.75 |
| 22 | 6.11 | 15.22 | 17.71 | 15.81 | 14.50 | 9.08 | 11.91 | 21.33 | 12.14 | 0.65 | 0.26 | 12.10 |
| 23 | 7.63 | 15.41 | 20.50 | 19.58 | 13.22 | 8.23 | 11.10 | 22.37 | 4.19 | 0.44 | 0.27 | 7.96 |
| 24 | 7.45 | 13.29 | 20.62 | 13.59 | 10.39 | 5.85 | 11.83 | 22.25 | 0.42 | 0.61 | 0.32 | 5.95 |
| 25 | 4.17 | 19.47 | 20.19 | 6.25 | 9.65 | 3.38 | 14.77 | 17.91 | 0.29 | 1.60 | 0.16 | 7.30 |
| 26 | 2.21 | 20.37 | 20.60 | 6.23 | 12.13 | 7.57 | 15.94 | 18.23 | 0.28 | 2.00 | 0.19 | 14.13 |
| 27 | 2.14 | 19.95 | 21.66 | 8.63 | 7.67 | 12.12 | 15.56 | 18.64 | 0.48 | 5.36 | 0.16 | 10.51 |
| 28 | 4.57 | 15.89 | 17.80 | 6.44 | 7.88 | 11.72 | 15.76 | 18.09 | 0.45 | 7.31 | 0.16 | 10.64 |
| 29 | 2.91 | 17.41 | 17.07 | 8.11 | 8.62 | 10.93 | 11.92 | 18.31 | 0.59 | 8.57 | 0.40 | 10.33 |
| 30 | 3.82 | 16.09 | 16.80 | 11.14 | | 10.15 | 11.56 | 18.19 | 2.66 | 9.33 | 0.19 | 10.67 |
| 31 | 3.92 | | 16.26 | 10.23 | | 12.68 | | 19.92 | | 7.03 | 0.28 | |
| Max | 18.21 | 20.37 | 23.23 | 23.61 | 20.63 | 17.87 | 15.94 | 23.79 | 25.74 | 10.94 | 4.23 | 20.22 |
| Min | 0.13 | 4.16 | 12.65 | 6.23 | 7.67 | 3.38 | 0.21 | 12.54 | 0.28 | 0.27 | 0.16 | 0.20 |
| Mean | 4.60 | 10.77 | 17.26 | 15.79 | 13.03 | 10.55 | 7.90 | 19.09 | 14.68 | 4.71 | 0.54 | 7.31 |



Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Salinity, parts per thousand, Water Year October 2007 to September 2008
Daily Minimum Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|------|-------|-------|------|------|------|-------|-------|------|------|------|
| 1 | 1.36 | 0.27 | 6.61 | 10.22 | 1.37 | 1.40 | 3.18 | 5.13 | 12.66 | 0.28 | 0.18 | 0.12 |
| 2 | 1.64 | 0.32 | 9.18 | 3.75 | 1.04 | 1.82 | 2.44 | 7.04 | 11.83 | 0.37 | 0.15 | 0.12 |
| 3 | 0.78 | 0.37 | 8.01 | 2.60 | 1.47 | 2.75 | 0.29 | 7.91 | 11.85 | 0.38 | 0.17 | 0.14 |
| 4 | 0.19 | 0.59 | 5.99 | 2.91 | 1.85 | 4.18 | 0.23 | 6.99 | 12.03 | 0.38 | 0.17 | 0.16 |
| 5 | 0.11 | 0.62 | 5.90 | 5.19 | 2.68 | 6.31 | 0.21 | 6.44 | 12.74 | 0.41 | 0.17 | 0.17 |
| 6 | 0.10 | 0.88 | 5.66 | 6.76 | 4.14 | 4.89 | 0.21 | 6.92 | 12.44 | 0.56 | 0.17 | 0.18 |
| 7 | 0.09 | 0.74 | 4.94 | 7.21 | 4.16 | 4.84 | 0.20 | 6.32 | 12.69 | 0.61 | 0.16 | 0.19 |
| 8 | 0.08 | 0.52 | 5.10 | 7.36 | 3.89 | 1.05 | 0.16 | 7.31 | 12.87 | 0.18 | 0.17 | 0.21 |
| 9 | 0.10 | 0.64 | 5.17 | 8.60 | 3.42 | 0.61 | 0.15 | 8.68 | 12.33 | 0.21 | 0.17 | 0.22 |
| 10 | 0.12 | 0.76 | 5.48 | 7.82 | 2.67 | 0.56 | 0.16 | 8.51 | 12.83 | 0.24 | 0.17 | 1.04 |
| 11 | 0.15 | 1.00 | 5.65 | 9.03 | 2.41 | 0.59 | 0.19 | 8.64 | 12.82 | 0.25 | 0.17 | 1.78 |
| 12 | 0.16 | 0.91 | 6.41 | 9.22 | 3.16 | 0.75 | 0.28 | 11.46 | 6.78 | 0.25 | 0.18 | 1.42 |
| 13 | 0.18 | 1.46 | 6.41 | 9.77 | 4.85 | 0.68 | 0.41 | 8.08 | 3.80 | 0.29 | 0.19 | 1.34 |
| 14 | 0.19 | 1.93 | 6.39 | 7.18 | 2.29 | 0.59 | 0.34 | 8.11 | 3.91 | 0.30 | 0.19 | 1.25 |
| 15 | 0.20 | 2.79 | 8.49 | 6.72 | 1.41 | 0.76 | 0.31 | 11.28 | 3.17 | 0.37 | 0.16 | 1.11 |
| 16 | 0.23 | 1.24 | 9.59 | 5.78 | 1.52 | 1.27 | 0.28 | 12.28 | 3.28 | 0.30 | 0.16 | 0.81 |
| 17 | 0.32 | 2.60 | 5.43 | 7.56 | 2.29 | 0.93 | 0.30 | 11.12 | 2.53 | 0.20 | 0.14 | 0.74 |
| 18 | 0.68 | 3.31 | 6.05 | 6.29 | 5.00 | 1.35 | 0.62 | 11.38 | 3.07 | 0.20 | 0.13 | 0.57 |
| 19 | 1.06 | 4.14 | 6.57 | 5.35 | 3.37 | 3.07 | 1.64 | 10.58 | 2.86 | 0.20 | 0.15 | 0.41 |
| 20 | 0.75 | 4.37 | 6.40 | 2.76 | 2.60 | 1.73 | 1.79 | 10.57 | 2.70 | 0.20 | 0.17 | 0.46 |
| 21 | 0.80 | 4.25 | 7.70 | 1.64 | 4.04 | 1.42 | 2.05 | 10.73 | 2.01 | 0.22 | 0.18 | 0.48 |
| 22 | 0.92 | 4.90 | 6.42 | 1.99 | 6.52 | 1.98 | 2.23 | 9.87 | 1.10 | 0.25 | 0.20 | 0.77 |
| 23 | 1.34 | 4.55 | 6.63 | 2.93 | 5.35 | 1.09 | 2.02 | 9.10 | 0.38 | 0.25 | 0.20 | 0.56 |
| 24 | 1.06 | 2.79 | 6.21 | 1.17 | 3.31 | 0.75 | 1.74 | 9.98 | 0.20 | 0.25 | 0.14 | 0.50 |
| 25 | 0.41 | 4.35 | 6.58 | 0.67 | 2.59 | 0.44 | 2.14 | 9.99 | 0.17 | 0.26 | 0.13 | 0.77 |
| 26 | 0.27 | 5.89 | 7.33 | 0.84 | 1.91 | 0.53 | 2.93 | 7.95 | 0.19 | 0.25 | 0.14 | 1.75 |
| 27 | 0.27 | 5.79 | 8.81 | 0.85 | 1.69 | 0.76 | 3.36 | 9.09 | 0.23 | 0.25 | 0.12 | 1.96 |
| 28 | 0.24 | 4.72 | 8.19 | 0.60 | 0.68 | 1.52 | 4.37 | 10.83 | 0.23 | 0.22 | 0.11 | 2.02 |
| 29 | 0.24 | 6.59 | 8.85 | 0.69 | 0.78 | 1.87 | 5.40 | 11.38 | 0.22 | 0.24 | 0.13 | 1.91 |
| 30 | 0.26 | 6.10 | 11.30 | 1.74 | | 1.88 | 3.42 | 11.40 | 0.26 | 0.25 | 0.12 | 1.77 |
| 31 | 0.29 | | 10.74 | 0.97 | | 1.89 | | 12.68 | | 0.21 | 0.12 | |
| Max | 1.64 | 6.59 | 11.30 | 10.22 | 6.52 | 6.31 | 5.40 | 12.68 | 12.87 | 0.61 | 0.20 | 2.02 |
| Min | 0.08 | 0.27 | 4.94 | 0.60 | 0.68 | 0.44 | 0.15 | 5.13 | 0.17 | 0.18 | 0.11 | 0.12 |
| Mean | 0.47 | 2.65 | 7.04 | 4.72 | 2.84 | 1.75 | 1.44 | 9.28 | 5.81 | 0.28 | 0.16 | 0.83 |

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Date Processed 10/29/08

Hydrologic Data Collection, Inc.

Little Manatee River Below I-75
Salinity, parts per thousand, Water Year October 2007 to September 2008
Daily Mean Values

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|------|------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|
| 1 | 4.56 | 1.50 | 11.21 | 12.53 | 6.01 | 6.02 | 8.73 | 8.58 | 16.63 | 1.91 | 0.59 | 0.94 |
| 2 | 5.58 | 1.68 | 11.49 | 7.27 | 5.46 | 6.21 | 6.02 | 10.72 | 17.16 | 2.88 | 0.20 | 0.14 |
| 3 | 6.77 | 1.90 | 10.98 | 4.91 | 6.79 | 8.58 | 1.71 | 11.58 | 17.83 | 2.20 | 0.20 | 0.16 |
| 4 | 1.19 | 2.51 | 10.13 | 7.41 | 7.54 | 10.24 | 0.70 | 11.68 | 18.44 | 2.17 | 0.19 | 0.18 |
| 5 | 0.14 | 2.31 | 11.11 | 12.39 | 8.59 | 10.41 | 0.54 | 10.97 | 18.50 | 2.97 | 0.19 | 0.20 |
| 6 | 0.13 | 3.42 | 11.03 | 14.11 | 9.66 | 8.87 | 0.30 | 11.53 | 17.66 | 3.08 | 0.18 | 0.33 |
| 7 | 0.10 | 2.93 | 11.01 | 14.62 | 9.03 | 9.02 | 0.25 | 12.51 | 17.51 | 3.21 | 0.18 | 0.34 |
| 8 | 0.10 | 2.25 | 10.81 | 14.37 | 8.31 | 8.24 | 0.20 | 14.80 | 17.25 | 0.55 | 0.21 | 0.26 |
| 9 | 0.12 | 3.12 | 11.10 | 14.56 | 7.46 | 1.30 | 0.17 | 14.77 | 16.63 | 0.24 | 0.21 | 0.36 |
| 10 | 0.15 | 3.32 | 11.56 | 13.77 | 5.96 | 1.47 | 0.47 | 14.27 | 16.06 | 0.34 | 0.18 | 8.50 |
| 11 | 0.18 | 4.01 | 11.78 | 14.48 | 5.08 | 2.55 | 1.86 | 14.85 | 15.90 | 0.38 | 0.19 | 9.64 |
| 12 | 0.21 | 4.34 | 12.42 | 14.51 | 8.61 | 4.08 | 2.95 | 13.74 | 12.78 | 0.54 | 0.21 | 4.25 |
| 13 | 0.24 | 5.68 | 12.21 | 14.23 | 11.24 | 2.90 | 1.97 | 12.30 | 11.30 | 1.08 | 0.60 | 3.88 |
| 14 | 0.28 | 6.50 | 12.58 | 11.35 | 5.82 | 3.65 | 2.00 | 12.48 | 10.62 | 1.84 | 0.58 | 4.03 |
| 15 | 0.31 | 6.94 | 14.07 | 9.96 | 5.95 | 5.71 | 0.64 | 14.90 | 10.67 | 2.25 | 0.19 | 3.63 |
| 16 | 1.24 | 3.41 | 16.42 | 9.67 | 6.60 | 5.57 | 0.50 | 16.29 | 10.94 | 1.50 | 0.17 | 2.74 |
| 17 | 2.34 | 7.00 | 8.30 | 15.15 | 9.24 | 3.69 | 1.05 | 15.98 | 10.09 | 0.38 | 0.16 | 2.41 |
| 18 | 3.97 | 7.59 | 9.38 | 13.05 | 11.27 | 5.72 | 2.99 | 16.49 | 10.75 | 0.28 | 0.14 | 2.22 |
| 19 | 5.05 | 7.45 | 11.59 | 13.21 | 7.75 | 8.49 | 4.86 | 16.29 | 9.39 | 0.30 | 0.16 | 1.66 |
| 20 | 4.37 | 6.53 | 12.40 | 8.11 | 7.24 | 6.80 | 5.75 | 16.29 | 9.48 | 0.37 | 0.18 | 2.28 |
| 21 | 3.02 | 7.71 | 13.09 | 3.78 | 9.42 | 4.02 | 6.11 | 16.21 | 7.36 | 0.46 | 0.19 | 2.57 |
| 22 | 2.99 | 9.57 | 12.00 | 9.14 | 10.56 | 5.37 | 6.05 | 15.42 | 5.80 | 0.36 | 0.21 | 4.44 |
| 23 | 3.77 | 8.80 | 12.83 | 8.61 | 10.13 | 4.71 | 5.60 | 15.54 | 1.60 | 0.31 | 0.22 | 3.32 |
| 24 | 3.41 | 7.73 | 12.77 | 4.86 | 7.49 | 2.54 | 5.53 | 15.90 | 0.30 | 0.33 | 0.21 | 2.07 |
| 25 | 1.25 | 10.91 | 12.60 | 1.93 | 6.52 | 0.96 | 7.40 | 13.56 | 0.21 | 0.43 | 0.15 | 3.25 |
| 26 | 0.57 | 11.90 | 13.49 | 2.87 | 7.38 | 3.10 | 8.52 | 13.48 | 0.24 | 0.51 | 0.16 | 5.89 |
| 27 | 0.63 | 11.64 | 14.31 | 3.56 | 4.44 | 5.38 | 8.98 | 14.60 | 0.30 | 1.12 | 0.13 | 5.48 |
| 28 | 1.00 | 10.22 | 13.75 | 1.92 | 2.40 | 6.58 | 10.60 | 15.19 | 0.29 | 1.47 | 0.13 | 5.52 |
| 29 | 0.65 | 11.97 | 13.78 | 3.70 | 4.12 | 6.46 | 8.40 | 14.71 | 0.30 | 1.64 | 0.17 | 5.37 |
| 30 | 1.00 | 11.59 | 14.28 | 5.20 | | 5.87 | 7.42 | 14.44 | 0.61 | 1.94 | 0.14 | 4.74 |
| 31 | 1.11 | | 13.48 | 5.88 | | 6.87 | | 15.54 | | 1.00 | 0.15 | |
| Max | 6.77 | 11.97 | 16.42 | 15.15 | 11.27 | 10.41 | 10.60 | 16.49 | 18.50 | 3.21 | 0.60 | 9.64 |
| Min | 0.10 | 1.50 | 8.30 | 1.92 | 2.40 | 0.96 | 0.17 | 8.58 | 0.21 | 0.24 | 0.13 | 0.14 |
| Mean | 1.82 | 6.21 | 12.19 | 9.39 | 7.45 | 5.53 | 3.94 | 14.05 | 10.09 | 1.23 | 0.22 | 3.03 |



Best Subsets Regression for Mean and Maximum Salinity

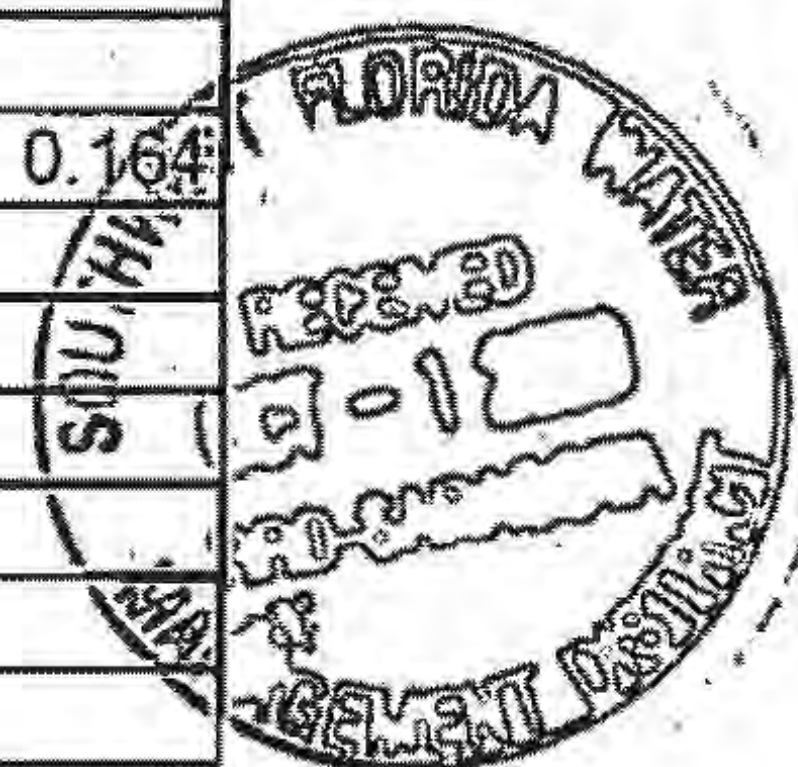
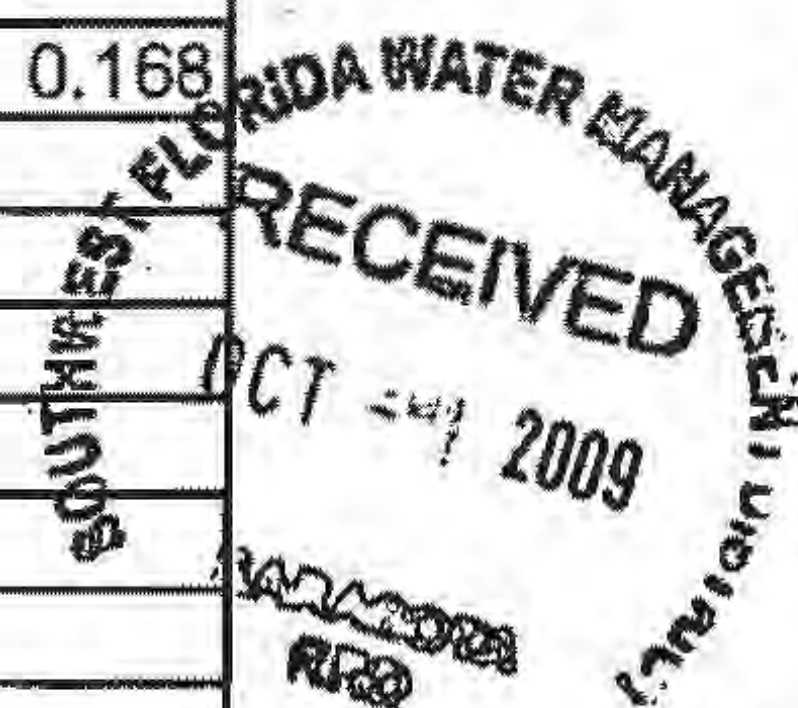
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Summary of Best Subsets Regression, Mean Salinity I75

| Subset | R square | N of Vars | Ln(Q) | lag1_Ln(Q) | LN(Q)_2 | LN(Q)_3 | LN(Q)_M AV3 | LN(Q)_ MAV6 | MeanStage FT I75 |
|--------|----------|-----------|--------|------------|---------|---------|----------------|----------------|---------------------|
| 1 | 0.7968 | 7 | -0.876 | -0.644 | -0.472 | 0.020 | 2.005 | -1.023 | 0.201 |
| 2 | 0.7968 | 6 | -0.871 | -0.647 | -0.456 | | 1.985 | -1.000 | 0.201 |
| 3 | 0.7932 | 6 | -0.445 | -0.532 | | -0.130 | 1.072 | -0.934 | 0.199 |
| 4 | 0.7923 | 5 | -0.361 | -0.475 | | | 0.986 | -1.106 | 0.198 |
| 5 | 0.7900 | 6 | -0.474 | | -0.319 | 0.057 | 0.784 | -1.009 | 0.204 |
| 6 | 0.7899 | 5 | -0.455 | | -0.273 | | 0.709 | -0.944 | 0.204 |
| 7 | 0.7883 | 6 | | -0.272 | 0.069 | -0.035 | 0.248 | -0.949 | 0.194 |
| 8 | 0.7883 | 5 | -0.215 | | | -0.055 | 0.268 | -0.948 | 0.203 |
| 9 | 0.7883 | 5 | | -0.264 | 0.046 | | 0.269 | -0.989 | 0.194 |
| 10 | 0.7881 | 5 | | -0.249 | | 0.006 | 0.271 | -0.967 | 0.193 |
| 11 | 0.7881 | 4 | | -0.249 | | | 0.267 | -0.956 | 0.193 |
| 12 | 0.7881 | 4 | -0.188 | | | | 0.268 | -1.025 | 0.202 |
| 13 | 0.7875 | 6 | -0.039 | -0.106 | 0.086 | -0.100 | | -0.787 | 0.198 |
| 14 | 0.7874 | 5 | | -0.133 | 0.100 | -0.086 | | -0.823 | 0.196 |
| 15 | 0.7873 | 5 | -0.055 | -0.050 | | -0.062 | | -0.779 | 0.198 |
| 16 | 0.7872 | 5 | -0.075 | | 0.023 | -0.063 | | -0.831 | 0.200 |
| 17 | 0.7871 | 4 | -0.074 | | | -0.055 | | -0.817 | 0.199 |
| 18 | 0.7871 | 5 | -0.016 | -0.061 | 0.034 | | | -0.896 | 0.197 |
| 19 | 0.7871 | 4 | | -0.077 | 0.044 | | | -0.905 | 0.197 |
| 20 | 0.7871 | 4 | -0.029 | -0.041 | | | | -0.870 | 0.197 |
| 21 | 0.7870 | 4 | | -0.078 | | -0.031 | | -0.832 | 0.196 |
| 22 | 0.7870 | 3 | | -0.064 | | | | -0.876 | 0.196 |
| 23 | 0.7870 | 4 | -0.047 | | 0.004 | | | -0.898 | 0.199 |
| 24 | 0.7870 | 3 | -0.047 | | | | | -0.894 | 0.199 |
| 25 | 0.7867 | 5 | | | 0.014 | 0.001 | 0.010 | -0.961 | 0.198 |
| 26 | 0.7867 | 4 | | | 0.014 | | 0.009 | -0.960 | 0.198 |
| 27 | 0.7867 | 4 | | | 0.019 | -0.005 | | -0.950 | 0.198 |
| 28 | 0.7867 | 3 | | | 0.017 | | | -0.953 | 0.198 |
| 29 | 0.7867 | 4 | | | | 0.009 | 0.020 | -0.965 | 0.197 |
| 30 | 0.7867 | 3 | | | | | 0.014 | -0.950 | 0.197 |
| 31 | 0.7866 | 3 | | | | 0.001 | | -0.938 | 0.197 |
| 32 | 0.7866 | 2 | | | | | | -0.937 | 0.197 |
| 33 | 0.7789 | 6 | -0.743 | -0.623 | -0.271 | -0.475 | 1.113 | | 0.192 |
| 34 | 0.7709 | 3 | -0.436 | | | -0.539 | | | 0.198 |
| 35 | 0.7700 | 3 | | | | -0.400 | -0.551 | | 0.189 |
| 36 | 0.7694 | 3 | | -0.516 | | -0.435 | | | 0.178 |
| 37 | 0.7622 | 6 | -0.752 | -0.707 | -0.436 | 0.022 | 1.896 | -0.936 | |
| 38 | 0.7559 | 3 | | -0.374 | | | 0.397 | -0.895 | |
| 39 | 0.7546 | 3 | -0.355 | | -0.587 | | | | 0.182 |
| 40 | 0.7533 | 2 | | -0.099 | | | | -0.772 | |
| 41 | 0.7525 | 2 | | | -0.028 | | | -0.841 | |
| 42 | 0.7525 | 2 | -0.014 | | | | | -0.855 | |
| 43 | 0.7525 | 2 | | | | | 0.016 | -0.883 | |
| 44 | 0.7525 | 2 | | | | -0.009 | | -0.859 | |
| 45 | 0.7525 | 1 | | | | | | -0.867 | |
| 46 | 0.7414 | 2 | | -0.491 | | -0.398 | | | |
| 47 | 0.7387 | 2 | | | | -0.376 | -0.507 | | |
| 48 | 0.7371 | 2 | | | | | -0.903 | | 0.177 |
| 49 | 0.7366 | 2 | -0.389 | | | -0.511 | | | |
| 50 | 0.7094 | 1 | | | | | -0.842 | | |
| 51 | 0.7047 | 1 | | -0.839 | | | | | |
| 52 | 0.7038 | 1 | | | -0.839 | | | | |
| 53 | 0.6854 | 1 | | | | -0.828 | | | |
| 54 | 0.6481 | 1 | -0.805 | | | | | | |
| 55 | 0.0174 | 1 | | | | | | | -0.132 |

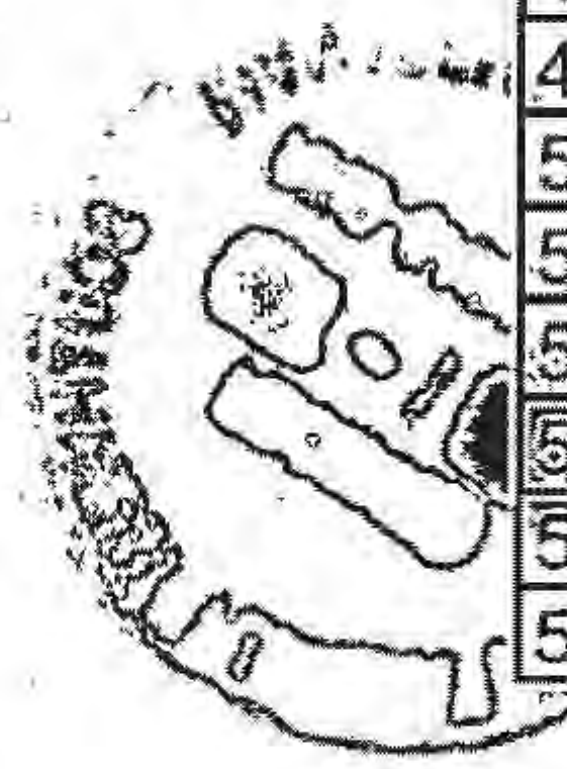
Summary of Best Subsets Regression, Max Salinity I75

| Subset | R square | N of Vars | Ln(Q) | lag1_Ln(Q) | LN(Q)_2 | LN(Q)_3 | LN(Q)_M AV3 | LN(Q)_ MAV6 | MeanStage FT I75 |
|--------|----------|-----------|--------|------------|---------|---------|----------------|----------------|---------------------|
| 1 | 0.7376 | 7 | -0.692 | -0.625 | -0.385 | 0.028 | 1.662 | -0.932 | 0.182 |
| 2 | 0.7375 | 6 | -0.685 | -0.629 | -0.363 | | 1.633 | -0.900 | 0.182 |
| 3 | 0.7351 | 6 | -0.340 | -0.533 | | -0.094 | 0.900 | -0.860 | 0.181 |
| 4 | 0.7347 | 5 | -0.279 | -0.492 | | | 0.837 | -0.985 | 0.181 |
| 5 | 0.7323 | 6 | | -0.331 | 0.042 | -0.015 | 0.274 | -0.874 | 0.177 |
| 6 | 0.7323 | 5 | | -0.327 | 0.032 | | 0.283 | -0.891 | 0.177 |
| 7 | 0.7322 | 5 | | -0.317 | | 0.010 | 0.288 | -0.885 | 0.176 |
| 8 | 0.7322 | 4 | | -0.317 | | | 0.282 | -0.869 | 0.176 |
| 9 | 0.7312 | 6 | -0.302 | | -0.237 | 0.064 | 0.478 | -0.919 | 0.186 |
| 10 | 0.7312 | 6 | 0.002 | -0.179 | 0.077 | -0.071 | | -0.737 | 0.180 |
| 11 | 0.7312 | 5 | | -0.178 | 0.076 | -0.072 | | -0.735 | 0.180 |
| 12 | 0.7310 | 5 | -0.281 | | -0.185 | | 0.393 | -0.846 | 0.186 |
| 13 | 0.7310 | 5 | -0.013 | -0.129 | | -0.037 | | -0.729 | 0.180 |
| 14 | 0.7310 | 5 | 0.018 | -0.147 | 0.040 | | | -0.814 | 0.180 |
| 15 | 0.7310 | 4 | | -0.135 | | -0.030 | | -0.742 | 0.180 |
| 16 | 0.7310 | 4 | | -0.130 | 0.029 | | | -0.804 | 0.180 |
| 17 | 0.7309 | 4 | 0.003 | -0.124 | | | | -0.784 | 0.180 |
| 18 | 0.7309 | 3 | | -0.122 | | | | -0.784 | 0.180 |
| 19 | 0.7302 | 5 | -0.109 | | | -0.019 | 0.094 | -0.873 | 0.185 |
| 20 | 0.7302 | 4 | -0.100 | | | | 0.094 | -0.901 | 0.185 |
| 21 | 0.7301 | 5 | -0.059 | | -0.029 | -0.009 | | -0.811 | 0.183 |
| 22 | 0.7301 | 4 | -0.055 | | -0.032 | | | -0.820 | 0.183 |
| 23 | 0.7301 | 4 | -0.060 | | | -0.019 | | -0.828 | 0.184 |
| 24 | 0.7301 | 3 | -0.050 | | | | | -0.855 | 0.183 |
| 25 | 0.7298 | 5 | | | -0.025 | 0.028 | -0.015 | -0.888 | 0.182 |
| 26 | 0.7298 | 4 | | | -0.032 | 0.037 | | -0.905 | 0.182 |
| 27 | 0.7298 | 4 | | | | 0.013 | -0.033 | -0.882 | 0.182 |
| 28 | 0.7298 | 4 | | | -0.008 | | -0.039 | -0.856 | 0.182 |
| 29 | 0.7298 | 3 | | | | | -0.041 | -0.861 | 0.182 |
| 30 | 0.7298 | 3 | | | | 0.026 | | -0.926 | 0.182 |
| 31 | 0.7297 | 3 | | | -0.017 | | | -0.885 | 0.182 |
| 32 | 0.7297 | 2 | | | | | | -0.901 | 0.182 |
| 33 | 0.7227 | 6 | -0.571 | -0.605 | -0.203 | -0.423 | 0.848 | | 0.174 |
| 34 | 0.7170 | 3 | | -0.526 | | -0.390 | | | 0.163 |
| 35 | 0.7159 | 3 | | | | -0.360 | -0.554 | | 0.174 |
| 36 | 0.7135 | 3 | -0.427 | | | -0.509 | | | 0.183 |
| 37 | 0.7090 | 6 | -0.579 | -0.682 | -0.353 | 0.030 | 1.562 | -0.853 | |
| 38 | 0.7052 | 3 | | -0.431 | | | 0.400 | -0.813 | |
| 39 | 0.7031 | 3 | -0.337 | | -0.572 | | | | 0.168 |
| 40 | 0.7026 | 2 | | -0.155 | | | | -0.689 | |
| 41 | 0.7009 | 2 | | | -0.058 | | | -0.781 | |
| 42 | 0.7008 | 2 | | | | | -0.039 | -0.799 | |
| 43 | 0.7007 | 2 | -0.020 | | | | | -0.819 | |
| 44 | 0.7007 | 2 | | | | 0.017 | | -0.853 | |
| 45 | 0.7007 | 1 | | | | | | -0.837 | |
| 46 | 0.6933 | 2 | | -0.503 | | -0.356 | | | |
| 47 | 0.6892 | 2 | | | | -0.339 | -0.514 | | |
| 48 | 0.6891 | 2 | | | | | -0.872 | | 0.164 |
| 49 | 0.6843 | 2 | -0.384 | | | -0.484 | | | |
| 50 | 0.6654 | 1 | | | | | -0.816 | | |
| 51 | 0.6639 | 1 | | -0.815 | | | | | |
| 52 | 0.6588 | 1 | | | -0.812 | | | | |
| 53 | 0.6345 | 1 | | | | -0.797 | | | |
| 54 | 0.6049 | 1 | -0.778 | | | | | | |
| 55 | 0.0182 | 1 | | | | | | | -0.135 |



Summary of Best Subsets Regression, Mean Salinity US 41

| Subset | R square | N of Vars | Ln(Q) | lag1_Ln(Q) | LN(Q)_2 | LN(Q)_3 | LN(Q)_M AV3 | LN(Q)_ MAV6 | MeanStage FT US41 |
|--------|----------|-----------|--------|------------|---------|---------|----------------|----------------|----------------------|
| 1 | 0.8298 | 7 | -0.595 | -0.572 | -0.342 | -0.005 | 1.421 | -0.870 | 0.077 |
| 2 | 0.8298 | 6 | -0.596 | -0.571 | -0.346 | | 1.427 | -0.876 | 0.077 |
| 3 | 0.8279 | 6 | -0.287 | -0.502 | | -0.117 | 0.762 | -0.805 | 0.076 |
| 4 | 0.8272 | 5 | -0.210 | -0.450 | | | 0.682 | -0.960 | 0.076 |
| 5 | 0.8259 | 6 | | -0.327 | 0.026 | -0.045 | 0.235 | -0.820 | 0.075 |
| 6 | 0.8258 | 5 | | -0.317 | | -0.029 | 0.243 | -0.827 | 0.074 |
| 7 | 0.8258 | 5 | | -0.315 | -0.004 | | 0.261 | -0.871 | 0.075 |
| 8 | 0.8258 | 4 | | -0.316 | | | 0.261 | -0.873 | 0.075 |
| 9 | 0.8251 | 6 | 0.002 | -0.196 | 0.054 | -0.093 | | -0.700 | 0.075 |
| 10 | 0.8251 | 5 | | -0.195 | 0.054 | -0.093 | | -0.699 | 0.075 |
| 11 | 0.8250 | 5 | -0.009 | -0.160 | | -0.068 | | -0.695 | 0.075 |
| 12 | 0.8250 | 4 | | -0.165 | | -0.063 | | -0.704 | 0.075 |
| 13 | 0.8247 | 5 | 0.021 | -0.153 | 0.004 | | | -0.800 | 0.075 |
| 14 | 0.8247 | 4 | 0.020 | -0.150 | | | | -0.797 | 0.075 |
| 15 | 0.8247 | 4 | | -0.133 | -0.009 | | | -0.786 | 0.075 |
| 16 | 0.8247 | 3 | | -0.135 | | | | -0.793 | 0.075 |
| 17 | 0.8244 | 6 | -0.248 | | -0.224 | 0.034 | 0.364 | -0.863 | 0.079 |
| 18 | 0.8244 | 5 | -0.236 | | -0.196 | | 0.318 | -0.824 | 0.078 |
| 19 | 0.8243 | 6 | -0.573 | -0.586 | -0.332 | -0.011 | 1.387 | -0.830 | |
| 20 | 0.8243 | 5 | -0.575 | -0.585 | -0.340 | | 1.399 | -0.842 | |
| 21 | 0.8238 | 5 | -0.063 | | -0.065 | -0.023 | | -0.780 | 0.077 |
| 22 | 0.8238 | 4 | -0.053 | | -0.072 | | | -0.804 | 0.077 |
| 23 | 0.8236 | 5 | -0.066 | | | -0.046 | 0.000 | -0.818 | 0.078 |
| 24 | 0.8236 | 4 | -0.066 | | | -0.046 | | -0.818 | 0.078 |
| 25 | 0.8235 | 4 | | | -0.046 | | -0.046 | -0.834 | 0.077 |
| 26 | 0.8235 | 4 | | | -0.068 | 0.027 | | -0.882 | 0.077 |
| 27 | 0.8235 | 4 | -0.044 | | | | 0.000 | -0.883 | 0.078 |
| 28 | 0.8235 | 3 | -0.044 | | | | | -0.883 | 0.078 |
| 29 | 0.8234 | 4 | | | | -0.026 | -0.076 | -0.824 | 0.077 |
| 30 | 0.8234 | 3 | | | -0.057 | | | -0.868 | 0.077 |
| 31 | 0.8234 | 3 | | | | | -0.059 | -0.866 | 0.077 |
| 32 | 0.8232 | 3 | | | | 0.004 | | -0.927 | 0.078 |
| 33 | 0.8232 | 2 | | | | | | -0.923 | 0.078 |
| 34 | 0.8206 | 3 | | -0.341 | | | 0.274 | -0.844 | |
| 35 | 0.8197 | 3 | | -0.183 | | -0.070 | | -0.661 | |
| 36 | 0.8194 | 3 | 0.029 | -0.173 | | | | -0.765 | |
| 37 | 0.8194 | 3 | | -0.146 | -0.015 | | | -0.749 | |
| 38 | 0.8193 | 2 | | -0.151 | | | | -0.759 | |
| 39 | 0.8182 | 3 | -0.055 | | -0.084 | | | -0.772 | |
| 40 | 0.8178 | 2 | | | -0.068 | | | -0.839 | |
| 41 | 0.8178 | 2 | | | | | -0.071 | -0.835 | |
| 42 | 0.8178 | 2 | -0.044 | | | | | -0.863 | |
| 43 | 0.8175 | 2 | | | | 0.005 | | -0.909 | |
| 44 | 0.8175 | 1 | | | | | | -0.904 | |
| 45 | 0.8169 | 6 | -0.483 | -0.560 | -0.167 | -0.428 | 0.665 | | 0.068 |
| 46 | 0.8084 | 2 | | -0.535 | | -0.392 | | | |
| 47 | 0.8069 | 2 | | | | -0.364 | -0.559 | | |
| 48 | 0.8025 | 2 | -0.422 | | | -0.518 | | | |
| 49 | 0.7944 | 2 | -0.326 | | -0.592 | | | | |
| 50 | 0.7796 | 1 | | | | | -0.883 | | |
| 51 | 0.7729 | 1 | | -0.879 | | | | | |
| 52 | 0.7695 | 1 | | | -0.877 | | | | |
| 53 | 0.7423 | 1 | | | | -0.862 | | | |
| 54 | 0.7119 | 1 | -0.844 | | | | | | |
| 55 | 0.0217 | 1 | | | | | | | -0.147 |



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Summary of Best Subsets Regression, Max Salinity US 41.

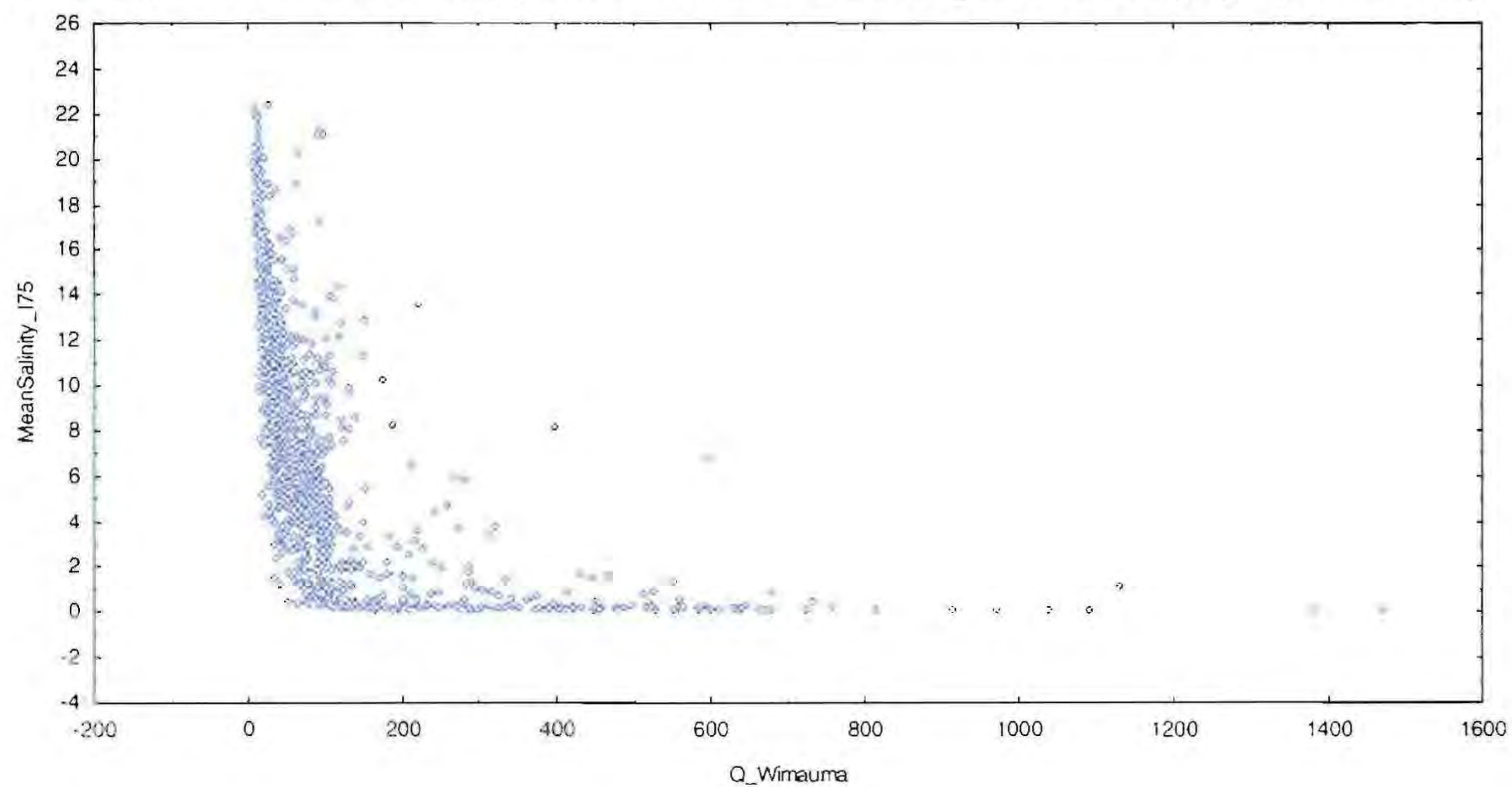
| Subset | R square | N of Vars | Ln(Q) | lag1_Ln(Q) | LN(Q)_2 | LN(Q)_3 | LN(Q)_M AV3 | LN(Q)_ MAV6 | MeanStage FT US41 |
|--------|----------|-----------|--------|------------|---------|---------|----------------|----------------|----------------------|
| 1 | 0.5780 | 7 | -0.362 | -0.571 | -0.131 | -0.042 | 0.898 | -0.599 | 0.108 |
| 2 | 0.5779 | 6 | -0.371 | -0.564 | -0.164 | | 0.941 | -0.646 | 0.108 |
| 3 | 0.5777 | 6 | -0.244 | -0.544 | | -0.084 | 0.646 | -0.574 | 0.107 |
| 4 | 0.5773 | 5 | -0.189 | -0.507 | | | 0.589 | -0.686 | 0.108 |
| 5 | 0.5765 | 6 | | -0.422 | 0.093 | -0.066 | 0.176 | -0.569 | 0.106 |
| 6 | 0.5763 | 5 | | -0.404 | 0.050 | | 0.214 | -0.643 | 0.107 |
| 7 | 0.5762 | 5 | | -0.387 | | -0.009 | 0.204 | -0.593 | 0.106 |
| 8 | 0.5762 | 4 | | -0.386 | | | 0.210 | -0.608 | 0.106 |
| 9 | 0.5761 | 6 | 0.015 | -0.333 | 0.120 | -0.097 | | -0.491 | 0.107 |
| 10 | 0.5761 | 5 | | -0.323 | 0.114 | -0.102 | | -0.477 | 0.107 |
| 11 | 0.5757 | 5 | 0.036 | -0.288 | 0.067 | | | -0.596 | 0.107 |
| 12 | 0.5756 | 4 | | -0.255 | 0.045 | | | -0.574 | 0.107 |
| 13 | 0.5756 | 5 | -0.009 | -0.254 | | -0.043 | | -0.481 | 0.107 |
| 14 | 0.5756 | 4 | | -0.258 | | -0.038 | | -0.490 | 0.107 |
| 15 | 0.5755 | 4 | 0.010 | -0.248 | | | | -0.545 | 0.107 |
| 16 | 0.5755 | 3 | | -0.241 | | | | -0.543 | 0.107 |
| 17 | 0.5726 | 6 | -0.015 | | -0.013 | -0.003 | -0.158 | -0.592 | 0.110 |
| 18 | 0.5726 | 5 | -0.016 | | -0.015 | | -0.154 | -0.595 | 0.110 |
| 19 | 0.5726 | 5 | -0.005 | | | -0.007 | -0.179 | -0.589 | 0.110 |
| 20 | 0.5726 | 5 | | | -0.002 | -0.005 | -0.183 | -0.590 | 0.110 |
| 21 | 0.5726 | 4 | | | | -0.006 | -0.185 | -0.589 | 0.110 |
| 22 | 0.5726 | 4 | | | -0.005 | | -0.179 | -0.595 | 0.110 |
| 23 | 0.5726 | 4 | -0.001 | | | | -0.179 | -0.599 | 0.110 |
| 24 | 0.5726 | 3 | | | | | -0.181 | -0.599 | 0.110 |
| 25 | 0.5725 | 5 | -0.096 | | -0.082 | 0.022 | | -0.628 | 0.110 |
| 26 | 0.5725 | 4 | -0.105 | | -0.075 | | | -0.604 | 0.110 |
| 27 | 0.5721 | 4 | -0.099 | | | -0.008 | | -0.676 | 0.111 |
| 28 | 0.5721 | 3 | -0.095 | | | | | -0.687 | 0.111 |
| 29 | 0.5719 | 6 | -0.285 | -0.563 | -0.010 | -0.332 | 0.377 | | 0.102 |
| 30 | 0.5717 | 4 | | | -0.088 | 0.096 | | -0.782 | 0.110 |
| 31 | 0.5712 | 3 | | | | 0.067 | | -0.839 | 0.111 |
| 32 | 0.5710 | 3 | | | -0.046 | | | -0.731 | 0.111 |
| 33 | 0.5708 | 2 | | | | | | -0.775 | 0.111 |
| 34 | 0.5694 | 3 | | -0.518 | | -0.275 | | | 0.099 |
| 35 | 0.5671 | 6 | -0.330 | -0.591 | -0.116 | -0.049 | 0.850 | -0.542 | |
| 36 | 0.5664 | 3 | | | | -0.254 | -0.535 | | 0.104 |
| 37 | 0.5656 | 3 | | -0.421 | | | 0.229 | -0.567 | |
| 38 | 0.5649 | 3 | | -0.285 | | -0.048 | | -0.428 | |
| 39 | 0.5648 | 3 | | -0.274 | 0.037 | | | -0.520 | |
| 40 | 0.5647 | 2 | | -0.263 | | | | -0.496 | |
| 41 | 0.5613 | 2 | | | | | -0.198 | -0.555 | |
| 42 | 0.5605 | 2 | -0.096 | | | | | -0.659 | |
| 43 | 0.5602 | 2 | | -0.513 | | -0.257 | | | |
| 44 | 0.5596 | 2 | | | | 0.068 | | -0.813 | |
| 45 | 0.5594 | 2 | | | -0.062 | | | -0.688 | |
| 46 | 0.5592 | 1 | | | | | | -0.748 | |
| 47 | 0.5563 | 2 | | | | -0.239 | -0.525 | | |
| 48 | 0.5531 | 2 | | | | | -0.760 | | 0.096 |
| 49 | 0.5521 | 2 | | -0.757 | | | | | 0.087 |
| 50 | 0.5450 | 1 | | -0.738 | | | | | |
| 51 | 0.5444 | 1 | | | | | -0.738 | | |
| 52 | 0.5269 | 1 | | | -0.726 | | | | |
| 53 | 0.4995 | 1 | | | | -0.707 | | | |
| 54 | 0.4988 | 1 | -0.706 | | | | | | |
| 55 | 0.0061 | 1 | | | | | | | -0.078 |



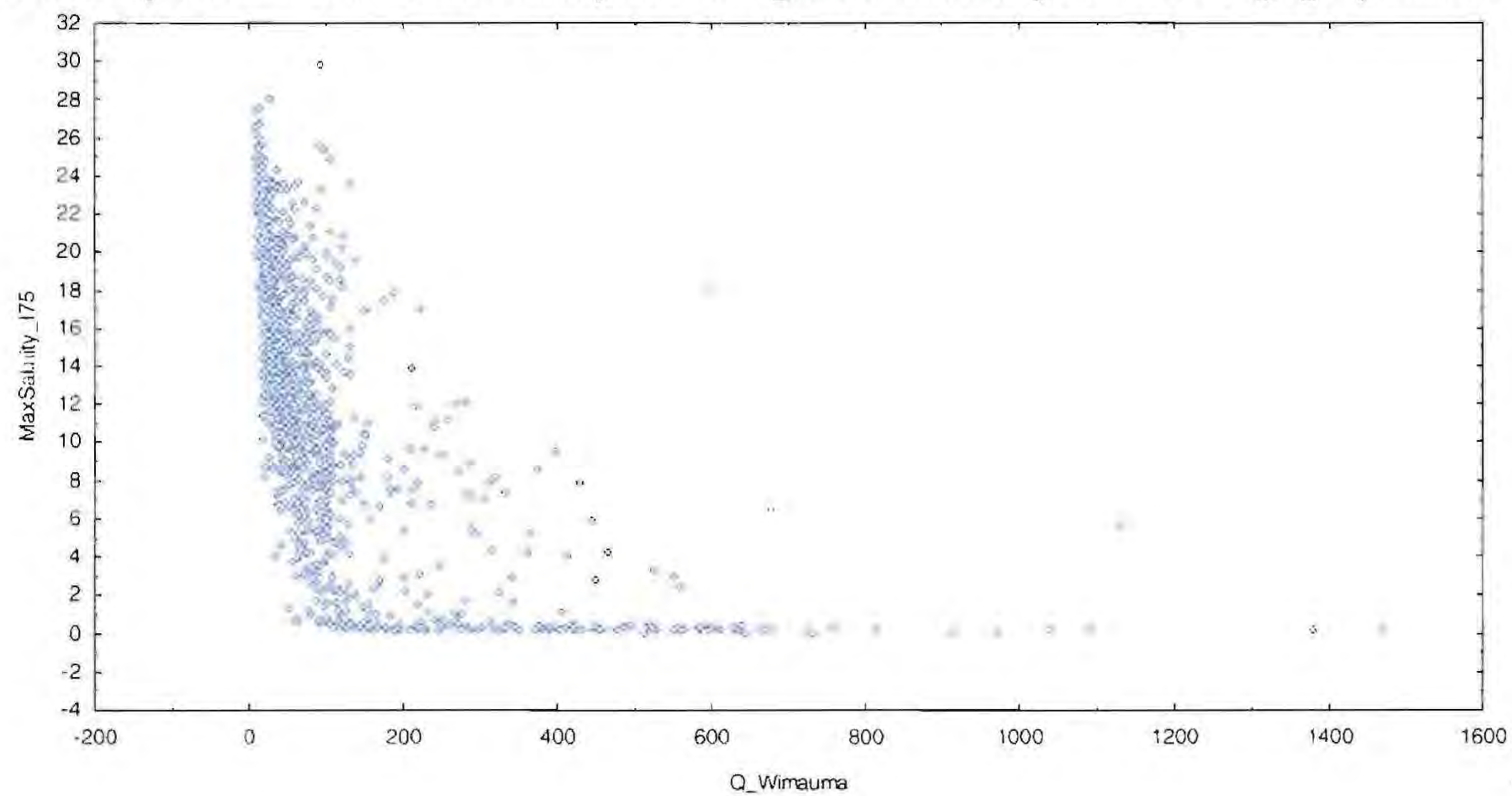
Output Tables and Scatter Plots

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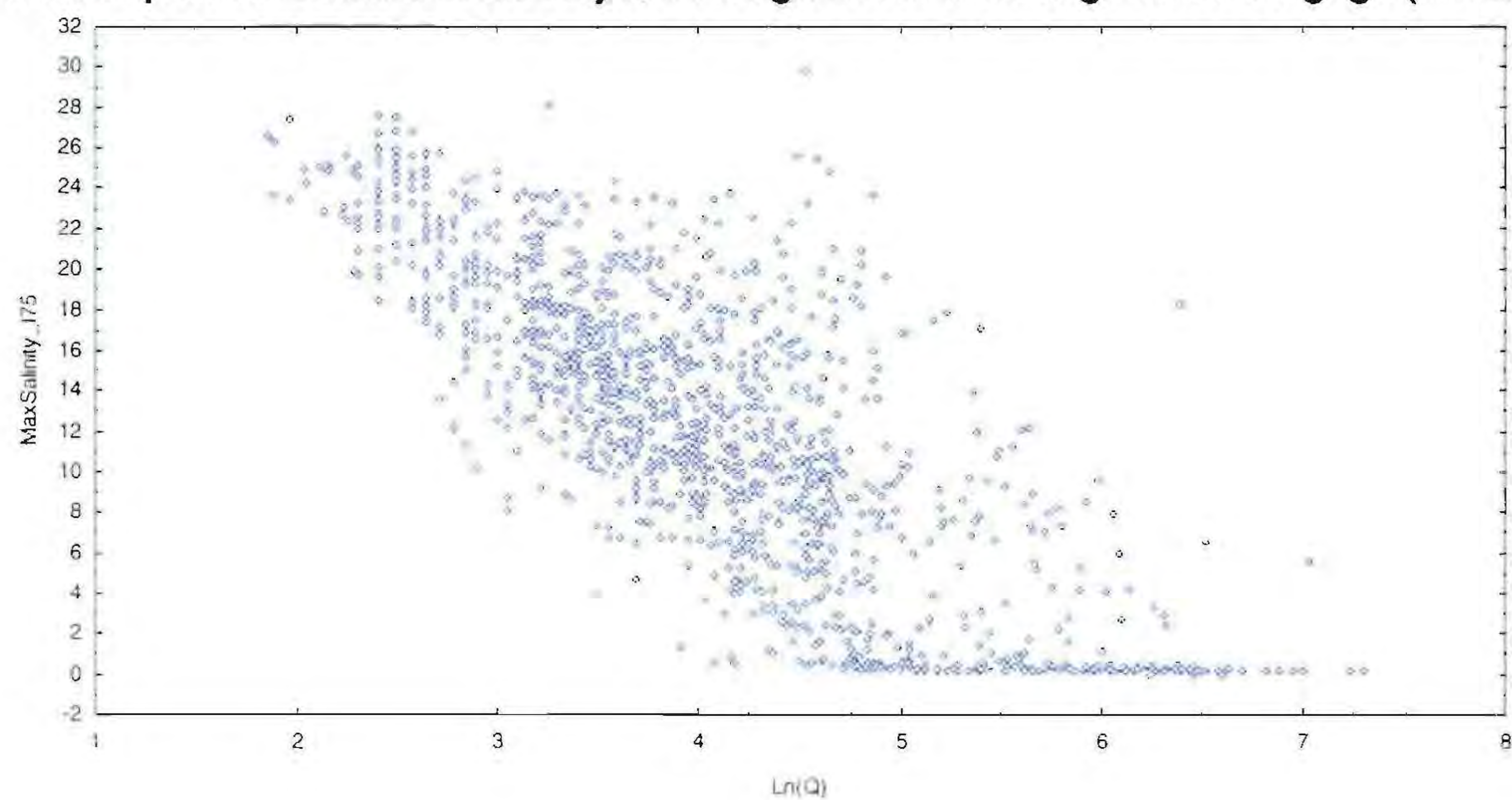
Scatter plot for mean salinity at I-75 against discharge at USGS gage (Wimauma).



Scatter plot for maximum salinity at I-75 against discharge at USGS gage (Wimauma).



Scatter plot for maximum salinity at I-75 against ln-discharge at USGS gage (Wimauma).



Output tables and plots related to salinity at I-75 station

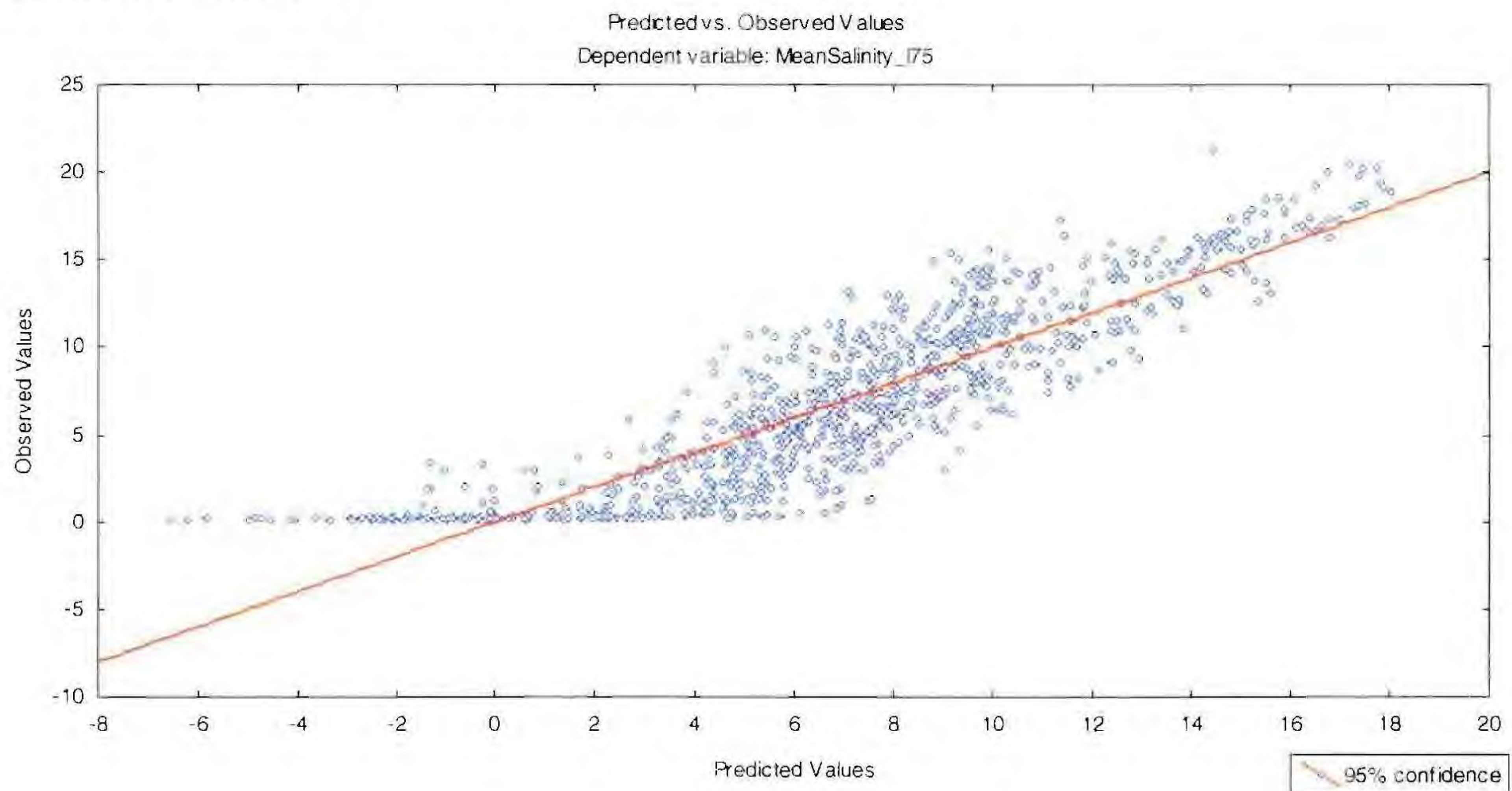
Output table for mean salinity at I-75.

| Variable | Summary of Stepwise Regression; DV: MeanSalinity_I75 (LManatee_MLR_D | | | | | | |
|------------------|----------------------------------------------------------------------|---------------|----------------------|--------------------|--------------------|----------|-----------------------|
| | Step +in/-out | Multiple R | Multiple R-square | R-square change | F - to entr/rem | p-level | Variables included |
| LN(Q)_MAV6 | 1 | 0.852128 | 0.726123 | 0.726123 | 2688.387 | 0.000000 | 1 |
| MeanStage FT_I75 | 2 | 0.883117 | 0.779895 | 0.053773 | 247.480 | 0.000000 | 2 |
| MaxStage FT_I75 | 3 | 0.884564 | 0.782454 | 0.002559 | 11.905 | 0.000583 | 3 |

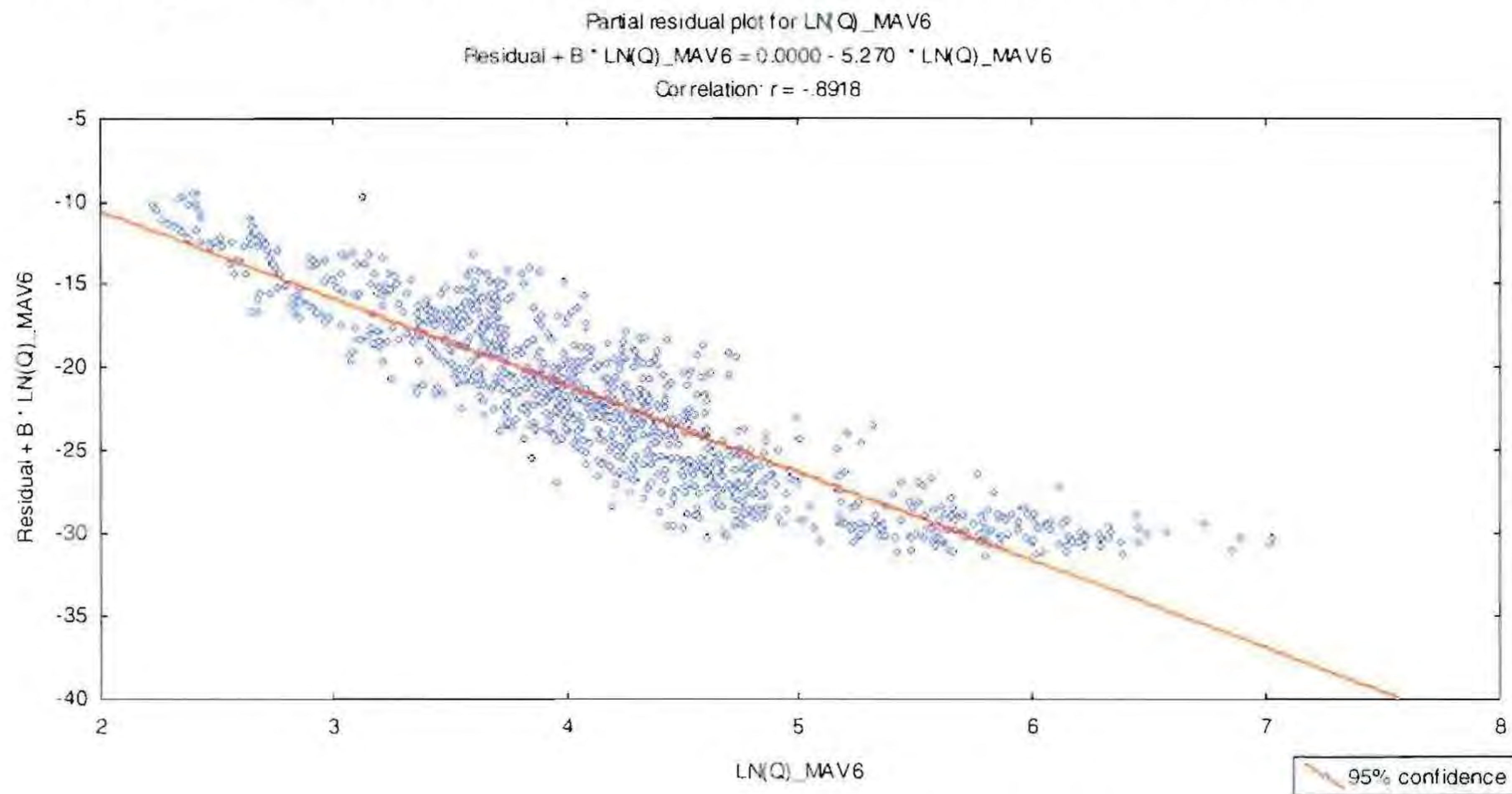
Output table for maximum salinity at I-75.

| Variable | Summary of Stepwise Regression; DV: MaxSalinity_I75 (LManatee_MLR_Datase | | | | | | |
|------------------|--------------------------------------------------------------------------|---------------|----------------------|--------------------|--------------------|----------|-----------------------|
| | Step +in/-out | Multiple R | Multiple R-square | R-square change | F - to entr/rem | p-level | Variables included |
| LN(Q)_MAV6 | 1 | 0.826143 | 0.682512 | 0.682512 | 2179.821 | 0.000000 | 1 |
| MaxStage FT_I75 | 2 | 0.884328 | 0.782036 | 0.099524 | 462.543 | 0.000000 | 2 |
| MeanStage FT_I75 | 3 | 0.889075 | 0.790454 | 0.008418 | 40.656 | 0.000000 | 3 |

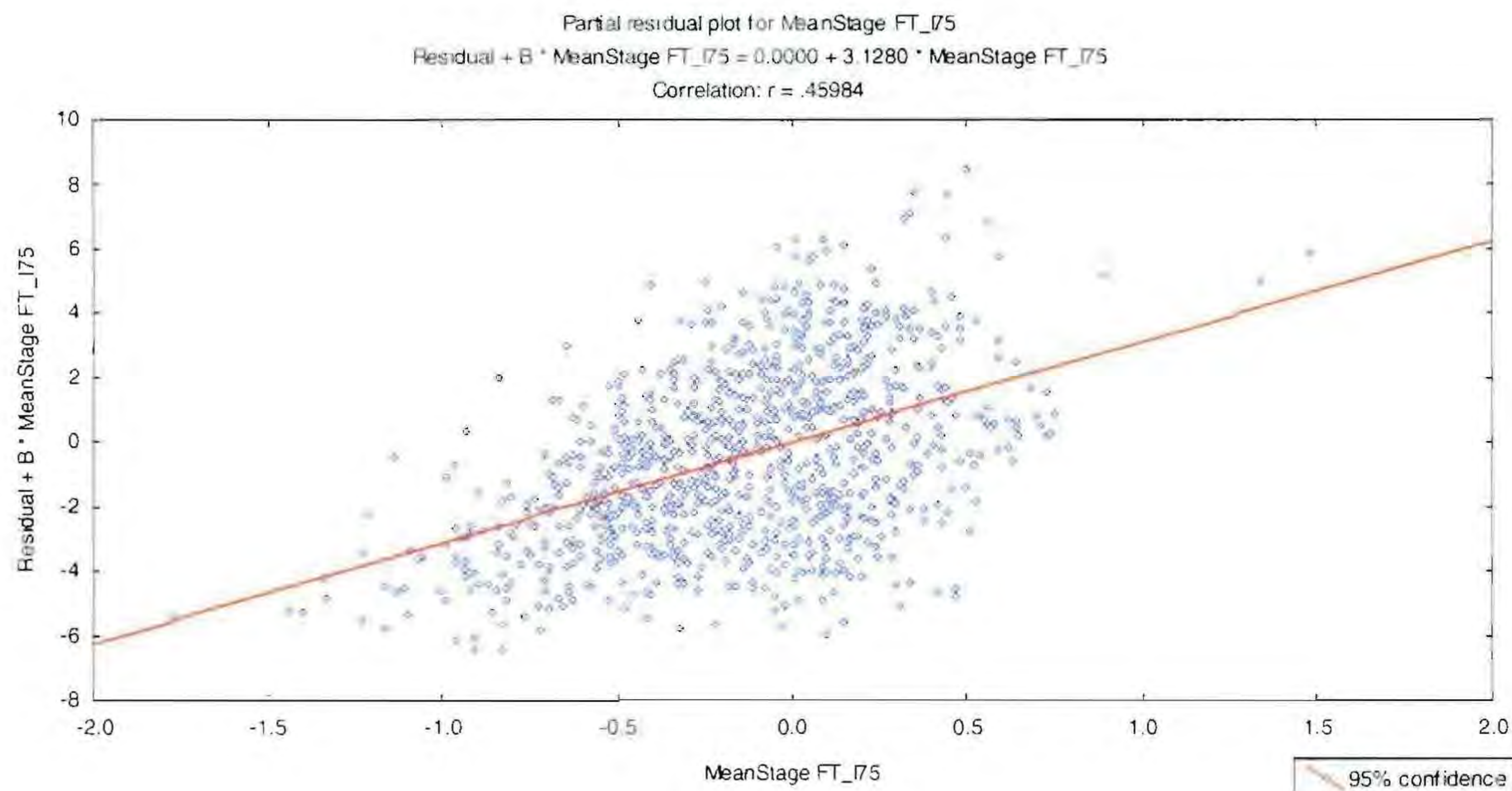
Scatter plot for observed and predicted mean salinity at I-75 with fitted regression lines and confidence intervals.



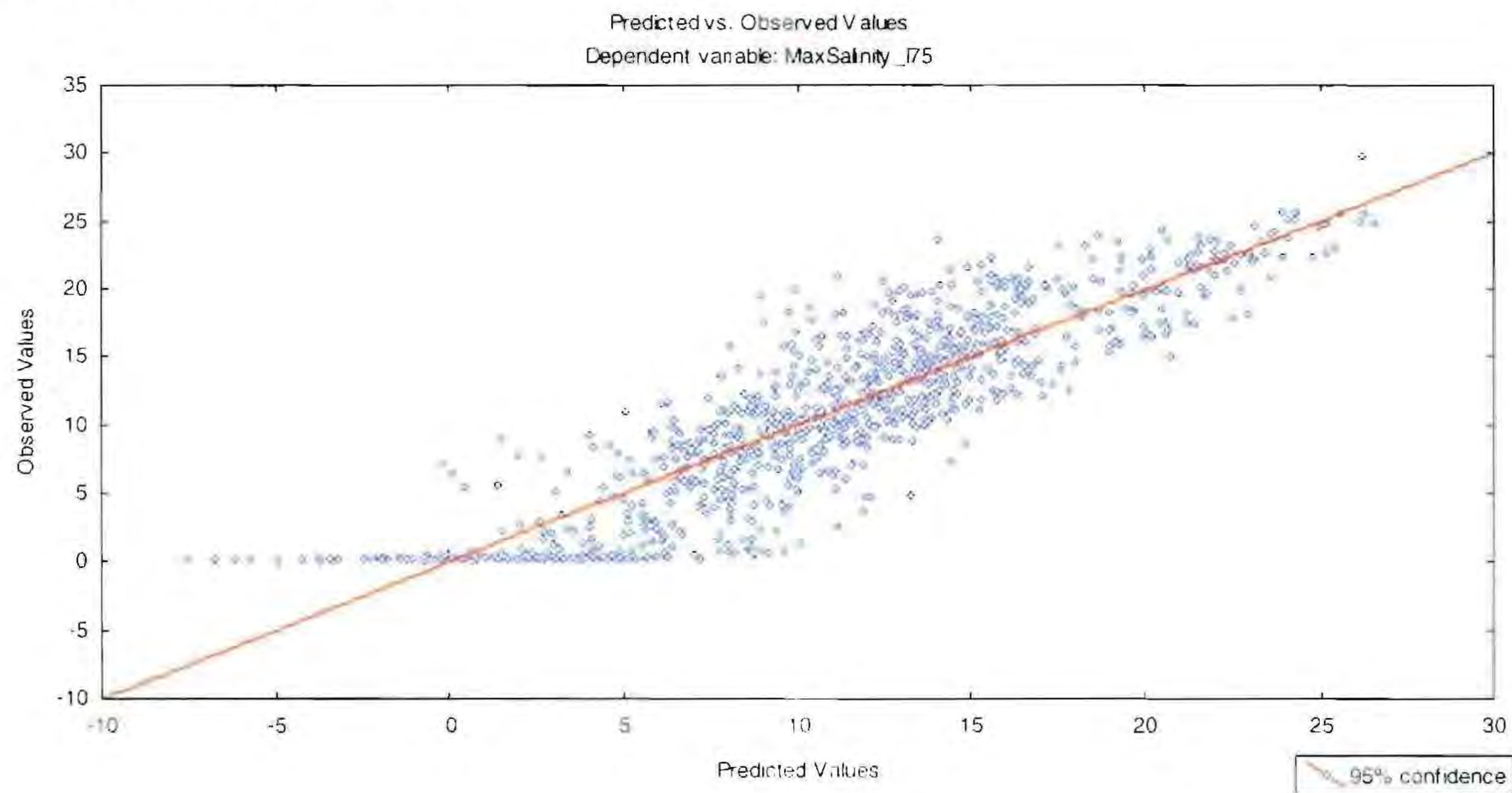
Partial residual scatter plot for lagged discharge (LN(Q)_MAV6) from the USGS gage from mean stage at I-75 with fitted regression lines and confidence intervals.



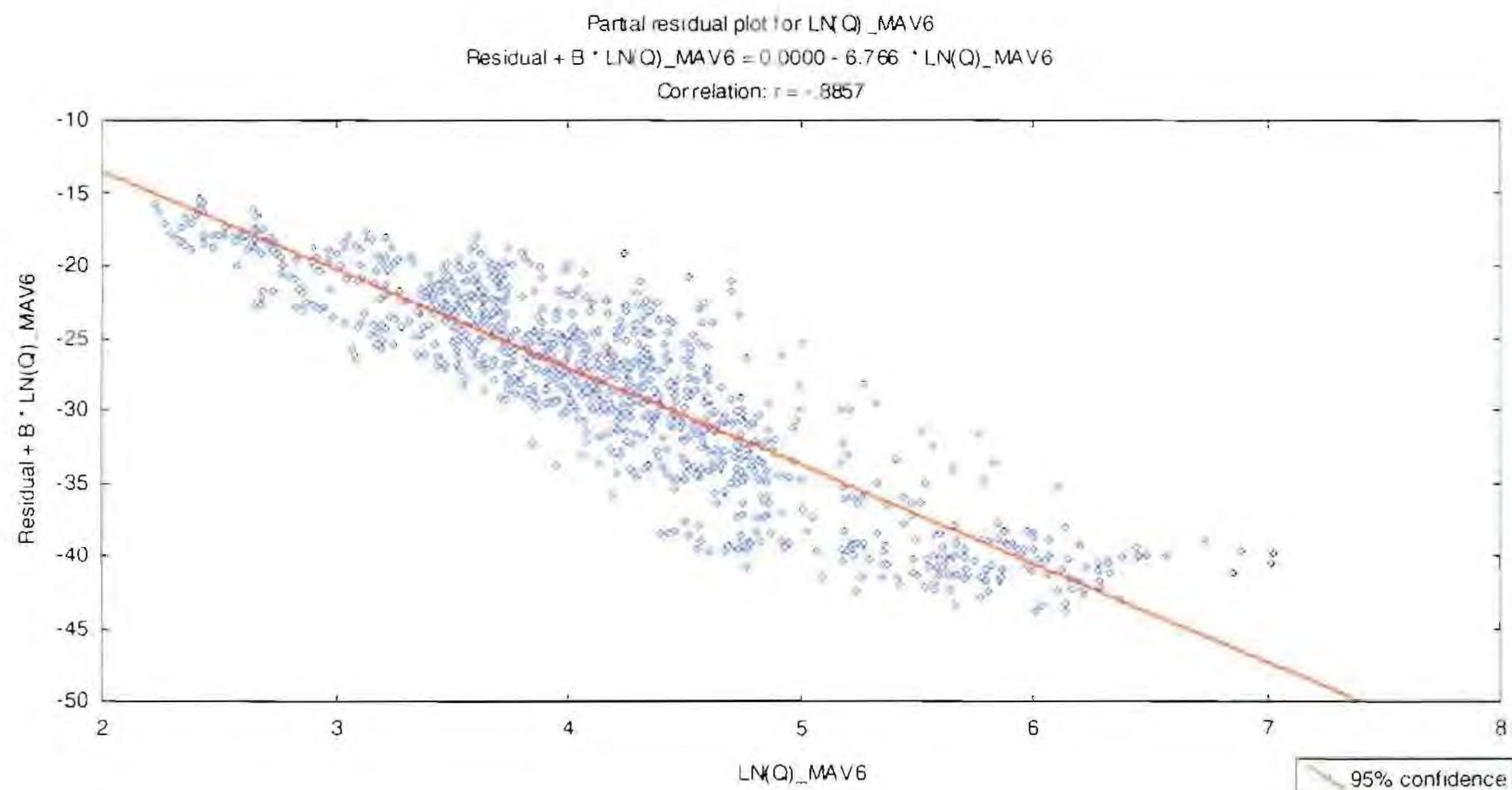
Partial residual scatter plot for mean stage at I-75 with fitted regression lines and confidence intervals.



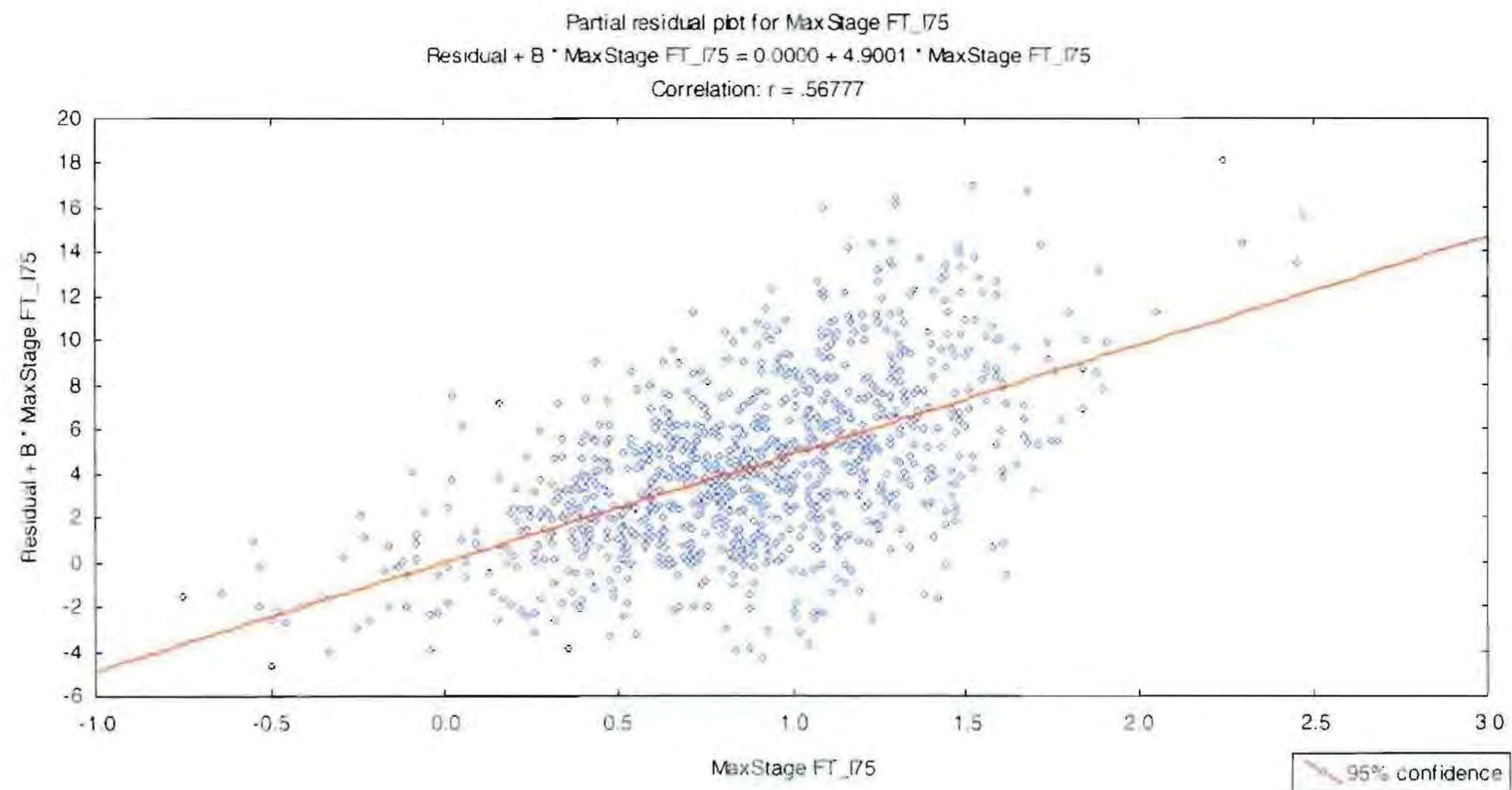
Scatter plot for observed and predicted maximum salinity at I-75 with fitted regression lines and confidence intervals.



Partial residual scatter plot for lagged discharge (LN(Q)_MAV6) from the USGS gage from maximum stage at I-75 with fitted regression lines and confidence intervals.



Partial residual scatter plot for maximum stage at I-75 with fitted regression lines and confidence intervals.



Output and plots related to salinity at US 41 station

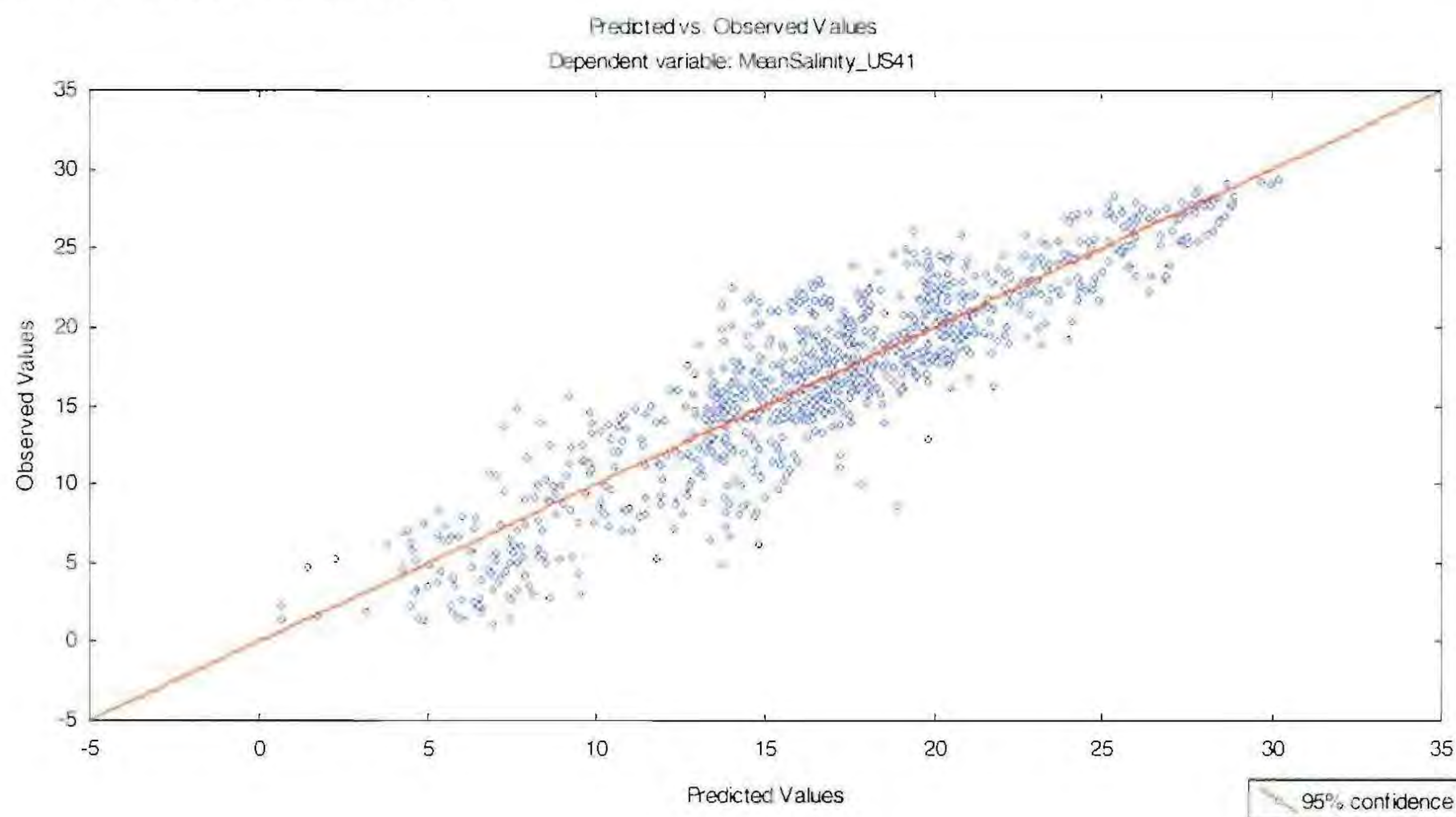
Output table for mean salinity at US 41.

| Variable | Summary of Stepwise Regression; DV: MeanSalinity_US41 (LManatee_ML) | | | | | | |
|-------------------|---------------------------------------------------------------------|---------------|----------------------|--------------------|--------------------|----------|-----------------------|
| | Step +in/-out | Multiple R | Multiple R-square | R-square change | F - to entr/rem | p-level | Variables included |
| LN(Q)_MAV6 | 1 | 0.902765 | 0.814984 | 0.814984 | 4281.596 | 0.000000 | 1 |
| MaxStage FT_US41 | 2 | 0.911672 | 0.831146 | 0.016162 | 92.939 | 0.000000 | 2 |
| MeanStage FT_US41 | 3 | 0.914236 | 0.835827 | 0.004681 | 27.657 | 0.000000 | 3 |

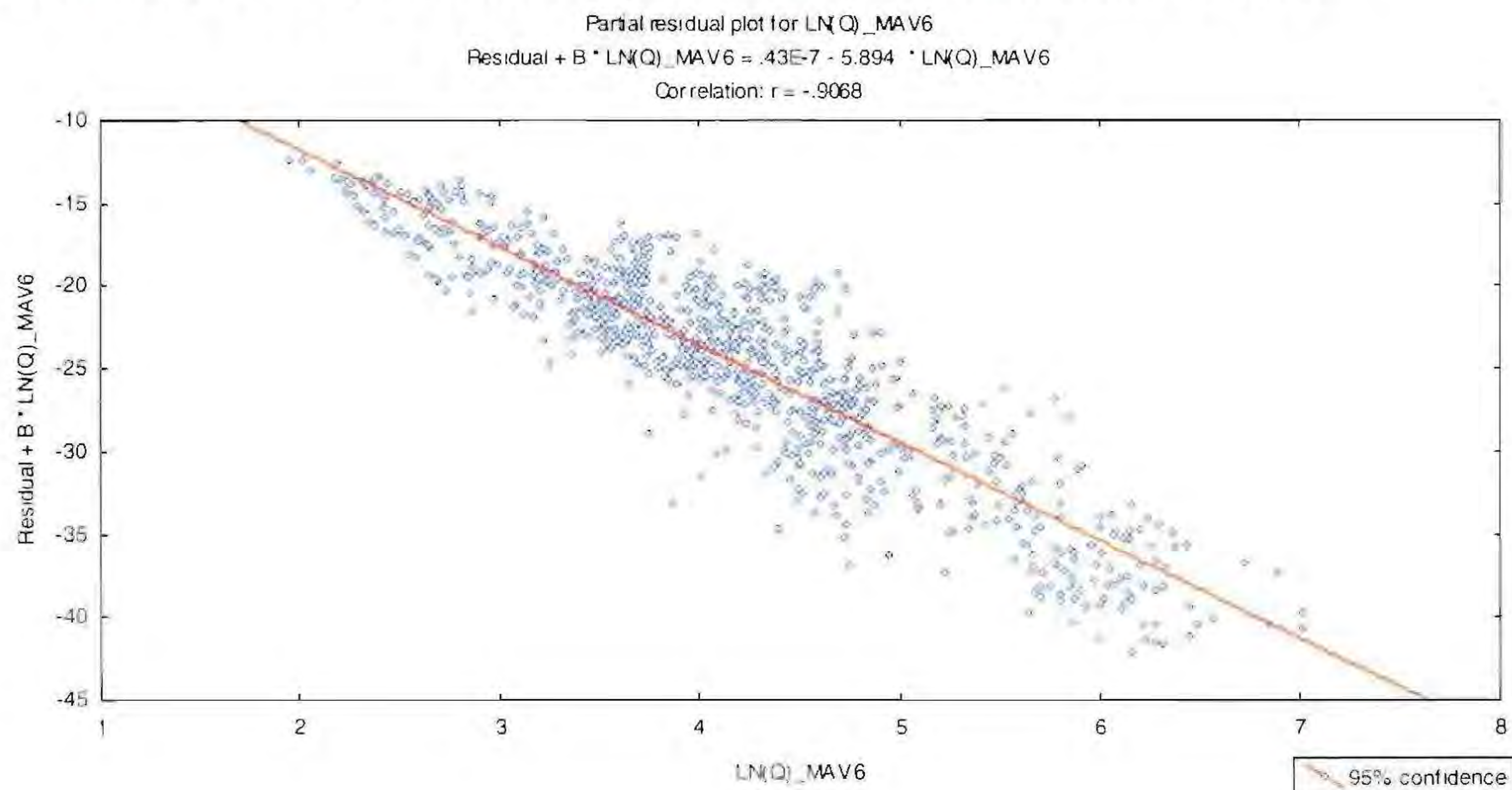
Output table for maximum salinity at US 41.

| Variable | Summary of Stepwise Regression; DV: MaxSalinity_US41 (LManatee_ML) | | | | | | |
|-------------------|--------------------------------------------------------------------|---------------|----------------------|--------------------|--------------------|----------|-----------------------|
| | Step +in/-out | Multiple R | Multiple R-square | R-square change | F - to entr/rem | p-level | Variables included |
| LN(Q)_MAV6 | 1 | 0.744951 | 0.554953 | 0.554953 | 1212.037 | 0.000000 | 1 |
| MaxStage FT_US41 | 2 | 0.777573 | 0.604620 | 0.049666 | 121.977 | 0.000000 | 2 |
| MeanStage FT_US41 | 3 | 0.810881 | 0.657526 | 0.052906 | 149.852 | 0.000000 | 3 |

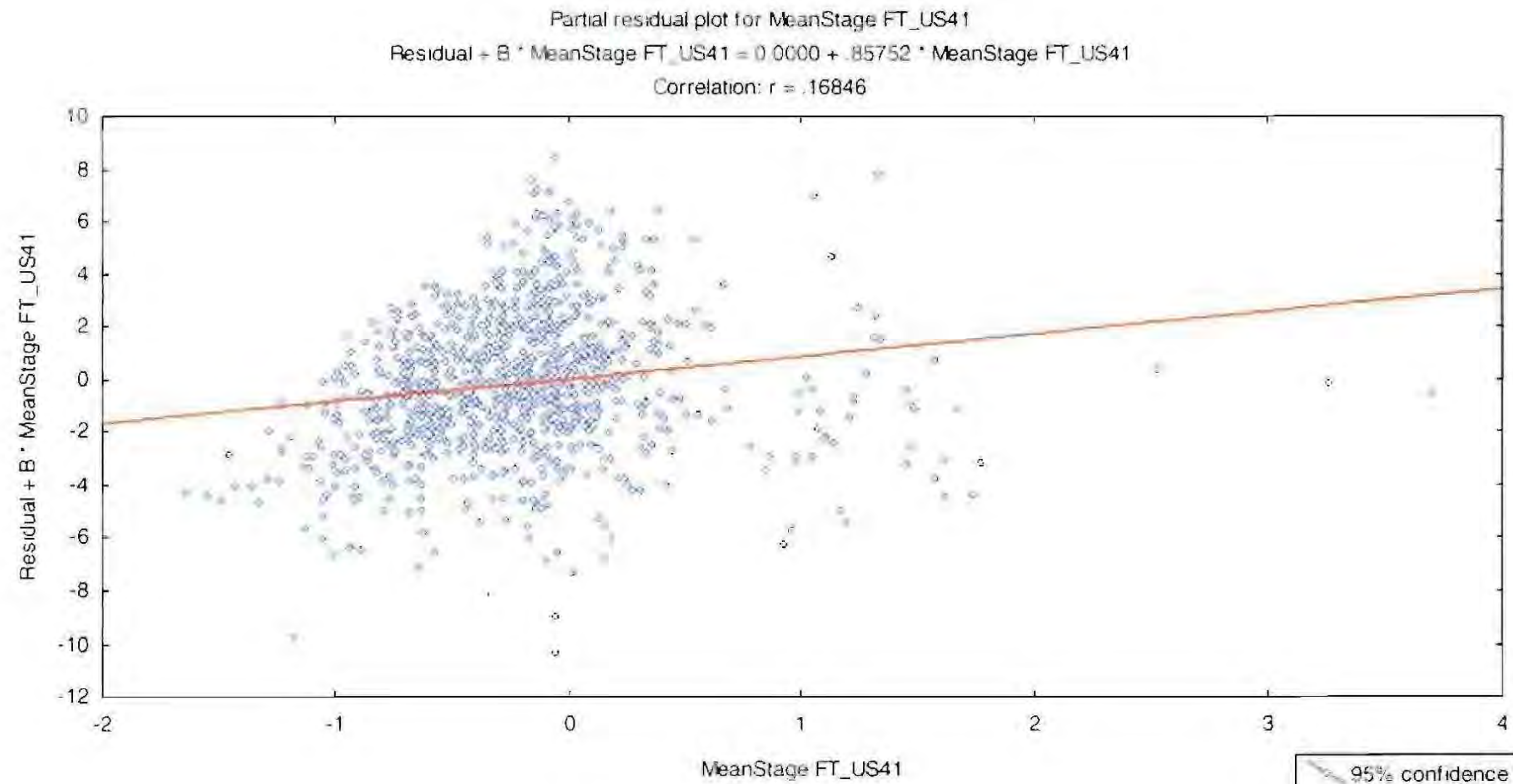
Scatter plot for observed and predicted mean salinity at US 41 with fitted regression lines and confidence intervals.



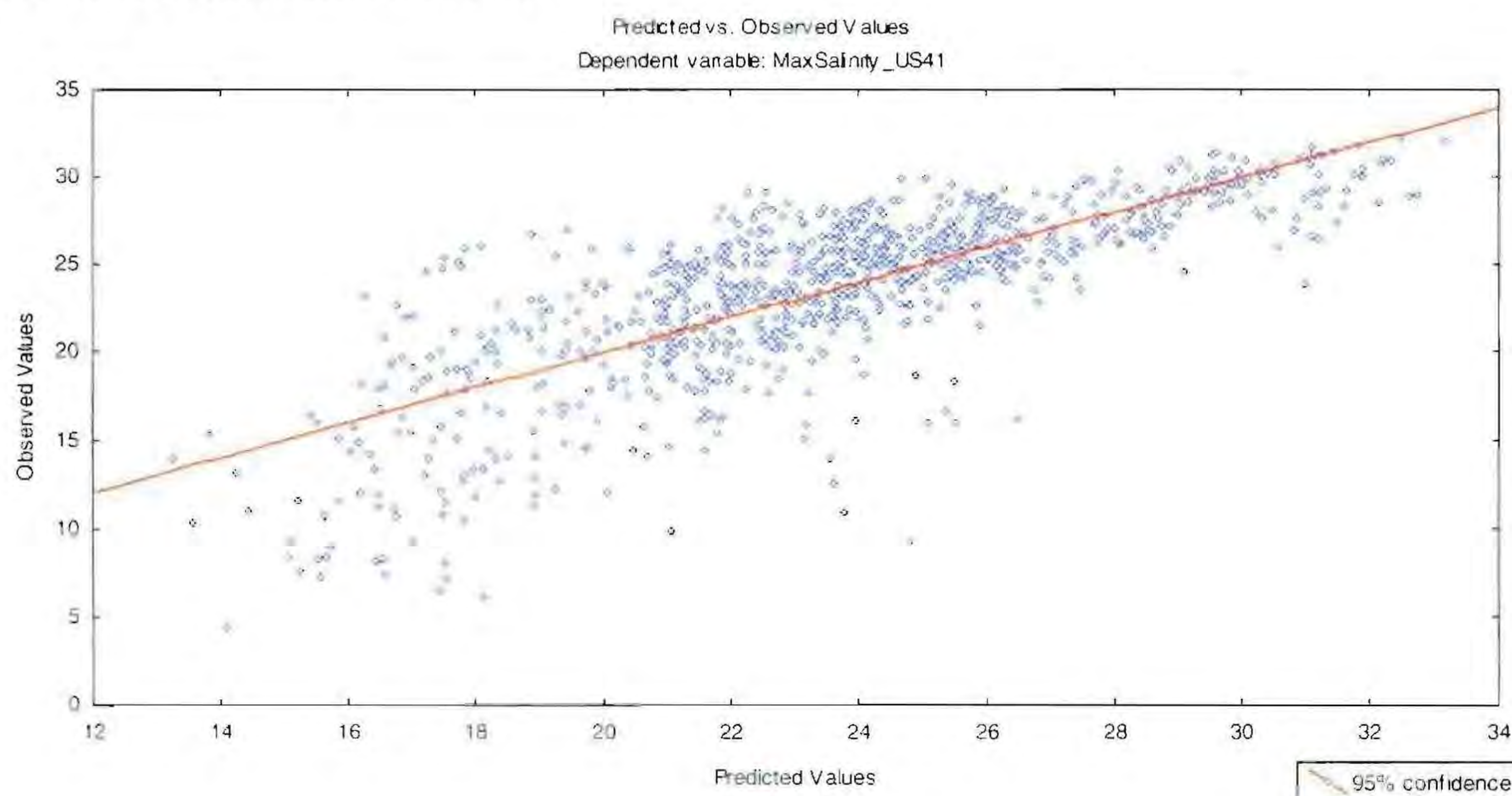
Partial residual scatter plot for lagged discharge (LN(Q)_MAV6) from the USGS gage from mean stage at US 41 with fitted regression lines and confidence intervals.



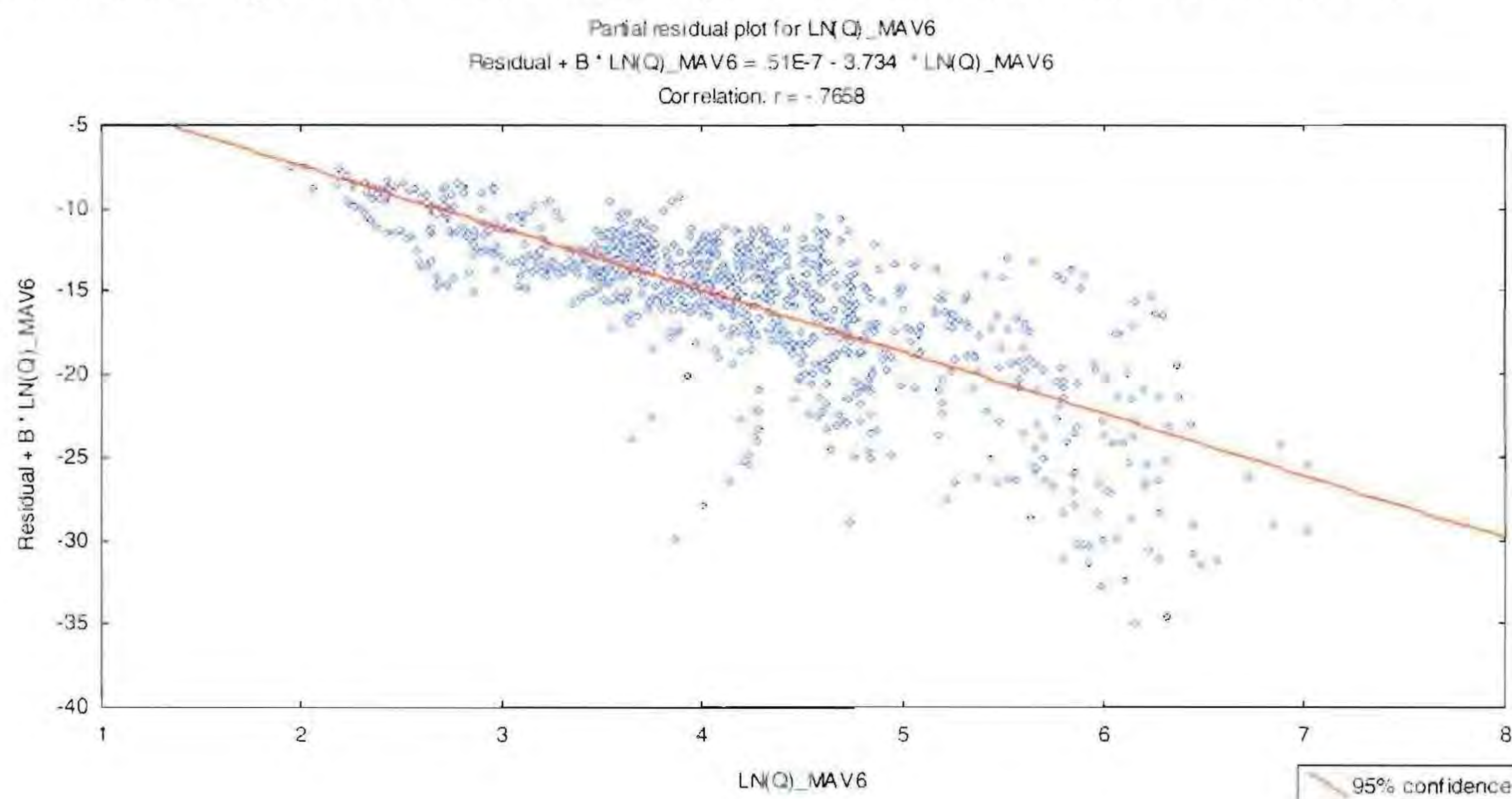
Partial residual scatter plot for mean stage at US 41 with fitted regression lines and confidence intervals.



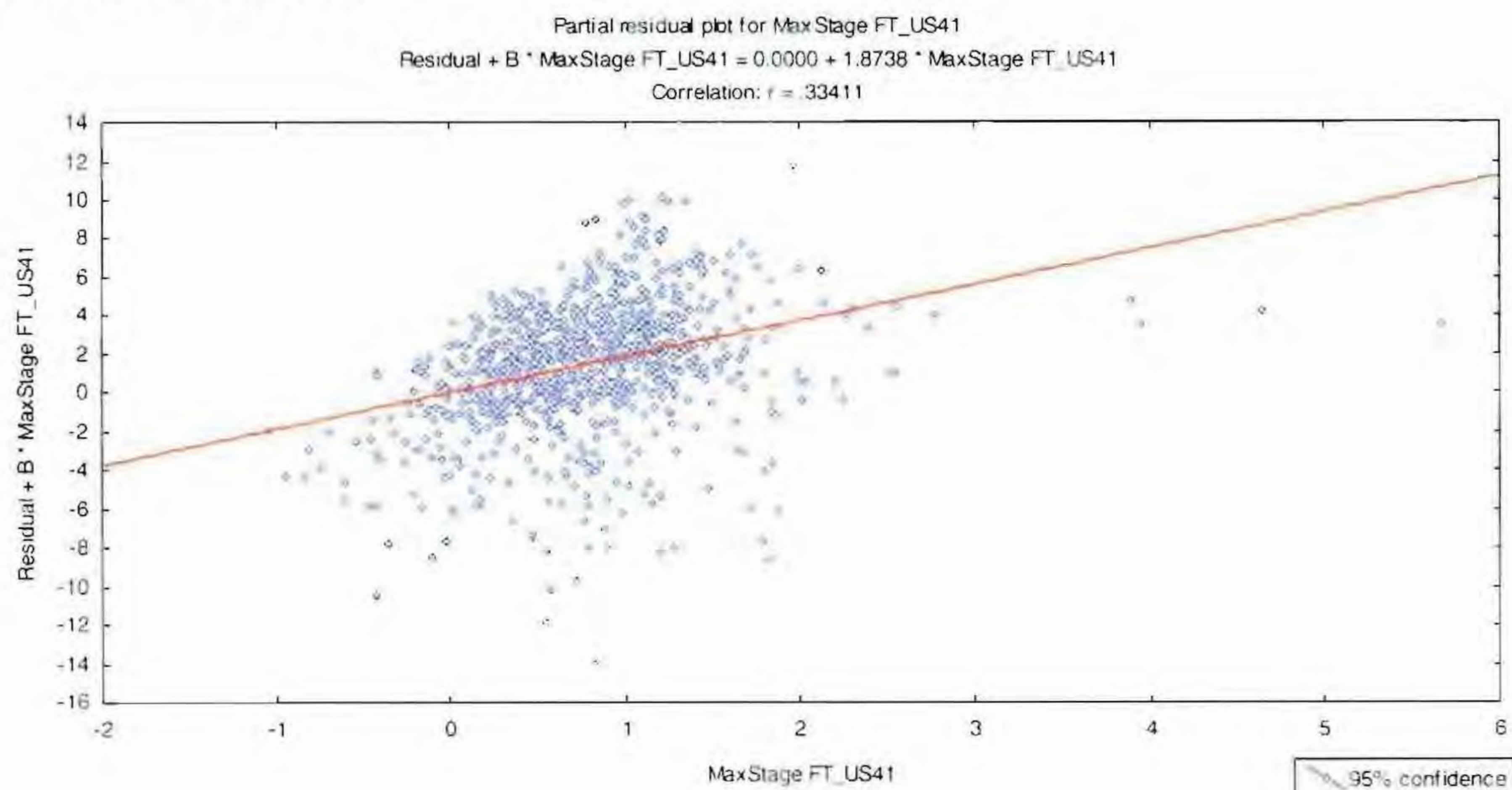
Scatter plot for observed and predicted maximum salinity at US 41 with fitted regression lines and confidence intervals.



Partial residual scatter plot for lagged discharge (LN(Q)_MAV6) from the USGS gage from maximum stage at US 41 with fitted regression lines and confidence intervals.



Partial residual scatter plot for maximum stage at US 41 with fitted regression lines and confidence intervals.



From: [Napoli, Kelly](#)
To: [Kym Holzwart](#)
Subject: FPL Comments on the Draft Little Manatee River MFL
Date: Friday, February 18, 2022 3:28:17 PM
Attachments: [FPL Comments on SWFWMD LMR Draft MFL.2022.02.18-signed.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Good afternoon Kym,

Happy Friday! As you know, Florida Power & Light (FPL) owns and operates the Manatee Power Plant in Manatee County, FL, which withdraws water from the Little Manatee River to supply its cooling pond. FPL is currently the only existing legal user of the Little Manatee River. We met on January 21st, 2022 with your team in order to discuss updates to the MFL and provide some operational background for the site. FPL appreciates the opportunity to submit comments for the current Draft MFL for the Little Manatee River. We hope that these comments provide clarity on FPL's withdrawal needs for both Regulatory Staff and the Peer Review Panel.

Please let me know if you and your team would like to meet again to discuss these comments. As mentioned on our last call, FPL would be more than happy to host a site visit to the Manatee Power Plant. Please let me know if there is still interest.

Have a great weekend,
Kelly Napoli, EI
Environmental Specialist II
Florida Power & Light | Environmental Services
700 Universe Blvd | JES/JB C5073
Juno Beach FL, 33408
O. 561.694.4015
C. 561.335.6659



 Please consider the environment before printing this email

From: [Hall, Jaime](#)
To: [Doug Leeper](#)
Cc: [Irving, Robert](#); [DiGruttolo, Laura](#); [Cucinella, Josh](#); [Sempstrott, Michelle](#); [Hight, Jason](#); [Kym Holzwart](#); [Conservation Planning Services](#); [McCue, Allie](#); [Lambert, Carla](#)
Subject: FWC Comments on Little Manatee River, Hillsborough and Manatee Counties
Date: Monday, April 11, 2022 9:52:07 AM
Attachments: [FWC Comments on Little Manatee River MFL Update 46722 04112022.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Please find attached FWC's comments on the above-referenced project. You will **not** receive a hard-copy version of this letter unless requested.

**If you wish to reply to our comments,
please send your reply to:**

ConservationPlanningServices@myFWC.com

Jaime "Nicki" Hall
Administrative Assistant I
Office of Conservation Planning Services
Florida Fish and Wildlife Conservation Commission
(850) 617-6020



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April 11, 2022

Doug Leeper
Southwest Florida Water Management District
Springs and Environmental Flows Section
2379 Broad Street
Brooksville, FL 34604
Doug.Leeper@WaterMatters.org

RE: Recommended Minimum Flows for the Little Manatee River Draft Report,
Southwest Florida Water Management District, Hillsborough and Manatee
Counties

Dear Mr. Leeper:

Florida Fish and Wildlife Conservation Commission (FWC) staff have reviewed the above referenced minimum flows and levels (MFL) report and appendices for the Little Manatee River. The following comments and recommendations are provided as technical assistance during your review of the draft MFL under Chapter 373, Florida Statutes (FS), and in accordance with FWC's authorities under Chapter 379, FS.

Executive Summary

The Southwest Florida Water Management District (SWFWMD) has completed the *Recommended Minimum Flows for the Little Manatee River Draft Report* (draft report, (2021) which summarizes minimum flows developed for the Little Manatee River, including both the freshwater and estuarine portions of the river. For purposes of minimum flows development, the freshwater portion or Upper Little Manatee River starts at the headwaters near Fort Lonesome in southeastern Hillsborough County and extends to the U.S. Highway 301 bridge, where the U.S. Geological Survey (USGS) "Little Manatee River at U.S. 301 near Wimauma, FL" (No. 02300500) gage is located. The estuarine portion or Lower Little Manatee River begins at the U.S. Highway 301 bridge and ends where the river flows into Tampa Bay.

The Little Manatee River is one of the most pristine blackwater rivers in Southwest Florida. The watershed of the Little Manatee River is in southern Hillsborough County and the northern portion of Manatee County; it includes the City of Palmetto and the communities of Parrish, Ruskin, Sun City, Wimauma, and Terra Ceia. The Little Manatee River flows west about 40 miles (64 km) from its headwaters east of Fort Lonesome before emptying into Tampa Bay near Ruskin.

The recommended minimum flows for the Little Manatee River were developed as required by Section 373.042, Florida Statutes and were based on relevant environmental values identified in the Florida Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code). The SWFWMD's approach for developing minimum flows is habitat-based, and because the Little Manatee River includes a great variety of

aquatic and wetland habitats that support diverse biological communities, key ecological resources were identified for the development of minimum flows. The resource management goals that were the focus of the technical analyses for the development of minimum flows for the Little Manatee River included the following:

- Determination of a low-flow threshold to provide protection for ecological resources and recreational use of the Little Manatee River during critical low-flow periods.
- Maintenance of seasonal hydrologic connections between the Upper Little Manatee River channel and floodplain to ensure the persistence of floodplain structure and function.
- Maintenance of available instream habitat for fish and benthic macroinvertebrates in the Upper Little Manatee River.
- Maintenance of biologically relevant salinities that protect the distribution of fish species, benthic macroinvertebrates, and shoreline vegetation communities in the Lower Little Manatee River.
- Maintenance of available estuarine habitat for fish in the Lower Little Manatee River.

The criteria used for minimum flows development in the Little Manatee River addressed maintenance of 85% of the most sensitive criterion associated with the resource management goals using flow-based blocks. In addition, a low-flow threshold specific to surface water withdrawals and applicable to all blocks were identified to ensure flow continuity for environmental and human-use values. Finally, assessments were conducted to ensure all relevant environmental values that must be considered when establishing minimum flows would be protected by the minimum flows proposed for the Little Manatee River.

For the Upper Little Manatee River, the recommended minimum flows for Block 1 and Block 2 are based on maintaining available instream habitat. The minimum flows for Block 3 are based on maintaining floodplain inundation. For all flow-based blocks, the most sensitive criterion for the Lower Little Manatee River minimum flows development was the maintenance of available estuarine fish habitat, and the recommended minimum flows were established based on preserving 85% of the available estuarine fish habitat. The recommended minimum flows for the Upper and Lower Little Manatee River are based on flows for the previous day at the USGS U.S. 301 near Wimauma (No. 02300500) gage adjusted for upstream withdrawals.

An adaptive management approach will be used by the SWFWMD to monitor and assess the status of minimum flows established for the Little Manatee River. Changes in the Little Manatee River watershed related to multiple factors, including climate change, could potentially affect flow and additional information relevant to minimum flows development may become available. The draft report states that the SWFWMD is committed to periodic evaluation and, if necessary, revision of minimum flows established for the Little Manatee River.

Comments and Recommendations

FWC staff appreciates the SWFWMD's evaluation of the recommended minimum flows and levels for the Little Manatee River. Specific comments pertaining to current research and fish and wildlife habitat are provided below as technical assistance.

- The FWC's Fish and Wildlife Research Institute (FWRI) has a long history of research and development of techniques to support science-based decision making regarding freshwater inflow effects on fish and macroinvertebrates in southwestern and west-central Florida (Tsou and Matheson 2002, Greenwood 2007; Greenwood et al. 2007; Peebles and Greenwood 2009; Flaherty and Guenther 2011; Stevens et al. 2010, 2013; Olin et al. 2013, 2015; Whaley et al. 2016). FWC staff recommends incorporation of the historical record of work completed in the Little Manatee River in this and subsequent MFL assessments. This review should include reports on historical sampling (Haddad et al. 1989, 1990; Peebles et al. 1991; MacAulay et al. 1993), a thorough discussion of relationships between freshwater inflow and populations of fish and selected macroinvertebrates in the Little Manatee River (MacDonald et al. 2007), and other published studies pertaining to the Little Manatee River (Rydene and Matheson 2003, Ley and Rolls 2018, Trotter et al. 2021). FWC staff recommends that more text be dedicated to the findings of this work (as was done in Janicki Environmental Inc. 2011) as the findings are directly applicable to establishing MFLs for the Little Manatee River.
- The Little Manatee River contains important nursery habitat for several economically important fishery species such as red drum (Whaley et al. 2016) and blue crab (MacDonald et al. 2007; Flaherty and Guenther 2011). Whaley et al. (2016) estimated that during the period from 1996 to 2008, the Little Manatee River contained 10 – 47% of the annual juvenile population of red drum surviving to the larger juvenile stage (50 – 100mm standard length) within the Tampa Bay estuary and adjacent rivers. FWRI's Fisheries-Independent Monitoring (FIM) program has abundant biological data (24-years of data collected monthly, 1996-2019) describing spatiotemporal distribution patterns of numerous fish and invertebrate species inhabiting the estuarine portions of the Little Manatee River, and the characterization of the lower river fish community could be greatly improved by a more thorough analysis of these taxa over the complete time record, instead of focusing on data collected from the most recent year of sampling (2019, p. 92 and Tables 4.8 and 4.9), a period of heavy inflow conditions. For example, it is standard practice to examine annual variation in fish abundance in terms of mean catch-per-unit-effort (number/net, number/unit area) instead of total numbers collected (Figures 4-9, 4-10), and annual patterns in young-of-the-year recruitment for selected species should be discussed in more detail (Figure 4-11).
- The assessment of significant harm (habitat reductions greater than 15%) appears to be solely determined using the Environmental Favorability Function (EFF) modelling to assess changes in favorable habitat. However, the final presentation of this modelling effort concentrated on species data from 2015 – 2019, a period of generally high freshwater inflow conditions. It is not clear in the draft report

whether other time periods were also assessed by the model, but not presented. If that is the case, those results should be discussed with a rationale as to why 2015-2019 was used in this report. The examination of percentage reduction in species habitat that may occur during dry periods appears to be missing in the report or the analyses. Species-inflow relationships can be non-linear, and a percent reduction in species habitat under wet conditions will not likely have the same magnitude during dry conditions. Previously published research has shown that abundance of juvenile red drum in the Little Manatee River varies greatly in wet versus dry periods (Whaley et al. 2016). In addition, the Little Manatee River is the least impacted major river system in the Tampa Bay watershed, so withdrawals from this system should be made carefully and include the full complement of data associated with the system, including major end points (1998/1999 El Nino and 2007/2008 severe drought) and perturbations (e.g., cold events such as in 2010, red tide events such as in 2005, 2018; Flaherty and Landsberg 2011, Stevens et al. 2016, Schrandt and MacDonald 2020) that may impact nekton communities, fish recruitment, and mortality.

- The magnitude that freshwater inflow modifications may have on the food web of the Little Manatee River does not appear to be addressed in this report. The relationships among freshwater inflow, nutrients, and distribution and abundance of phytoplankton are well established (Peebles 2002; Olin et al. 2013; Stevens et al. 2013). Phytoplankton concentrations are closely related to the distribution and abundance of bay anchovy (Peebles 2002, Olin et al. 2013), a dominant nekton species in the lower rivers, and an important component of the food web (Hollander and Peebles, 2004). In addition, a lower volume of freshwater can affect inundation and nekton use of important riverine floodplains, such as marshes, along the shoreline of the river (see reviews by Robins et al. 2005 and Gillson 2011). These marshes typically provide abundant benthic food sources as well as protection from predation for many nekton species, including some fishery species (Beck et al. 2001 and references therein). Addressing the influence of freshwater flow reduction on the food web (planktonic and benthic pathways) would be helpful in the analysis and report.
- Spatial species modelling regarding minimum flows, such as the EFF modeling by Janicki Environmental Inc. (2011, 2018, SWFWMD 2021), could be improved by consulting with FWRI staff in the FIM program and Center for Spatial Analysis. FWRI staff have related fish populations to flow and other habitat variables in several rivers along the Gulf coast (e.g., Alafia, Anclote, Chassahowitzka, Crystal, Hillsborough, Homosassa, Manatee, Myakka, Peace, and Weeki Wachee Rivers) including the Little Manatee River (MacDonald et al. 2007), so these methods should be investigated and applied as appropriate for each individual river system. For example, in the Alafia River just north of the Little Manatee River, FWRI identified freshwater resident and transient species that recruit into the river from the estuary and offshore as potential indicators of the impacts of differing flow regimes (Flaherty et al. 2013, MacDonald et al. 2013, Matheson et al. 2013). There are also species that tend to focus on a particular river section and others that move up and down the river that could be used to determine impacts of different flow regimes. The transport of juveniles related to flow (not just water level or salinity regime) within the estuarine

portions of rivers should also be considered (Norcross and Shaw 1984). In addition, although the conservation of the oligohaline zone is important for nekton, it is unclear why the goal is to maintain the 1-2 practical salinity unit (psu) habitat conditions (river km ~15-19; as noted in the initial peer review report) even though many of the species mentioned were not abundant in the 1-2 psu range. Other research on salinity zones in southwest Florida suggest that the 0.1-1 psu range corresponds with relatively large changes in nekton communities (Greenwood 2007), and several marine species tend to use the lower river as nursery habitat. Furthermore, the report mentions Schireiber and Gill's (1995) three-tiered classification system for assessing important fish habitats, where the tidal freshwater zone of this system would correspond with Greenwood's (2007) findings, but it does not give a rationale as to why the three-tiered system was not used for the nekton. In other MFLs nationwide, the low salinity zone is targeted for management with the assumption that the salinity gradient downstream is maintained. If this is the case here, then it could be stated more explicitly. Also, the reader should be made aware that much of the nursery habitat for estuarine and marine species occurs in the lower river. In general, FWC staff recommends the report more clearly describe how and why these rivers are important to estuarine/marine species and what the effects of reduced freshwater inflow are likely to be.

In summary, given the breadth of the longstanding fisheries data for the Little Manatee River, FWC staff believes the information above should be more clearly described or examined further in the final version of the report.

FWC staff appreciates the early coordination with the SWFWMD staff during the data collection and technical analysis phases of MFL evaluations and looks forward to working through fish and wildlife habitat concerns throughout the final approval process for this MFL. For specific technical questions regarding the content of this letter, please contact Michelle Sempstrott at (407) 452-1995 or by email at Michelle.Sempstrott@MyFWC.com. All other inquiries may be sent to ConservationPlanningServices@MyFWC.com.

Sincerely,



Jason Hight, Director
Office of Conservation Planning Services

jh/ms

Little Manatee River MFL Update_46722_04112022

cc: Kym Holzwart, Southwest Florida Water Management District,
Kym.Holzwart@swfwmd.state.fl.us

Literature Cited

- Beck, M.W., Heck, K.L., Able, K.W., Childers, D.L., Eggleston, D.B., Gillanders, B.M., Halpern, B., Hays, C.G., Hoshino, K., Minello, T.J. and Orth, R.J., 2001. The identification, conservation, and management of estuarine and marine nurseries for fish and invertebrates: a better understanding of the habitats that serve as nurseries for marine species and the factors that create site-specific variability in nursery quality will improve conservation and management of these areas. *Bioscience*, 51(8), pp.633-641.
- Flaherty, K.E., K. Fischer, R. E. Matheson, Jr., T. C. MacDonald, and R. H. McMichael, Jr. 2013. Accounting for influences on nekton abundance and distribution that are external to the Alafia River. A report on the hydrobiological monitoring program to Tampa Bay Water. Submitted October 1, 2013.
- Flaherty, K.E., and C.B. Guenther. 2011. Seasonal distribution and abundance of Blue Crabs (*Callinectes sapidus*) in the Tampa Bay Estuary. *Gulf of Mexico Science* 29(2): 91-110.
- Flaherty, K. E., and J. H. Landsberg. 2011. Effects of a persistent red tide (*Karenia brevis*) bloom on community structure and species-specific relative abundance of nekton in a Gulf of Mexico estuary. *Estuaries and Coasts* 34:417–439.
- Gandy, R.L., Crowley, C.E., Machniak, A.M. and Crawford, C.R. 2011. Review of the biology and population dynamics of the blue crab, *Callinectes sapidus*, in relation to salinity and freshwater inflow. *Report to the Southwest Florida Water Management District*.
- Gillson, J., 2011. Freshwater flow and fisheries production in estuarine and coastal systems: where a drop of rain is not lost. *Reviews in Fisheries Science*, 19(3), pp.168-186.
- Greenwood, M. 2007. Nekton community change along estuarine salinity gradients: Can salinity zones be defined? *Estuaries and Coasts* 30:537-542.
- Greenwood, M. F. D., R. E. Matheson, R. H. McMicheal, and T. C. MacDonald. 2007. Community structure of shoreline nekton in the estuarine portion of the Alafia River, Florida: Differences along a salinity gradient and inflow-related changes. *Estuarine, Coastal and Shelf Science* 74:223-238.
- Haddad, K.D., G.A. McGarry, R.E. Matheson, Jr., W.J. Conely, P. Carlson, M. Durako, J.L. Serino, and T. MacDonald. 1989. Assessment of Fisheries Habitat, Tasks 1, 2, 3, and 4. Final
- Hollander, D, and D. Peebles. 2004. Estuarine nursery function of tidal rivers in west-central Florida: Ecosystem analyses using multiple stable isotopes. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.
- Report to the Office of Coastal Management, National Oceanic and Atmospheric Administration, submitted December 1989, Florida Marine Research Institute, St. Petersburg, FL, 153 pp.

Haddad, K.D., G.A. McGarry, R.E. Matheson, Jr., D.A. Rydene, K.M. Peters, M. Durako, F.J. Sargent, P.F. Houhoulas, A.L. Petri, S.D. Geiordano, L.A. Houchin, and N.J. Berill. 1990. Marine Resources Geographic Information System and Fishery Resources. Final Report to the Office of Coastal Management, National Oceanic and Atmospheric Administration, submitted December 1990, Florida Marine Research Institute, St. Petersburg, FL, 263 pp.

Janicki Environmental Inc. 2011. Defining the Fish - Flow Relationship in Support of Establishing Minimum Flows and Levels for Southwest Florida Tidal Rivers: Building on the Toolbox of Analytical Techniques. Final Report to the SWFWMD, submitted December 2011, pp.

Janicki Environmental Inc. 2018. Recommended Minimum Flows for the Little Manatee River estuary, Draft Report, submitted to the Southwest Florida Water Management District

Ley, J.A., and H.J. Rolls. 2018. Using otolith microchemistry to assess nursery habitat contribution and function at a fine spatial scale. Marine Ecology Progress Series 606: 151-173.

MacDonald, T.C., Greenwood, M.F.D., Matheson Jr, R.E., Keenan, S.F., Bradshaw, C.D. and McMichael Jr, R.H., 2007. Assessment of relationships between freshwater inflow and populations of fish and selected macroinvertebrates in the Little Manatee River, Florida. Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL.

MacDonald, T.C., R. E. Matheson, Jr., K. E. Flaherty and R.H. McMichael, Jr. 2013. Growth and mortality of nekton taxa in three tributaries that discharge into Hillsborough Bay with an assessment of the impact of inflow. A report on the hydrobiological monitoring program to Tampa Bay Water. Submitted October 1, 2013.

MacAulay, G.M., T.J. Leary, K.B. Donnelly, R.E. Matheson, Jr., S.L. Drumm, and K.D. Haddad. 1993. Marine Resources Geographic Information System. 1993. Final Report to the Florida Department of Community Affairs pursuant to National Oceanic and Atmospheric Administration award no. NA270Z0354-01, submitted March 1993, Florida Marine Research Institute, St. Petersburg, FL, 92 pp.

Matheson, Jr., R.E., K.E. Flaherty, T.C. MacDonald, and R.H. McMichael, Jr. 2013. Abundance of low-salinity resident fishes in the Alafia River in relation to habitat and freshwater inflow. A report on the hydrobiological monitoring program to Tampa Bay Water. Submitted October 1, 2013.

Norcross, B.L. and Shaw, R.F., 1984. Oceanic and estuarine transport of fish eggs and larvae: a review. Transactions of the American Fisheries Society, 113(2), pp.153-165.

Olin, J.A., Hussey, N.E., Rush, S.A., Poulakis, G.R., Simpfendorfer, C.A., Heupel, M.R. and Fisk, A.T., 2013. Seasonal variability in stable isotopes of estuarine consumers under different freshwater flow regimes. Marine Ecology Progress Series, 487, pp.55-69.

Olin, J.A., Stevens, P.W., Rush, S.A., Hussey, N.E. and Fisk, A.T., 2015. Loss of seasonal variability in nekton community structure in a tidal river: evidence for homogenization in a flow-altered system. Hydrobiologia, 744(1), pp.271-286.

Peebles, E.B., 2002. Temporal resolution of biological and physical influences on bay anchovy *Anchoa mitchilli* egg abundance near a river-plume frontal zone. Marine Ecology Progress Series, 237, pp.257-269.

Peebles, E.B., Flannery, M.S., Matheson Jr, R.E. and Rast, J.P., 1991, February. Fish nursery utilization of the Little Manatee River estuary: relationships to physicochemical gradients and the distribution of food resources. In Basis II: Proceedings of the Second Bay Area Scientific Information Symposium (pp. 341-368).

Peebles, E.B., M.F.D. Greenwood. 2009. Spatial abundance quantiles as a tool for assessing habitat compression in motile estuarine organisms. Florida Scientist 72:277-288.

Robins, J.B., Halliday, I.A., Staunton-Smith, J., Mayer, D.G. and Sellin, M.J., 2005. Freshwater-flow requirements of estuarine fisheries in tropical Australia: a review of the state of knowledge and application of a suggested approach. Marine and Freshwater Research, 56(3), pp.343-360.

Rydene, D. A., and R. E. Matheson. 2003. Diurnal fish density in relation to seagrass and drift algae cover in Tampa Bay, Florida. Gulf of Mexico Science 2003:35-58.

Schrandt, M. N., and T. C. MacDonald. 2020. Long-Term Stability of the Faunal Community of a Subtropical Estuary: Evaluating Disturbances in the Context of Interannual Variability. Estuaries and Coasts 43:347-359.

Southwest Florida Water Management District. 2021 (Draft). Recommended minimum flows for the Little Manatee River Draft Report. Southwest Florida Water Management District, Brooksville, FL.

Stevens, P. W., D. A. Blewett, R. E. Boucek, J. S. Rehage, B. L. Winner, J. M. Young, J. A. Whittington, and R. Paperno. 2016. Resilience of a tropical sport fish population to a severe cold event varies across five estuaries in southern Florida. Ecosphere 7:n/a-n/a.

Stevens, P. W., M. F. D. Greenwood, C. F. Idelberger, and D. A. Blewett. 2010. Mainstem and backwater fish assemblages in the tidal Caloosahatchee River: implications for freshwater inflow studies. Estuaries and Coasts 33(5): 1216-1224.

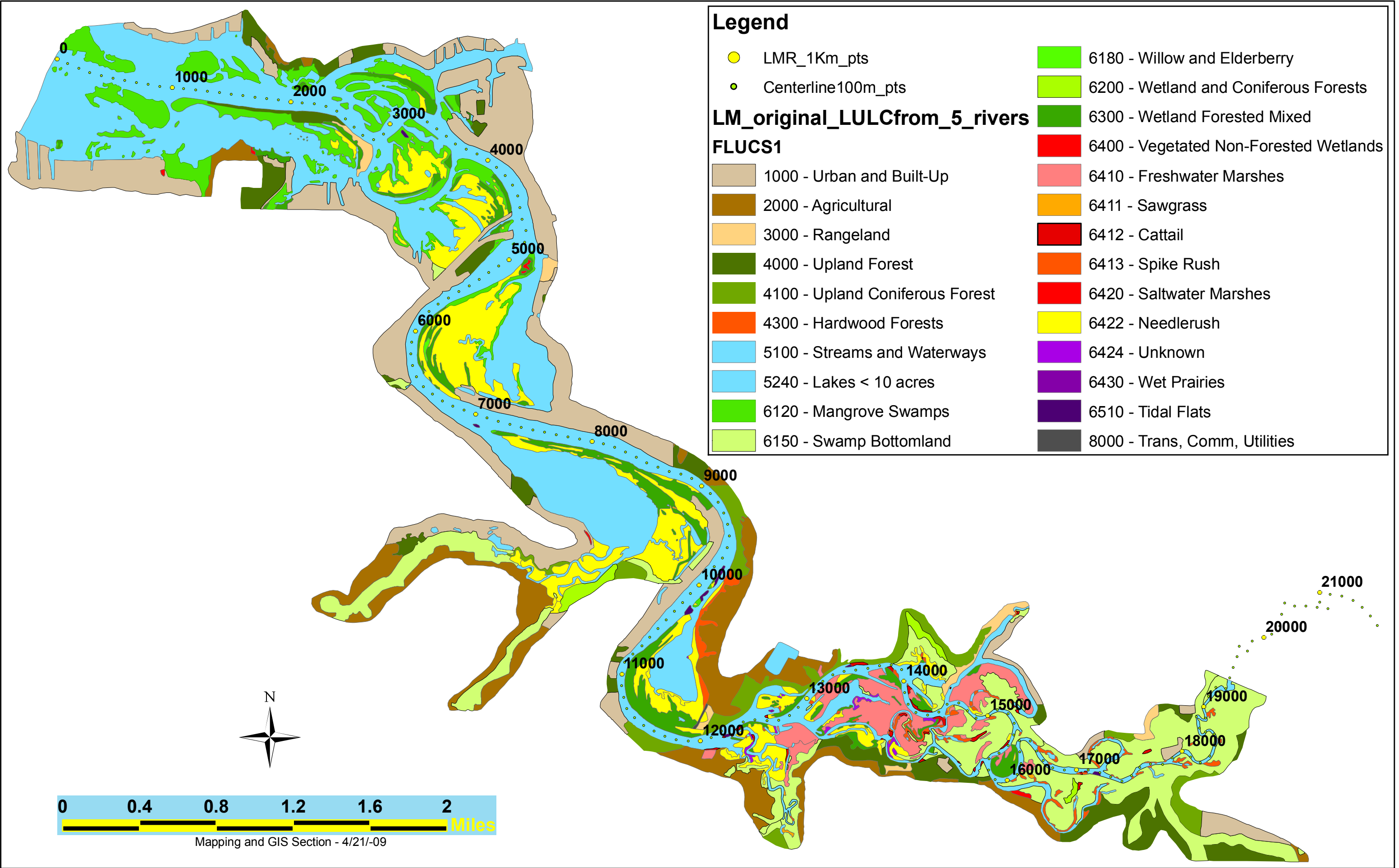
Stevens, P.W., Greenwood, M.F. and Blewett, D.A., 2013. Fish assemblages in the oligohaline stretch of a southwest Florida river during periods of extreme freshwater inflow variation. Transactions of the American Fisheries Society, 142(6), pp.1644-1658.

Trotter, A.A., Ritch, J.L., Nagid, E., Whittington, J.A., Dutka-Gianelli, J. and Stevens, P.W., 2021. Using geomorphology to better define habitat associations of a large-bodied fish, common snook *Centropomus undecimalis*, in coastal rivers of Florida. *Estuaries and Coasts*, 44(3):.627-642.

Tsou, T.-S., and R. E. Matheson, Jr. 2002. Seasonal changes in the nekton community of the Suwannee River estuary and the potential impacts of freshwater withdrawal. Estuaries 25:1372-1381.

Whaley, S.D., Christman, M. and Burd, J.J., 2016. Spatial distribution–abundance relationships in juvenile (age 0) red drum (*Sciaenops ocellatus*) and spotted seatrout (*Cynoscion nebulosus*). I: influence of freshwater inflow. Estuaries and coasts, 39(3): 742-751.

Major Vegetation Communities along the Lower Little Manatee River



Means, number of observations (N) and periods of data collection for chlorophyll α concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers.

| | | Salinity-based stations | | | |
|-------------------------------------------------------|----------|---------------------------------------------------|--------------|---------------|------------------------------------------|
| | N | 0.5 psu | 6 psu | 12 psu | 18 psu or 20 psu (Peace only) |
| | | Chlorophyll a ($\mu\text{g/l}$) | | | |
| Little Manatee (12/87 - 01/90) | 36 | 20.5 | 13.7 | 8.5 | 4.0 |
| Peace - same time period as Little Manatee | 24 | 8.9 | 22.1 | 31.5 | 7.9 |
| Peace - same time period as Alafia | 36 | 6.3 | 23.4 | 22.6 | 15.2 |
| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |

Annual average phytoplankton abundance in each salinity zone

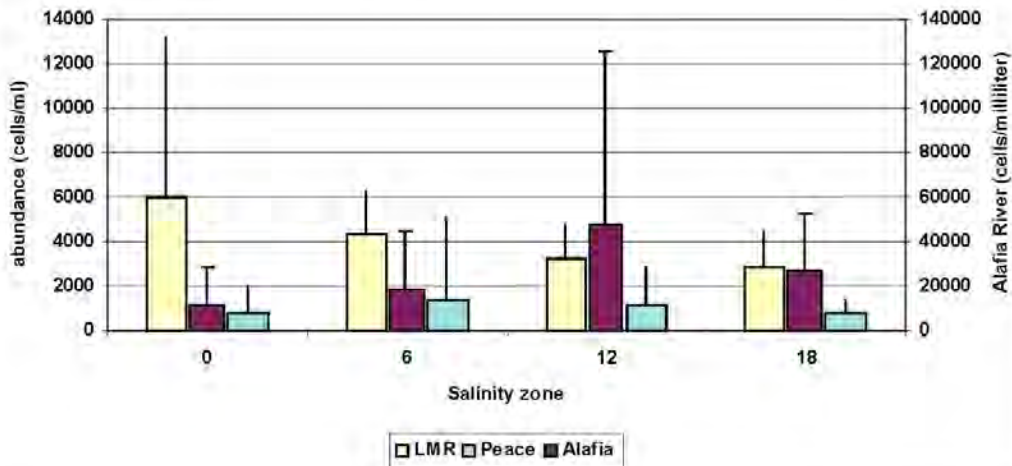


Figure 3: Annual average phytoplankton abundance in the Little Manatee, Peace, and Alafia rivers by salinity zone. The Alafia River data is shown on a separate axis since the counts are more than an order of magnitude greater than in the other rivers.

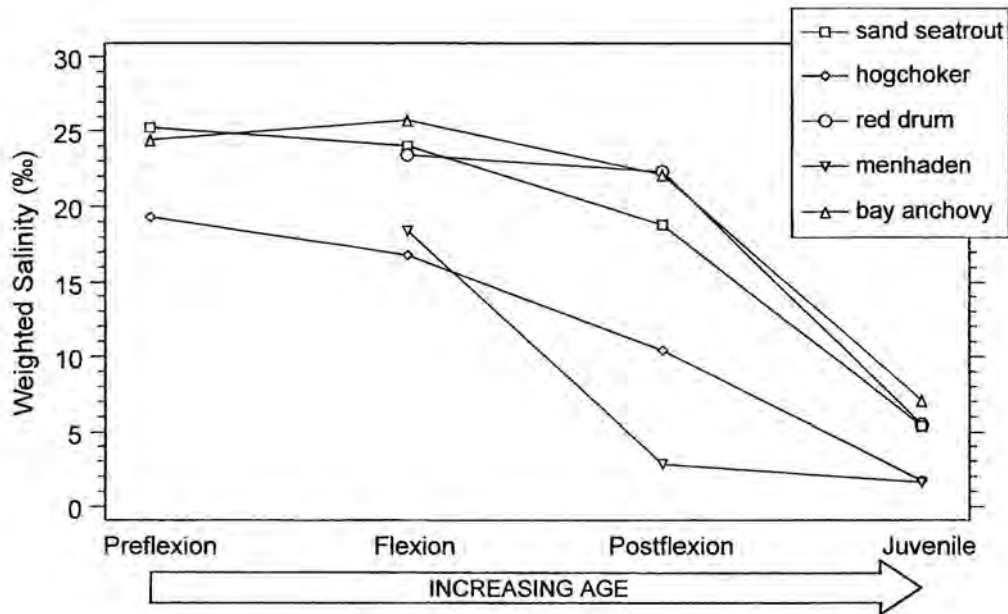


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

Sciaenops ocellatus (Red drum), Seines

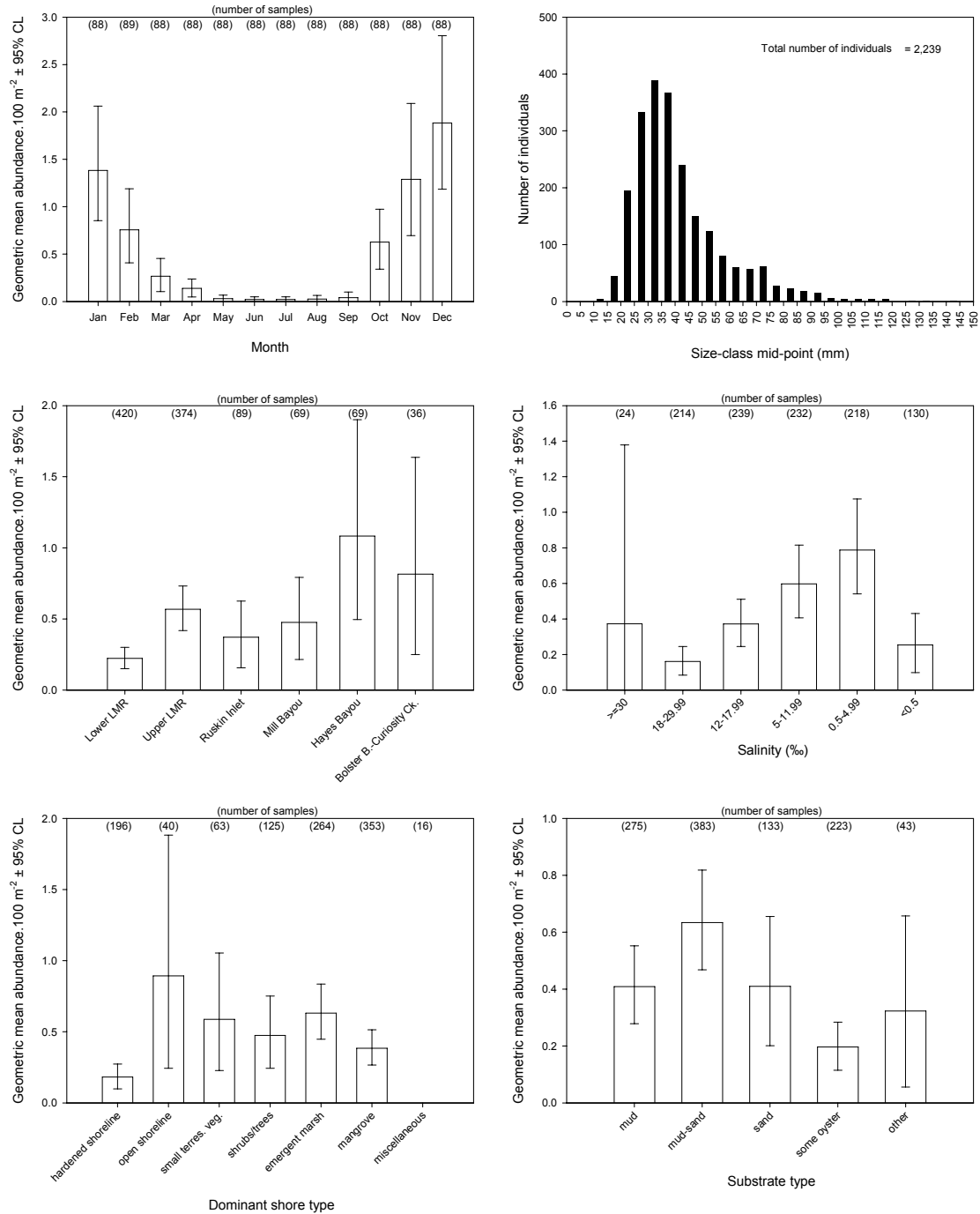


Figure 71. Abundance of *Sciaenops ocellatus* (red drum) in shoreline habitats of the Little Manatee River watershed (FIM SRS survey, January 1996–December 2006).

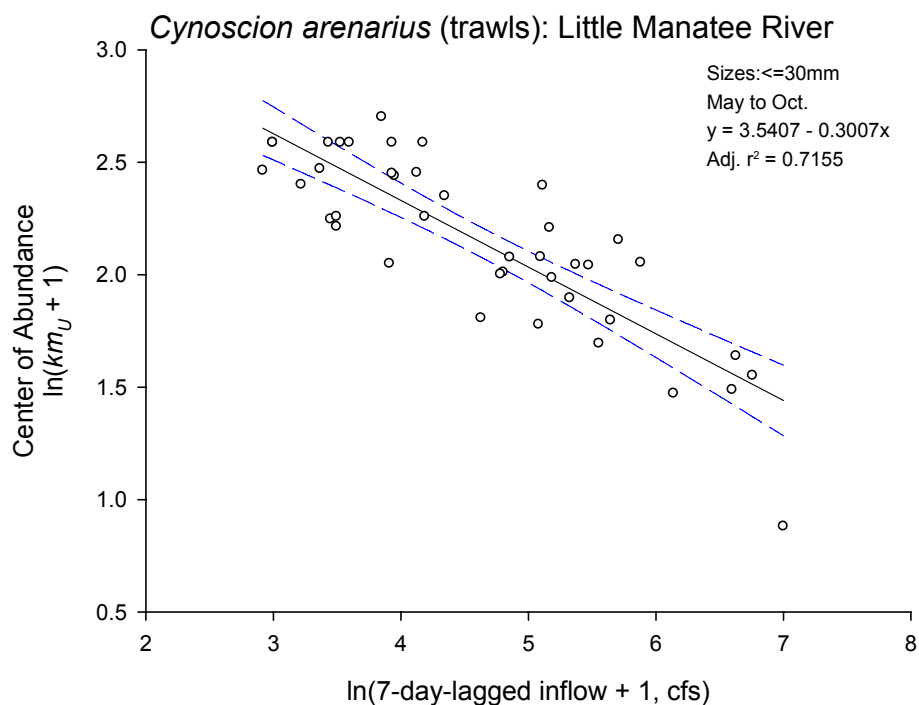


Figure 93. Distribution response of *Cynoscion arenarius* (sand seatrout), $\leq 30\text{mm}$ in the Little Manatee River CZM survey area to 7-day-lagged inflow. Solid lines: predicted values; dashed lines: 95% CI.

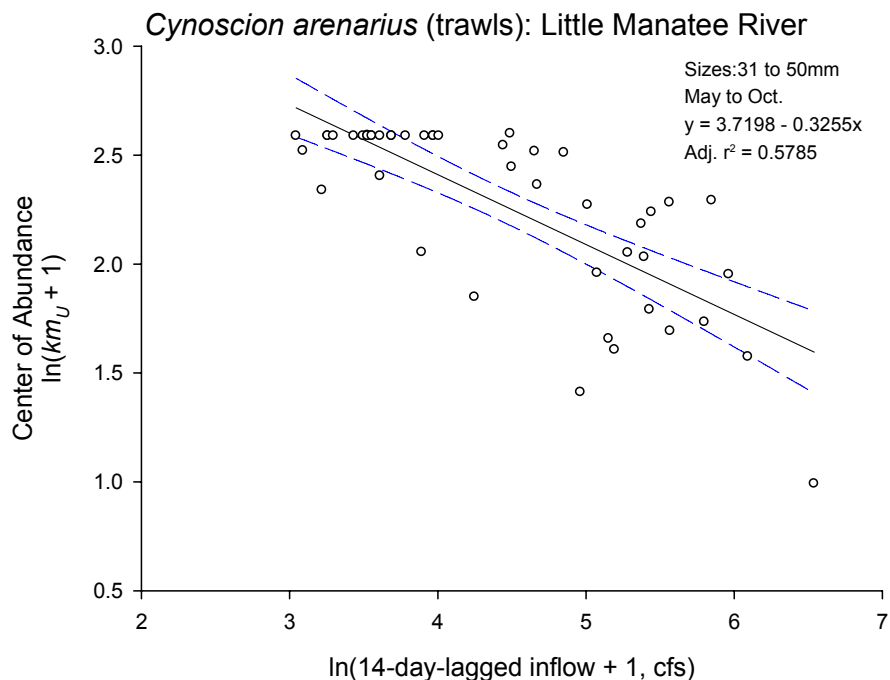


Figure 94. Distribution response of *Cynoscion arenarius* (sand seatrout), 31 to 50mm in the Little Manatee River CZM survey area to 14-day-lagged inflow. Solid lines: predicted values; dashed lines: 95% CI.

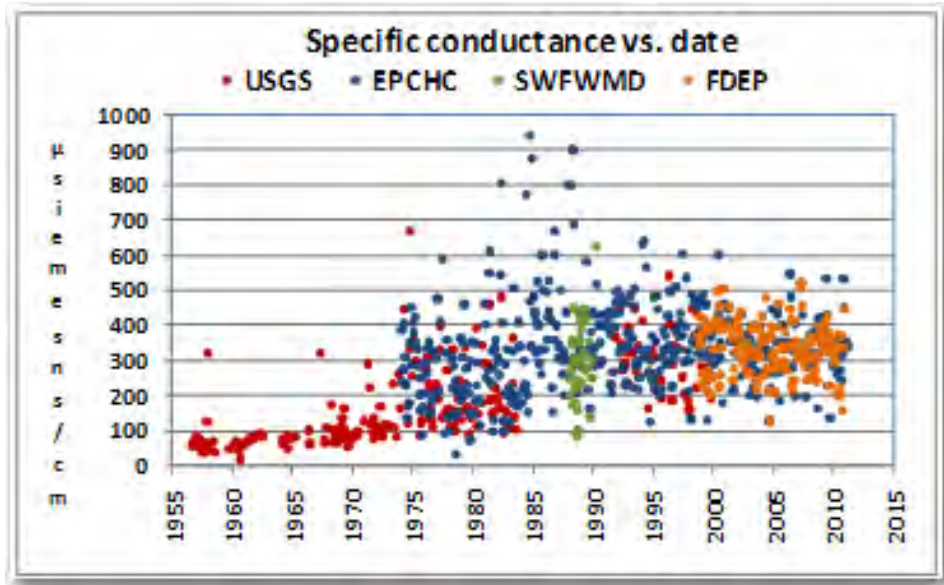


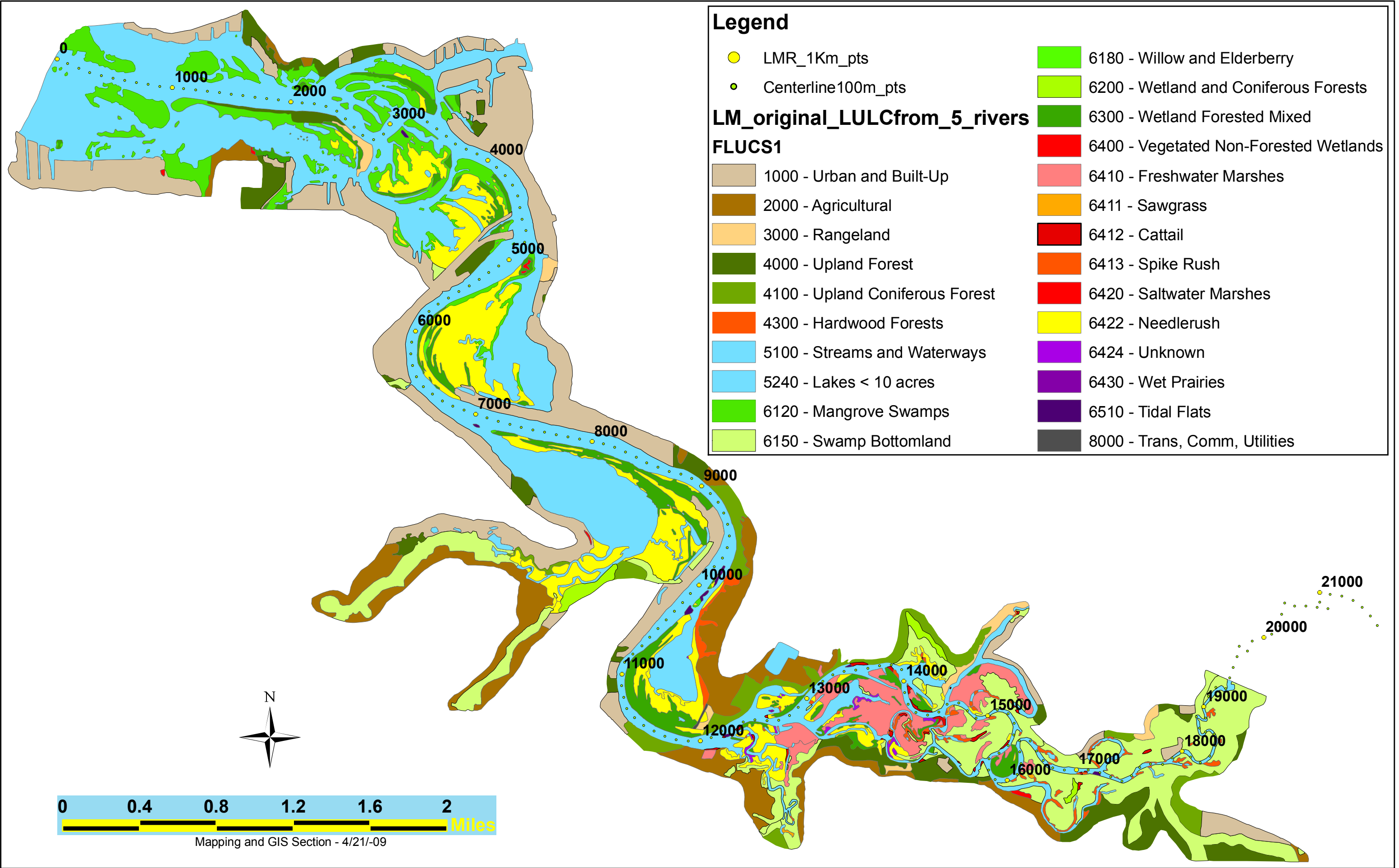
Figure 4-23. Specific conductance values at the Little Manatee River near Wimauma gage recorded by four different agencies (U. S. Geological Survey, Environmental Protection Commission of Hillsborough County, Southwest Florida Water Management District, and the Florida Department of Environmental Protection).

Specific conductance measures the ability of water to conduct an electrical current, which increases with the mineral content of the water. Under natural conditions, ground water in the Little Manatee River basin has greater mineral content than river water. Prior to the 1970s, specific conductance value in the river were typically below 100 microsiemens/cm, reflecting the mineral poor content of rainwater and the sandy soils that comprise the surficial aquifer, from which most of the groundwater baseflow originates. In contrast, the specific conductance values of water in the Floridan aquifer range typically range from 350 to 1,000 microsiemens/cm, depending on proximity to the coast and depth within the aquifer, although much higher concentrations can occur in deeper zones near Tampa Bay.

The increases in the river's low flow characteristics and specific conductance values in the mid-1970s correspond to when there began a pronounced increase agricultural water use in the southern part of the District. Much of the irrigation water that was pumped from the Floridan aquifer that was not used by the crops or lost by non-crop evapotranspiration made its way to the streams. Under high irrigation rates, actual surface runoff of excess irrigation water to the streams was observed. Even when runoff does not occur, excess irrigation water can supplement the surficial aquifer, resulting in increased groundwater baseflow to the river.

Baseflow supplementation and the increased mineralization of river water due to increased agricultural land and water use has been reported for several other

Major Vegetation Communities along the Lower Little Manatee River



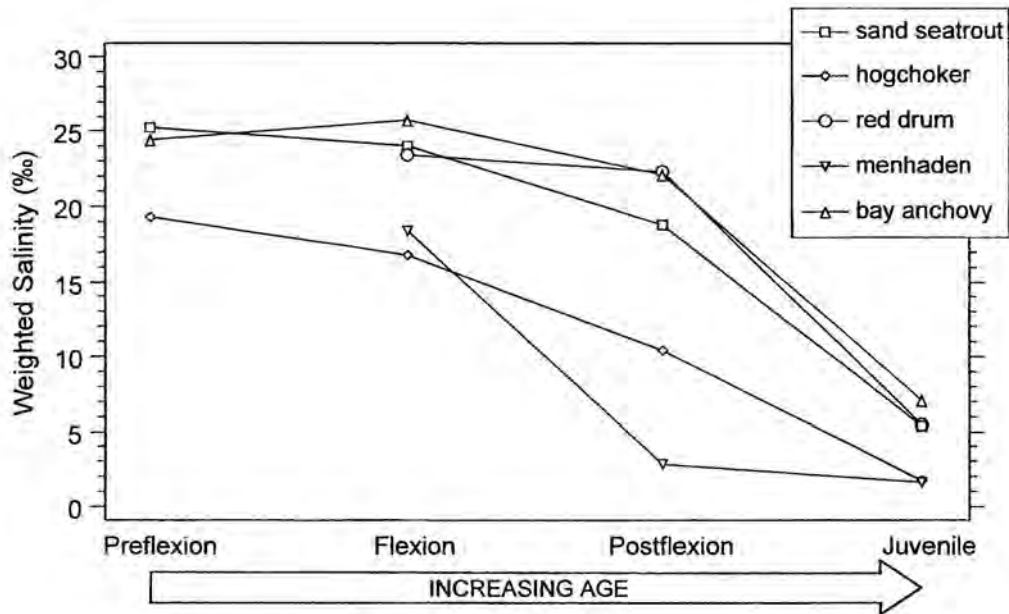


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

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From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Gabe I. Herrick](#); [Lei Yang](#); [Xinjian Chen](#); [Chris Zajac](#); [Ron Basso](#); [Kristina Deak](#); [Jordan D. Miller](#); [Randy Smith](#); [Adrienne E. Vining](#); [Eric DeHaven](#)
Subject: Re: Little Manatee MFLs Peer Review Panel Kick-Off Meeting
Date: Monday, October 4, 2021 12:04:44 PM
Attachments: [1. Lower Little Manatee vegetation map.pdf](#)
[4. Ichthyoplankton figure.pdf](#)
[2. Chlorophyll a table.pdf](#)
[3. Phytoplankton bar graph.pdf](#)
[5. FFWCC Red Drum figures.pdf](#)
[7. Appendix A figure.pdf](#)
[6. FFWCC Sand Seatrout distribution flow response.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello District Staff,

I would like to address the Little Manatee peer review panel as part of the public comment period during tomorrow's meeting. If possible, I would like to speak for 12 to 15 minutes or so and have provided a brief overview of my comments below. It might be helpful, but not critical, if I could show several slides and I have attached some in that regard.

I would like for my time to address the panel to cover the following three areas.

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2. The second topic I have is related to the slides. I think this is very safe ground that can efficiently improve the District's minimum flows report without too much trouble. The District conducted or sponsored a number of studies of the ecology of the Little Manatee River that are not cited in the report. Each of these studies could be described with one or two paragraphs in the report (probably one), and possibly include a figure or table. One of the figures (#1 attached) is a map that should replace a map currently in the District report. These studies are clearly related to the freshwater flow relationships of the Little Manatee, but briefly describing them would not call for any new minimum flow analyses or reanalysis of existing findings.
3. The most substantive point I have is that from my first reading of the report, it seems the flow based blocks were based strictly on ecological relationships in the freshwater reach of the river. I commend the District for going to flow based blocks rather than seasonal based blocks, and a good hydrologic case is made for that. However, the best flow thresholds for blocks in the estuarine reach of the river might be different than in the freshwater reach, and flow based blocks specific to the tidal reach of the river should possibly be examined separately.

That's it for now. Please let me know if I can speak for 12 to 15 minutes or so. If I can show some slides, I would ask the District moderator to pull them up.

Sid

On Mon, Oct 4, 2021 at 7:42 AM Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us> wrote:
Agenda is attached

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From: [Sid Flannery](#)
To: [Kym Holzwart](#)
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Subject: Re: Little Manatee MFLs Peer Review Panel Kick-Off Meeting
Date: Monday, October 4, 2021 5:02:52 PM
Attachments: [A. Lower Little Manatee vegetation map.pdf](#)
[B. Ichthyoplankton figure.pdf](#)
[C. Chlorophyll a table.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

I will stick with five minutes. I will go through my comments tonight and think I could show three slides comfortably in the five minutes. If that is too much, I will limit it to 1 or 2.

The three slides I could potentially use are attached and listed as A, B, and C in order of priority.

Sid

On Mon, Oct 4, 2021 at 4:39 PM Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us> wrote:

Good afternoon Sid,

Thanks for providing comments. Please limit your comments to 5 minutes during the public comment period at the end of tomorrow's meeting. If there is a slide or two you wish to be shown while you are speaking, please send it/them to me by email. As a reminder, there are five additional meetings scheduled for the peer review panel to do their work, so there will be plenty of opportunities for you to provide comments.

Best regards,

Kym

From: Sid Flannery <sidflannery22@gmail.com>

Sent: Monday, October 4, 2021 12:03 PM

To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>

Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Lei Yang <Lei.Yang@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Randy Smith <Randy.Smith@swfwmd.state.fl.us>; Adrienne E. Vining <Adrienne.Vining@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>

Subject: Re: Little Manatee MFLs Peer Review Panel Kick-Off Meeting

[EXTERNAL SENDER] Use caution before opening.

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Sid

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Public comments by Sid Flannery at the Little Manatee River minimum flows peer review meeting on 10/5/21 (not completed at the meeting due to time constraints)

Below is a transcript of the complete comments I had hoped to give at the peer review panel meeting on October 5, 2021, but ran short on time. I have added two paragraphs about the work by Dr. Gabriel Vargo and have supplied one additional slide I would like sent to the peer review panel with this document. The other two slides that were shown at the meeting are also submitted and all three slides are shown at the end of this document.

I encourage readers to review the information about Dr. Vargo's work and the important topic of separate flow thresholds for freshwater and estuarine sections of the river that starts on page 3, which I did not have time to cover in my public comments at the meeting.

My name is Sid Flannery, and as I introduced myself earlier, I am a retired Chief Environmental Scientist with the District's minimum flows program, where I worked many years on the hydrobiological flow relationships of the Little Manatee River. I managed nine different consultant research or analysis projects for the river and have probably spent 50 plus field days on the lower portions of the Little Manatee.

I want to first acknowledge how hard and conscientiously District staff works on the minimum flows reports, for they are under a very challenging schedule for the adoption of the minimum flow rules.

I quickly read through the minimum flows report for the Little Manatee, and based on further review, I will submit a series of questions and comments to the District. I will request that these questions and comments be provided to the peer review panel via the minimum flows web-board.

Today, I want to briefly discuss two aspects of the minimum flows report, the first of which I think is pretty easy to address, and the second which may require some new analyses.

The first topic is the report does not cite nor describe some important earlier technical reports that were prepared for the District about the Little Manatee River which provide very useful information regarding its ecological relationships with freshwater flows. I think these reports need to be cited and briefly summarized in the District report. Importantly, I don't think that concise summaries of these reports will change the recommended minimum flows and it should be fairly easy to incorporate them in the format of the District report. Inclusion of this material will improve the public and the technical community's understanding of the freshwater flow relationships of the Little Manatee River, and therefore better support the recommended minimum flows.

I have got two slides I want to show you in this regard (*a third slide has been added since I spoke*).

On page 70, the District report shows a land cover map for the lower, tidal reach of the Little Manatee River using the Florida Land Use, Cover, and Forms Classification System, also known

as FLUCCS. However, there is much better information available for the river, for in the 1990's the District contracted the State of Florida Marine Research Institute to do detailed mapping of vegetation communities in five tidal rivers, including the Little Manatee.

This slide (at end of this document) shows the vegetation communities that were mapped as part of that project. Note that compared to the FLUCCS codes shown in the District report, the low salinity plant communities are identified with much greater resolution, including *Typha*, *Cladium*, *Acrostichum*, freshwater marshes and other communities. It is worth noting that on the Little Manatee and other tidal rivers, the District has rightly emphasized the protection of low salinity zones, such as < 2 psu salinity. This is particularly relevant on the Little Manatee for it has a highly braided zone above kilometer 12, which has a very high degree of shoreline length per river kilometer. This zone of the river is one of the real unique areas in southwest Florida and its health is closely linked to the minimum flows. This is the map that needs to be used in the District report and work that produced it needs to be cited.

Also, in 1988 and 1989, the District received grants from the Florida Department of Environmental Protection to examine the linkages between the Little Manatee River watershed and its receiving estuary. That project included a two-year study of ichthyoplankton communities in the tidal reach of the river, which involved the early life stages of estuarine fishes. This was conducted by Dr. Ernst Peebles of the University of South Florida College of Marine Science and it is briefly described on page 99 in the District report, followed by a table of the 30 most abundant fish life stages captured during the study. It should be noted this study also quantified the abundance of many invertebrates caught in the plankton net that are important fish food organisms.

There are other valuable findings from this project that could also be briefly summarized in the District report. The next slide is from that project. I think If there is one slide that best supports the District's minimum flows program for tidal rivers, this is it. It shows mean salinity at capture for the immature life stages for five species of fish in the Little Manatee, with age increasing toward the right. The first three are larval stages, as many important estuarine dependent species spawn in the bay or gulf or near the mouths of rivers.

As these fishes grow to juveniles and develop stronger swimming ability, they move into low salinity waters. This, about as effectively as anything, justifies the use of the low salinity habitats as a parameter for establishing minimum flows. There are some other aspects of the ichthyoplankton report for the Little Manatee that are valuable, but at a minimum this graphic needs to go into the District report.

There are four other papers or reports (one a group of three related reports) that need to be cited and summarized in the District report. Of particular significance is important primary production work done by Dr. Gabriel Vargo of the University of South Florida College of Marine Science.

On page 56, the District report shows yearly mean chlorophyll *a* concentrations at five stations in the Little Manatee monitored by the Environmental Protection Commission of Hillsborough

County, including four in the estuarine reach of the river. The report states the spatial pattern shown between these stations is typical of tidal rivers. Well not exactly, the Little Manatee is unusual in that regard and there are reasons for it. The table below, which is also submitted as a slide, is adapted from a report that Dr. Vargo prepared for the District that compares chlorophyll and phytoplankton relationships in the Little Manatee, Alafia, and Peace Rivers.

| Means, number of observations (N) and periods of data collection for chlorophyll <i>a</i> concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers. | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------|--------------|---------------|------------------------------------------|
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| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |

The Alafia and Peace have the more typical pattern of high chlorophyll *a* concentrations at the 6 and 12 psu zones, while the Little Manatee frequently has its highest values near the freshwater/brackish water interface. This is likely due to comparatively longer residence times in the braided reach of the river which allows phytoplankton blooms to develop. The effects of changes on freshwater inflows on excessive phytoplankton blooms can be an important factor to consider in minimum flows analyses, as was done for the Lower Alafia. I think we are okay on the Little Manatee in that regard, but the three reports that Dr. Vargo prepared for the District need to be cited and briefly summarized in the minimum flows report.*

The citation and summaries of these and a few other reports can be very brief, one or two paragraphs with a figure or table. These concise and informative summaries will improve the public and technical community's understanding of the freshwater inflow relationships of the Little Manatee River and better support the technical justification of the minimum flows.

Assessment of separate thresholds for flow-based blocks for the freshwater and estuarine sections of the Little Manatee River

I want to change topics now and discuss the use of flow-based blocks in the District report. I strongly support the use of flow-based blocks, but they probably should be identified separately for the freshwater and estuarine reaches of the river. For most rivers, the District has previously produced separate reports for the freshwater and estuarine reaches of each river using different analytical methods, such as for the Alafia, Peace and Myakka Rivers. For many

* The District report cites a paper by Vargo et al. (1991) in the Proceedings of the BASIS 2 Symposium, but the reports for the District provide other valuable findings with the third report completed after BASIS 2.

years the District used a seasonal block approach for the freshwater rivers, with three seasonal blocks corresponding to low, medium, and high flows. For example, if it was February, you assumed flows were in the medium range and you applied the minimum flow percentages for that time of year.

On page 103 the District report makes a good case that this method has serious limitations, for flows in any season can be above or below the expected seasonal flow range for prolonged periods of time. A much simpler and more direct way to avoid this is to use flow-based blocks, in which minimum flow percentages are defined for different flow ranges, an approach which the District has recommended for the Little Manatee, which I strongly support.

Flow based minimum flows have previously been determined by the District for estuarine rivers, such as the Lower Pithlachascotee and the Lower Peace. In these rivers, the relationships of variables to freshwater inflow within the estuary were examined to determine ranges of flows where different percent withdrawal limits should be applied. Combined with a low flow cutoff, this is a very effective way to largely preserve natural flow characteristics, protect the estuary from significant harm, and make water proportionately more available as flows increase.

The problem with the Little Manatee River report is that flow thresholds of 35 and 72 cfs were based solely on environmental analyses of the freshwater reach of the river. These flow thresholds are then applied to the estuarine reach of lower river as well. This is a first, as the District has never done this before, and it is probably not the best approach.

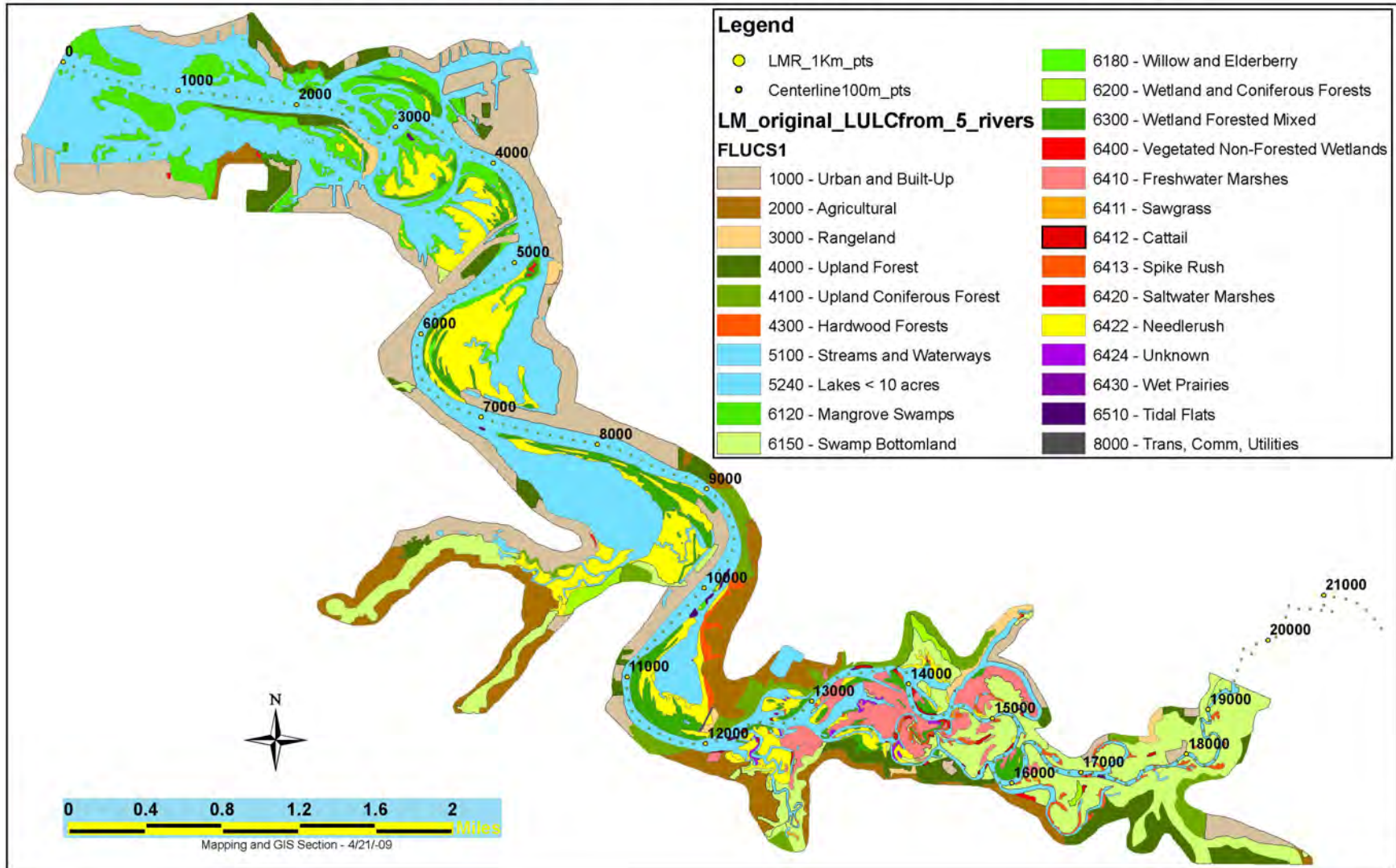
As was done for the Lower Pithlachascotee and Lower Peace Rivers, the response of key variables in the estuary to freshwater inflows should be examined separately for a series of flow ranges. Flow thresholds can then be identified to switch percent allowable flow reductions. Practical and ecologically effective flow thresholds for the estuarine portion of the Little Manatee might be similar to the flow thresholds identified for the freshwater reach, but you don't know until you analyze the data in that manner.

If necessary, the application of separate thresholds for flow-based blocks for the freshwater and estuarine reaches of a rivers is very feasible from a management perspective and can easily be applied, especially on a small river like the Little Manatee.

I recommend the District conduct further analyses to examine the response of low salinity zones and the environmental favorability functions for fishes in the lower river to freshwater inflow, and determine if separate thresholds for flow-based blocks in the estuarine section of the Little Manatee River are needed. The Lower Little Manatee River is an Outstanding Florida Water, an Aquatic Preserve, and is the jewel of tidal rivers flowing to Tampa Bay. It warrants a high degree of protection and the best analyses possible.

Three slides begin on the following page

Major Vegetation Communities along the Lower Little Manatee River



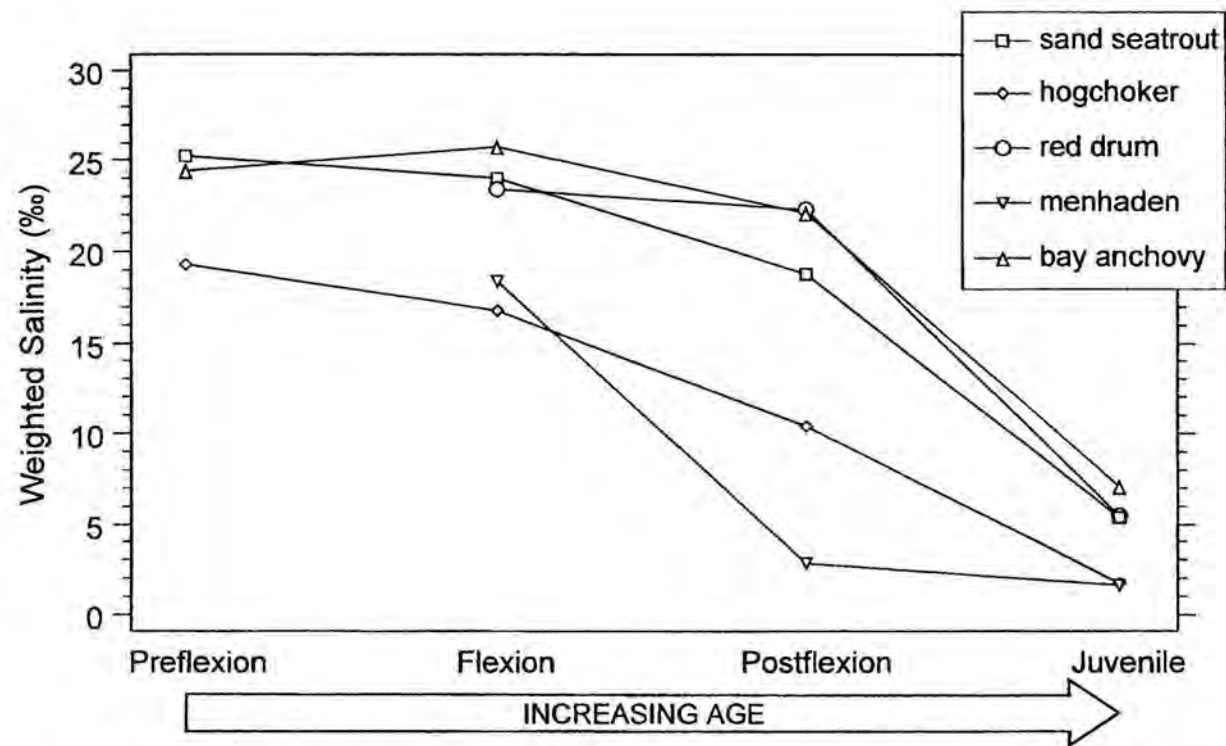


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

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Subject: Comments for submittal to Little Manatee River minimum flows peer review panel
Date: Wednesday, October 6, 2021 9:52:59 AM
Attachments: [Comments to Little Manatee River peer review panel from Sid Flannery, #1.pdf](#)
[Slide 2. Ichthyoplankton figure.pdf](#)
[Slide 1 - Lower Little Manatee vegetation map.pdf](#)
[Slide 3. Chlorophyll a table.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

Kudos to you and the District for facilitating an excellent kick-off meeting of the Little Manatee River minimum flows peer review panel. Attached is a pdf of the complete comments I had hoped to present to the panel yesterday, but time ran out before I could finish them.

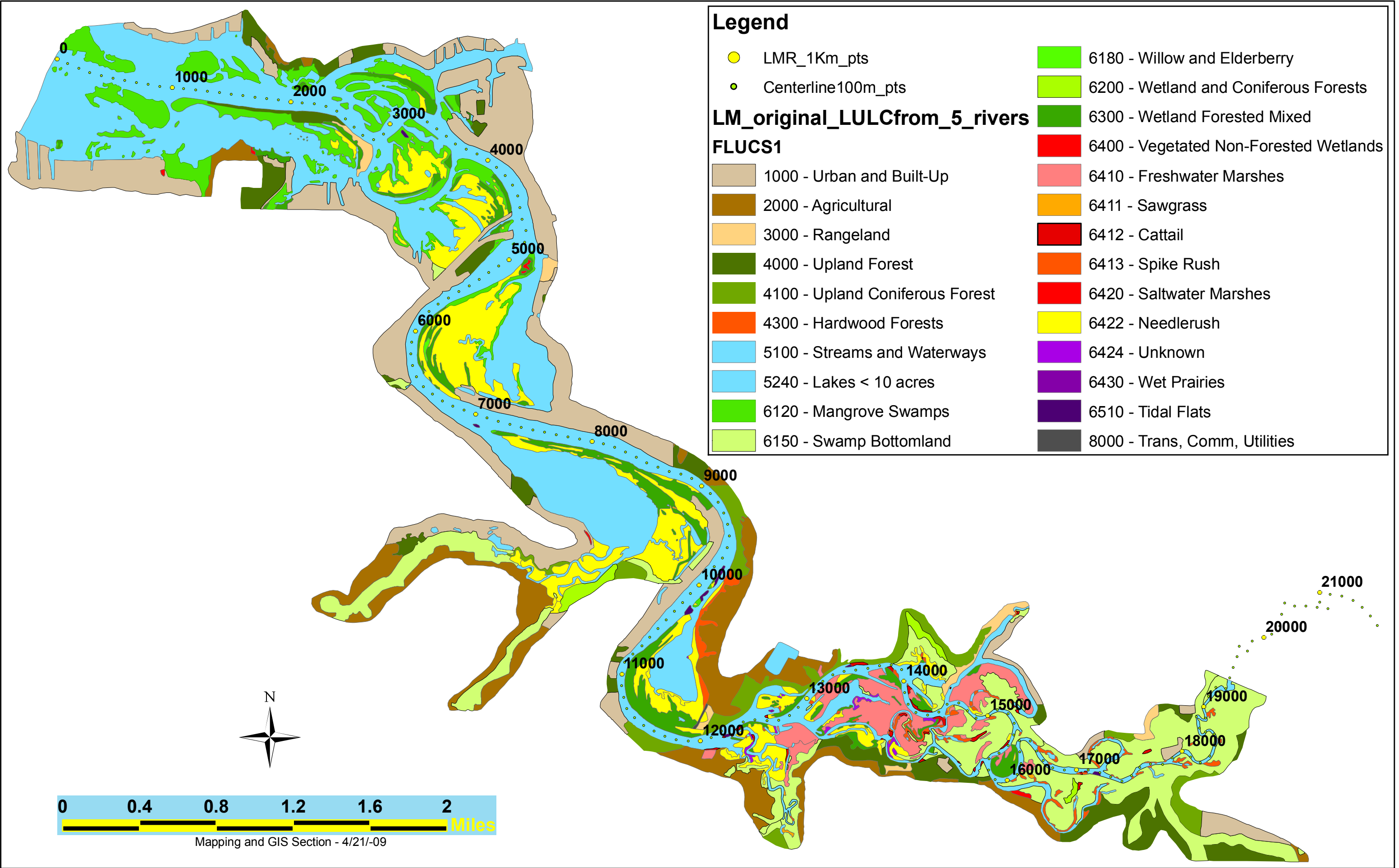
As described in the italicized preface to the comments, I added two paragraphs and one slide based on work conducted by Dr. Gabriel Vargo of the University of South Florida College of Marine Science (retired). I also encourage readers to review the important section about separate flow-based thresholds for the freshwater and estuarine sections of the river, which begins on page 3.

The three slides that are referenced in my comments are also attached.

Please provide this email and the attached documents to the minimum flows peer review panel for the Little Manatee River. Thanks to the District for conducting the peer review and considering public comment. I anticipate submitting additional comments to the panel, so please keep me apprised of the dates of future panel meetings.

Thanks again,
Sid

Major Vegetation Communities along the Lower Little Manatee River



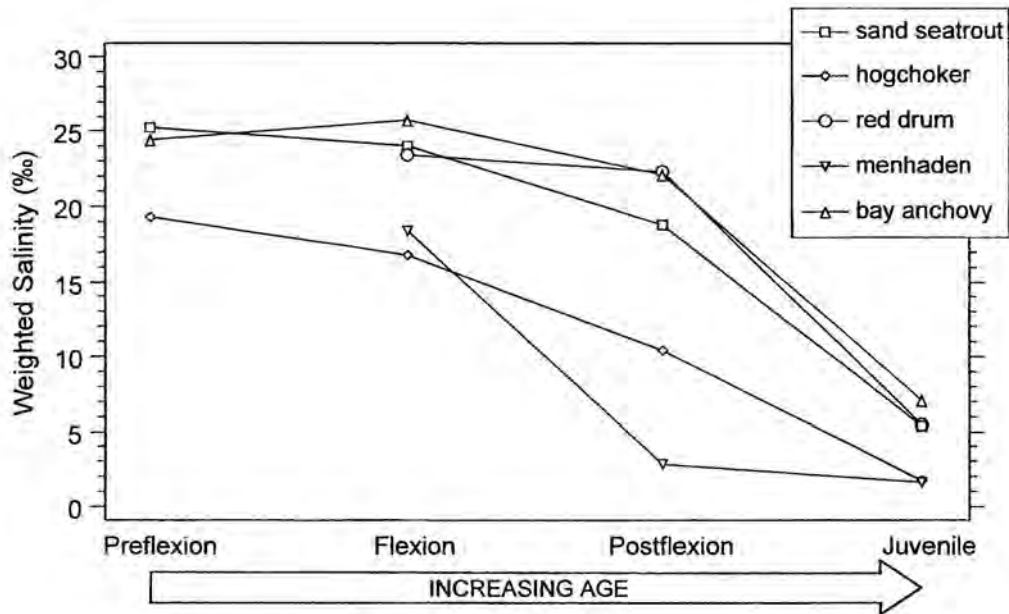


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

Means, number of observations (N) and periods of data collection for chlorophyll α concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers.

| | | Salinity-based stations | | | |
|-------------------------------------------------------|----|-----------------------------------|-------|--------|----------------------------------|
| | N | 0.5 psu | 6 psu | 12 psu | 18 psu or 20 psu (Peace only) |
| | | Chlorophyll a ($\mu\text{g/l}$) | | | |
| Little Manatee (12/87 - 01/90) | 36 | 20.5 | 13.7 | 8.5 | 4.0 |
| Peace - same time period as Little Manatee | 24 | 8.9 | 22.1 | 31.5 | 7.9 |
| Peace - same time period as Alafia | 36 | 6.3 | 23.4 | 22.6 | 15.2 |
| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |



**ENVIRONMENTAL ADVISORY COMMITTEE MEETING
TUESDAY, JULY 13, 2021 – 10:00 AM
2379 BROAD STREET, BROOKSVILLE, FLORIDA 34604**

MINUTES

Committee Members Present

Jennifer Hecker, Coastal and Heartland National Estuary Partnership
Allain Hale, Environmental Confederation of Southwest Florida
Gordon Colvin, Save the Homosassa River Alliance
Sid Flannery, Sierra Club Tampa Bay
Alan Bailey, Florida Trail Association
Dave Tomasko, Sarasota Bay Estuary Program
Dwayne Carlton, Ocala/Marion County Chamber & Economic Partnership
Ed Sherwood, Tampa Bay Estuary Program
Paul Crowell, Keystone Civic Association

Staff Members

Michelle Hopkins
Robyn Felix
Randy Smith
Mohamed Hersi
John Campbell
Eric DeHaven
Doug Leeper
Dave Kramer
Chris Anastasiou
April Brenton
Adrienne Vining
Barbara Garrett

Governing Board Liaison

John Mitten

Board Administrative Support

Virginia Singer
Lauren Vossler

1. Call to Order and Introductions

The Environmental Advisory Committee of the Southwest Florida Water Management District (District) met for its regular meeting at 10:00 a.m., on July 13, 2021, via Microsoft Teams.

Chair Jennifer Hecker called the meeting to order, and attendance was called.

Mr. John Mitten was introduced as the Liaison for Environmental Advisory Committee.

2. Additions and Deletions to the Agenda

None

3. Approval of April 13, 2021, Meeting Minutes

A motion was made for approval of the April 13, 2021 minutes. The motion was seconded and passed unanimously.

4. Public Comments

None

5. Elections of Chair and Vice Chair

A motion was made to nominate Ms. Jennifer Hecker as the Chair and Dave Tomasko as Vice Chair of the Environmental Advisory Committee. The motion was seconded and passed unanimously.

6. 2021 MFL Priority List and Schedule – Doug Leeper, MFLs Program Lead

Mr. Leeper provided committee members with information on the timeline and process for the annual update of the District's Minimum Flows and Levels (MFLs) priority list and schedule. He discussed statutory timeline requirements and the activities to be completed prior to submission of the list to the Department of Environmental Protection (DEP) for approval. Mr. Leeper noted the draft priority list meets all statutory and rule requirements. He summarized the status of and accomplishments for water bodies included on the current priority list and also discussed the status and accomplishments for a number of unscheduled MFLs.

Mr. Leeper provided members with details on the draft 2021 MFLs priority list. He noted the addition of three Southern Water Use Caution Area (SWUCA) lakes for MFLs reevaluation in 2023 and five SWUCA lakes for reevaluation in 2024. He also noted the addition of MFLs establishment for the Withlacoochee River that is planned for 2024. A detailed timeline was provided for the upcoming steps being taken to support finalization of the 2021 priority list.

Ms. Hecker asked how the District determines when it is appropriate to develop a water reservation in addition to an MFL. Mr. Leeper explained MFLs identify significant harm associated with water use. He further noted that water reservations identify the quantity and the timing of water that is reserved from use by permit applicants for the protection of fish and wildlife or public health and safety.

Ms. Hecker inquired about how much an MFL would have to be exceeded before the need to establish a water reservation would be identified. Mr. Leeper explained if an MFL is not being met then the Governing Board and staff will have to adopt and develop a recovery strategy to ensure compliance with the MFL.

Mr. Flannery inquired about the District's reevaluation of MFLs established for the Upper Peace River. Mr. Leeper noted this reevaluation is not currently on the priority list, but it is planned for completion in 2025.

Mr. Tomasko asked what role hydrologic restoration and water quality will have in terms of MFL development for lakes. Mr. Leeper explained the District is guided by the State Water Resource Implementation Rule which identifies environmental values that are to be considered when developing MFLs, and water quality is one of the values.

7. ERP Stormwater Rulemaking Update – Dave Kramer, Environmental Resource Permit Bureau Chief

Mr. Kramer provided an update on the SB712 – Statewide Stormwater Rulemaking Update. He explained stormwater-related pollution is one of the largest potential contributors of nutrients throughout the state, increasing number of water bodies are not meeting state water quality standards, and algae blooms and the red tide events are part of the contributing issues. He discussed part of the solution including: the Blue-Green Algae Task Force, passage of the Senate Bill 712 – Clean Waterways Act, and the Stormwater Technical Advisory Committee (TAC) and agency workgroups.

Mr. Kramer explained that the legislation directed DEP to enter rulemaking by January 1, 2021, to improve the existing regulations pertaining to stormwater. He discussed the goal of the Stormwater TAC is to provide recommendations to the DEP and water management districts related to anticipated rule development, updating stormwater design and operation regulations.

Mr. Kramer explained the expected outcome will consist of recognition of non-traditional stormwater solutions, consideration of most recent scientific stormwater information available,

consistent statewide water quality design criteria, improved guidance, updates to Applicants Handbook Volume II (AHVII) or new sections of AHVII, and reductions in stormwater related nutrient pollutant loading.

Ms. Hecker asked how much the current TAC has looked at what the previous TAC crafted regarding the rule language and topics of concern. Mr. Kramer explained the draft 2010 applicant handbook is being used as a baseline for the rulemaking effort.

Ms. Hecker inquired about a possible discussion by the TAC on moving predevelopment to natural land use loading rates based on the predevelopment land coverage types. Mr. Kramer responded in the affirmative.

Discussion ensued about considering wetland areas appropriately in water quality loading and efficiency calculations.

Ms. Hecker also inquired about the TAC timeframe, remaining meetings and what needs to be done to stay engaged. Mr. Kramer responded the TAC meetings began in January, there are two to three additional meetings, and within the next three months the rulemaking process will be initiated.

8. 2020 Seagrass Mapping Results – Chris Anastasiou, Chief Water Quality Scientist

Dr. Anastasiou provided members with the 2020 Seagrass mapping results. He explained the three phases that go into creating the maps are acquisition, photointerpretation, and field verification. He provided members with the 2020 mapping results finalized by estuary. Dr. Anastasiou discussed the independent accuracy assessment and its ability to provide 90% accuracy acceptance of the final map product.

Dr. Anastasiou explained the mapped seagrass acreage in Tampa Bay dropped to a 10-year low of 34,297 acres. Sarasota Bay mapped seagrass acreage dropped to a 12-year low of 10,540 acres. However, in Blackburn Bay there was a 4% increase in seagrass acreage. He mentioned the greatest loss occurred along the northern section of Charlotte Harbor's east wall, losing 1,770 acres compared to the previous mapping cycle in 2018. Dr. Anastasiou provided members with the open data portal to view the seagrass mapping: <http://data-swfwmd.opendata-arcgis.com/>.

Discussion ensued regarding seagrass loss, cause, and effect.

9. Development of agenda topics for the next Environmental Advisory Committee Meeting Tentatively at 10:00 a.m. on Tuesday, October 12, 2021.

Mr. Flannery suggested a future presentation on Lake Hancock and the Upper Peace River recovery strategy. For the upcoming meeting he recommended a presentation on the approach taken on the Little Manatee River MFLs.

Mr. Bailey suggested an update on statewide stormwater rulemaking and low-impact development design and treatment trains into stormwater treatment standards

Mr. Carlton asked for an update on how Piney Point has impacted the Tampa Bay area.

10. Announcements and Other Business

None

11. Adjournment

The meeting adjourned at 12:03 p.m.

From: [Sid Flannery](#)
To: [Virginia Singer](#)
Cc: [Michael Molligan](#); [Jennifer Hecker](#); [Doug Leeper](#); [Kym Holzwart](#); [Chris Zajac](#); [Kristina Deak](#); [Jordan D. Miller](#)
Subject: Follow up to today's EAC meeting
Date: Tuesday, October 12, 2021 2:56:57 PM
Attachments: [EAC 7-13-2021 Draft Minutes .pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Ms. Singer and Mr. Molligan,

Thanks as always to the District for putting on another informative Environmental Advisory Committee meeting. I believe you can let the EAC know when pdfs of the powerpoint presentations are available. Also, can you forward a link where interested parties can view a video of the meeting?

Also, when you convey my question as to why the District chose not to give a presentation to the EAC about the Little Manatee River minimum flows, please note that in Item 9 in the attached EAC meeting minutes from July 13th, I requested that a presentation be given on the approach that was being taken for the minimum flows. In posing that question, I was clear this did not need to include the proposed minimum flows, for I can understand why the District would not want to present those findings until the minimum flows report is approved by the Governing Board for submittal to the peer review panel.

For future reference, when requested, I think it would be valuable to give a general presentation to the EAC about the approach being taken for the minimum flows for a specific river before the report is released for peer review. Having such a presentation about the Little Manatee at today's meeting, which would have been two weeks after the report was approved for peer review, would have been very timely and valuable.

Thanks again,
Sid Flannery

INCREASED NUTRIENT LOADING AND BASEFLOW SUPPLEMENTATION IN THE LITTLE MANATEE RIVER WATERSHED

M. S. Flannery
H. C. Downing, Jr.
G. A. McGarry
M. O. Walters

ABSTRACT

The Little Manatee River has been the site of an interdisciplinary study of the ecological linkages between a watershed and its receiving estuary. This paper examines spatial and temporal trends in the quantity and quality of streamflow in the basin. Analyses of long-term rainfall-runoff relationships show that dry season streamflow in April and May has significantly increased since the mid-1970s while rainfall for those months has decreased or risen only slightly. Streamflow records for six sites gaged during 1988 showed that the highest rates of yearly runoff were from subbasins with the highest rates of agricultural water use. Increased basin outflows are attributed to the direct contribution of irrigation waters or land and water use practices that increase runoff potential. Water quality was measured biweekly for one year at the six streamflow stations and at a seventh station where flows were estimated. The site with the least intensive land use had concentrations of sulfate, nitrate-nitrite, total suspended solids, particulate nutrients and specific conductance that were significantly less than for most other stations. High specific conductance and sulfate concentrations in certain tributaries in the watershed were attributed to mineralized ground water from the Floridan aquifer entering those streams as a result of irrigation runoff. Nitrate-nitrite concentrations were negatively correlated with flow in less impacted, upstream areas, but comparatively high concentrations were observed during high flows at more impacted sites. Turbidity and suspended solids showed a much stronger response to flow increases at the more impacted sites. Areal flux rates for dissolved inorganic and particulate nitrogen differed by an order of magnitude between the least and most impacted subbasins. Long-term data at the Highway 301 bridge show that marked increases of specific conductance, nitrate-nitrite and sulfate concentrations have occurred in the river since the mid-1970s. Average midafternoon dissolved oxygen concentrations during the summer were relatively low (3.4 to 4.2 mg/l) throughout much of the estuary, and further perturbations to water quality of the river and estuary could result in the decreased biological diversity and productivity of this system.

INTRODUCTION

Among the principal creeks and rivers flowing to Tampa Bay, the Little Manatee River (Figure 1) is considered to be the stream that is in the best hydrobiological condition. For this reason, the Little Manatee was selected as the site for an interdisciplinary study of the ecological linkages between a watershed and its receiving estuary. The upstream, freshwater component of the project has emphasized natural and anthropogenic influences on hydrology and water quality, utilizing physical (soils, topography) and land use/cover data available from a Geographic Information System assembled for the project. The downstream portion of the study has examined estuarine water chemistry plus phytoplankton, zooplankton, and larval and juvenile fish communities in the tidal regions of the river and adjacent areas of Tampa Bay (Peebles et al.; Vargo et al., this volume). The goals of the project are two-fold. First, biological data from this study serves as valuable basic information on how tidal creek and river habitats are utilized by the biota of Tampa Bay. Second, the findings of the study will be used to formulate a series of management recommendations specific to the Little Manatee River watershed so that the qualities of this system can be maintained in the wake of expected population growth.

This paper discusses spatial and temporal trends in the quantity and quality of streamflow in the river and its tributaries and compares these trends to the distribution of land and water uses in the basin. These findings are presented as preliminary since we are in the early stages of analysis, and a final report will be available in early 1992 from the Southwest Florida Water Management District (SWFWMD) with contributions by Dames & Moore and the Florida Department of Natural Resources Marine Research Institute. That report will expand the use of GIS data to examine relationships of physical and land-use factors to the delivery of fresh

water and nutrients from the basin. At this time, however, several trends are apparent which have important implications for the ecology of the river and Tampa Bay. Dry season flows in the Little Manatee River are supplemented by irrigation waters, and nitrogen loading from the basin appears to have increased significantly in recent years. Recognition of these trends and the development of appropriate management strategies are of immediate concern if the effects of these factors on estuarine productivity and eutrophication are to be controlled.

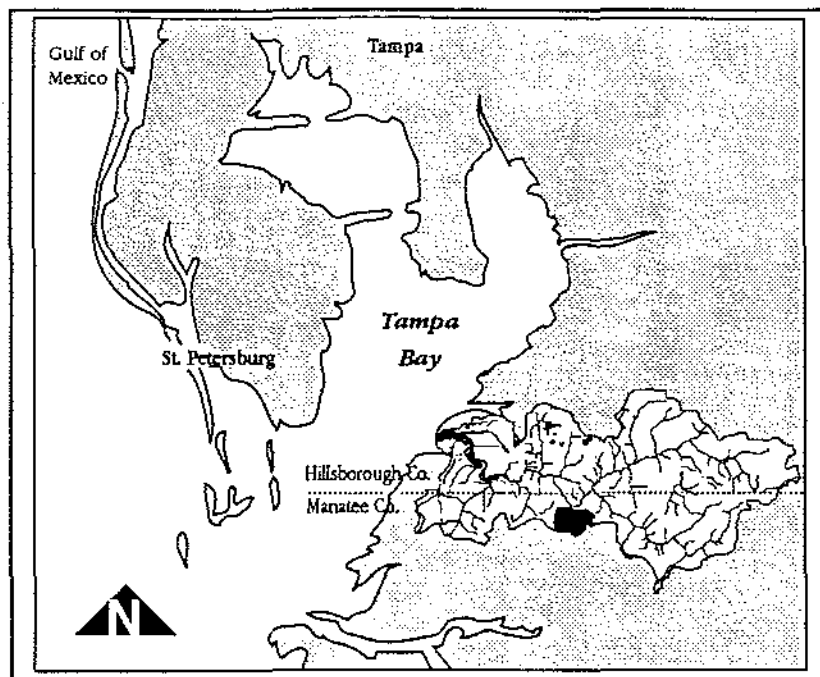


Figure 1. Location of the Little Manatee River watershed.

METHODS AND DATA SOURCES

Seven rainfall stations with daily records are available within or near the Little Manatee River watershed (Figure 2). The periods of record for these stations are of short to intermediate length, ranging from three to twenty years. A Thiessen polygon network was constructed from five of these stations to estimate average rainfall in the basin during the period of this study (1988 and 1989). Long-term rainfall in the basin must be estimated from several long-term (77 to 89 years) stations in the Tampa Bay region (e.g., Tampa, Bradenton, Bartow). For the period of record for each intermediate-term station, stepwise multiple linear regression analysis was used to develop a predictive equation for monthly rainfall at the intermediate station as a function of monthly rainfall at a combination of long-term sites. These equations were then used to generate synthetic records for the intermediate stations prior to data collection at those sites. Long-term trends in rainfall for the basin were then evaluated based on the combined synthetic and measured data for the intermediate-term stations.

The U.S. Geological Survey (USGS) maintains and reports daily streamflow records for three gaging stations in the Little Manatee River (LMR) watershed (LMR near Wimauma, LMR near Ft. Lonesome, and Cypress Creek). For this study, three additional gaging stations were established by the USGS and operated from October 1987 to January 1989 (Figure 2). Daily streamflow values for this period were estimated for a seventh station (LMR North Fork) based on differences between nearby stations and adjustment factors for subbasin area. Using reported daily

streamflow values from the six gages and estimated values for North Fork, runoff and nutrient loading per unit area were calculated for a total of seven subbasins in the watershed (Figure 2).

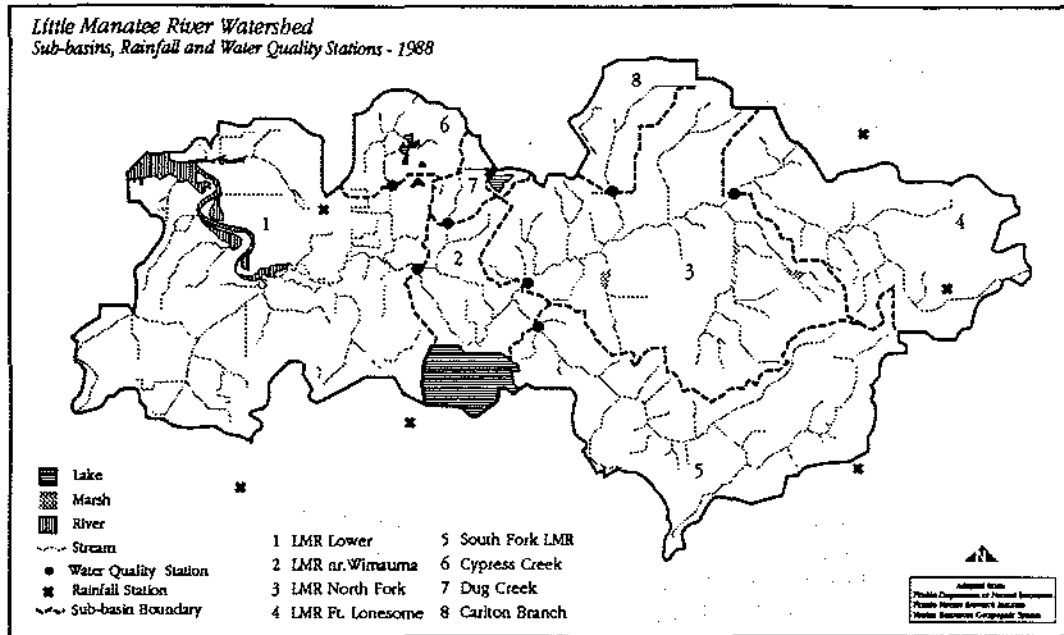


Figure 2. Subbasins, rainfall and water quality stations monitored during the first year of study.

Water quality was monitored by the SWFWMD at biweekly intervals during the first year of study (January 26, 1988 to January 24, 1989) at the seven stream flow sites shown in Figure 2. Measurements of temperature, specific conductance, pH and dissolved oxygen were taken in the field using a Hydro-Lab water quality meter. Duplicate water samples for chemical analysis were collected from a depth of 0.25 meters, or shallower if necessary, placed on ice and returned to the SWFWMD laboratory where analyses were performed according to methods described in EPA (1983), APHA (1983), and the Perkin-Elmer Corporation (1987). Duplicate water samples for chlorophyll *a* determination were collected from three sites and transported in water baths at ambient river temperature to the Department of Natural Resources Laboratory in St. Petersburg where filtrations were performed early that afternoon. Chlorophyll *a* values expressed in this report were calculated using the equations of Jeffrey and Humphrey (1975). Water chemistry, Hydro-Lab, and chlorophyll measurements were continued on a monthly basis for the second year of study (January 1989 to January 1990) at the LMR near Wimauma station. Concurrent with the freshwater sampling regime, water quality monitoring was conducted for both study years at seven stations in the estuarine portion of the river and adjacent areas of Tampa Bay. Details regarding station locations and methods for the estuarine sampling are provided elsewhere in these proceedings (Peebles et al., Vargo et al.). Water quality values reported in this paper also include data collected for the river by the USGS and the Hillsborough County Environmental Protection Commission (HCEPC).

Nutrient loading rates for the seven subbasins were calculated as follows. For each station, total daily loads (kg/day) were calculated separately for the 26 biweekly sampling events by multiplying the constituent concentrations * average flow on that day. These daily loads were then log-transformed and regressed against the logarithm of same day flow for each sample date to yield predictive equations for daily loadings as a function of same-day flow. Using daily streamflow records, these equations were

then used to predict daily loadings for each day of the study year. Values for total monthly or yearly loads were then summed from the predicted daily loadings, and flux rates (kilograms/hectare/year) were calculated by dividing the yearly load by the subbasin area.

All spatial geographic data were stored and analyzed using the Marine Resources Geographic Information System (MRGIS) at the Florida Department of Natural Resources Marine Research Institute. MRGIS applications software include the commercially available ERDAS, Inc. raster-based package and ESRI's ARC/INFO vector-based package. The MRGIS also uses ELAS, a nonproprietary image processing software developed by NASA. Numerous data layers are being implemented on the MRGIS and represent a variety of sources (Haddad and McGarry 1989). Land cover data were interpreted from the SPOT satellite base map (imaged April 1988) and aerial photography. Watershed subbasins were digitized based on United States Geological Survey delineations.

THE STUDY AREA

Physiographic and Hydrogeologic Setting

The Little Manatee River watershed drains approximately 222 mi² (576 km²) in southern Hillsborough and northern Manatee Counties, discharging to Middle Tampa Bay on its eastern shore. The headwaters of the river lie in the Polk Uplands physiographic province (White 1970), where land elevations are in excess of 100' above sea level (NGVD). Immediately to the west, much of the drainage system crosses a small northern lobe of the DeSoto Plain, and the lower third of the watershed lies in the Gulf Coast Lowlands, where elevations range from sea level to 50' NGVD.

The maximum length of the river is about 40 miles. The two principal tributaries to the river are the North and South Forks, which join about 22 miles above the river mouth at Tampa Bay (the North Fork is generally labeled as the Little Manatee River on maps). In most areas, the channels of the two forks are narrow and well incised. Channel-slope gradients for both forks are comparatively high for peninsular Florida, reported at about 0.13% for the North Fork near the Ft. Lonesome gage (Dames and Moore 1975). Near the USGS stream gage at Highway 301, the channel gradient of the river becomes gentler and minor tidal water level fluctuations are observed during low flow periods. In its lower 10 mile (16 km) reach, the river channel and floodplain become much wider and numerous tidal features such as tidal creeks, bayous, and mangrove-dominated islands become prevalent.

Hydrogeologically the Little Manatee River area is characterized by three distinct groundwater systems: the surficial, intermediate, and Floridan aquifers. The surficial aquifer system is an unconfined system which consists of marine and nonmarine quartz sands, clayey sand, shell and phosphorite. The water table in the surficial aquifer generally follows the topographic relief, with local flow patterns that lead to surface water drainage or depressional features. Below the surficial aquifer is the intermediate system which consists of water-bearing and confining units. The confining beds of the intermediate aquifer impede the vertical exchange of water between all three systems. Estimated recharge rates from the surficial to the intermediate and Floridan aquifers are very low (<2%). This low rate of recharge can partially explain the high runoff potential of the watershed. Below the intermediate system is the Floridan aquifer, which is the principal ground water supply source used within the basin. The Floridan aquifer is a series of limestone formations that begins 200-300' below land surface and is 1200-1400' thick. Water quality in the Floridan aquifer is generally good, but deteriorates with depth and proximity to the coast.

Land Use/Cover

The distribution of major land use and cover types are shown in Figure 3. This information is also presented in Table 1, where land use/cover types are expressed as percentages of area for the subbasins shown in Figure 2. Compared to most basins

draining to Tampa Bay, the Little Manatee River watershed is lightly urbanized. The combined urban-suburban coverage comprises only 6.6% of the entire watershed. The two principal urban centers, Ruskin and Sun City Center, are located in the western half of the watershed; residential development is minor in the eastern areas. Domestic wastewater facilities in the watershed include a number of small, privately owned plants near Ruskin, which discharge to percolation ponds or drain fields, and the South Hillsborough County wastewater treatment plant which discharges via spray irrigation and industrial reuse.

Industrial land uses in the watershed are primarily for two purposes, phosphate mining and electrical power generation. Most conspicuous is the Florida Power and Light Corporation's power generation facility located near the southern edge of the watershed. A 1,616-hectare offstream reservoir, shown as a lake in Figure 2, is used to store waters for power plant cooling purposes. Phosphate mines, which comprise 0.9% of the total area, are located in the easternmost portions of the watershed where there is a permitted discharge to the river from the Four Corners Mine. At present, the IMC Fertilizer Corporation is in the Development of Regional Impact review process to gain regulatory approval to mine substantially more of their land holdings in the watershed, which lie primarily in the Ft. Lonesome subbasin (Figure 2).

The most notable characteristic of the Little Manatee River watershed is its large amount of agricultural land use. Lands used for row crops and citrus total 27.3% of the watershed while pasture comprises another 26.3%. Vegetable row crops are distributed throughout the basin, but are particularly concentrated in the central and southwestern regions. Citrus, which comprises 8.8% of the watershed, is widely distributed with one area of concentration in the north central region near Carlton and Pierce Branches. Pasture, which includes both improved and unimproved classifications, is concentrated near the I-75 corridor and in the eastern portions of the watershed. Tropical fish farms comprise 0.6% of the watershed and are located in the eastern and central regions.

Apart from agriculture, vegetative land covers comprise approximately 35% of the watershed. The largest vegetation category is wetlands forest (12.6%), which is primarily associated with the stream channels of the river network. Herbaceous wetlands (3.9%) are scattered throughout the basin and estuarine wetlands are located near the river mouth. Upland communities are comprised of hardwoods, pine flatwoods, and range (shrub and brush) which combined total 17.7% of the watershed.

Water Use

A total of 100.4 million gallons per day (mgd) average pumpage is permitted from the Little Manatee River watershed, predominantly from groundwater sources. Total permitted quantities for four major water use categories (agricultural, industrial, recreational and domestic supply) are listed in Table 1 for the entire watershed and the subbasins shown in Figure 2. Industrial water use represents 23.1% of the permitted use in the watershed, with IMC Fertilizer, Inc. and Florida Power and Light Corporation comprising most of this amount. Under an agreement with the SWFWMD, Florida Power and Light Corporation diverts water from the Little Manatee River to maintain their cooling-water reservoir. Water can be diverted when streamflow in the river is over a monthly minimum flow level, and the diversions have averaged 10.6 cfs per day since reservoir filling was completed in 1977. Domestic water supply use in the watershed is very low (0.6 mgd), consisting of small, private water supply systems. There is also a small amount (0.5 mgd) of recreational water use (golf course irrigation) in the watershed.

Agricultural water use comprises about three-fourths (76%) of the total water use in the basin. This use is almost entirely from ground water, using deep wells that tap the Floridan aquifer. Of the subbasins shown in Figure 2, agricultural water use is highest in the lower LMR and North Fork subbasins. Based on a ratio of water use to subbasin size, however, agricultural water use rates are highest in the Carlton

Branch, Cypress and Dug Creek subbasins (0.22 to 0.24 mgd/km²) and lowest in the Ft. Lonesome and South Fork subbasins (0.07 to 0.10 mgd/km²).

Supplemental irrigation is typically provided for citrus and vegetable production while little to no irrigation is provided for pastures. Crop irrigation primarily occurs throughout the dry season (October to June). Although irrigation rates can be high in the fall for strawberries and fall vegetables, the highest seasonal pumpage rates typically occur in the spring when crop water demands are the greatest. For citrus and strawberries, short-term periods of high pumpage can occur during the winter for frost-freeze protection.

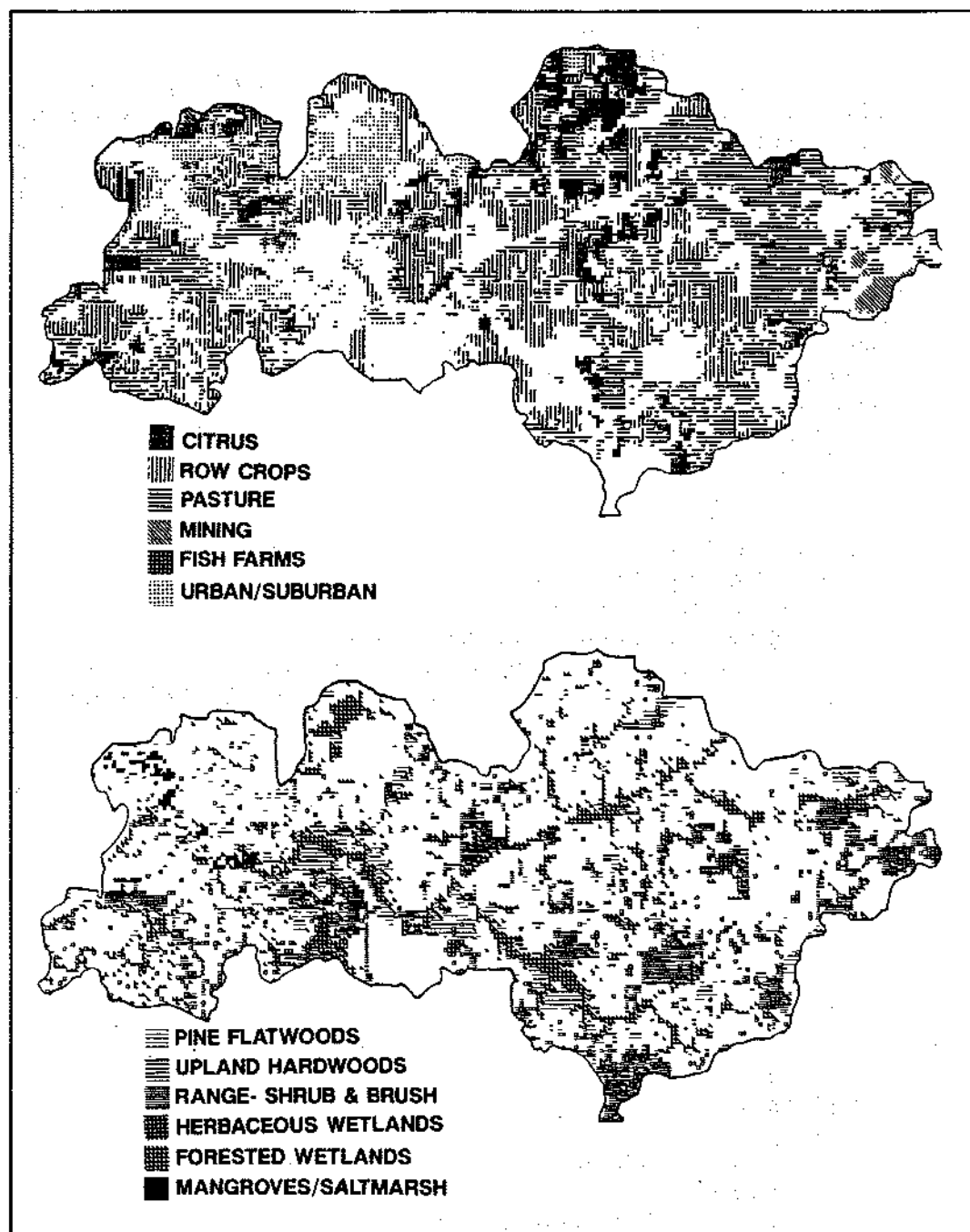


Figure 3. Distribution of major land use and land cover types in the Little Manatee River watershed during 1988.

Table 1. Area, percent coverage of major land use/cover types, and permitted water use for the subbasins shown in Figure 2. The FP&L offstream reservoir is not included in the area and percent coverage data for the LMR-Wimauma subbasin, but the permitted water use associated with the power plant is listed for that subbasin. Water use data were retrieved from the SWFWMD Regulatory Data Base for permits active in May 1991.

| | TOTAL | 1. LMR LOWER | 2. LMR NEAR WIMAUMA | 3. LMR NORTH FORK | 4. LMR FT. LONESOME | 5. SOUTH FORK | 6. GYPPRESS CREEK | 7. DUG CREEK | 8. CARLTON BRANCH |
|----------------------------|-------|--------------------|------------------------------|----------------------------|------------------------------|---------------------|-------------------------|--------------------|-------------------------|
| Area-(Km ²) | 575.9 | 170.6 | 28.3 | 132.8 | 79.8 | 100.4 | 20.5 | 8.4 | 21.8 |
| PERCENT COVERAGE | | | | | | | | | |
| Urban-Suburban | 6.6 | 12.6 | 7.6 | 1.2 | 0.3 | 0.2 | 43.4 | 15.1 | 5.3 |
| Citrus | 8.8 | 6.4 | 6.0 | 10.5 | 7.8 | 7.4 | 0.7 | 10.2 | 41.5 |
| Row Crops | 18.5 | 20.2 | 25.0 | 27.7 | 1.4 | 16.9 | 18.0 | 28.5 | 15.5 |
| Pasture | 26.3 | 19.3 | 15.9 | 26.4 | 52.1 | 29.9 | 3.8 | 4.0 | 26.4 |
| Fish Farms | 0.6 | 1.14 | 2.9 | 0.3 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 |
| Mining | 0.9 | 0.2 | 0 | 0 | 5.8 | 0.1 | 0.0 | 0.0 | 0.0 |
| Uplands- Hardwoods | 2.4 | 2.9 | 1.6 | 2.5 | 2.1 | 3.2 | 0.3 | 0.3 | 0.4 |
| Uplands- Pinelands | 6.6 | 7.7 | 15.7 | 4.2 | 3.1 | 9.6 | 4.0 | 17.7 | 1.5 |
| Uplands-Shrub and Brush | 8.7 | 5.8 | 7.3 | 11.2 | 11.0 | 13.3 | 0.8 | 8.9 | 0.2 |
| Wetlands- Herbaceous | 3.9 | 4.9 | 1.2 | 3.7 | 3.6 | 4.9 | 1.0 | 2.0 | 1.5 |
| Wetlands- Forest | 12.6 | 12.3 | 16.0 | 12.0 | 12.2 | 14.3 | 21.4 | 12.2 | 7.0 |
| Mangroves & Saltmarsh | 0.6 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Water | 3.7 | 4.5 | 0.6 | 0.4 | 0.6 | 0.2 | 6.6 | 1.1 | 0.4 |
| WATER USE (MGD) | | | | | | | | | |
| Domestic Supply | 0.6 | 0.5 | 0.04 | 0.02 | 0.01 | 0 | 0 | 0 | 0 |
| Industrial | 23.2 | 0.3 | 10.45 | 1.6 | 10.8 | 0 | 0 | 0 | 0 |
| Agricultural | 76.1 | 21.2 | 3.67 | 23.9 | 5.9 | 10.2 | 4.4 | 1.9 | 5.0 |
| Recreational | 0.5 | 0.001 | 0 | 0 | 0 | 0 | 0.5 | 0 | 0 |

The two primary irrigation methods employed in the watershed are micro-irrigation and seepage. Micro-irrigation uses drip or miniature sprinkler systems to apply water directly or in proximity to the soil root zone, resulting in high irrigation efficiencies. Seepage or subirrigation uses lateral ditches and the soil to transport water to the plants. Essentially, an artificial water table is created in close proximity to the root zone which provides a constant supply of water by capillary rise. Irrigation efficiencies for seepage irrigation systems are usually low, and the potential for runoff is high under all weather conditions due to the saturated soil conditions.

RESULTS AND DISCUSSION

Rainfall

The typical seasonal rainfall pattern for the Little Manatee River watershed is shown in Figure 4, where average monthly rainfall totals are shown for the Bradenton and Bartow weather stations. These stations are not in the Little Manatee watershed, but along with the Tampa station, represent the nearest long-term sites. Average rainfall for the 1933 to 1989 period was about 54" for both the Bradenton and Bartow sites. Rainfall at these stations is highest during the summer months of June through September, representing about 60% of the annual rainfall. The summer rainy season is caused by the frequent occurrence of convective thunderstorms in the region and the periodic influence of tropical depressions and storms. A fall to spring dry season extends from October to May, with a minor rainfall peak in February and March due to an increase in rains resulting from cold fronts.

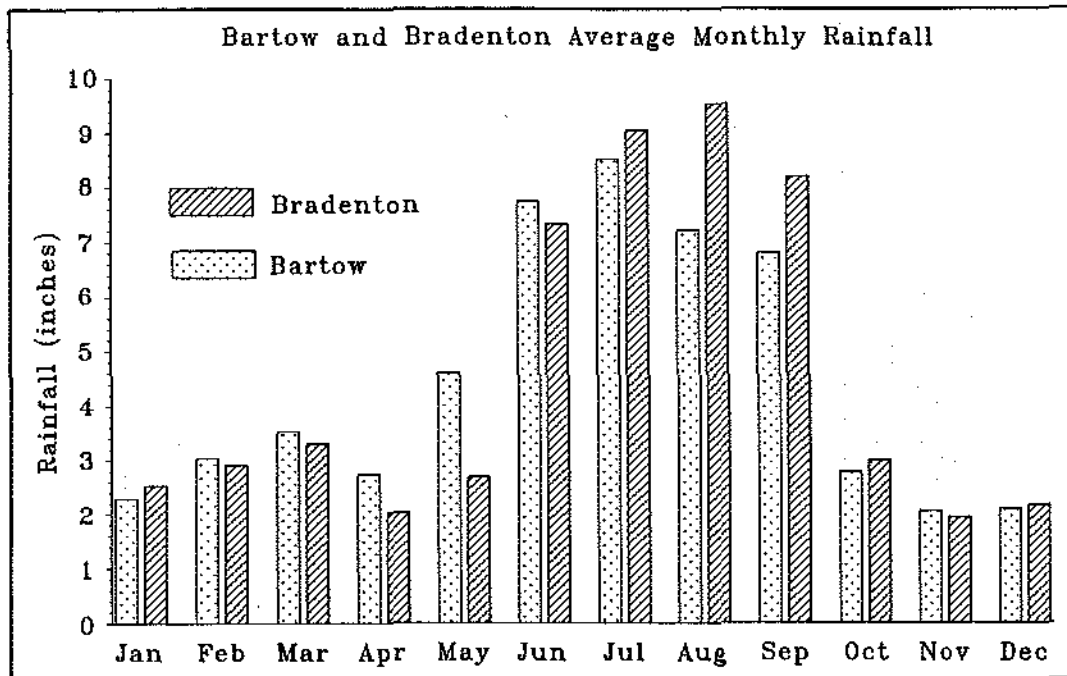


Figure 4. Average monthly precipitation at the Bartow and Bradenton rainfall stations.

Analyses of yearly rainfall records for the Bradenton, Bartow and Tampa stations indicate that portions of the Tampa Bay watershed have experienced a prolonged dry period since 1960. All the stations experienced an extreme wet period around 1960 that was well above the long-term average, but Bartow and Tampa exhibited a significant decrease in the long-term average rainfall after 1960 while the Bradenton station did not. Bradenton's average annual rainfall decreased approximately an inch between the pre-1961 and post-1960 time periods whereas the Bartow and Tampa average rainfalls decreased between 5 and 6 inches. Most of the decreases at Bartow and Tampa occurred between the months of April through October, whereas Bradenton exhibited only a minor redistribution of the monthly rainfall totals (Table 2). As described, stepwise multiple linear regression analysis was used to generate predictive equations for monthly rainfall at stations within or near the LMR watershed as a function of records at the long-term sites. Based on these statistical relationships, the predicted average annual rainfall since January 1961 ranged from 51" in the southern portion of the LMR watershed to 49" in the northern regions. This is in comparison to predicted average annual rainfalls of 56" and 54", respectively, for these regions during the pre-1961 time period.

Table 2. Changes in average monthly and yearly rainfalls from the pre-1961 to the post-1960 period. Values in the top row for each station are differences in inches, whereas the values in parentheses are expressed as percent change.

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|-----------|-----------------|----------------|-----------------|----------------|-----------------|------------------|------------------|-----------------|-----------------|------------------|----------------|---------------|------------------|
| BARTOW | 0.02 (0.8) | 0.46 (17) | -0.06 (-1.8) | -1.39 (-45) | -0.43 (-8.8) | -1.48 (-17) | -0.79 (-9.1) | -0.89 (-11) | -0.94 (-13) | -1.10 (-32) | 0.50 (29) | 0.29 (14) | -5.81 (-10.4) |
| BRADENTON | 0.04 (-1.5) | 0.13 (4.6) | 0.43 (15) | -1.33 (-52) | -0.34 (-11) | 0.85 (12) | -0.23 (-2.5) | 0.03 (0.3) | 0.27 (3.4) | -1.05 (-31) | 0.17 (9.0) | 0.10 (4.6) | -1.01 (-1.8) |
| TAMPA | -0.18 (-8.1) | 0.46 (17.9) | -0.03 (-0.1) | -1.24 (-52) | 0 (0) | -1.53 (-21.8) | -1.67 (-20.5) | -0.02 (-2.5) | -0.42 (-6.4) | -0.78 (-28.1) | 0.27 (17.5) | 0.20 (9.9) | -5.12 (-10.4) |

Spatially averaged rainfall for the watershed during the first study year (January 1988 to January 1989) totaled 54.6", a near normal amount. The seasonal distribution of rainfall was somewhat exaggerated, however, with an unusually dry spring and a wet late summer. Basin-average rainfall from mid-March to early June totaled only 3.4", providing an excellent opportunity to study low-flow conditions in the river. Early the following September, tropical air masses brought over nine inches of rain to the basin during a four-day period, resulting in flooding conditions on the river and a basin-average rainfall of 12.2" for the month of September.

Streamflow — Runoff

The U.S. Geological Survey has reported daily streamflow records for the Little Manatee River near Wimauma gaging station since 1939. This station is located about 15 miles upstream from the river mouth, and measures flow from approximately 67% of the river's watershed. Average yearly flows at the LMR near Wimauma station are plotted versus time in Figure 5A. A trend line derived from a linear regression of flow against year indicates there may be a slight decreasing trend in average yearly flows, but this relationship was not statistically significant. On the other hand, a plot of yearly minimum flows, or the lowest daily flow during a year, shows a definite increasing trend (Figure 5B), which was found to be statistically significant ($\alpha=.05$, Kendall tau-b test, line plotted using linear regression). The figure also shows that yearly minimum flows typically occur during the months of April through June. Thus, although there has been no significant trend for yearly flows in the basin, baseflow levels in the spring appear to be increasing.

Double-mass curves of accumulated rainfall in the basin and streamflow at the LMR near Wimauma site were examined to see if there has been a change in rainfall-runoff relationships for the basin. The resultant straight line relationship shown in Figure 5C indicates there has been no significant change in the overall rainfall-runoff relationship over the period of record. However, since it was expected that baseflow increases are a seasonal phenomenon, double-mass curves of rainfall and runoff were plotted for individual months. This approach contains a large potential source of error, since average streamflow levels for a month can be strongly affected by antecedent conditions (high flows at the end of a preceding month). The double-mass curve for May shows a similar slope for the periods of 1940 to 1954 and 1960 to 1979. However, there are distinct changes in slope between 1954 and 1960 and from 1979 to 1989. The 1954 to 1960 rise in slope appeared related to antecedent conditions, since there were a number of relatively wet Aprils during that period. For the 1979 to 1989 period, however, April rainfall was below normal while May rainfall showed a small positive net change. Therefore, it appears that during the last decade, greater amounts of streamflow are generated during the spring for given amounts of rain, indicating flow supplementation and/or a change in factors controlling storm-generated runoff.

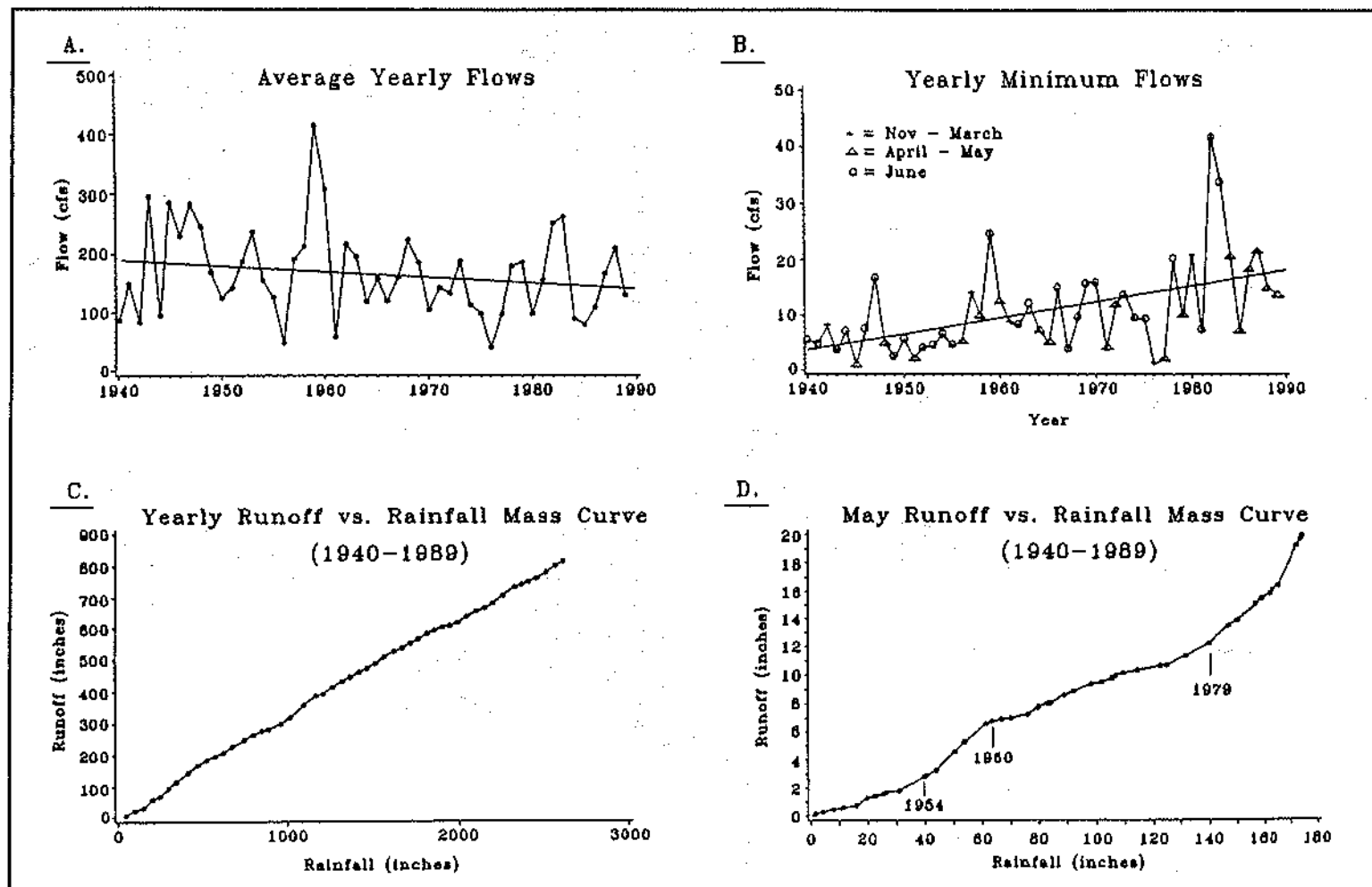


Figure 5. Plots of average yearly flows (A) and yearly minimum flows (B) versus year and double mass curves of cumulative rainfall versus cumulative runoff for yearly totals (C) and totals for May (D) for the period 1940 to 1989.

To further examine possible changes in seasonal levels of streamflow, average monthly flows for the pre-1976 and post-1976 periods were compared (Figure 6). The year 1976 was chosen as a division point since yearly minimum flows indicated a significant increase in values around that time. 1976 was not included in either of these two periods because large non-metered withdrawals from the river by Florida Power and Light Corporation occurred during that year. A comparison of the average monthly flows for the pre-1976 and post-1976 periods (Figures 6A and 6B) shows that flows in April and May increased while flows in the summer and fall (June through October) decreased between the two periods. The decreases in summer and fall streamflow were attributable to corresponding decreases in rainfall (Figure 6C). Increases in streamflow for April and May, however, were not accompanied by similar increases in rainfall. April flows increased by 23% between the two periods despite a 33% decrease in rainfall. In May, streamflow increased by 170% while rainfall increased by only 24%. Other months which showed opposite trends for rainfall and streamflow between the two periods were December and February.

From field observations made during the study it appears that much of the streamflow supplementation of the river comes from agricultural irrigation runoff. These observations are supported by a comparison of net runoff from the seven subbasins monitored during the study. In Figure 7, a smoothed daily hydrograph is shown for runoff from the Carlton Branch and Ft. Lonesome subbasins. The Carlton Branch subbasin contained 57% of its area in citrus and row crops while these land uses comprised only 9.2% of the land in the Ft. Lonesome subbasin. Figure 7 compares the runoff from each gaged area in units of inches to adjust for differences in basin areas. Runoff from the two subbasins exhibited similar temporal patterns, but during the drier months of April through June and October through December, Carlton Branch exhibited higher runoff than Ft. Lonesome. These months correspond to periods of significant irrigation for citrus and vegetable crops. Consequently, the higher runoff rates for Carlton Branch are attributed to either direct irrigation contributions to baseflow or indirect effects which increase the runoff potential of the area.

Yearly runoff rates for the six subbasins from which streamflow was directly monitored during 1988 are listed along with average yearly flows (cfs) in Table 3. The highest runoff rates were observed for the Carlton Branch, Cypress and Dug Creek subbasins (23.2" to 27.0" per year), which have the highest permitted agricultural water use per unit area. The yearly runoff rates for the remaining stations ranged from 21.2" to 21.6". Yearly precipitation totals for the seven rainfall stations monitored during 1988 did not show any spatial pattern that would explain these differences in runoff. The average rate of basin runoff for fifty years of record at the Little Manatee River near Wimauma gage is 15.4" per year. The high rates of runoff observed for all the stations during 1988 were due to the effects of a flood in September 1988, which corresponded to between a one-in-10 and one-in-25 year event.

Water Quality

The water quality results presented below are largely restricted to the biweekly monitoring data collected by the SWFWMD during the first year of study. This is done because of the balanced sampling design and consistency of analytical techniques employed for the seven subbasin sites. For some parameters, however, data available from other sources (USGS, HCEPC) are used to support observed trends. The following discussion characterizes water quality in the Little Manatee River watershed by first examining differences in mean concentrations for the seven monitored stations, and then contrasting water quality at these sites during periods of low flow and storm runoff. Mean values for water quality parameters at each station are listed in Table 4.

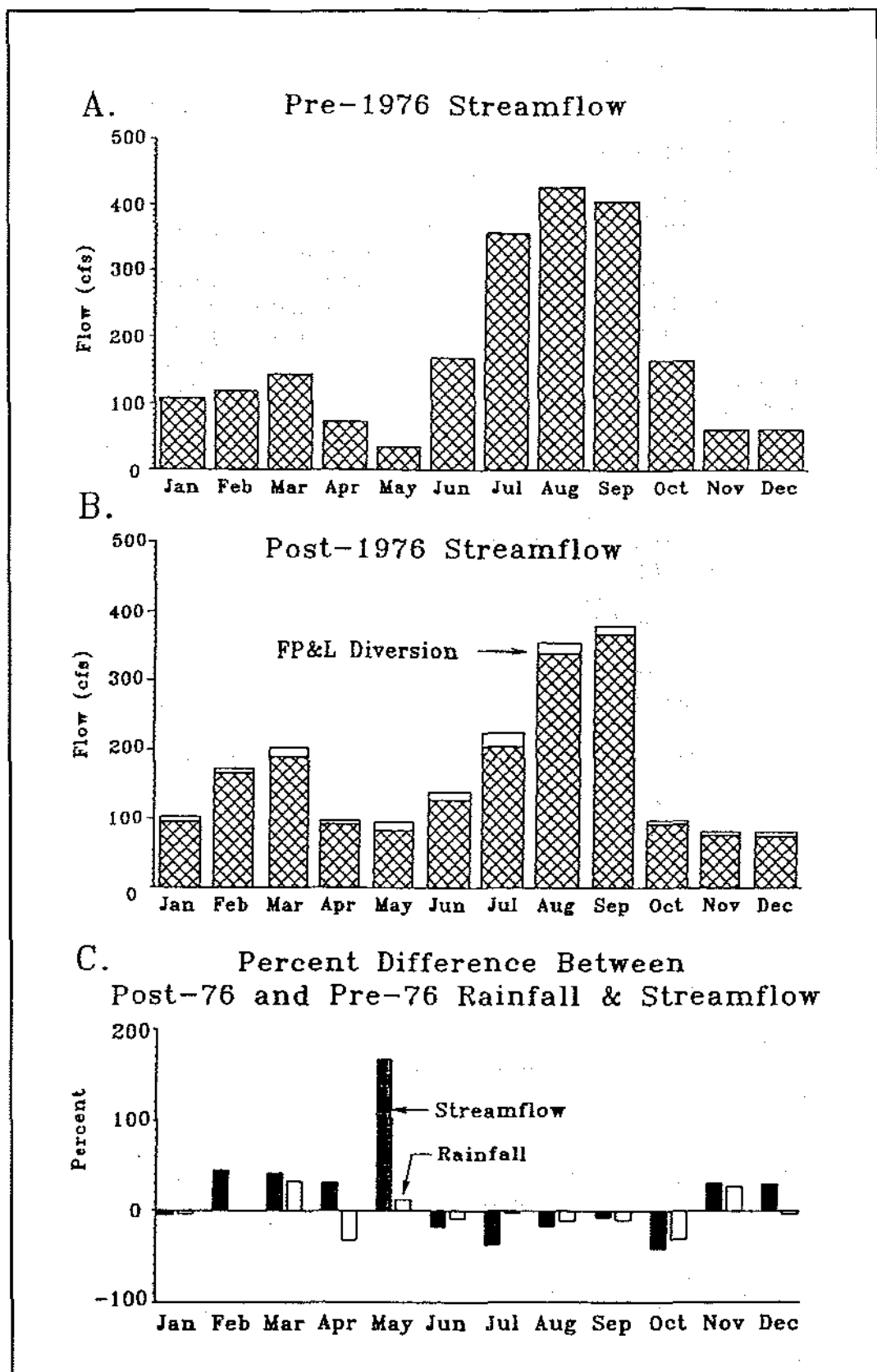


Figure 6. Pre-1976 and post-1976 average monthly flows for the Little Manatee River near Wimauma and percentage changes in monthly rainfall and streamflow between these two periods.

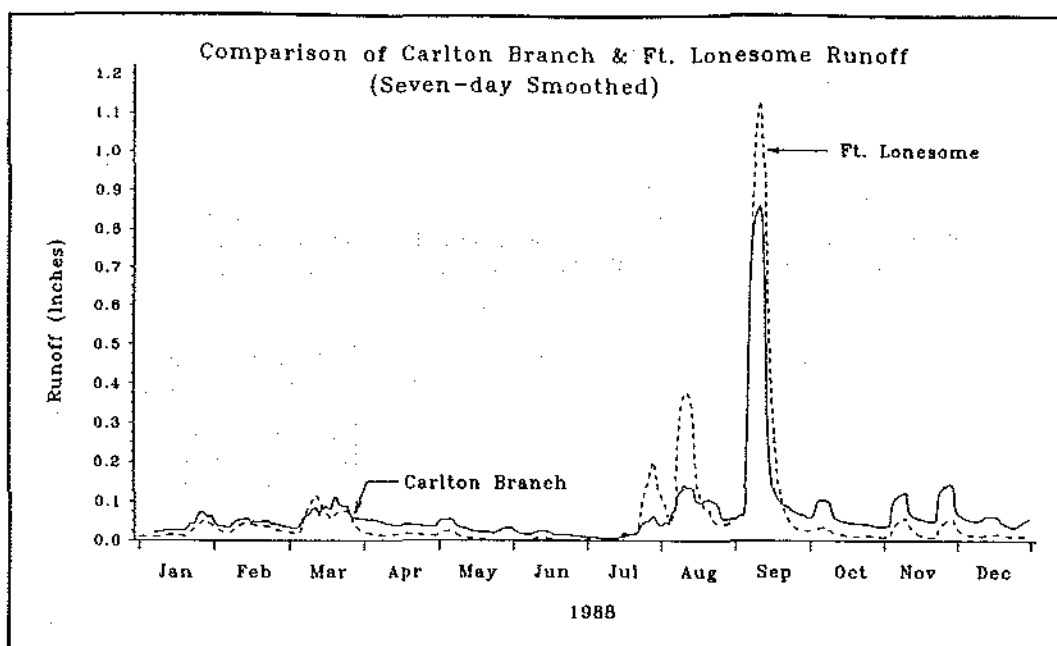


Figure 7. Smoothed hydrograph (seven-day moving average) for runoff in inches for the Carlton Branch and Ft. Lonesome subbasins during 1988.

Table 3. Yearly runoff and average streamflow rates for six subbasins monitored during 1988.

| | LMR* NEAR WIMAUMA | FT. LONESOME | SOUTH FORK | CYPRESS CREEK | DUG CREEK | CARLTON BRANCH |
|-------------------------|-------------------------|-----------------|---------------|------------------|--------------|-------------------|
| Runoff (inches/year) | 21.2 | 21.6 | 21.5 | 27.0 | 23.2 | 24.8 |
| Streamflow (cfs) | 220.9 | 46.6 | 61.4 | 15.7 | 5.5 | 15.3 |

*FP&L withdrawals included.

In order to compare the similarities of water quality at the seven monitored sites, cluster analysis (average linkage method, SAS 1989) was performed on mean values for nine of the parameters listed in Table 4. A dendrogram illustrating the results of this analysis is shown in Figure 8. The horizontal axis of the figure represents the degree of similarity between clusters, with groupings toward the right having increased similarity. To better illustrate spatial trends in the watershed, mean water quality values for the seven stations are discussed in groupings corresponding to the results of the cluster analysis.

Ft. Lonesome and South Fork

Of particular interest are the data for the LMR near Ft. Lonesome station. Mean values for sulfate, total suspended solids, and particulate phosphorus were all significantly less for this station compared to all other sites (Tukey's studentized range test, $\alpha=0.05$). The lowest mean values for specific conductance, nitrate-nitrite, turbidity, pH, and particulate carbon and nitrogen were also observed for the Ft. Lonesome station, with all but pH and turbidity being significantly different from

four or five of the other sites. Conversely, mean concentrations of color and dissolved organic carbon were highest at this station.

Table 4. Water quality values for the first study year at the seven stations shown in Figure 2. Value on the first row for each station is the mean for 26 biweekly samples. On the second row from left to right are the averages for five low-flow and five high-flow events among the biweekly samples. Value on the bottom row for four stations is the average from three high-flow and two additional storm samples. Positive or negative sign indicates that parameter concentrations were significantly ($\alpha=.05$) correlated with flow, with an r value either less than or greater than zero. All values expressed as mg/l except pH or as noted.

| | LMR NEAR WIMAUMA | LMR NORTH FORK | LMR FT. LONESOME | SOUTH FORK | CYPRESS CREEK | DUG CREEK | CARLTON BRANCH |
|---------------------------------------|-------------------------------|-----------------------|-------------------------------|----------------------|-------------------------------|-----------------------|-----------------------------|
| pH | 6.5 (-) 7.1 6.1 6.4 | 6.4 (-) 7.3 5.8 | 6.2 (-) 7.3 5.7 5.8 | 6.3 (-) 6.8 5.8 | 6.4 6.5 6.2 6.4 | 6.8 6.9 6.6 | 6.7 (-) 7.2 6.2 6.2 |
| Turbidity (NTU) | 4.5 (+) 1.3 9.9 43.2 | 4.3 (+) 1.7 7.2 | 2.3 (+) 1.3 4.4 9.3 | 3.2 (+) 1.9 6.9 | 7.1 6.3 7.5 13.9 | 5.6 (+) 2.1 14.2 | 3.7 (+) 2.8 7.4 14.8 |
| Color (PCU) | 113 (+) 35 253 189 | 120 (+) 39 270 | 142 (+) 69 293 250 | 117 (+) 37 281 | 78 (+) 41 92 75 | 39 (+) 16 71 | 38 (+) 14.1 83 99 |
| Specific Conductance (umhos/cm) | 271 (-) 369 156 267 | 287 (-) 410 143 | 154 (-) 198 117 128 | 204 (-) 297 145 | 430 (-) 499 386 393 | 528 (-) 699 400 | 322 (-) 324 288 299 |
| Ammonia-N | .08 .06 .12 .18 | .07 .05 .14 | .06 .02 .17 .12 | .07 .06 .15 | .24 (-) .40 .14 .19 | .10 .05 .15 | .08 .04 .25 .20 |
| Nitrate/ Nitrite-N | .55 .32 .41 .70 | .60 .27 .37 | .19 (-) .24 .11 .23 | .53 (-) .49 .17 | .39 (-) .74 .12 .14 | 1.1 1.4 .86 | 1.7 1.2 1.8 2.1 |
| Particulate Nitrogen | .05 (+) .01 .12 .60 | .08 (+) .10 .09 | .03 .04 .08 .10 | .04 (+) .02 .09 | .11 (+) .06 .16 .27 | .11 (+) .05 .22 | .08 (+) .07 .17 .16 |
| Ortho- phosphorus | .34 (+) .24 .52 .53 | .37 (+) .27 .55 | .37 (+) .30 .53 .42 | .27 (+) .20 .42 | .04 (+) .02 .03 .03 | .10 (+) .07 .24 | .27 (+) .18 .38 .49 |
| Particulate phosphorus | .03 .02 .05 .29 | .04 .02 .04 | .01 .01 .02 .10 | .03 (+) .02 .05 | .07 .02 .06 .25 | .04 (+) .03 .07 | .03 (+) .03 .05 .10 |
| Total Suspended Solids | 5.2 (+) 1.6 9.9 44.3 | 7.0 (+) 2.6 8.6 | 2.0 (+) 1.6 2.8 5.2 | 4.1 (+) 2.1 8.3 | 8.6 (+) 5.1 11.2 23 | 6.2 (+) 3.4 13.1 | 5.8 (+) 5.1 8.6 10.7 |
| Dissolved organic carbon | 15.3 (+) 11.8 21.2 16.4 | 14.4 (+) 11.4 21.3 | 18.2 (+) 14.9 23.0 19.0 | 13.6 (+) 9.0 18.4 | 16.2 (+) 18.0 16.2 13.8 | 10.5 (+) 11.6 13.4 | 8.7 (+) 8.2 12.0 13.8 |
| Particulate carbon | .80 (+) .24 1.8 8.7 | .93 (+) .43 1.32 | .45 (+) .28 .88 1.4 | .74 (+) .43 1.4 | 1.13 (+) .62 1.6 2.9 | 1.23 (+) .61 3.0 | 1.15 (+) 1.3 1.8 2.6 |
| Sulfate | 60 (-) 99 18 29 | 64 (-) 105 12 | 16 (-) 33 9.6 14 | 38 (-) 91 5 | 93 (-) 124 76 57 | 168 233 146 | 56 64 47 28 |
| Silicon | 6.0 (-) 9.0 3.7 3.3 | 6.4 (-) 10.5 3.4 | 4.5 (-) 6.6 3.3 2.7 | 6.4 (-) 10.6 3.8 | 3.9 (-) 6.0 2.6 1.9 | 7.4 (-) 13.6 3.9 | 7.0 (-) 10.5 4.9 3.7 |
| Chlorophyll a (mg/m ³) | 2.6 2.9 6.0 | 2.9 4.8 2.7 | | 1.3 2.1 1.6 | | | |

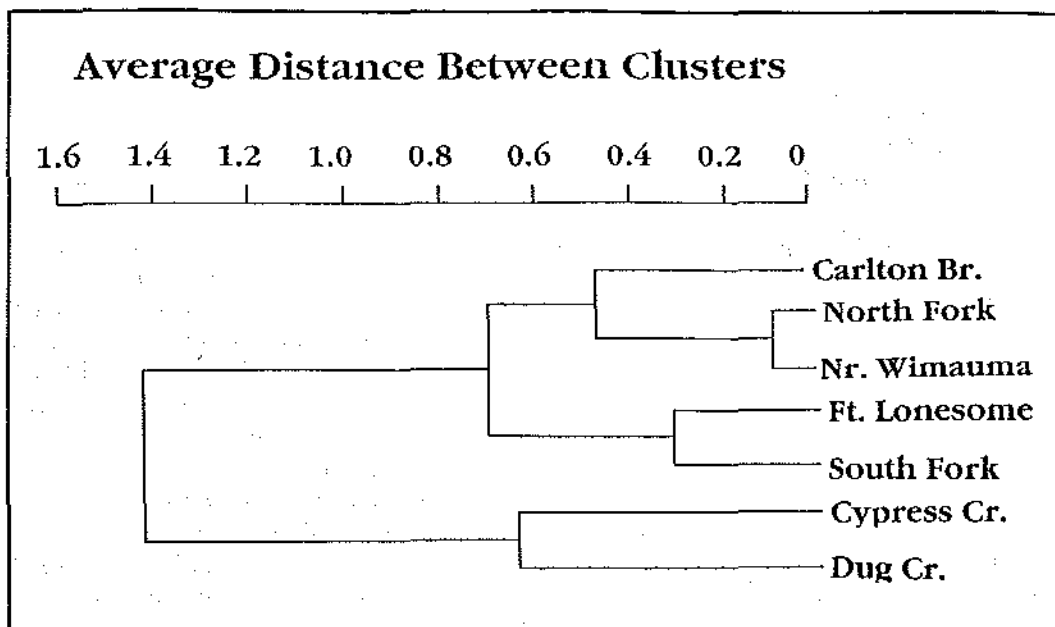


Figure 8. Cluster dendrogram for the seven stations based on mean values of nine water quality parameters. Clusters joined toward the right have greater similarity.

Although water quality at the Ft. Lonesome station has been impacted to some degree, during our study this site best represented the water quality of a natural stream in the basin and can be viewed somewhat as a control site. Over 50% of the land use in the subbasin is improved or unimproved pasture. There is virtually no urban development in the subbasin and citrus and row crops combined are only about 9% of the land area. Much of the land in this subbasin is owned by IMC Fertilizer Inc., and by 1988 approximately 5.8% of the subbasin had been mined for phosphate. This mine was inactive from 1986 through 1988, and average monthly discharges from the one permitted NPDES site were generally small (0.5 to 2.2 cfs) during the study. Larger wet season releases occurred in August and September 1988, when average monthly discharges were 4.8 and 11.3 cfs, respectively. Mining resumed in the subbasin in 1989, and it is emphasized the data presented in this report for the Ft. Lonesome station do not represent any potential influences of recent discharges. The IMC Corporation is currently in the Development of Regional Impact review process for plans to mine substantially more of their land holdings in the Ft. Lonesome area in the next thirty years.

The station that exhibited the greatest similarity to the Ft. Lonesome was the South Fork. Next to Ft. Lonesome, this station had the second lowest mean values for turbidity, specific conductance, sulfate, suspended solids, and particulate nitrogen and carbon. For most land use categories, this subbasin had similar percentage breakdowns as the Ft. Lonesome subbasin, except that it has very little mining and substantially more row crops (16.9% vs. 1.4%).

Cypress and Dug Creeks

Two other stations, Cypress and Dug Creeks, showed similarities distinctly apart from the other five monitored sites (Figure 8). These stations had significantly greater concentrations of specific conductance (430 and 528 $\mu\text{mhos/cm}$) and sulfate (93 and 168 mg/l) compared to other sites. As elaborated later, high concentrations of these parameters are indicative of pumped ground water entering the streams, primarily as irrigation runoff. The Cypress and Dug Creek stations also shared the characteristic of having significantly lower mean ortho-phosphorus values than the other sites. This

was particularly the case for the Cypress Creek, where the mean value (0.04 mg/l) was less than the means of the five highest ranked stations by factors of about 7 to 9, and individual observations showed much reduced variation about the mean compared to other stations.

The Cypress and Dug Creek stations were also similar in that they had comparatively high values for turbidity, total suspended solids, and particulate nutrients. This was especially true for Cypress Creek, which had relatively high turbidity and suspended solids values even during periods of low flow (see low-flow averages in Table 4). The Cypress Creek station represented the only substantially urbanized subbasin in the study, with a combined urban-suburban coverage of 43.4%. During the study, extensive construction work was performed on State Road 674 upstream of the Cypress Creek station and this may have been related to the high turbidity and suspended solids observed at this site. Row crops also comprise a significant proportion (18.7%) of this subbasin, and combined agricultural and golf course irrigation caused this subbasin to have one of the highest rates of groundwater use per unit area (Table 1). The Dug Creek subbasin also contains a significant proportion (15%) of combined urban development, mostly as clustered houses and 34 hectares of golf course, but contains substantially more row crops (28.5%) and citrus (10.2%), which are probably the principal sources of groundwater inputs to this stream.

LMR Near Wimauma, North Fork and Carlton Branch

The remaining three stations were all in the central part of the watershed. The LMR near Wimauma and North Fork sites, along with Ft. Lonesome, are "in-line" stations along the main channel of the river. The Wimauma site represents drainage from 67% of the entire watershed and is the site most often referenced to describe net water quality in the Little Manatee River. The North Fork site, in turn, contributes 35% of the drainage measured at the Wimauma gage. Not surprisingly, water quality at these two stations showed a high degree of similarity and mean concentrations for most parameters were very close.

It is interesting to note that the Ft. Lonesome station was more closely allied to the South Fork than to the immediately downstream North Fork station, and mean values for all parameters except color, ammonia and ortho-phosphorus were significantly different between the Ft. Lonesome and the North Fork sites. These differences were particularly large for nitrate-nitrite, sulfate and particulate nutrients, for which mean values were about 2 to 4 times higher at the North Fork site. This dramatic change in water quality between these two stations reflects the intense agricultural land use in the drainage area between them, much of which occurs in close proximity to natural or man-made drainage channels. An exception to this pattern was ortho-phosphorus, which had similar mean values for the Ft. Lonesome, North Fork and Wimauma sites.

The remaining station, Carlton Branch, was also located upstream of the North Fork site. Mean water quality values indicate that Carlton Branch receives substantial amounts of pumped ground water, as evidenced by high concentrations of specific conductance and sulfate and low concentrations of color. The most distinctive result from Carlton Branch is the high mean nitrate-nitrite concentration (1.7 mg/l), which was significantly greater than for all other stations except Dug Creek. Along with Dug Creek and the North Fork subbasins, Carlton Branch has high percentages of land use in croplands, and by far the highest percentage in citrus production.

Dry Season Characteristics

In addition to mean water quality values (n=26), Table 4 lists average values calculated from five low-flow and five high-flow events at the seven monitored stations. Also shown is a symbol indicating whether the concentration of each parameter was significantly positively or negatively correlated with flow. In general, water quality during low-flow periods was characterized by reduced concentrations

of turbidity, ortho-phosphorus and particulate materials, slightly higher pH, and increased concentrations of sulfate, silicon and specific conductance. Color and dissolved organic carbon concentrations were generally near minimum values in the low-flow samples, presumably due to reduced drainage through humus containing soils and vegetation.

It is interesting to note that at the three stations where it was measured, average chlorophyll *a* concentrations were relatively low (2.1 to 4.8 mg/m³) for the low-flow samples. The 4.8 mg/m³ average for the North Fork site was influenced by one reading of 10.2 mg/m³, as values from the other four dates ranged from 2.0 to 4.9 mg/m³. Based on the one year of data, it appears that algal blooms are uncommon in the nontidal portions of the Little Manatee River, despite the occurrence of abundant nutrients. This is probably due in part to short residence times in the river, for even during low flows the elevational gradient of the channel maintains significant downstream currents. Using average channel velocity data available from USGS streamflow rating measurements, we estimate that transport times from the headwaters to the estuary are no more than three to four days during low flows.

In order to more widely characterize dry season water quality in the watershed, two additional sampling trips were performed in May 1988 and May 1990, during which a total of 21 stations were sampled (Figure 9). For most parameters, concentrations at the stations were similar between the two dates, verifying the spatial trends observed. Average specific conductance values calculated for these two dates showed large variation between tributaries to the North Fork of the river. Values upstream of Carlton Branch were comparatively low, ranging from 190 to 306 μ mhos/cm. Four stations in Carlton Branch showed progressively increasing values along the length of the Branch, increasing from 185 μ mhos/cm in the upstream reaches to 411 μ mhos/cm near the confluence with the river. Highly mineralized waters were observed on three downstream tributaries to the North Fork, with average conductance values exceeding 800 μ mhos/cm at these sites. Correspondingly, average conductance values in the North Fork progressively increased downstream, from 222 μ mhos/cm at the Ft. Lonesome station to 595 μ mhos/cm near the confluence with the South Fork. The South Fork of the river, which had only two accessible sampling sites, similarly showed increased concentrations progressing downstream, but was generally less mineralized than the North Fork as shown by its lower average value (380 μ mhos/cm) near the confluence.

Sulfate concentrations for the two May sampling trips showed the same spatial pattern observed for specific conductance, and concentrations of these two parameters were highly correlated ($r=.93$) throughout the study. Data from headwater reaches in this study and historic values from the USGS indicate that specific conductance values for natural surface waters in the region during the dry season are well under 200 μ mhos/cm. Conversely, specific conductance values for wells tapping the Floridan aquifer in the region are typically in the range of 300 to 1,300 μ mhos/cm, with sulfate values ranging from less than 20 to over 400 mg/l (USGS 1990). Because of the heavy agricultural water use in the region, it is reasonable to conclude that high instream concentrations of these parameters are indicative of mineralized water from the Floridan aquifer reaching these streams via groundwater pumping. Mineralization of the aquifer increases with depth and proximity to the coast; therefore, the spatial patterns shown in Figure 9 are not entirely indicative of relative amounts of groundwater supplementation since the contributing well waters may have very different mineral concentrations.

Response of Water Quality to Increased Streamflow

The response of various water quality parameters to increased flow was examined through Pearson product-moment correlation analysis of instream concentrations and same-day average flows at the seven sites (Table 4). Additional water samples were

taken at four stations (LMR near Wimauma, Ft. Lonesome, Cypress Creek and Carlton Branch) during two storm events during the study. Along with three dates from the regular biweekly sampling, a total of five sampling trips occurred on the rising limb of storm hydrographs at these four stations. Average values calculated for these five storm events at the four stations are listed separately in Table 4, along with averages calculated from a total of five high-flow events for the regular biweekly sampling at all stations (three dates are shared between the high flow and storm averages).

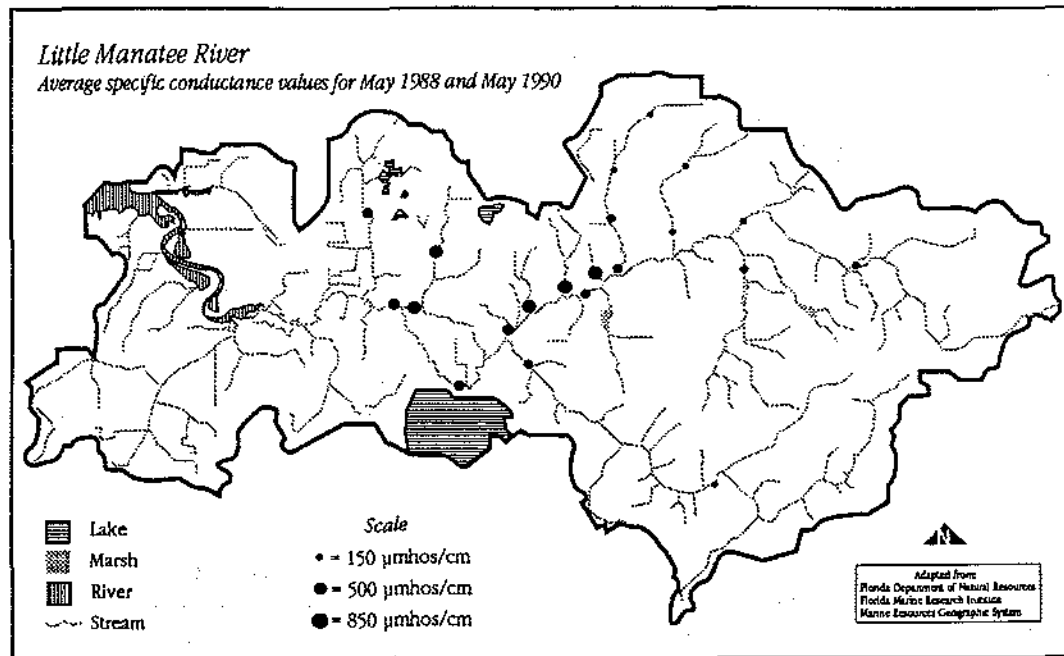


Figure 9. Average specific conductance values for 21 stations sampled during May 1988 and May 1990.

As expected, concentrations of turbidity and particulate materials were positively correlated ($\alpha=.05$) with flow at most stations. Turbidity was highly correlated with flow at all sites except Cypress Creek, where the relationship was not significant, and average turbidity values were relatively high (6.3 NTU) during low-flow periods. Total suspended solids and particulate carbon and nitrogen were positively correlated with flow at all sites, with the exception of particulate nitrogen at Ft. Lonesome. Interestingly, particulate phosphorus was significantly correlated with flow at only three of the sites, where the corresponding correlation coefficients were less than for the other particulate nutrients.

Although turbidity, suspended solids, and particulate carbon and nitrogen were positively related to flow at most sites, the magnitude of the response of these variables to flow showed large variation throughout the watershed. Average concentrations of suspended solids at Ft. Lonesome for five regular high-flow events were less than the high-flow averages for the other stations by factors of 3.0 to 4.7. Averages for turbidity and particulate nutrients were also lowest at this station. The highest concentrations of turbidity and suspended materials were observed for Dug Creek, followed by Cypress Creek or the LMR near Wimauma site. Dug Creek was not sampled on the extra storm sampling trips, but the storm sample averages listed in Table 4 for Cypress Creek and LMR-Wimauma show very high turbidity and particulate concentrations, especially for the LMR-Wimauma station. Storm averages for turbidity and suspended solids at LMR-Wimauma were 43 NTU and 44 mg/l, respectively, or about 2 to 4 times the averages for Cypress Creek and Carlton Branch, and more than 4 and 8 times the storm averages for turbidity and suspended solids,

respectively, at Ft. Lonesome. Comparison of the data from the Ft. Lonesome and LMR-Wimauma sites indicates that land use alterations between these locations have had substantial impact on the loadings of particulate materials to the river system.

Compared to particulate materials, the response of dissolved constituents to streamflow was more varied. Significant negative correlations with flow were observed for sulfate, silicon and specific conductance at all sites, with the exception of sulfate at Dug Creek and Carlton Branch. The reduction of these parameters with increasing flow reflects the reduced proportion of ground water in these streams during periods of increased storm runoff. Ammonia concentrations showed no general pattern, being unrelated to flow at four of the stations, negatively correlated with flow at Cypress Creek, and demonstrating a positive trend at Carlton Branch ($\alpha=.06$). Ortho-phosphorus did show a consistent trend being positively correlated with flow at all stations.

Nitrate-nitrite concentrations were negatively correlated with flow at three stations and a nonsignificant negative trend with a lower confidence level ($\alpha=.08$) was observed at Dug Creek. One exception to this pattern was Carlton Branch, where nitrate-nitrite concentrations showed little relationship to flow ($r=.02$) and high concentrations (>2.0 mg/l) occurred during both high and low flows. For the other stations, plots of nitrate-nitrite concentrations versus flow showed two general types of patterns. For better illustration, and because the 1988 and the combined data sets show consistent relationships, nitrate-nitrite values from the combined SWFWMD-USGS-HCEPC data for the LMR-Wimauma and Ft. Lonesome stations are plotted versus flow in Figure 10. The flow ranges shown for the stations are those flows which were exceeded 10% of the time for the period of the data shown (1982 to 1990). Older nitrate-nitrite values were not used because there has been a significant increase in this parameter over time at the LMR-Wimauma station.

The first thing apparent from Figure 10 is that nitrate-nitrite concentrations at the Wimauma station fluctuate over a much wider range, as only one value from the Ft. Lonesome site exceeded 0.5 mg/l, whereas 56% of the observations from the LMR-Wimauma site exceeded that amount. Second, the basic shapes of the two curves are different; nitrate-nitrite concentrations decreased rapidly with flow below 20 cfs at Ft. Lonesome and remained below 0.2 mg/l at higher flows. There was much more scatter in this relationship at the LMR-Wimauma site, with concentrations above 0.5 mg/l continuing to occur at higher flows and a significant negative correlation was not found with flow. The difference in these two plots indicates that storm runoff in the Ft. Lonesome catchment carries much less nitrate-nitrite than does runoff from areas farther downstream. It is possible that this downstream enrichment occurs in both the surface drainage and the interflow components of the storm hydrograph, but the relative magnitude of these components is not known. It does seem likely that crop fertilization in the basin could enrich nutrient concentrations in the surficial aquifer, potentially increasing instream concentrations via ground-water interflow where agricultural lands are near water table gradients toward stream channels.

Nutrient Loading Rates

The collection of streamflow and water quality data allowed for the computation of nutrient loading rates for the seven subbasins. Yearly flux rates (kilograms per hectare per year) for seven dissolved and particulate constituents from the monitored subbasins during the first study year are listed in Table 5. The flux rates listed for the LMR-Wimauma and the North Fork stations include all areas upstream of those gages. The total areas used for computation of flux rates from those subbasins are as follows from Table 1: North Fork = subbasins 3+4+8; LMR-Wimauma = subbasins 2+3+4+5+7+8. As such, the LMR-Wimauma gage integrates loadings from 67% of the watershed. Cypress Creek represents loading from another 3.6%, so loading from 30.4% of lower river basin was not measured by this study.

Similar to the results for instream concentrations, flux rates for all constituents except dissolved organic carbon and ortho-phosphorus were lowest from the Ft. Lonesome subbasin. The ratio of yearly fluxes of dissolved inorganic nitrogen (ammonia plus nitrate-nitrite) to ortho-phosphorus from the Ft. Lonesome subbasin was 0.34, which is unusually low. This was due to the high ortho-phosphorus concentrations in the stream and the opposite correlative relationship of nitrate-nitrite (negative) and phosphorus concentrations (positive) to flow. Ortho-phosphorus flux rates were similar (2.36 to 2.63 kg/ha/yr) to Ft. Lonesome at three other stations (LMR-Wimauma, North Fork, Carlton Branch), but markedly lower at Cypress and Dug Creeks (0.31 and 0.82 kg/ha/yr).

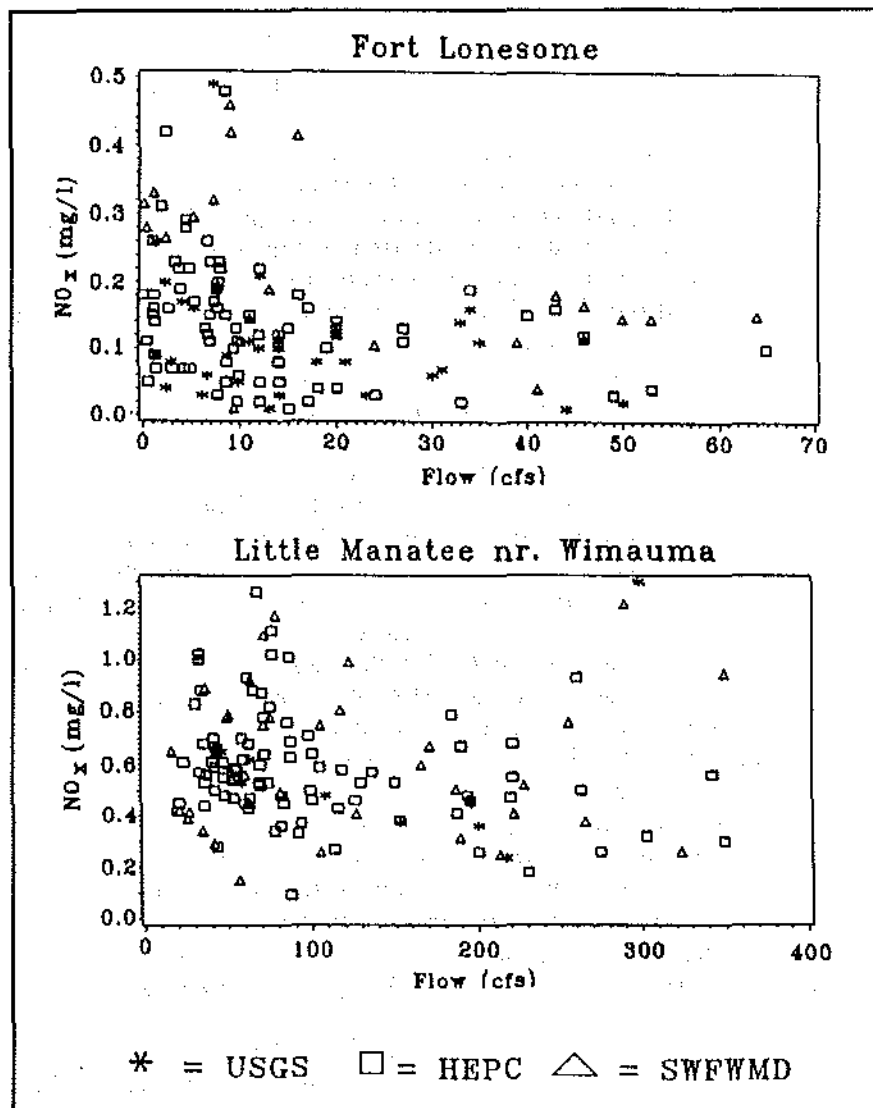


Figure 10. Concentrations of nitrate-nitrite versus streamflow for the Ft. Lonesome and Little Manatee River near Wimauma monitoring stations for 1982 to 1990. Maximum flows shown correspond to the 10% exceedance flow at each station for that period. One outlier for Ft. Lonesome not shown (flow=5.7 cfs, $\text{NO}_x=0.78$ mg/l).

Dissolved inorganic nitrogen (DIN) fluxes were more than twice as high for Carlton Branch than for all other subbasins, and an order of magnitude higher than at Ft. Lonesome. The Dug Creek subbasin, which like Carlton Branch has a high

percentage of agricultural land use, had the second highest flux rate for DIN (3.51 kg/ha/yr). The DIN flux for the downstream LMR-Wimauma site was 2.56 kg/ha/yr, and the ratio of DIN and ortho-phosphorus fluxes at this station was approximately one. Readers are reminded these N/P flux ratios do not include particulate nutrients or dissolved organic nitrogen. Dissolved organic nitrogen is less available for plant growth and was not measured in our study. Inclusion of this constituent would increase reported N/P concentration and flux ratios.

Table 5. Yearly material fluxes (kilograms per hectare per year) for the seven monitored subbasins shown in Figure 2. Values expressed for the LMR-Wimauma and North Fork were calculated using the entire drainage areas upstream of those gages.

| | LMR NEAR WIMAUMA | LMR NORTH FORK | LMR FT. LONESOME | SOUTH FORK | CYPRESS CREEK | DUG CREEK | CARLTON BRANCH |
|-----------------------------------------------------------------|------------------------|----------------------|------------------------|---------------|------------------|--------------|-------------------|
| Dissolved inorganic nitrogen ($\text{NH}_4 + \text{NO}_x$) | 2.56 | 2.47 | 0.81 | 1.78 | 1.72 | 3.51 | 8.96 |
| Particulate nitrogen | 0.76 | 0.53 | 0.11 | 0.46 | 1.10 | 1.12 | 0.58 |
| Ortho-phosphorus | 2.43 | 2.63 | 2.38 | 2.23 | 0.31 | 0.82 | 2.36 |
| Particulate phosphorus | 0.17 | 0.18 | 0.08 | 0.18 | 0.33 | 0.39 | 0.43 |
| Total suspended solids | 60.91 | 62.55 | 12.82 | 40.78 | 79.80 | 67.40 | 55.66 |
| Dissolved organic carbon | 114.1 | 118.3 | 128.9 | 106.4 | 124.3 | 77.6 | 66.6 |
| Particulate carbon | 10.48 | 8.54 | 2.95 | 7.22 | 10.79 | 12.63 | 9.16 |

The flux rates for particulate materials were highest at the Cypress and Dug Creek stations. In general, differences in particulate flux rates for the seven subbasins were generally less than the range of fluxes observed for dissolved constituents. With the exception of Ft. Lonesome, the highest and lowest flux rates for total suspended solids and particulate nitrogen differed by factors of 1.9 and 2.4, respectively, while the high and low fluxes for DIN and ortho-phosphorus differed by factors of 5.0 and 8.5. Again, the Ft. Lonesome subbasin had flux rates for particulate materials that were markedly lower than the other stations. This was particularly true for total suspended solids and particulate nitrogen, for which fluxes at Ft. Lonesome were about three to four times less than the next lowest subbasin (South Fork), and about five to seven times lower than the net basin flux expressed at the LMR-Wimauma site.

In addition to yearly nutrient flux rates, a few points regarding seasonal nutrient loadings are noteworthy. First, the supplementation of flows by irrigation runoff resulted in very large differences in nutrient loadings between subbasins in the dry season. For example, the computed DIN flux from the Carlton Branch during May 1988 was 35 times higher than the same monthly flux from the Ft. Lonesome subbasin. Second, loading to the estuary is very seasonal, and can be strongly influenced by large storms. In Figure 11, the monthly loadings of DIN and ortho-phosphorus during 1988 are plotted for the sum of the Cypress Creek and the LMR-Wimauma subbasins, or about 70% of the entire watershed. The vertical bar representing the loadings in September has a broken scale to show the effect of a flood event which occurred that month. That flood, which was caused by an average of 9.6" of rain in the basin over four days, raised the peak-day flow to 9,720 cfs at the LMR-Wimauma site, corresponding to between a one-in-10 and one-in-25 year event. Due in large part

to this flood, September loadings represented 39% and 58% of the yearly loads of DIN and ortho-phosphorus, respectively.

To indicate seasonal nutrient loading in a more typical year, we adjusted the streamflow records by holding the maximum daily flows observed in September to the maximum daily levels observed in August. This involved changing flows for six days at the LMR-Wimauma and Cypress Creek stations, reducing the peak flow in September to a level that on the average is exceeded about three days in that month. The adjusted September load is indicated by the tops of the shaded bars in Figure 11. This adjustment probably better represents the typical seasonal pattern of loading for these constituents. Although the majority of nutrients continue to be delivered in the late summer, a secondary peak occurs in March, which might have an important role in stimulating primary productivity in the estuary during the spring.

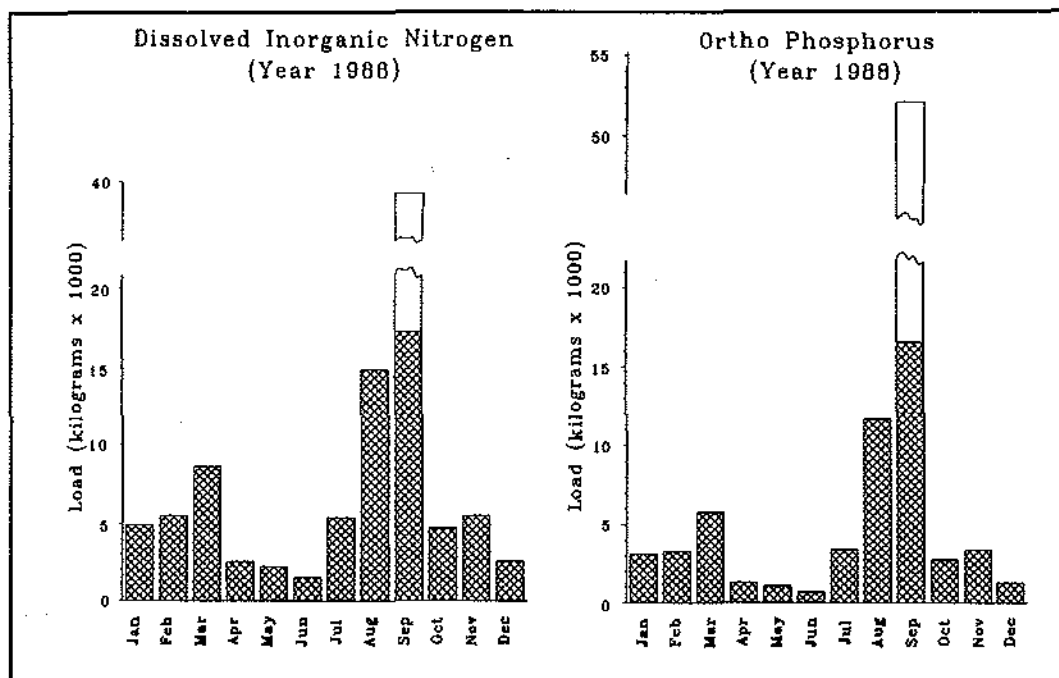


Figure 11. Monthly loadings of dissolved inorganic nitrogen and ortho-phosphorus for the sum of the Cypress Creek and LMR-Wimauma subbasins during 1988. Top of clear bar for September indicates actual load, whereas top of shaded bar indicates loading if combined peak September flows held to peak flows observed in August (1166 cfs).

Finally, it is apparent from Figure 11 that the occurrence of the September flood strongly affected the yearly nutrient fluxes expressed in Table 5. We recalculated total yearly loadings using the adjusted streamflow data and found that the four day flood event accounted for 39%, 22%, and 54% of the total yearly loadings for ortho-phosphorus, DIN, and dissolved organic carbon, respectively. The reason for the high percentage reduction of dissolved organic carbon was that concentrations were highly correlated with flow, so calculated loadings were especially high during the flood. Therefore, it is emphasized that the yearly flux rates listed in Table 5 be used primarily to compare stations within the watershed, and be used with caution if compared to values from other basins.

Long-Term Trends: Other Data Sources

Long-term water quality data from other sources were reviewed to see if temporal trends in water quality mimic the spatial variations we observed between subbasins during 1988. Water quality data for a few parameters are available back to

the 1950s from the USGS, and fairly extensive data sets are available back to the mid-1970s when the Hillsborough County Environmental Protection Commission began sampling programs in the region. Data were retrieved from these two sources and merged with the SWFWMD data to create a combined data set for the basin. For constituents that were measured by different labs and expressed in the same units, these values were combined as a single variable. We have not as yet closely checked the methods used by the different labs, but intend to do so to the degree possible. For some parameters, such as specific conductance, there is good confidence that the data are comparable. For some nutrient parameters, such as nitrate-nitrite, very old data may be of questionable resolution, but data for the last 10 to 15 years should be comparable. Kendall tau-b nonparametric correlation analysis was performed to test for significant relationships of constituent concentrations with time (date). Where trends are reported in the following discussion, at least 150 observations were analyzed over periods of ten years or greater. Since the simple Kendall tau-b test does not account for possible seasonality or serial correlation within the data, reported trends are presented as preliminary, and we are currently developing programs to perform the more rigorous seasonal Kendall test (Hirsh and Slack 1984).

The two stations with the most long-term water quality data are the LMR-Wimauma and Ft. Lonesome, which currently have very different water quality characteristics. At the Ft. Lonesome site, Kendall tau-b tests indicated there were significant ($\alpha=.05$) increasing trends for specific conductance, pH, turbidity and sulfate. For conductance and sulfate, plots of the data versus time showed a rise in the values around 1985 and a stable trend thereafter. Means calculated for the pre-1985 and post-1984 periods for specific conductance rose from 125 to 191 $\mu\text{mhos/cm}$, for sulfate from 18.3 to 44.0 mg/l, and for pH from 6.5 to 6.9 units. Based on a considerable number of observations, there were no significant trends for total suspended solids or nitrate-nitrite.

Much stronger trends were observed for the LMR near Wimauma station. Specific conductance showed an increasing trend over time with sharp increases in concentrations since the mid-1970s (Figure 12A). Because specific conductance is a very easy and reliable measurement to perform, there should be good confidence in these data. The degree of enrichment since the early 1970s is substantial; the average value for the last three years ($n=70$) is 320 $\mu\text{mhos/cm}$ compared to average value of 83 $\mu\text{mhos/cm}$ for the period 1955 to 1972 ($n=131$). Although not shown here, the plot for sulfate showed a similar trend with mean values of 7.8 and 124 mg/l for the pre-1973 and post-1987 periods, respectively. We expect the barium chloride turbidimetric technique was used for the early sulfate measurements and have little reason to doubt those data are reliable. The data indicate that the Little Manatee River has become much more mineralized in the last two decades. As previously discussed, we expect that increased groundwater pumping and irrigation runoff are the primary reasons for the increased mineralization of the river.

Significant trends for increasing concentrations were also observed for turbidity, pH, and nitrate-nitrite. The Kendall tau-b coefficients for turbidity and pH were relatively low (.25 and .22), but plots showed a rise in pH values in the mid-1970s, similar to the pattern observed for conductance and sulfate. The average pH value for dates between 1955 and 1972 was 6.5 ($n=104$), whereas the average for dates after 1972 was 7.1. A very strong trend was observed for nitrate-nitrite (Figure 12B). The plot of nitrate-nitrite concentrations versus time shows an increasing trend began in the middle to late 1960s and has continued upward in a steady manner. There was no significant trend for ortho-phosphorus concentrations dating back to the 1960s, indicating that the basin is naturally high in phosphorus compounds.

Overall, observations of the long-term data at the LMR-Wimauma station are very striking. Assuming the data from the 1950s and early 1960s are reliable, the Little Manatee was a slightly acid stream with low specific conductance and inorganic nitrogen concentrations. Average values for specific conductance, sulfate, and

nitrate-nitrite from the LMR-Wimauma station during early 1970s indicate that water quality there was similar to what is now observed at the Ft. Lonesome site. Independent measurements (pH, sulfate, nitrate-nitrite) show major changes in water quality began occurring in the basin in the 1970s. We have not examined old aerial photographs or other records to examine if dramatic changes in land or water use have occurred since that time. However, the temporal trends at the LMR-Wimauma station correspond to the spatial differences currently observed between highly developed and less impacted subbasins, indicating that intensifying land and water use have been the principal causative factors.

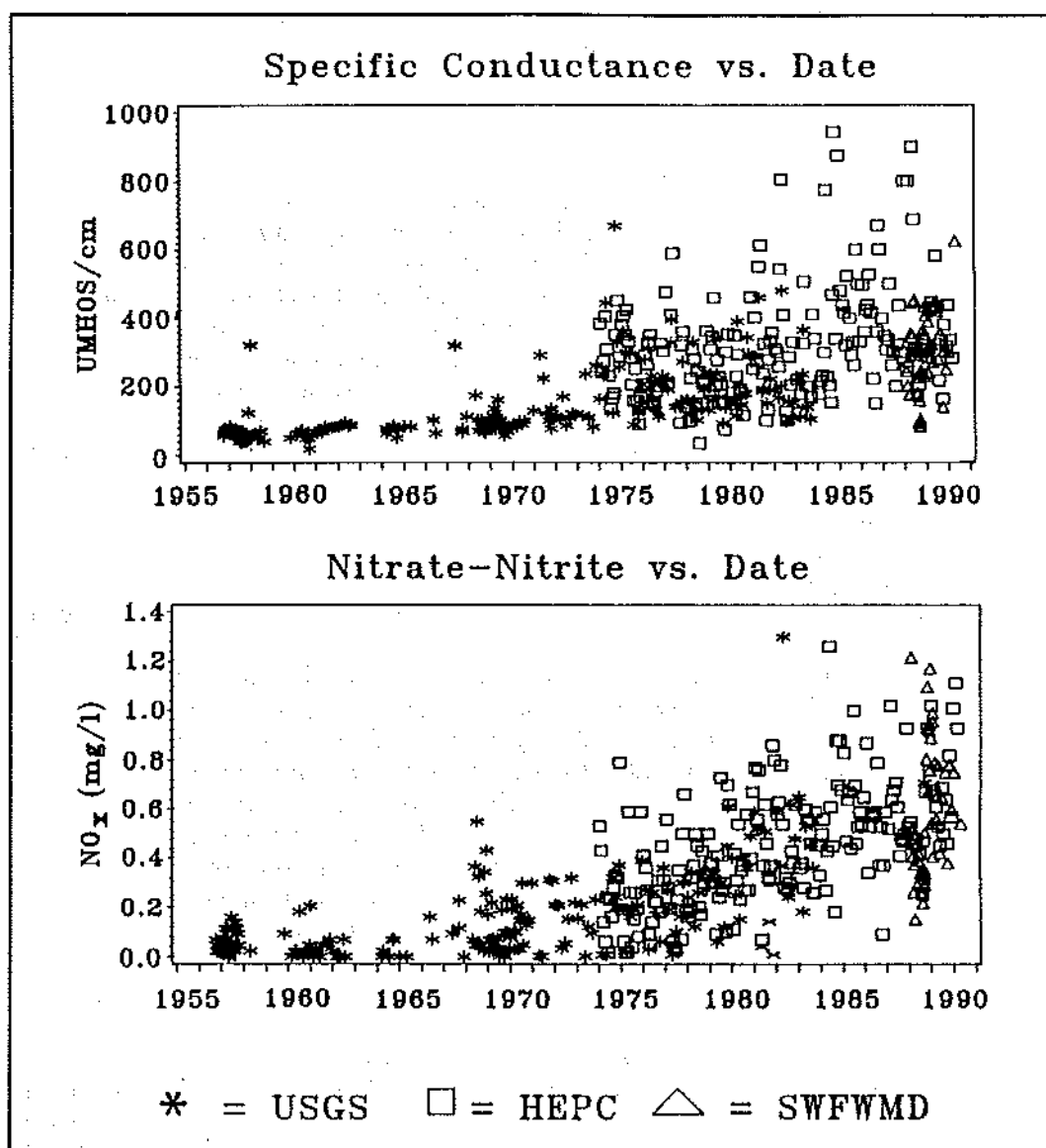


Figure 12. Specific conductance and nitrate-nitrite concentrations versus date for the Little Manatee River near Wimauma station. Symbol indicates source of the data.

Overview — Estuarine Considerations

The focus of this paper has been the freshwater reaches of the Little Manatee River, for much of our estuarine analyses are now in progress and will be published in early 1992 (SWFWMD and Dames & Moore, in prep.). At this time, however, some

considerations regarding potential impacts to the estuary are apparent and are discussed below.

The popular perception that the Little Manatee River represents the healthiest river flowing to Tampa Bay is probably correct, but our study indicates there have been significant changes in the streamflow and water quality characteristics of the river in the last 20 years. The nitrate enrichment of the river has particular relevance to Tampa Bay, because phytoplankton production in the bay is nitrogen limited (Fanning and Bell 1985, Palmer and McClelland 1988). The relationships of nitrate-nitrite concentrations to streamflow shown in Figure 10 and the plot of nitrate-nitrite vs. time in Figure 12 indicate that nitrate concentrations in storm runoff have significantly increased due to changes in land use. The Little Manatee River represents approximately 10% of the entire drainage basin for Tampa Bay and contributes approximately the same percentage of tributary flow (Hutchinson, 1983; Flannery, 1989). Obviously, the observed increases for nitrate-nitrite concentrations in the river have important implications for the overall nitrogen budget of Tampa Bay.

The second general conclusion of this report pertains not to the open waters of Tampa Bay, but to the tidal river habitats upstream of the river mouth. Data from companion biological studies of the Little Manatee River (Peebles et al., Vargo et al., this volume) indicate that various estuarine zones along the freshwater to bay gradient differ significantly in their response and sensitivity to eutrophication. One interesting finding was the relative stability of chlorophyll concentrations and phytoplankton numbers near the mouth of the river compared to higher and more variable levels in the upper estuary. The reasons for these spatial patterns are unclear, but may involve differences in biological factors (zooplankton grazing or benthic filter feeding) or physical factors (tidal exchange near the mouth of the river) affecting phytoplankton abundance in these two environments. Algal blooms in the upper estuary were common in the spring and fall during times of low streamflow. Like Tampa Bay, phosphorus is present in excess throughout the riverine estuary and nitrogen appears to be the macronutrient controlling phytoplankton growth (Vargo et al., this volume). Although the effects of nitrogen enrichment in the river during times of low streamflow might be of minor importance to the yearly loading of nutrients to Tampa Bay, increased dry season loading could have important implications for maintaining high algal biomass in the upper estuary.

Field observations and water quality data indicate the upper estuary is rich in organic material in both dissolved and particulate forms (Peebles et al., this volume). Estuaries, because of rapidly changing water chemistry and occurrence of estuarine circulation, are known to accumulate fine-grained and organic materials in upper estuarine mixing zones (Postma 1967, Pritchard and Schubel 1981). Although historical data are scarce, comparison of the recent data from the seven monitored subbasins indicates that land use changes have increased the loading of particulate carbon and nitrogen to the estuary. Particulate organic materials serve as food sources in detrital food webs (Knox 1986), but in excess can lead to low dissolved oxygen concentrations depending on the oxidizable nature of the materials and the potential for high microbial respiration (Aston 1980, Kennish 1986).

Dissolved oxygen concentrations were measured throughout the length of Little Manatee River estuary during the two year estuarine study. During the summer months of July through September, mean water column dissolved oxygen concentrations averaged about 5.2 mg/l for stations near the mouth of the river, with percent saturation values averaging about 77%. Dissolved oxygen concentrations at stations in the middle and upper reaches (above mile 4) were considerably lower, with average concentrations between 3.4 and 4.2 mg/l and percent saturation values in the range of 47% to 56%. These values were all midafternoon readings, and dissolved oxygen concentrations may have been lower during late night or early morning hours. In highly colored Florida waters, and estuaries in general, naturally occurring processes or hydrographic factors can contribute to low dissolved oxygen concentrations

(Belanger et al. 1985, Tyler 1986). It is difficult to discern to what degree the relatively low dissolved oxygen concentrations in the Little Manatee estuary are the result of natural processes versus anthropogenic effects. It can be concluded, however, that summertime dissolved oxygen conditions are marginal with regard to a healthy aquatic system (Friedemann and Hand 1989, F.A.C. 1990), and any perturbations which further lower these concentrations could result in diminished biological diversity and productivity of the system.

In summation, this study emphasizes that estuarine relationships to the quantity and quality of freshwater flows should be examined not only in the open waters of the bay but also in the gradient of ecological zones upstream of tidal creek and river mouths. Because of the important role these areas play with regard to fisheries production, their proper management is of obvious importance. Potentially, these tidal creek/river habitats can be impacted by either point or nonpoint sources. Seasonal nutrient loadings that seem small compared to the overall nutrient budget of the bay may exert important effects in low salinity areas. Fortunately, the total drainage area of Tampa Bay is relatively small, about 2,184 mi² (5,650 km²), and most of the tributary flow originates in one of three counties. Hopefully, the localized nature of tributary flows to Tampa Bay can allow for the development of effective nonpoint source control strategies through the cooperation of the public and private entities involved.

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LITERATURE CITED

- American Public Health Association. 1983. Standard Methods For the Examination of Water and Wastewater. 16th Ed.
- Aston, S.R. 1980. Nutrients, dissolved gases, and general biogeochemistry in estuaries. In: Olausson, E. and J. Cato (eds.), Chemistry and Biogeochemistry of Estuaries. Wiley and Sons.
- Belanger, T.V., F.E. Dierberg and J. Roberts. 1985. Dissolved oxygen concentrations in Florida's humic-colored waters and water quality standard implications. Florida Scientist 48(2):107-119.
- Dames & Moore. 1975. Hydrobiologic Assessment of the Alafia and Little Manatee Rivers. Report prepared for the Southwest Florida Water Management District. Brooksville.
- Florida Administrative Code. 1990. Surface Water Quality Classifications. Chapter 17-302.530.
- Fanning, K.A. and L.M. Bell. 1985. Nutrients in Tampa Bay. In: S.F. Treat et al., (Eds). Proceedings of the Tampa Bay Area Scientific Information Symposium.
- Flannery, M.S. 1989. Tampa and Sarasota Bays: Watersheds and Tributaries. In: Estevez, E.D. (ed.), Tampa and Sarasota Bays: Issues, Resources, Status, and Management. NOAA Estuary-of-the-Month seminar series No. 11. Washington, D.C.
- Friedemann, M., and J. Hand. 1989. Typical Water Quality Values for Florida's Lakes, Streams and Estuaries. Florida Department of Environmental Regulation Report. Tallahassee.
- Haddad, K.D., and G.A. McGarry. 1989. Basin-wide management: A remote sensing/GIS approach. Pp. 1822-1836 in O.T. Magoon, H. Converse, D. Miner, L.T. Tobin, and D. Clark, eds. Coastal Zone 89, Vol. 2, Proc. Sixth Symposium on Coastal and Ocean Management, ASCE, Vol. 2, Charleston, S.C. 1010 pp.
- Hirsch, R.M., and J.R. Slack, 1984. A Nonparametric Trend Test for Seasonal Data with Serial Dependence. Water Resources Research 20(6):727-732.

- Hutchinson, C.B. 1983. Assessment of the Interconnection between Tampa Bay and the Floridan Aquifer, Florida. U.S. Geological Survey Water Resources Investigation, 82-54. Tallahassee, Florida.
- Jeffrey, S.W. and G.F. Humphrey. 1975. New spectrophotometric equations for determining chlorophyll *a*, *b*, *c1*, *c2* in higher plants, algae and natural phytoplankton. *Biochem. Physiol. Pflanz.* 167:191-194.
- Kennish, M.J. 1986. *Ecology of Estuaries, Volume I, Physical and Chemical Aspects.* CRC Press, Boca Raton, Florida.
- Knox, G.A. 1986. *Estuarine Ecosystems: A Systems Approach.* CRC Press, Boca Raton, Florida.
- Palmer, S.L. and S.I. McClelland. 1988. Tampa Bay Water Quality Assessment-205(J) Water Quality Study. Florida Department Environmental Regulation Water Quality Technical Services Volume 3, No. 17, Tallahassee.
- Peebles, E.B., M.S. Flannery, R.E. Matheson, Jr. and J.P. Rast. This volume. Fish nursery utilization of the Little Manatee River Estuary: Relationships to physicochemical gradients and the distribution of food resources.
- Postma, H. 1967. Sediment Transport and Sedimentation in Estuaries. In: Lauff, G.H. (ed.), *Estuaries.* American Assoc. Advan. Sci. Publication No. 83. Washington, D.C.
- Pritchard, D.W. and J.R. Schubel. 1981. Physical and geologic processes controlling nutrient levels in estuaries. In: Neilson, B.J., and L.E. Cronin (eds.), *Estuaries and Nutrients.* Humana Press, Clifton, N.J.
- Statistical Analysis System. 1989. *SAS/STAT User's Guide, Release 6.03 Edition.* SAS Institute. Cary, N.C.
- Tyler, M.A. 1986. Flow-induced variation in transport and deposition pathways in the Chesapeake Bay: The effect on phytoplankton dominance and anoxia. In: Wolfe, D.A. (ed.), *Estuarine Variability.* Academic Press, New York.
- Southwest Florida Water Management District and Dames and Moore, Ltd. (in prep.) An investigation of the relationships of land and water use to the hydrology and water quality of the Little Manatee River and estuary. SWFWMD, Brooksville.
- U.S. Environmental Protection Agency. 1983. *Methods for the Chemical Analysis of Water and Wastes.* USEPA, Washington, D.C.
- U.S. Geological Survey. 1990. Water Data Report FL-90-3B, Southwest Florida Ground Water. U.S. Geological Survey, Tallahassee, Florida.
- Vargo, G.A., W.R. Richardson, D. Howard and J.H. Paul. This volume. Phytoplankton production in Tampa Bay and two tidal rivers: The Alafia and Little Manatee.
- White, William A. 1970. Geomorphology of the Florida Peninsula, Florida Bureau of Geology, Bull. 51, 164p.

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A Percent-of-flow Approach for Managing Reductions of Freshwater Inflows from Unimpounded Rivers to Southwest Florida Estuaries

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ABSTRACT: The Southwest Florida Water Management District has implemented a management approach for unimpounded rivers that limits withdrawals to a percentage of streamflow at the time of withdrawal. The natural flow regime of the contributing river is considered to be the baseline for assessing the effects of withdrawals. Development of the percent-of-flow approach has emphasized the interaction of freshwater inflow with the overlap of stationary and dynamic habitat components in tidal river zones of larger estuarine systems. Since the responses of key estuarine characteristics (e.g., isohaline locations, residence times) to freshwater inflow are frequently nonlinear, the approach is designed to prevent impacts to estuarine resources during sensitive low-inflow periods and to allow water supplies to become gradually more available as inflow increases. A high sensitivity to variation at low inflow extends to many invertebrates and fishes that move upstream and downstream in synchrony with inflow. Total numbers of estuarine-resident and estuarine-dependent organisms have been found to decrease during low-inflow periods, including mysids, grass shrimp, and juveniles of the bay anchovy and sand seatrout. The interaction of freshwater inflow with seasonal processes, such as phytoplankton production and the recruitment of fishes to the tidal-river nursery, indicates that withdrawal percentages during the springtime should be most restrictive. Ongoing efforts are oriented toward refining percentage withdrawal limits among seasons and flow ranges to account for shifts in the responsiveness of estuarine processes to reductions in freshwater inflow.

Introduction

Stream ecologists have emphasized the importance of natural flow regimes for maintaining the geomorphological and ecological characteristics of rivers (Hill et al. 1991; Poff et al. 1997; Richter et al. 1997). There is also evidence that naturally occurring patterns of freshwater inflow are important for maintaining the structure and productivity of estuarine ecosystems. Suspended sediments transported by periodic pulses of high river discharge are a major factor controlling the geomorphological structure of river deltas and bays (Kennish 1986; Jay and Simenstad 1996; Day et al. 1997). The productivity of coastal fisheries is positively related to freshwater inflow (Browder 1985; Drinkwater 1986; Day et al. 1989), and alterations to inflow regimes have caused dramatic declines and recoveries in fish stocks (Moyle and Leidy 1992; Mann and Lazier 1996; Sinha et al. 1996). Significant relationships have been found between fishery yields of estuarine-dependent species and pre-

ceding freshwater inflow terms calculated over 2-mo or 3-mo intervals, indicating that the seasonality of inflow can have a significant effect on fish abundance (Browder 1985; Longley 1994). Wilber and Bass (1998) also found that oyster harvests were negatively correlated with the number of low-flow days that occurred 2 yr prior, indicating that alteration of one component of a flow regime can have an effect on a specific stage of an organism's life history.

As groundwater sources reach their sustainable limits in southwest Florida, there is growing emphasis on using rivers for water supply. Many major rivers in Florida are not impounded and have not been used for water supplies in the past (Jue 1989; Fernald and Purdum 1998). Based on a series of studies of the freshwater inflow relationships of estuaries in the region, the Southwest Florida Water Management District (SWFWMD) has implemented a management approach for unimpounded rivers that limits withdrawals to a percentage of streamflow at the time of withdrawal. This approach considers the natural flow regime of a river to be the baseline for assessing the effects of withdrawals. Trends in various streamflow parameters

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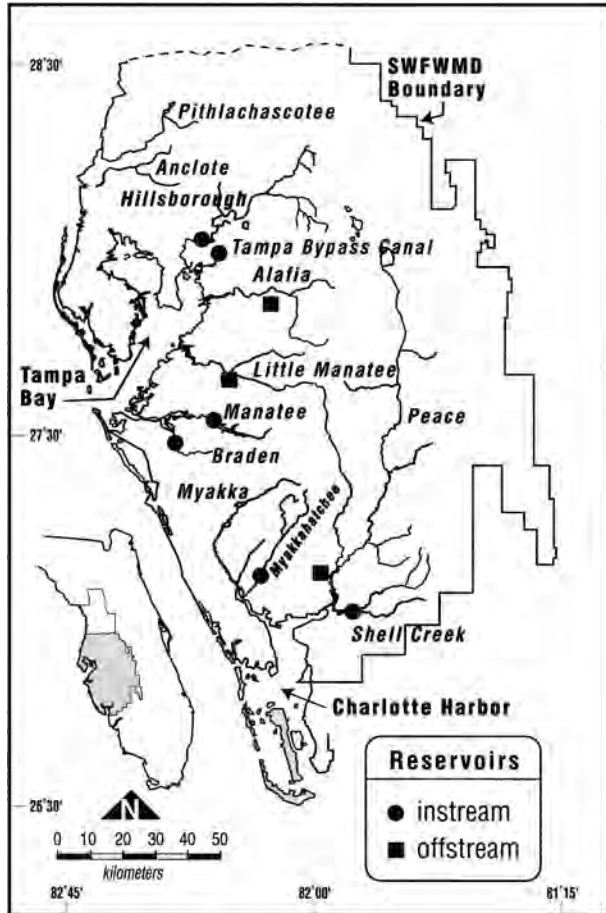


Fig. 1. Location of rivers in the Southwest Florida Water Management District extending from the Tampa Bay area to Charlotte Harbor, including the location of in-stream and off-stream reservoirs used for water supply.

are evaluated to determine if any components of a river's flow regime have changed. Estuarine relationships with freshwater inflow are then examined within seasons and flow ranges in order to determine percentage withdrawal limits that do not result in adverse environmental impacts. We review the theoretical and empirical framework on which the percent-of-flow approach is based and describe how it is applied in the water management setting. Analyses supporting this approach have emphasized hydrobiological relationships within tidal-river zones of larger estuarine systems in southwest Florida. Representative findings from these tidal rivers are reviewed to illustrate key ecological relationships and applications to the management of freshwater inflow.

Hydrologic Setting of the Region

West-central Florida contains 14 named rivers and numerous small streams that flow to the Gulf

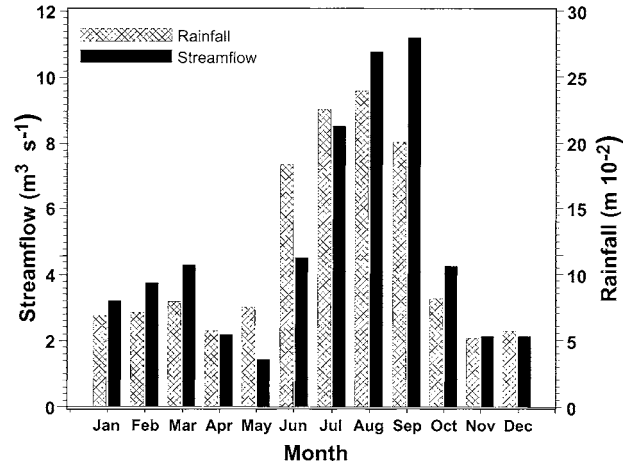


Fig. 2. Mean monthly rainfall at Bradenton, Florida and streamflow (U.S. Geological Survey gauge 02300500) for the Little Manatee River basin for the period 1940–2000.

of Mexico. The flow regimes of several rivers north of Tampa Bay are dominated by groundwater discharges from large artesian springs, whereas flows in rivers from just north of Tampa Bay southward (Fig. 1) are dominated by surface runoff (Estevez et al. 1991). The region receives an average rainfall of about 1.35 m yr^{-1} with about 60% occurring from June through September. The temporal variability of streamflow in spring-fed rivers is typically more subdued than seasonal variations in rainfall, while average monthly flows in rivers dominated by surface runoff exhibit greater seasonal variability than monthly rainfall (Fig. 2). In rivers dominated by surface runoff, low flows occur in April and May when rainfall is low and potential evapotranspiration rates are increasing (Bidlake and Boetcher 1997; Lee and Swancar 1997); peak flows typically occur in August or September when depressional storage is full and water tables are high. The interaction of this seasonal streamflow pattern with estuarine processes forms the hydrobiological setting for managing freshwater inflows in these systems.

Detecting Changes in Inflow from Unimpounded Rivers

The water supply planning and regulation programs administered by the SWFWMD are designed to maintain the physical structure and ecological characteristics of the region's unimpounded rivers. Municipal water supplies are obtained from five in-stream impoundments in southwest Florida (Fig. 1), including major reservoirs on the Hillsborough and Manatee Rivers and small, low-head structures that serve as salinity barriers on three smaller streams (Braden River and Shell and Myakkahatchee Creeks). Water supplies are also obtained from

the Tampa Bypass Canal, which is a regulated flood control waterway that was constructed in the channel of the Palm River. With the exception of the Tampa Bypass Canal, all of these impoundments were constructed before 1965. Since the mid-1970s, the SWFWMD (1992, 2001b) has emphasized the use of alternative water storage methods for the development of water supplies from unimpounded rivers in order to avoid impacts to riverine systems that can result from impoundment (Petts 1984; Ligon et al. 1995; Collier et al. 1996). Water supply storage from unimpounded rivers has been achieved using offstream reservoirs, which are diked or excavated areas located away from the river channel, and aquifer storage and recovery facilities, in which treated surface waters are pumped into underground aquifers for storage and subsequent retrieval.

The initial step for evaluating potential withdrawals (and resulting reductions in freshwater inflow) from an unimpounded river involves the assessment of historical changes in the river's flow regime. Many factors, such as changes in land use or surface water-groundwater relations in a river basin, can affect flow regimes in the absence of impoundment or direct withdrawals (Newson 1994; FISRWG 1998). Richter et al. (1996) developed a series of quantifiable indicators of hydrologic alteration that can be used to evaluate trends in different components of a flow regime over time. Another useful technique for evaluating changes in low or high flows is trend analysis of daily flow percentiles within each year (Lins and Slack 1999). Using one or more of these hydrologic indicators, historical streamflow records are evaluated to identify trends in different components of a flow regime or changes in seasonal flows. If changes have occurred, analytical effort is directed toward distinguishing the relative effects of climatic variability and anthropogenic influences, which can occur either as distinct events or as gradual changes through time. A series of hydrologic studies have been conducted on the three unimpounded rivers in southwest Florida that are currently allocated for water supply (Peace, Alafia, and Little Manatee; see Fig. 1) in order to assess trends in long-term flows (Hammett 1990; Flannery et al. 1991; Flannery and Barcelo 1998; SDI Environmental Services 1998), seasonal flows (Flannery et al. 1991; Coastal Environmental 1996a), low and high flows (Flannery et al. 1991; Stoker et al. 1996; Flannery and Barcelo 1998), and to compare the effects of anthropogenic influences and climatic variability on streamflow (Hammett 1990; Coastal Environmental 1996b; Flannery and Barcelo 1998; SDI Environmental Services 1998). The findings of these studies have been used to help define the

baseline flow regime against which projected withdrawals and potential ecological effects are evaluated.

Defining Interactions Between Stationary and Dynamic Features in Tidal Rivers

The SWFWMD's approach to evaluating estuarine responses to freshwater inflow has been based on a series of literature reviews, workshops, and field studies that have been conducted since the mid-1970s. Two years after being delegated the authority to manage consumptive water use, the SWFWMD sponsored a literature review of the role of freshwater inflow in estuarine systems (Snedaker et al. 1977) and a workshop on the relationships of freshwater inflow to the resources of the Florida coast (Seaman and McLean 1977). A few years later, the proceedings of a national symposium on freshwater inflow to estuaries (Cross and Williams 1981) produced many valuable papers, including one by Browder and Moore (1981), who suggested that fishery recruitment is maximized when there is optimal overlap between stationary and dynamic habitats (i.e., salinity). Stationary components of estuarine habitat include features associated with the geomorphological structure of an estuary plus biological features, such as oyster reefs and tidal wetlands, that change relatively slowly over periods of years. Dynamic components of estuarine habitat include characteristics that can change rapidly as a function of freshwater inflow, such as circulation patterns, turbidity maxima, salinity distributions, and dissolved oxygen concentrations. Biological processes that move within the estuary in response to freshwater inflow can also be considered part of the dynamic component of estuarine systems. The management strategies employed by the SWFWMD are oriented to the conceptual model of Browder and Moore (1981), as the withdrawal of freshwater can move dynamic components away from what are structurally the most productive regions of an estuary.

The stationary components of estuarine habitats have been characterized by mapping and quantifying the distribution of important physical features in tidal rivers such as estuarine volume, the area of deep and shallow habitats, shoreline length, and the area of contiguous wetlands. Salinity distributions are then superimposed over these features to derive the area or volume of habitats within various salinity zones (Peebles and Flannery 1992; Estevez and Marshall 1997; PBS&J 2001). The distribution and salinity relations of tidal wetlands have been emphasized due to the important functions these communities have with regard to habitat structure and the abundance of fish and wildlife associated with estuaries (Odum et al.

1984; Lewis et al. 1985; Coultas and Hsieh 1997). The Florida Marine Research Institute (1997, 1999) used aerial imagery to map the distribution of major wetland communities within tidal freshwater, brackish marsh, salt marsh, and mangrove zones in seven rivers for which salinity data were available. Clewell et al. (2002) investigated the relationships of salinity distributions to plant species composition at 462 shoreline sites in these tidal rivers.

Other investigations of relationships between largely stationary ecological features and freshwater inflow have involved the distribution of mollusk populations and macroinvertebrate communities associated with oyster reefs. Mote Marine Laboratory (2001a) compared the distribution of live and dead mollusk shells in the Peace River and found that as a severe drought progressed, living shells aligned with relict shell footprints, reflecting the effect of periodic droughts on mollusk distributions. Sprinkel (1986) sampled oyster reefs extending off the mouths of four spring-fed rivers and found that the largest oysters were at inshore reefs where mean salinity values were in the range of 11 to 16 psu. On these same rivers, Gorzelany (1986) found there was greater similarity (Morisita's index) among macroinvertebrate communities associated with inshore oyster reefs from different rivers than among communities from inshore, middle, and offshore reefs from the same river.

To address the dynamic component of estuarine systems, a series of studies of the salinity characteristics of tidal rivers in west-central Florida was initiated in the late 1970s, including several that developed regression models to predict the locations of various isohalines as a function of freshwater inflow. These studies indicated that isohalines respond to freshwater inflow in a largely linear manner in five spring-dominated rivers north of Tampa Bay (Yobbi and Knochemus 1989a,b), but respond in a curvilinear manner in seven rivers dominated by surface runoff located farther south (Giovannelli 1981; Stoker et al. 1989; Fernandez 1990; Hammett 1992; Peebles and Flannery 1992; Coastal Environmental 1996b; Estevez and Marshall 1997; Janicki Environmental 2001). The shape of the relationship between isohaline location and freshwater inflow for the Peace and Little Manatee Rivers is typical of this southern region, in that relatively small reductions in freshwater inflow during the dry season can result in dramatic upstream movement of isohalines (Fig. 3). This characteristic response is due to the funnel shape of these tidal rivers, in which the cross-sectional area and volume of the estuary increase rapidly with distance downstream.

The curvilinear response of isohaline locations

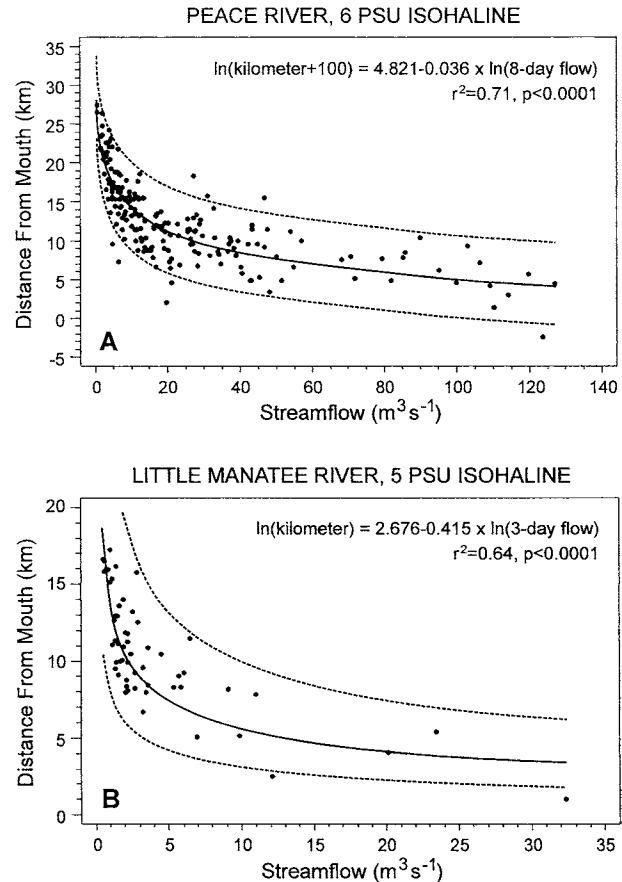


Fig. 3. Regressions of freshwater inflow with (A) the location of the 6 psu surface isohaline in the Peace River (adapted from Janicki Environmental 2001) and (B) the location of the 5 psu surface isohaline in the Little Manatee River (adapted from Peebles and Flannery 1992), with the 95% confidence limits for the predicted values. Regressions are plotted using non-transformed data.

to freshwater inflow was a principal finding used by SWFWMD to develop the percent-of-flow approach for managing withdrawals. Limiting withdrawals to a fixed percentage of streamflow results in relatively small isohaline movements (< 0.8 km) at low, medium, and high inflows (Table 1), preventing major changes to salinity distributions throughout the year. Although isohaline movements for a given percentage flow reduction may be slightly greater at low inflows, the reduction in water volume within a given salinity zone (e.g., < 5 psu) may be greater at higher inflows due to the isohalines being located in a broader region of the estuary. Since the percent-of-flow approach was first implemented, the SWFWMD has emphasized the development of hydrodynamic models to simulate salinity distributions in tidal river estuaries, including the Manatee (Camp, Dresser and McKee, Inc. 1995), Hillsborough (Chen et al. 2000),

TABLE 1. The locations and upstream movements of low-salinity surface isohalines in four rivers in response to 10% reductions of streamflow at flows equal to the 10th, 50th, and 90th percentile flows in the long-term streamflow records. Locations were predicted using regressions developed for the Peace (Janicki Environmental 2001), Myakka (Hammett 1992), Little Manatee (Peebles and Flannery 1992), and Anclote Rivers (Fernandez 1990).

| River | Isohaline (psu) | Location + Upstream Movement (km from River Mouth) | | |
|----------------|-----------------|----------------------------------------------------|-----------------|-----------------|
| | | 10th Percentile | 50th Percentile | 90th Percentile |
| Peace | 6 | 18.39 + 0.45 | 12.76 + 0.43 | 5.69 + 0.41 |
| Myakka | 0.5 | 33.95 + 0.55 | 21.64 + 0.35 | 16.18 + 0.26 |
| Little Manatee | 5 | 17.67 + 0.79 | 11.35 + 0.51 | 5.57 + 0.25 |
| Anclote | 5 | 14.37 + 0.18 | 12.47 + 0.18 | 7.54 + 0.18 |

Alafia (Chen 2001), and Palm (Myers et al. 2002) Rivers.

Primary Production as a Management Criterion

Phytoplankton populations are among a suite of parameters than can be considered to be dynamic habitat components, as their abundance and distribution can respond quickly to changes in freshwater inflow. To investigate the influence of freshwater inflow on abundance and distribution of phytoplankton, a suite of parameters including chlorophyll *a* (chl *a*) and phytoplankton species counts has been collected at four surface isohalines (0.2 or 0.5, 6, 12, and 18 or 20 psu) in the Peace, Little Manatee, and Alafia Rivers (Vargo et al. 1991; PBS&J 1999a; SWFWMD 2002b). With the exception of the Little Manatee, where chl *a* concentrations were highest near the boundary with tidal freshwater (0.5 psu), mean chlorophyll values were greatest and concentrations most variable at the 6 and 12 psu isohalines, whereas lower values typically occurred in higher salinity waters (Table 2).

The most extensive data for examining phytoplankton response to freshwater inflow are from the Peace River, where phytoplankton production (^{14}C uptake) and chl *a* have been monitored monthly since 1984, with taxonomic cell counts conducted since 1988 (PBS&J 1999a). McPherson et al. (1990) concluded that maximum phytoplankton production and biomass in the Peace River and Charlotte Harbor estuarine system occurs in mid-salinity zones, where freshwater inflow increases the availability of nutrients, but organic color of riverine origin is diluted, allowing for increased light penetration. There is also a positive response

to water temperature and presumably photoperiod, as the highest monthly mean values for chl *a* tend to occur in warm waters with moderate amounts of color (PBS&J 1999a). Monthly mean chl *a* concentrations generally increase with water temperature from February through April, but decline or are relatively stable during May and June (Fig. 4). Freshwater inflow typically declines from April through mid-June, reducing nutrient delivery from the watershed. As inflow and nutrient loads increase during the summer rainy season, chl *a* values increase at the 6, 12, and 20 psu isohalines.

These data indicate that reductions of inflow and nutrient loading during the spring dry season could act to limit phytoplankton biomass in the tidal river. Because isohaline locations are sensitive to movement during periods of low inflow, reductions in freshwater inflow during the springtime could move areas of maximum phytoplankton abundance farther upstream with implications for secondary production. Depending on dry-season nutrient loads, increased residence times resulting from reductions in freshwater inflow could act to increase phytoplankton biomass in zones of a tidal river (Ingram et al. 1985; Vallino and Hopkinson 1998). Current SWFWMD efforts are directed toward better defining the roles of light penetration, nutrient loading, and residence time in controlling phytoplankton abundance in tidal rivers in the region, including the highly eutrophic Alafia.

Fish Nursery Use as a Management Criterion

An important component of the SWFWMD's management approach to tidal rivers has involved the response of zooplankton, benthic macroinver-

TABLE 2. Mean (\pm standard deviation) and number of surveys (n) for chlorophyll *a* concentrations ($\mu\text{g L}^{-1}$) at four surface isohalines in the Peace, Alafia, and Little Manatee Rivers. Values for the 0.2 and 20 psu isohalines in the Peace River are listed with the 0.5 and 18 psu isohalines, respectively (data from Vargo et al. 1991; PBS&J 2001; SWFWMD 2002b).

| River | n | Isohaline (psu) | | | |
|----------------|-----|-----------------|--------------|---------------|-------------|
| | | 0.5 | 6 | 12 | 18 |
| Peace | 208 | 9.6 (11.2) | 23.7 (27.4) | 23.3 (32.5) | 12.7 (18.8) |
| Alafia | 24 | 13.1 (15.7) | 78.7 (135.2) | 106.0 (163.6) | 47.2 (41.1) |
| Little Manatee | 28 | 22.1 (14.9) | 15.9 (8.6) | 10.7 (8.4) | 5.6 (2.0) |

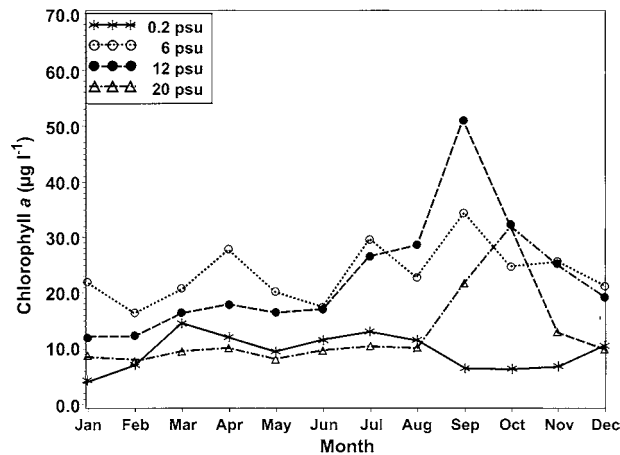


Fig. 4. Monthly mean concentrations of chlorophyll *a* at four surface isohalines in the lower Peace River for the period 1984–2000 (data from PBS&J 2001).

tebrates, and fishes to freshwater inflow. These studies have been primarily directed toward young or short-lived organisms, particularly the estuarine-dependent fishes that use tidal rivers as juvenile nursery habitat and the prey organisms that these fishes depend on while occupying such habitats. Because tidal-river habitats are small and are directly affected by watershed runoff, the potential for an inflow-related influence on fish recruitment success would appear to be strong. Juvenile estuarine-dependent fishes are generally described as being seasonal migrants (Merriner et al. 1976; Peters and McMichael 1987; McMichael et al. 1989; Barry et al. 1996; Livingston 1997), which is a status that subjects them to inflow variations at sub-annual time scales.

Rast et al. (1991) found that most zooplankters have peak densities in the downstream, higher-salinity reaches of the Little Manatee River, making them abundantly available as prey for the early life stages of fishes that are spawned near the mouth of the river or migrate there from more seaward locations. Within the tidal river, larval fishes tend to be most abundant near this downstream zooplankton maximum (Peebles and Flannery 1992). As the larvae develop into juveniles, a number of species move into areas of reduced salinity in the interiors of the tidal rivers (Fig. 5). This estuarine-dependent life history pattern is associated with growth-related diet shifts, such as the shift from copepods and other zooplankton to bottom-dwelling organisms, notably mysids, amphipods, and deposit-feeding invertebrates in general (Peters and McMichael 1987; McMichael and Peters 1989; McMichael et al. 1989; Barry et al. 1996; Peebles 1996). Deposit-feeding invertebrates have been observed to be abundant within organically enriched

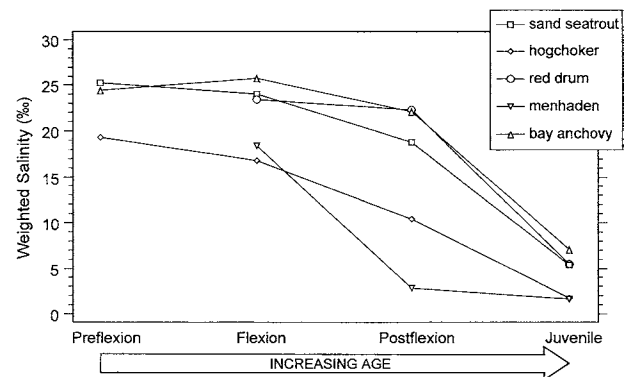


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

regions of the upper estuary, both locally (Mote Marine Laboratory 2001a,b; Grabe et al. 2002) and elsewhere (McBee and Brehm 1982; Holland et al. 1987; Gaston and Nasci 1988).

Phytoplankton biomass is often maximal either within or immediately upstream of the organically enriched oligohaline and mesohaline areas that are used as juvenile fish nursery habitat (Table 2; Fig. 4). Some species, such as menhaden, appear to associate directly with the chlorophyll maximum in other estuaries (Hughes and Sherr 1983; Friedland et al. 1996). Although the estuarine-dependent pattern of habitat use would appear to increase food availability in many cases (Barry et al. 1996; Peebles 1996; Livingston 1997), various alternative explanations have also been proposed to explain this phenomenon, including benefits associated with reduced predator diversity, reduced predator access to shallow water, and increased structural complexity (Reis and Dean 1981; Weinstein and Brooks 1983; Miller et al. 1985; Day et al. 1989; Hoss and Thayer 1993). Regardless of the cause, the estuarine-dependent life history places the juvenile fishes and their prey within relatively small, semi-confined areas of tidal rivers that constitute focal points for watershed runoff.

The locations occupied by both the fishes and their prey shift upstream and downstream in apparent response to changes in freshwater inflow (Table 3; Fig. 6). This response has been observed in both planktonic forms and active swimmers. For estuarine-resident and estuarine-dependent organisms, movement upstream during low-inflow periods usually involves movement into river reaches that have reduced volumes (Peebles and Flannery 1992; Peebles 2002a,b), which raises the possibility that carrying capacities could also be reduced by low inflow.

The abundances of many estuarine-resident and

TABLE 3. Organism distribution (mean km weighted by CPUE) responses to same-day freshwater inflow ($\ln \text{ m}^3 \text{ s}^{-1}$) into the tidal Alafia River, ranked by linear regression slope (b). Other regression statistics are the number of monthly transects in which each taxon was encountered (n), intercept (a), slope probability (p), and fit (r^2 , as %). DW identifies possible serial correlation (x indicates $p < 0.05$ for Durbin-Watson statistic). Gear codes: P = 500- μm mesh, 0.5-m mouth plankton net deployed surface to bottom over about 400 m of channel length during nighttime flood tide, S = 21.3-m center-bag seine with 3.2-mm mesh deployed at shoreline during day under variable tide stage, T = 6.1-m otter trawl, 38-mm stretched mesh and 3.2-mm liner, deployed over about 180 m of channel bottom during day under variable tide stage (adapted from Peebles 2002a).

| Gear | Taxon | Common Name | n | a | b | p | r^2 | DW |
|------|--------------------------------------------|-----------------------|----|-------|-------|--------|-------|----|
| S | <i>Gobiosoma bosc</i> | naked goby | 18 | 5.22 | 1.57 | 0.0275 | 27 | |
| P | calanoids | copepods | 21 | -0.05 | -0.31 | 0.0224 | 25 | x |
| P | all dipteran larvae | flies, mosquitoes | 26 | 11.33 | -0.45 | 0.0384 | 17 | |
| P | <i>Anchoa</i> spp. flexion larvae | anchovies | 20 | 1.36 | -0.62 | 0.0333 | 23 | |
| P | dipterans, chironomid larvae | midges | 26 | 11.56 | -0.64 | 0.0060 | 27 | |
| P | odonates, zygopteran larvae | damsel flies | 12 | 13.11 | -0.64 | 0.0438 | 35 | |
| P | <i>Anchoa</i> spp. preflexion larvae | anchovies | 19 | 1.42 | -0.65 | 0.0440 | 22 | |
| S | <i>Achirus lineatus</i> | lined sole | 20 | 2.95 | -0.67 | 0.0333 | 23 | |
| S | <i>Fundulus seminolis</i> | Seminole killifish | 21 | 12.58 | -0.68 | 0.0020 | 40 | |
| P | trichopteran larvae | caddisflies | 17 | 13.71 | -0.69 | 0.0389 | 25 | |
| T | <i>Farfantepenaeus duorarum</i> | pink shrimp | 21 | 3.97 | -0.76 | 0.0245 | 24 | |
| P | <i>Lucifer faxoni</i> | shrimp | 25 | 1.81 | -0.80 | 0.0121 | 24 | x |
| T | <i>Callinectes sapidus</i> | blue crab | 23 | 4.70 | -0.84 | 0.0146 | 25 | x |
| S | <i>Oligoplites saurus</i> | leather jack | 15 | 4.78 | -0.89 | 0.0501 | 26 | |
| S | <i>Eucinostomus gula</i> | silver jenny | 20 | 2.57 | -0.92 | 0.0104 | 31 | |
| S | <i>Cynoscion nebulosus</i> | spotted seatrout | 16 | 3.34 | -0.93 | 0.0189 | 33 | x |
| T | <i>Menticirrhus americanus</i> | southern kingfish | 19 | 3.64 | -0.96 | 0.0028 | 42 | |
| P | <i>Erichsonella attenuata</i> | isopod | 12 | 2.91 | -1.01 | 0.0092 | 51 | |
| P | copepods, freshwater cyclopoids | copepods | 14 | 13.65 | -1.02 | 0.0122 | 42 | |
| P | cumaceans | cumaceans | 26 | 2.94 | -1.05 | 0.0002 | 44 | x |
| P | <i>Anchoa mitchilli</i> adults | bay anchovy | 26 | 5.36 | -1.07 | 0.0050 | 28 | x |
| P | cladocerans, daphniid | water fleas | 11 | 14.14 | -1.09 | 0.0071 | 57 | |
| T | <i>Cynoscion arenarius</i> | sand seatrout | 20 | 6.07 | -1.10 | 0.0190 | 27 | |
| P | <i>Anchoa mitchilli</i> juveniles | bay anchovy | 26 | 8.00 | -1.13 | 0.0005 | 40 | |
| S | <i>Farfantepenaeus duorarum</i> | pink shrimp | 23 | 4.38 | -1.14 | 0.0091 | 28 | x |
| P | coleopterans, elmid adults | riffle beetles | 18 | 13.47 | -1.18 | 0.0469 | 22 | x |
| P | gobiid preflexion larvae | gobies | 16 | 5.44 | -1.21 | 0.0243 | 31 | |
| P | <i>Anchoa mitchilli</i> postflexion larvae | bay anchovy | 18 | 3.78 | -1.21 | 0.0103 | 35 | |
| P | decapod zoeae | crab larvae | 26 | 3.91 | -1.23 | 0.0261 | 19 | x |
| P | mysids | opossum shrimp | 26 | 5.85 | -1.23 | 0.0120 | 24 | |
| P | polychaetes | worms | 26 | 7.93 | -1.25 | 0.0006 | 39 | |
| P | hydracarina | water mites | 20 | 13.98 | -1.26 | 0.0002 | 54 | |
| S | <i>Cynoscion arenarius</i> | sand seatrout | 14 | 5.45 | -1.33 | 0.0082 | 45 | x |
| S | <i>Symphurus plagiosa</i> | blackcheek tonguefish | 14 | 4.42 | -1.34 | 0.0408 | 30 | |
| S | <i>Callinectes sapidus</i> | blue crab | 20 | 5.29 | -1.36 | 0.0012 | 45 | |
| P | branchiurans, <i>Argulus</i> spp. | fish lice | 18 | 10.55 | -1.41 | 0.0065 | 38 | |
| S | <i>Synodus foetens</i> | inshore lizardfish | 12 | 3.36 | -1.52 | 0.0036 | 59 | |
| P | <i>Limulus polyphemus</i> larvae | horseshoe crab | 13 | 3.93 | -1.52 | 0.0260 | 38 | |
| P | <i>Cynoscion arenarius</i> juveniles | sand seatrout | 14 | 7.04 | -1.56 | 0.0036 | 52 | |
| S | <i>Membras martinica</i> | rough silverside | 12 | 4.75 | -1.57 | 0.0040 | 58 | |
| P | <i>Microgobius</i> spp. postflexion larvae | gobies | 18 | 4.70 | -1.60 | 0.0098 | 35 | |
| S | <i>Menidia</i> spp. | silversides | 23 | 9.36 | -1.65 | 0.0031 | 35 | |
| S | <i>Menticirrhus americanus</i> | southern kingfish | 17 | 5.01 | -1.70 | 0.0025 | 47 | |
| P | <i>Edotea triloba</i> | isopod | 25 | 8.08 | -1.75 | 0.0000 | 59 | |
| P | isopods (grouped) | isopods | 26 | 7.92 | -1.76 | 0.0000 | 57 | |
| P | cymothoid sp. a (<i>Lironeca</i>) | isopod | 26 | 7.79 | -1.80 | 0.0000 | 53 | |
| P | <i>Gobiosoma</i> spp. postflexion larvae | gobies | 20 | 6.72 | -1.87 | 0.0234 | 25 | |
| S | <i>Cyprinodon variegatus</i> | sheepshead minnow | 14 | 7.26 | -1.94 | 0.0129 | 41 | x |
| P | <i>Trinectes maculatus</i> juveniles | hogchoker | 19 | 9.89 | -2.04 | 0.0024 | 43 | |
| P | <i>Trinectes maculatus</i> postflexion | hogchoker | 18 | 8.66 | -2.11 | 0.0002 | 60 | |
| P | <i>Syngnathus louisianae</i> juveniles | chain pipefish | 10 | 5.76 | -2.16 | 0.0235 | 49 | x |
| P | <i>Trinectes maculatus</i> flexion larvae | hogchoker | 12 | 6.85 | -2.36 | 0.0141 | 47 | |
| S | <i>Brevoortia</i> spp. | menhaden | 10 | 10.42 | -3.49 | 0.0034 | 68 | |

young estuarine-dependent species appear to decline during low-inflow periods (Figs. 7 and 8; Table 4). This trend could raise concern over calculation artifacts because river-segment volume is

strongly influential in the calculation of total number and organisms typically move downstream into regions with larger volume-weighting factors during high inflow periods. For many taxa in Table 4,

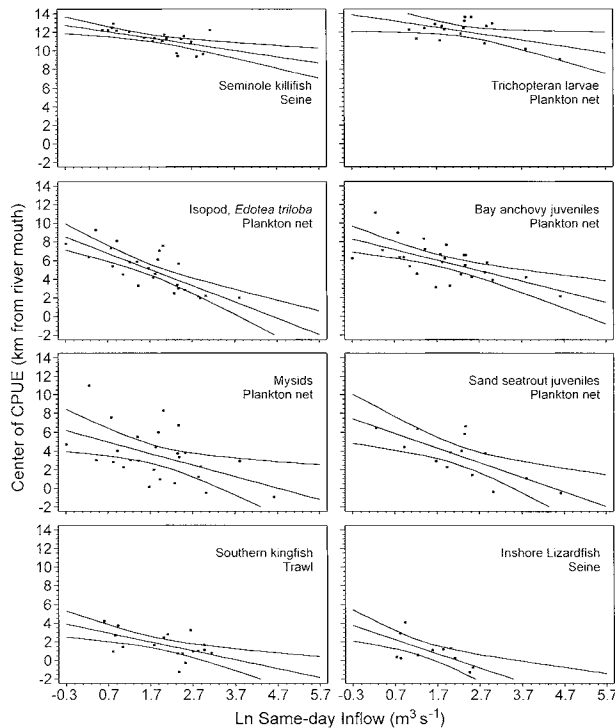


Fig. 6. Regressions of organism distribution against freshwater inflow into the tidal Alafia River, with 95% confidence limits for predicted means. Center of catch per unit effort (CPUE) is the mean location of capture during monthly transects, with the mean being weighted by CPUE. During each transect, the seine and plankton net were deployed at 12 stations and trawls were deployed at four stations. CPUE is either the number per deployment for seines and trawls or the number per volume filtered by the plankton net. Regression statistics are presented in Table 3 (adapted from Peebles 2002a).

the positive inflow relationship also exists when total catch is used (no volume-weighting factor), suggesting that the response is not merely a calculation artifact. For other taxa, the relationship is also likely to be real, as the approach for estimating total number is conceptually robust. It should be kept in mind that the number estimated is actually the number of individuals that are vulnerable to the collection gear within the channel's water column, and this number may be affected by influx from the shoreline, bottom, or downstream directions. The relationships in Fig. 7 represent the ascending limb of a broader response curve; very high flows could decrease abundance in the tidal river.

Other studies (e.g., Jassby et al. 1995; Kimmerer et al. 2001) have documented abundance responses to inflow-related variables by comparing annual averages, which would tend to eliminate the influence of recruitment seasonality and would strongly reduce the effects of short-term time lags in the response. Figures 7 and 8 indicate that abundance

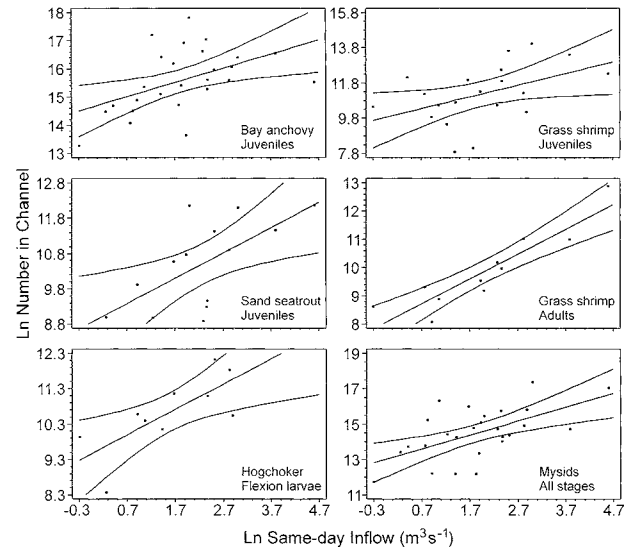


Fig. 7. Regressions of organism number against freshwater inflow into the tidal Alafia River, with 95% confidence limits for predicted means. Number was calculated for each monthly transect by summing the products of mean organism density (ind m^{-3}) and a volume weighting factor (m^3) for six contiguous river segments. All data are from plankton net deployments, which were made at 12 stations per transect. Regression statistics are presented in Table 4 (adapted from Peebles 2002a).

responses can also be identified within sub-annual time intervals for a variety of organisms, and often without any indication of serial correlation (Table 4). Several factors encourage synchrony between the inflow and abundance observations. Because the regressions are based on plankton-net data, most of the animals in the analysis are short-lived species. Longer-lived fish and crustacean species

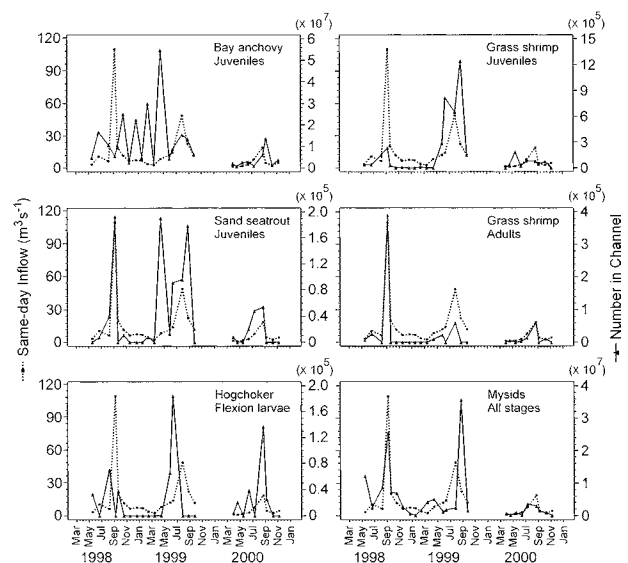


Fig. 8. Time series of the data in Fig. 7.

TABLE 4. Response of total estimated number (ln number of individuals) to same-day freshwater inflow (ln m³ s⁻¹) into the tidal Alafia River, ranked by linear regression slope (b). Other regression statistics are the number of monthly transects in which each taxon was encountered (n), intercept (a), slope probability (p), and fit (r², as %). DW identifies possible serial correlation (x indicates p < 0.05 for Durbin-Watson statistic). Total number was estimated by summing the products of mean plankton-net density (individuals m⁻³) and water-level-corrected volume across 6 contiguous river segments (adapted from Peebles 2002a).

| Taxon | Common Name | n | a | b | p | r ² | DW |
|-----------------------------------------|---------------------------|----|-------|-------|--------|----------------|----|
| dipteran, <i>Chaoborus punctipennis</i> | phantom midge | 16 | 7.47 | 1.43 | 0.0058 | 43 | |
| pinnotherid juveniles | pea crabs | 18 | 11.50 | 1.40 | 0.0035 | 42 | |
| crabs (grouped) | crabs | 24 | 10.90 | 1.32 | 0.0049 | 31 | |
| freshwater cyclopoids | copepods | 14 | 7.50 | 1.31 | 0.0000 | 78 | |
| ephemeropterans | mayflies | 22 | 7.94 | 1.10 | 0.0001 | 56 | |
| <i>Palaemonetes pugio</i> adults | daggerblade grass shrimp | 11 | 8.06 | 0.88 | 0.0001 | 83 | |
| coleopterans, dytiscid adults | predaceous diving beetles | 13 | 7.30 | 0.88 | 0.0064 | 51 | |
| mysids | opossum shrimps | 26 | 13.01 | 0.79 | 0.0016 | 35 | |
| <i>Cynoscion arenarius</i> juveniles | sand seatrout | 14 | 8.85 | 0.72 | 0.0131 | 41 | |
| <i>Trinectes maculatus</i> flexion | hogchoker | 10 | 9.46 | 0.72 | 0.0139 | 55 | |
| <i>Palaemonetes pugio</i> juveniles | daggerblade grass shrimp | 20 | 9.84 | 0.66 | 0.0375 | 22 | x |
| dipterans, pupae | flies, mosquitoes | 25 | 10.07 | 0.63 | 0.0092 | 26 | x |
| coleopterans (grouped) | beetles | 21 | 8.72 | 0.57 | 0.0053 | 34 | |
| <i>Anchoa mitchilli</i> juveniles | bay anchovy | 26 | 14.63 | 0.51 | 0.0114 | 24 | |
| dipterans (grouped) | flies, mosquitoes | 26 | 10.98 | 0.42 | 0.0064 | 27 | x |
| alphaeid postlarvae | snapping shrimps | 14 | 13.35 | -0.41 | 0.0386 | 31 | x |
| <i>Lolliguncula brevis</i> juveniles | bay squid | 13 | 11.49 | -0.49 | 0.0458 | 32 | |
| cymothoid sp. a (<i>Lironeca</i>) | isopods | 26 | 16.03 | -0.53 | 0.0079 | 26 | x |
| isopods (grouped) | isopods | 26 | 15.73 | -0.58 | 0.0069 | 27 | x |
| gobiid preflexion larvae | gobies | 15 | 13.00 | -0.66 | 0.0051 | 46 | |
| gobiid flexion larvae | gobies | 17 | 11.90 | -0.91 | 0.0129 | 35 | |
| calanoids | copepods | 21 | 19.47 | -1.15 | 0.0219 | 25 | |

were partitioned into shorter developmental stages before analysis and abundance was assessed independently for each stage. For such species, the rate of passage through various larval stages is fast relative to the monthly sampling frequency. Even for the potentially long-lived juvenile stages of larger species (e.g., *Cynoscion arenarius*), a combination of gear avoidance and natural mortality (larger individuals becoming rare) dramatically abbreviated the age range observed in the plankton-net data.

Most of the abundance regressions remained significant when inflows from the previous month's collection dates were used, indicating that the response is not as spontaneous as Figs. 7 and 8 might imply. In the relationships illustrated by these figures, significance was generally lost when a 2-mo lag was used, which suggests that the relationships with inflow had durations of less than 2 mo. Explanations for the decreased abundance include reductions in reproductive effort (Peebles 2002c) and survival rates during low-inflow periods.

From a management perspective, the shape of the abundance response curves can be used to identify inflow ranges that have proportionately large influences on abundance. The non-transformed data represented by the regression statistics in Table 4 are described by the power function $y = ax^b$, which is differentiated as $dy/dx = abx^{(b-1)}$. The value of the slope determines the shape of the non-transformed abundance response to variations in inflow. Organisms with slopes < 0 undergo pro-

portionately large decreases in number as low-end inflows increase. This is characteristic of animals that often occupy the higher salinities near the river mouth. Members of the second group, which includes freshwater, estuarine-resident, and estuarine-dependent taxa, have slopes between 0 and 1 and undergo proportionately large increases in number as low-end inflows increase, although the abundance increase becomes more constant for organisms with slopes near 1. Members of the third group, which is primarily composed of freshwater organisms, are characterized by slopes > 1. Freshwater taxa may either wash into the tidal river at a fairly constant rate (e.g., ephemeropteran larvae in Table 4) or, at even larger slopes, increase dramatically in number during floods (freshwater cyclopoids and *Chaoborus punctipennis*). Floods may also cause burrowing marine-derived animals (e.g., the pinnotherid crab *Pinnixa sayana*) to emerge from their burrows in large numbers, producing a very similar pattern.

Because most estuarine-resident and estuarine-dependent taxa tend to have a group-2 response (proportionately large increases in number at the low end of the inflow range), protection of low inflows becomes important. By scaling withdrawals to the concurrent rate of streamflow, the percent-of-flow approach provides a general safeguard against dramatic changes in organism abundance that could result from large withdrawals during periods of low freshwater inflow.

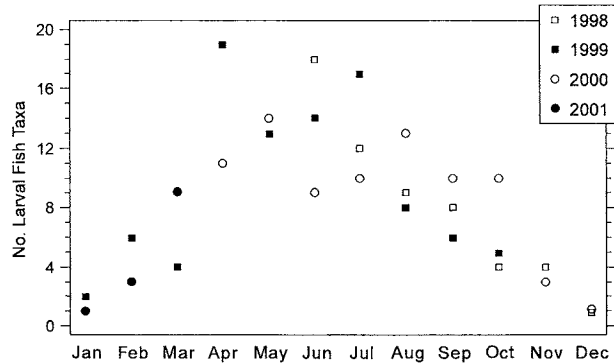


Fig. 9. The seasonal distribution of approximate larval richness in the tidal Alafia River (data from Peebles 2002a).

Most estuarine-dependent fishes have been found to exhibit very regular seasonality in their use of low-salinity habitats, further emphasizing the importance of a seasonal component to inflow management. The spawning-season durations of individual species range from a few months to year-round. Those with shorter seasons generally demonstrate regular seasonality in their spawning. It is interesting that spawning seasons and overall trends in larval taxonomic richness do not conform to the local seasonal rainfall pattern, which can be very different from the pattern in other parts of these species' ranges. Richness is very high during April and May (Fig. 9), which are among the driest months of the year (Fig. 2), and does not change appreciably during the transition to the summer wet season. Richness starts to decline in August and gradually reaches its minimum during December and January. This pattern has been observed repeatedly at various locations since 1988.

The potential for a strong influx of juvenile estuarine-dependent fishes into low-salinity nursery habitats is very high during the spring dry season, making management of freshwater inflow particularly sensitive during that time of year. Although the seasonal pattern of larval richness in Fig. 9 suggests that this sensitivity may diminish during winter, many of the spring and summer larval migrants are still present during winter as older juveniles. There is no season when inflow management becomes less relevant to low-salinity nursery use, although spring appears to be a particularly sensitive season. Any limiting effects associated with the naturally low springtime inflows could be amplified by relatively small freshwater withdrawals.

Applications to the Management of Freshwater Withdrawals

In the late 1980s, the SWFWMD first began to implement a management approach of limiting withdrawals from rivers to a percentage of streamflow at the time of withdrawal. The goals of this

approach were to make withdrawals mimic the temporal characteristics of the flow regimes of the streams used for water supply and to protect the estuaries from the effects of large freshwater withdrawals during the ecologically vulnerable dry season. Findings initially used to support the approach included the curvilinear response of isohaline locations to freshwater inflow (Flannery 1989) and the influence of inflow on the location of the center of catch per unit effort (CPUE) for a number of key organisms, a relationship that was first documented in the Little Manatee River (Peebles and Flannery 1992). Studies of the Lower Peace River and Charlotte Harbor estuarine system also demonstrated that the response of residence time to freshwater inflow in that system is strongly curvilinear (Stoker et al. 1989; Miller and McPherson 1991). Reduction of freshwater inflow of a fixed quantity would result in a much greater increase in residence time during periods of low inflow, with possible negative effects on water quality.

The percent-of-flow approach was first applied to the Peace River, where withdrawals for public water supplies began in 1980. The Peace River is not impounded and withdrawals from the river are either pumped directly to the customers after treatment or are stored in an offstream reservoir or the groundwater system using aquifer storage and recovery facilities. Prior to 1989, withdrawals from the Peace River were regulated by the SWFWMD in a manner similar to a groundwater withdrawal, with limitations on maximum-daily and yearly average withdrawal rates. Maximum-daily withdrawals could be taken when flows in the river were above minimum flow rates that were specified for each month. Given this regulatory schedule, withdrawals could take up to 25% of streamflow on low-flow days during the dry season. Based on recommendations of ecologists from both the water supply utility and SWFWMD, the withdrawal schedule was changed in 1989 so that withdrawals could not exceed 10% of the average streamflow from the preceding day as measured at an upstream gauge.

The percent-of-flow approach was also recently applied to allocated withdrawals from the Alafia River, from which withdrawals are scheduled to begin in 2003. These withdrawals by the water supply utility cannot exceed 10% of the streamflow from the preceding day as measured at the intake site, and withdrawals in excess of immediate customer needs will be stored in an offstream reservoir. Withdrawals for cooling water for an electrical power plant have been diverted to an offstream reservoir from the Little Manatee River since 1975. These withdrawals have been regulated as a percentage of streamflow at the time of withdrawal, but at higher percentage rates than allowed for the

Peace or Alafia Rivers (up to 47% on some days during high flows). This power plant has been operating at approximately one-third of capacity since its construction and withdrawals from the Little Manatee River have been relatively infrequent (28% of days) and well below the allocated percentage quantities. In a recent application to convert the power plant from fuel oil to natural gas and increase power production, the utility has requested that the diversion limit be reduced to 10% of the daily flow at the intake site in anticipation of more frequent, but smaller, withdrawals (Florida Power and Light 2002). Findings to support this change in the diversion limit included simulations of changes in salinity distributions and movements of the locations of the center of CPUE for key organisms in the Little Manatee River.

Application of the percent-of-flow approach to these unimpounded rivers has included the use of low-flow cutoffs, or rates of streamflow below which no withdrawals are allowed. These low-flow cutoffs correspond to the long-term 13th percentile flow on the Peace, the 21st percentile flow on the Alafia, and the 36th percentile flow on the Little Manatee. Criteria for determining these low-flow cutoffs have varied, but are generally based on inflections in the response of key variables to freshwater inflow. Data for the Peace River indicate that salinity distributions in the upper estuary are especially sensitive to reductions in freshwater inflow below the low-flow cutoff of $3.7 \text{ m}^3 \text{ s}^{-1}$. During droughts, streamflow in these rivers can be below their low-flow cutoffs for several consecutive months, during which time water supplies must come entirely from storage.

During high flows, the capacities of the diversion structures on these rivers do not allow the utilities to take their full percentage quantities. The effect of regulated percentage withdrawals, including the range of flows over which a full 10% of flow can be diverted, is shown for the Peace River during a typical year (Fig. 10). Due to these regulatory and physical constraints, seasonal and annual reductions in streamflow that result from the percent-of-flow approach are often considerably less than the percent daily limit. Since the streamflow gauges used to calculate the percentage withdrawals do not account for freshwater inflow below the gauging sites, percent reductions of total inflows to the tidal rivers are even less. The drainage areas for the gauges used to calculate percent daily withdrawal limits on the three rivers range from 58% of the total river basin for the Peace River to 91% of the total river basin for the Alafia. Current efforts are directed to modeling the ungauged streamflow in these river basins, so that the actual

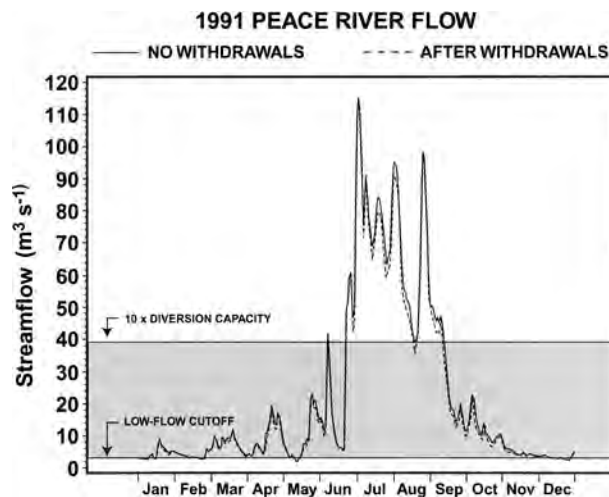


Fig. 10. Daily streamflow values for the Peace River during 1991 (U.S. Geological Survey gauge 02296750), with and without maximum possible withdrawals calculated using the 10% of flow daily limit, combined with a low-flow cutoff of $3.7 \text{ m}^3 \text{ s}^{-1}$ and a diversion capacity of $3.9 \text{ m}^3 \text{ s}^{-1}$. The shaded area represents the range of flows over which a full 10% of streamflow can be diverted.

percentage flow reductions to the tidal rivers can be more closely quantified (Tara et al. 2001).

Ongoing Refinements to the Percent-of-flow Approach

The natural flow regimes of unimpounded rivers and their documented ecological responses provide important information on when estuarine resources are most vulnerable to the effects of reductions in freshwater inflow. Withdrawal quantities that can result in ecological impacts may be markedly smaller during some seasons than others. The findings from southwest Florida estuaries indicate that reductions of freshwater inflow should be most limited during the spring. Historically, the withdrawal of water from rivers has not accounted for the seasonal needs of downstream ecosystems. Rozengurt and Hedgpeth (1989) reported a 12% reduction in the estimated mean annual runoff to the Lower Volga-Caspian Sea ecosystem, but reductions in springtime flows had decreased by as much as 37%. Similarly, water use in southwest Florida also typically peaks during the spring dry season due to increased domestic and agricultural irrigation (SWFWMD 2001a), and percent flow reductions in the region's impounded rivers are greatest during that time of year. The adoption of minimum flow releases that can account for seasonal variations have been scheduled for these impounded rivers (SWFWMD 2002a). It is expected that all new surface water withdrawals in the region will come from unimpounded rivers, for which the

SWFWMD has endorsed the percent-of-flow approach (SWFWMD 1992, 2001b). With the exception of the Little Manatee River, applications of the percent-of-flow approach have used the same percentage rate throughout the year. Current SWFWMD efforts are directed toward evaluating percentage withdrawal limits on a seasonal basis to better account for seasonality in the life histories of various organisms.

The evaluation of potential freshwater withdrawals should also account for the frequent nonlinear response of key estuarine characteristics to freshwater inflow. Changes in residence times, isohaline locations, and salinity at different locations in an estuary can be much greater for a given volume of freshwater withdrawal if it occurs during periods of low freshwater inflow (Miller and McPherson 1991; Uncles and Stephens 1993; Sklar and Browder 1998; Vallino and Hopkinson 1998). The relationships presented herein indicate there can often be a larger decrease in organism numbers if withdrawals of a given quantity are made during low freshwater inflows. A goal of the percent-of-flow approach is to adjust for such nonlinear relationships by scaling withdrawals to the rate of freshwater inflow. The SWFWMD is investigating sliding withdrawal percentages that differ among flow ranges based on changes in the responsiveness of the estuarine variables of concern. In cases where increasing freshwater inflows exacerbate a problem condition such as hypoxia (e.g., Breitburg 2002), percentage withdrawal limits can be adjusted to account for such processes. If high flows cause dispersion of estuarine-dependent organisms away from productive zones of an estuary (e.g., Peebles et al. 1996; Peebles 2002c), this can be factored into the withdrawal management strategy.

Although the percent-of-flow approach uses the flow regime of the contributing river as the basis for determining withdrawals, it is the inflow relationships of the living resources in the estuary that are the final determinant of percentage withdrawal limits. The ambient flow record (without any withdrawals) is used to assess the spatial and seasonal variation of physico-chemical and biological variables within the estuary that are related to freshwater inflow. Percentage withdrawals can then be applied to evaluate responses in the estuary under a range of inflow conditions. For those variables in the estuary that can be modeled, values can be simulated in order to compare the effects of different withdrawal scenarios to the ambient flow record (PBS&J 1998, 2001; Janicki Environmental 2001).

Development of the percent-of-flow approach has largely emphasized tidal rivers because most oligohaline and mesohaline zones and nursery habitats in southwest Florida estuaries are located

upstream of the tributary mouths. The withdrawal quantities that have been evaluated for unimpounded rivers using the percent-of-flow approach have been relatively small. We have assumed that the physico-chemical effects of these withdrawals and their related biological responses are most strongly manifest within the tidal rivers, due to their small water volumes relative to the open bays. This assumption is periodically reviewed and as the pressure for larger withdrawals increases, the strategy of examining more far-field effects will be increasingly employed.

The percent-of-flow approach lends itself to the process of adaptive management, in which continued data collection can be used to refine management strategies as the body of information expands over time. The SWFWMD requires the monitoring of hydrologic and ecological variables for permits for large surface-water or groundwater withdrawals. At present, extensive monitoring programs are required for withdrawals from both the Peace and Alafia Rivers (PBS&J 1999b, 2001). The findings of these programs can be used to modify percentage withdrawal schedules to better manage the resource, as the findings from the Peace River monitoring program were used to develop the percent-of-flow concept in 1989.

In addition to issuing individual water use permits, the SWFWMD must also establish minimum flow and level rules for flowing water courses which are defined in Florida Statutes (Chapter 373.042) as "the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." Minimum flows and levels address not only existing withdrawals, but also the potential effects of future withdrawals and are important for water supply planning. The adoption of minimum flows and levels for the Peace and Alafia rivers could develop percentage withdrawal limits that differ from the 10% regulations currently in effect. The determination of significant harm in the minimum flow and level process rests with Governing Board of the SWFWMD, who are appointed by the Governor of the State of Florida. The role of ecologists is to identify those ecological features, processes, and organisms that can be affected by reductions in freshwater inflow and to develop quantifiable relationships among these variables so that policy makers can determine how much ecological change is to be allowed. The SWFWMD is applying the percent-of-flow approach to evaluate alterations of natural streamflow regimes and to determine how much water may be available for supply without causing adverse impacts to estuarine resources.

LITERATURE CITED

- BARRY, J. P., M. M. YOKLAVICH, G. M. CAILLET, D. A. AMBROSE, AND B. S. ANTRIM. 1996. Trophic ecology of the dominant fishes in Elkhorn Slough, California, 1974–1980. *Estuaries* 19: 115–138.
- BIDLAKE, W. R. AND P. F. BOETCHER. 1997. Near-surface water balance of an undeveloped upland site in west-central Florida. Water Supply Paper No. 2452. U.S. Geological Survey, Denver, Colorado.
- BREITBURG, D. 2002. Effects of hypoxia, and the balance between hypoxia and enrichment, on coastal fishes and fisheries. *Estuaries* 25:767–781.
- BROWDER, J. A. 1985. Relationship between pink shrimp production on the Tortugas grounds and water flow patterns in the Florida Everglades. *Bulletin of Marine Science* 37:839–856.
- BROWDER, J. A. AND D. MOORE. 1981. A new approach to determining the quantitative relationship between fishery production and the flow of fresh water to estuaries, p. 403–430. In R. Cross and D. Williams (eds.). Proceedings of a National Symposium on Freshwater Inflow to Estuaries. Report FWS/OBS-81/04. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C.
- CAMP, DRESSER, AND MCKEE, INC. 1995. Freshwater releases from Lake Manatee—Effects on Manatee River salinity and future water supply. Report prepared for the Manatee County Public Service Department, Bradenton, Florida.
- CHEN, X. C., M. S. FLANNERY, AND D. L. MOORE. 2000. Response times of salinity in relation to changes in freshwater inflows in the Lower Hillsborough River, Florida. *Estuaries* 23:735–742.
- CLEWELL, A. F., M. S. FLANNERY, S. S. JANICKI, R. D. EISENWERTH, AND R. T. MONTGOMERY. 2002. An analysis of vegetation-salinity relationships in seven tidal rivers on the coast of west-central Florida. Technical Report. Southwest Florida Water Management District, Brooksville, Florida.
- COASTAL ENVIRONMENTAL, INC. 1996a. Review and analyses of meteorological, tributary flow, and water quality data from the Charlotte Harbor estuarine system. Report prepared for the Southwest Florida Water Management District, Brooksville, Florida.
- COASTAL ENVIRONMENTAL, INC. 1996b. Living resource-based freshwater inflow and salinity targets for the tidal Peace River. Report prepared for the Southwest Florida Water Management District, Brooksville, Florida.
- COLLIER, M. C., R. H. WEBB, AND J. C. SCHMIDT. 1996. Dams and rivers: A primer on the downstream effects of dams. Circular 1126. U.S. Geological Survey, Tucson, Arizona.
- COULTAS, C. L. AND Y. P. HSIEH (EDS.). 1997. Ecology and Management of Tidal Marshes: A Model for the Gulf of Mexico. St. Lucie Press, Delray Beach, Florida.
- CROSS, R. AND D. WILLIAMS (EDS.). 1981. Proceedings of the National Symposium on Freshwater Inflow to Estuaries. Report FWS/OBS-81/04. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C.
- DAY, JR., J. W., C. A. S. HALL, W. M. KEMP, AND A. YÁÑEZ-ARANCIBIA. 1989. Estuarine Ecology. John Wiley and Sons, New York.
- DAY, JR., J. W., J. F. MARTIN, L. CARDOCH, AND P. H. TEMPLET. 1997. System functioning as a basis for sustainable management of deltaic ecosystems. *Coastal Management* 25:115–153.
- DRINKWATER, K. F. 1986. On the role of freshwater outflow on coastal marine ecosystems—A workshop summary, p. 429–438. In S. Skreslet (ed.). The Role of Freshwater Outflow in Coastal Marine Ecosystems. Springer-Verlag, Berlin, Germany.
- ESTEVEZ, E. D., L. K. DIXON, AND M. S. FLANNERY. 1991. West-coastal rivers of peninsular Florida, p. 187–221. In R. J. Livingston (ed.). Rivers of Florida. Ecological Studies No. 83. Springer-Verlag, New York.
- ESTEVEZ, E. D. AND M. J. MARSHALL. 1997. A landscape-level method to assess estuarine impacts of freshwater inflow alterations, p. 217–236. In S. F. Treat (ed.). Proceedings: Tampa Bay Scientific Information Symposium 3. Tampa Bay Regional Planning Council, Clearwater, Florida.
- FERNALD, E. A. AND E. D. PURDUM (EDS.). 1998. Water Resources Atlas of Florida. Institute of Science and Public Affairs, Florida State University, Tallahassee, Florida.
- FERNANDEZ, JR., M. 1990. Surface-water hydrology and salinity of the Anclote River estuary, Florida. Water Resources Investigations Report 84-4301. U.S. Geological Survey, Tallahassee, Florida.
- FISRWG. 1998. Stream corridor restoration: Principles, processes, and practices. Report of the Federal Interagency Stream Restoration Working Group (FISRWG), Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3, U.S. General Printing Office, Washington D.C.
- FLANNERY, M. S. 1989. Part II rule revision: Potential impacts to streams and estuaries. Technical memorandum. Southwest Florida Water Management District, Brooksville, Florida.
- FLANNERY, M. S. AND M. D. BARCELO. 1998. Spatial and temporal patterns of streamflow trends in the Upper Charlotte Harbor watershed, p. 63–71. In S. F. Treat (ed.). Proceedings of the Charlotte Harbor Public Conference and Technical Symposium. Technical Report 98-02. Charlotte Harbor National Estuary Program, Ft. Myers, Florida.
- FLANNERY, M. S., H. D. DOWNING, G. A. MCGARRY, AND M. O. WALTERS. 1991. Increased nutrient loading and baseflow supplementation in the Little Manatee River watershed, p. 369–395. In S. A. Treat and P. A. Clark (eds.). Tampa Bay Area Scientific Information Symposium 2. Tampa Bay Regional Planning Council, Clearwater, Florida.
- FLORIDA MARINE RESEARCH INSTITUTE. 1997. Development of GIS-based vegetation maps for the tidal reaches of five gulf coast rivers. Report prepared by the Florida Department of Environmental Protection for the Southwest Florida Water Management District, Brooksville, Florida.
- FLORIDA MARINE RESEARCH INSTITUTE. 1999. Development of GIS-based maps to determine the status and trends of oligohaline vegetation in the tidal Peace and Myakka Rivers. Report prepared by the Florida Department of Environmental Protection for the Southwest Florida Water Management District, Brooksville, Florida.
- FLORIDA POWER AND LIGHT. 2002. Site certification application for the Manatee expansion project. Report submitted to the Florida Department of Environmental Protection. Florida Power and Light Company, Juno Beach, Florida.
- FRIEDLAND, K. D., D. W. AHRENHOLZ, AND J. F. GUTHRIE. 1996. Formation and seasonal evolution of Atlantic menhaden juvenile nurseries in coastal estuaries. *Estuaries* 19:105–114.
- GASTON, G. R. AND J. C. NASCI. 1988. Trophic structure of macrobenthic communities in the Calcasieu estuary, Louisiana. *Estuaries* 11:201–211.
- GIOVANNELLI, R. F. 1981. Relations between freshwater flow and salinity distributions in the Alafia River, Bullfrog Creek, and Hillsborough Bay, Florida. Water Resources Investigation Report 80-102. U.S. Geological Survey, Tallahassee, Florida.
- GORZELANY, J. 1986. Oyster associated fauna, Volume IV: A data collection program for selected coastal estuaries in Hernando, Citrus, and Levy counties, Florida. Report prepared by Mote Marine Laboratory for the Southwest Florida Water Management District. Brooksville, Florida.
- GRABE S. A., D. J. KARLEN, L. GUTIERREZ-ANTRIM, C. M. HOLDEN, AND B. GOETTING. 2002. Benthic habitat status of the lower Hillsborough, Palm, Alafia, and Little Manatee Rivers: 1995–2000. Report prepared by the Environmental Protection Commission of Hillsborough County for the Southwest Florida Water Management District, Brooksville, Florida.
- HAMMETT, K. M. 1990. Land use, water use, and streamflow characteristics of the Charlotte Harbor inflow area, Florida.

- Water Supply Paper No. 2359. U.S. Geological Survey, Tallahassee, Florida.
- HAMMETT, K. M. 1992. Physical processes, salinity characteristics, and potential salinity changes due to freshwater withdrawals in the tidal Myakka River, Florida. Water Resources Investigations Report 90-4054. U.S. Geological Survey, Tallahassee, Florida.
- HILL, M. T., W. S. PLATTS, AND R. L. BESCHTA. 1991. Ecological and geomorphological concepts for instream and out-of-channel flow requirements. *Rivers* 2:198-210.
- HOLLAND, A. F., A. T. SHAUGHNESSY, AND M. H. HIEGEL. 1987. Long-term variation in mesohaline Chesapeake Bay macrobenthos: Spatial and temporal patterns. *Estuaries* 10:227-245.
- HOSS, D. E. AND G. W. THAYER. 1993. The importance of habitat to the early life history of estuarine dependent fishes. *American Fisheries Society Symposium* 14:147-158.
- HUGHES, E. H. AND E. B. SHERR. 1983. Subtidal food webs in a Georgia estuary: $\delta^{13}\text{C}$ analysis. *Journal of Experimental Marine Biology and Ecology* 67:227-242.
- INGRAM, R. G., L. L. LEGENDRE, Y. SIMARD, AND S. LEPAGE. 1985. Phytoplankton response to freshwater runoff: The diversion of the Eastmain River, James Bay. *Canadian Journal of Fisheries and Aquatic Sciences* 42:1216-1221.
- JANICKI ENVIRONMENTAL, INC. 2001. Regression analyses of salinity-streamflow relationships in the Lower Peace River/Upper Charlotte Harbor estuary. Report prepared for the Peace River Manasota Regional Water Supply Authority, Sarasota, Florida.
- JASSBY, A. D., W. J. KIMMERER, S. G. MONISMITH, C. ARMOR, J. E. CLOERN, T. M. POWELL, J. R. SCHUBEL, AND T. J. VENDLINSKI. 1995. Isohaline position as a habitat indicator for estuarine populations. *Ecological Applications* 5:272-289.
- JAY, D. A. AND C. A. SIMENSTAD. 1996. Downstream effects of water withdrawal in a small, high-gradient basin: Erosion and deposition of the Skokomish River delta. *Estuaries* 19:501-517.
- JUE, D. K. 1989. Florida rivers assessment. Publication of the Florida Department of Natural Resources, Division of Recreation and Parks, Tallahassee, Florida.
- KENNISH, M. J. 1986. Ecology of Estuaries, Volume 1. Physical and Chemical Aspects. CRC Press, Boca Raton, Florida.
- KIMMERER, W. J., J. H. COWAN, JR., L. W. MILLER, AND K. A. ROSE. 2001. Analysis of an estuarine striped bass population: Effects of environmental conditions during early life. *Estuaries* 24:557-575.
- LEE, T. M. AND A. SWANCAR. 1997. The influence of evaporation, ground water, and uncertainty in the hydrologic budget of lake Lucerne, a seepage lake in Polk County, Florida. U.S. Water-Supply Paper 2439. U.S. Geological Survey, Denver, Colorado.
- LEWIS, III, R. R., R. G. GILMORE, D. W. CREWZ, AND W. E. ODUM. 1985. Mangroves, p. 281-336. In W. Seaman (ed.). Florida Aquatic Habitat and Fishery Resources. Florida Chapter of the American Fishery Society, Kissimmee, Florida.
- LIGON, K. L., W. M. DIETRICH, AND W. M. TRUSH. 1995. Downstream ecological effects of dams: A geomorphic perspective. *BioScience* 45:183-192.
- LINS, L. F. AND J. R. SLACK. 1999. Streamflow trends in the United States. *Geophysical Research Letters* 26:227-230.
- LIVINGSTON, R. J. 1997. Trophic response of estuarine fishes to long-term changes of river runoff. *Bulletin of Marine Science* 60:894-1004.
- LONGLEY, W. L. (ED.). 1994. Freshwater inflows to Texas Bays and estuaries: Ecological relationships and methods for determination of needs. Texas Water Development Board and Texas Parks and Wildlife Department, Austin, Texas.
- MANN, K. H. AND J. R. N. LAZIER. 1996. Dynamics of Marine Ecosystems. Biological-Physical Interactions in the Ocean. Blackwell Science, Cambridge, Massachusetts.
- MCBEE, J. T. AND W. T. BREHM. 1982. Spatial and temporal patterns in the macrobenthos of St. Louis Bay, Mississippi. *Gulf Research Reports* 7:115-124.
- McMICHAEL, JR., R. H. AND K. M. PETERS. 1989. Early life history of spotted seatrout, *Cynoscion nebulosus* (Pisces: Sciaenidae) in Tampa Bay, Florida. *Estuaries* 12:98-110.
- McMICHAEL, JR., R. H., K. M. PETERS, AND G. R. PARSONS. 1989. Early life history of the snook, *Centropomus undecimalis*, in Tampa Bay, Florida. *Northeast Gulf Science* 10:113-125.
- McPHERSON, B. F., R. T. MONTGOMERY, AND E. E. EMMONS. 1990. Phytoplankton productivity and biomass in the Charlotte Harbor estuarine system, Florida. *Water Resources Bulletin* 26:787-800.
- MERRINER, J. V., W. H. KRIETE, AND G. C. GRANT. 1976. Seasonality, abundance, and diversity of fishes in the Piankatank River, Virginia (1970-1971). *Chesapeake Science* 17:238-245.
- MILLER, J. M., L. B. CROWDER, AND M. L. MOSER. 1985. Migration and utilization of estuarine nurseries by juvenile fishes: An evolutionary perspective. *Contributions in Marine Science* 68:338-352.
- MILLER, R. L. AND B. F. MCPHERSON. 1991. Estimating estuarine flushing and residence times in Charlotte Harbor, Florida, via salt balance and a box model. *Limnology and Oceanography* 36:602-612.
- MOTE MARINE LABORATORY. 2001a. Peace River, benthic macroinvertebrate and mollusk indicators. Report prepared by Mote Marine Laboratory for the Peace River Manasota Regional Water Supply Authority, Sarasota, Florida.
- MOTE MARINE LABORATORY. 2001b. An investigation of relationships between freshwater inflows and benthic macroinvertebrates in the Alafia River estuary. Report prepared by Mote Marine Laboratory for the Southwest Florida Water Management District, Brooksville, Florida.
- MOYLE, P. B. AND R. A. LEIDY. 1992. Loss of biodiversity in aquatic ecosystems: Evidence from fish faunas, p. 127-169. In P. L. Fiedler and S. K. Jain (eds.). Conservation Biology: The Theory and Practice of Nature Conservation, Preservation, and Management. Chapman and Hall, New York.
- MYERS, S. B., Y. JUNG, AND M. E. LUTHER. 2002. Simulations of salinity distributions and residence times in the Palm River and McKay Bay. Report prepared by the University of South Florida College of Marine Science for the Southwest Florida Water Management District, Brooksville, Florida.
- NEWSON, M. 1994. Hydrology and the River Environment. Clarendon Press, Oxford, U.K.
- ODUM, W. E., T. J. SMITH, III, J. K. HOOVER, AND C. C. McIVOR. 1984. The ecology of tidal freshwater marshes of the United States east coast: A community profile. Report FSW/OBS-83/17. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C.
- PBS&J, INC. 1998. Assessment of potential impacts of the Tampa Bay Water Surface Water Projects on Tampa Bay. Report prepared for the Tampa Bay Water, Clearwater, Florida.
- PBS&J, INC. 1999a. Summary of historical information relevant to the hydrobiological monitoring of the lower Peace River and upper Charlotte Harbor estuarine system. Report prepared for the Peace River Manasota Regional Water Supply Authority, Sarasota, Florida.
- PBS&J, INC. 1999b. Tampa Bypass Canal/Alafia River water supply projects: Hydrobiological monitoring program. Report prepared for the Tampa Bay Water, Clearwater, Florida.
- PBS&J, INC. 2001. Peace River hydrobiological monitoring program year three interpretive report. Report prepared for the Peace River Manasota Regional Water Supply Authority, Sarasota, Florida.
- PEEBLES, E. B. 1996. Ontogenetic habitat and diet selection in estuarine-dependent fishes: Comparisons of observed patterns with model predictions. Ph.D. Dissertation, University of South Florida, Tampa, Florida.
- PEEBLES, E. B. 2002a. An assessment of the effects of freshwater inflows on fish and invertebrate habitat use in the Alafia River

- estuary. Report prepared by the University of South Florida College of Marine Science for the Southwest Florida Water Management District, Brooksville, Florida.
- PEEBLES, E. B. 2002b. An assessment of the effects of freshwater inflows on fish and invertebrate habitat use in the Peace River and Shell Creek estuaries. Report prepared by the University of South Florida College of Marine Science for the Southwest Florida Water Management District, Brooksville, Florida.
- PEEBLES, E. B. 2002c. Temporal resolution of biological and physical influences on bay anchovy *Anchoa mitchilli* egg abundance near a river-plume frontal zone. *Marine Ecology Progress Series* 237:257–269.
- PEEBLES, E. B. AND M. S. FLANNERY. 1992. Fish nursery use of the Little Manatee River estuary (Florida): Relationships with freshwater discharge. Southwest Florida Water Management District, Brooksville, Florida.
- PEEBLES, E. B., J. R. HALL, AND S. G. TOLLEY. 1996. Egg production by the bay anchovy *Anchoa mitchilli* in relation to adult and larval prey fields. *Marine Ecology Progress Series* 131:61–73.
- PETERS, K. M. AND R. H. MCMICHAEL, JR. 1987. Early life history of the red drum, *Sciaenops ocellatus* (Pisces: Sciaenidae), in Tampa Bay, Florida. *Estuaries* 10:92–107.
- PETTS, G. E. 1984. Impounded Rivers: Perspectives for Ecological Management. John Wiley and Sons, Chichester, U.K.
- POFF, N. L., J. D. ALLAN, M. B. BAIN, J. R. KARR, K. L. PRESTEGAARD, B. D. RICHTER, R. E. SPARKS, AND J. C. STROMBERG. 1997. The natural flow regime: A paradigm for river conservation and restoration. *Bioscience* 47:769–784.
- RAST, J. P., M. E. FLOCK, T. T. SUTTON, AND T. L. HOPKINS. 1991. The zooplankton of the Little Manatee River estuary: Combined report for years 1988 and 1989. Report prepared by University of South Florida Department of Marine Science for the Southwest Florida Water Management District, Brooksville, Florida.
- REIS, R. R. AND J. M. DEAN. 1981. Temporal variation in the utilization of an intertidal creek complex by the bay anchovy (*Anchoa mitchilli*). *Estuaries* 4:16–23.
- RICHTER, B. D., J. V. BAUMGARTNER, J. POWELL, AND D. P. BRAUN. 1996. A method for assessing hydrologic alteration within ecosystems. *Conservation Biology* 10:1163–1174.
- RICHTER, B. D., J. V. BAUMGARTNER, R. WIGINGTON, AND D. P. BRAUN. 1997. How much water does a river need? *Freshwater Biology* 37:231–249.
- ROZENGURT, M. A. AND J. W. HEDGPETH. 1989. The impact of altered river flow on the ecosystem of the Caspian Sea. *CRC Critical Reviews in Aquatic Sciences* 1:337–362.
- SEAMAN, W. L. AND R. MCLEAN (EDS.). 1977. Seminar proceedings: Fresh water and the Florida Coast, Southwest Florida. Southwest Florida Water Management District, Brooksville, Florida.
- SDI ENVIRONMENTAL SERVICES, INC. 1998. Analysis of streamflow and rainfall at selected sites in west-central Florida. Report prepared for Tampa Bay Water, Clearwater, Florida.
- SINHA, M., M. K. MUKHOPADHYAY, P. M. MITRA, M. M. BAGCHI, AND H. C. KARMAKAR. 1996. Impact of Farakka barrage on the hydrology and fishery of Hooghly estuary. *Estuaries* 19:710–722.
- SKLAR, F. H. AND J. A. BROWDER. 1998. Coastal environmental impacts brought about by alterations to freshwater flow in the Gulf of Mexico. *Environmental Management* 22:547–562.
- SNEDAKER, S., D. DE SILVA, AND D. COTRELL. 1977. A review of the role of freshwater in estuarine ecosystems. Report prepared by the University of Miami Rosenstiel School of Marine Science for the Southwest Florida Water Management District, Brooksville, Florida.
- SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 1992. Water supply needs and sources 1990–2020. Southwest Florida Water Management District, Brooksville, Florida.
- SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 2001a. Estimated water use in the Southwest Florida Water Management District for 1999. Southwest Florida Water Management District, Brooksville, Florida.
- SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 2001b. Regional water supply plan. Southwest Florida Water Management District, Brooksville, Florida.
- SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 2002a. Priority list and schedule for the adoption of minimum flows and levels. *Florida Administrative Weekly* 28:243–244.
- SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 2002b. The occurrence of high nutrient and chlorophyll *a* concentrations in the Alafia River estuary. Technical memorandum. Southwest Florida Water Management District, Brooksville, Florida.
- SPRINKEL, J. 1986. Oyster Reefs, Volume IV: A data collection program for selected coastal estuaries in Hernando, Citrus, and Levy counties, Florida. Report prepared by Mote Marine Laboratory for the Southwest Florida Water Management District, Brooksville, Florida.
- STOKER, Y. E., S. E. HENDERSON, AND B. F. MCPHERSON. 1989. Hydraulic and salinity characteristics of the tidal reach of the Peace River, southwestern Florida. Water Resources Investigations Report 88-4162. U.S. Geological Survey, Tallahassee, Florida.
- STOKER, Y. E., V. A. LEVESQUE, AND W. M. WOODHAM. 1996. The effect of discharge and water quality of the Alafia River, Hillsborough River, and the Tampa Bypass Canal on nutrient loading to Hillsborough Bay, Florida. Water Resources Investigation Report 95-4107. U.S. Geological Survey, Tallahassee, Florida.
- TARA, P. E., R. ROKICKI, AND M. A. ROSS. 2001. Estimation of ungaged flows in the Alafia River. Report prepared by the University of South Florida Center for Modeling Hydrologic and Aquatic Systems for the Southwest Florida Water Management District, Brooksville, Florida.
- UNCLES, R. J. AND J. A. STEPHENS. 1993. The freshwater-saltwater interface and its relationship to the turbidity maximum in the Tamar estuary, United Kingdom. *Estuaries* 16:126–141.
- VALLINO, J. J. AND C. S. HOPKINSON. 1998. Estimation of dispersion and mixing times in Plum Island Sound estuary. *Estuarine, Coastal and Shelf Science* 46:333–350.
- VARGO, G. A., W. R. RICHARDSON, D. HOWARD, AND J. PAUL. 1991. Phytoplankton production in two tidal rivers, the Alafia and Little Manatee, p. 317–340. In S. A. Treat and P. A. Clark (eds.). Tampa Bay Area Scientific Information Symposium 2. Tampa Bay Regional Planning Council, Clearwater, Florida.
- WEINSTEIN, M. P. AND H. A. BROOKS. 1983. Comparative ecology of nekton residing in a tidal creek and adjacent seagrass meadow: Community composition and structure. *Marine Ecology Progress Series* 12:15–27.
- WILBER, D. A. AND R. BASS. 1998. Effect of Colorado River diversion on Matagorda Bay epifauna. *Estuarine, Coastal and Shelf Science* 47:309–318.
- YOBBI, D. D. AND L. A. KNOCHEMUS. 1989a. Salinity and flow relations in the Chassahowitzka and Homosassa Rivers and adjacent areas of the Gulf of Mexico, Florida. Water Resources Investigation 88-4044. U.S. Geological Survey, Tallahassee, Florida.
- YOBBI, D. D. AND L. A. KNOCHEMUS. 1989b. Effects of river discharge and high-tide stage on salinity intrusion in the Weeki Wachee, Crystal River, and Withlacoochee River estuaries, Southwest Florida. Water Resources Investigation 88-4116. U.S. Geological Survey, Tallahassee, Florida.

SOURCE OF UNPUBLISHED MATERIALS

- CHEN, X. C. 2001. Studying hydrodynamics in a riverine estuary by a combination of 2-D and 3-D simulations (abstract). Poster presented at the 16th biennial conference of the Estuarine Research Federation, November 4–8, 2001. St. Petersburg Beach, Florida.

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Subject: Technical review of the freshwater flow characteritics presented in the Little Manatee River minimum flows report
Date: Thursday, October 14, 2021 12:31:26 PM
Attachments: [Technical review of Little Manatee River flow characterization from Sid Flannery.pdf](#)
[Flannery et al. BASIS 2, 1991.pdf](#)
[Flannery, Peebles and Montgomery \(2002\) Percent of flow method.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Attached is my technical review of the material in the minimum flows report for the Little Manatee River that pertains to the freshwater flow characteristics of the river and how they are related to application of the flow-based minimum flows. I also attached two articles that are referenced in the review.

Would please forward this email and the attached review and articles to the peer review panel for the Little Manatee River minimum flows report via the minimum flows web-board or however.

In a week or so, I plan to submit comments pertaining to the analyses of the estuarine section of the river contained in the minimum flows report. Would you please keep me apprised of all upcoming meetings of the peer review panel.

Thanks very much,
Sid Flannery

Technical review of the description and analysis of the freshwater flow regime of the Little Manatee River presented in the 2021 SWFWMD minimum flows report

Submitted by Sid Flannery, October 14, 2021

The comments contained in this document pertain to the characterization of the freshwater flow regime of the Little Manatee River presented in the current draft minimum flows report for the river. Some of the comments pertain to the discussion of factors that can affect those flows such as land and water use, climate, and permitted surface water withdrawals and discharges. In a week or two, I will submit additional comments related to the response of various biological and water quality variables in the estuarine portion of the river to freshwater inflow.

In the meantime, the comments below are intended to clarify and enhance the material presented in the District's draft minimum flows report so that readers have a better understanding of the flow regime of the Little Manatee River and how it is related to the ecological characteristics of the river and the potential effects of the proposed minimum flows.

The primary consultant, Janicki Environmental Inc. (JEI), has done a very good job in justifying the use of flow-based blocks, which I strongly support. Also, the method they developed to adjust the gaged flows to develop a baseline flow record is very good and better than the method presented in the first minimum flow report (Hood et al. 2011).

I realize the District wants to produce minimum flows reports that are concise, but for some topics (e.g., the Florida Power and Light withdrawals), I think the hydrologic characterizations presented in the first minimum flows report are more informative than the material presented in the current report. I suggest the review panel read pages 4-1 and 4-6 to 4-32 in the first minimum flows report. That report is provided as Appendix A with the current minimum flow report, and possibly in some cases the current report could say something like "See Appendix A for further details on". In that regard, I preface some of my suggested edits with "At a minimum" and suggest the current report make reference to material presented in the first report. I don't think that is the best solution, but the District could go that route on some items to direct readers to the first minimum flows report for more information on a certain topic.

Organization

In several other minimum flows reports including the Lower Alafia, the Pithlachascotee and the Lower Myakka, the section on the baseline flow adjustment was in the same chapter as the hydrologic characterization, which flowed nicely as the baseline adjustment was described after the presentation of historic trends in rainfall, flows, and anthropogenic factors.

On the other hand, in the current report rainfall and flows are discussed in Chapter 2, while the flow blocks and generation of the baseline flow record are in Chapter 5, as was done for the Lower Peace River minimum flows report. I found this a bit hard to follow, but it is workable and suitable the District did it that way. However, for understanding the potential ecological changes that can result from applying the percent-of-flow method, it is helpful to see some other basic

hydrologic data reductions such as a bar graph of average monthly flows and a flow duration curve of baseline and observed flows. Some suggestions in that regard are presented below, along with other edits to the parts of the report that deal the freshwater flow regime of the river. Another day I will submit comments pertaining to the estuarine results presented in the report.

Suggested edits

Page (P) 18, Lines (L) 4 to 5. This sentence could be shortened and slightly revised to read “Compared to other rivers in the region, flow in the Little Manatee watershed has a relatively high mean runoff rate normalized by contributing area. See page 4-10 in the previous minimum flows report (Appendix A), where average areal based runoff rates for the Little Manatee are listed along with values for five other rivers.”

Regarding the second half of this same sentence on page 18, I don’t think the Little Manatee has a moderate to high baseflow fraction compared to other rivers such as the Hillsborough, Alafia and Withlacoochee, which all receive some springflow and other flow from the upper Floridan aquifer.

For example, from the minimum flows report for the Lower Alafia River, which is located about 14 miles north of the Little Manatee, the 10th percentile flow of the Alafia is 16.2% of its mean flow. If flows from Lithia and Buckhorn Springs are added to the gaged flows, the 10th percentile flow for the Alafia is 21.9% of its mean flow. In contrast, the 10th percentile flow for gaged flows on Little Manatee for 1996 to 2019 period (24 cfs) listed on page 144 in the current report is 14.4% of the mean flow (167 cfs) for that period.

Keep in mind the baseflow in the gaged record of the Little Manatee has been supplemented by excess agriculture irrigation water and the mean flow I just cited was not corrected for withdrawals from Florida Power and Light. So, the baseflow fraction for natural flows corrected for agricultural flows and FP&L withdrawals would be even lower. Therefore, I would not characterize the Little Manatee as having a moderate to high baseflow fraction. Simply drop that part of the sentence, which will agree better with the statement two sentences later about flows in the river having spiky behavior and low relatively low surface storage, which is accurate.

P28 – 30. I have reservations about over postulating about the effects of the Atlantic Multidecadal Oscillation (AMO). In the more recent warm AMO period (Figure 2-12), which is supposed to result in more rainfall, some of the worst multi-year droughts in the region occurred, including the year 2000 and early 2001 and an eight-year period from 2006 to 2013 when yearly rainfall was below normal for seven years (Figure 2-14). The report says there is not a lot of surface or surficial aquifer storage in the Little Manatee River basin and it responds quickly to rainfall events. In that regard, the time series graph of moving 20 -year average rainfall does not have as much to do with variations in flows the Little Manatee River as it might with rivers with more surface and groundwater storage like Pithlachascotee or the Withlacoochee. A moving average yearly rainfall hydrograph of shorter length would be more appropriate for comparison to flow trends in the Little Manatee. The previous minimum flows report used a moving three-year average rainfall hydrograph (Figure 4-4 on page 4-6).

P38 Section 2.5 (Little Manatee River Flow History) This section of the current report starts off describing the effect of agriculture on past flows, then follows with two short paragraphs and four hydrographs about the gaged flow record, then turns to a discussion of groundwater flow modeling. I suggest it would be better to start off with a description of the flow record and present the hydrographs and discuss the temporal patterns shown in them, then switch to possible causative factors including the groundwater modeling discussion.

P39. Figure 2-24. This figure plots average yearly flows on a semi-log scale with a fitted polynomial trend line. The range of yearly flows appears to be from about 40 to 400 cfs, which should plot fine on an arithmetic scale and would give the readers a better sense of the natural variation in yearly flows. If the polynomial trend was fitted to log transformed data, the current hydrograph could also be shown, but I think would be helpful to also show the flows on an arithmetic scale (see page 4-1 in the previous minimum flow report).

Monthly flows are plotted on a semi-log scale in Figure 2-25, which is helpful as there is much greater range in values. The report says there appears to be no significant long-term trend in monthly flows, but the occurrence of low monthly flows prior to the mid-1970s seems apparent, which is supported by other findings presented in the report. The report does suggest there appears to be a slight increasing trend in dry season flows (October to May), but not wet season flows. As with Figure 2-24, the time series plots of yearly average dry and wet season flows on an arithmetic scale would be valuable.

Though the data end in the year 2010, there are very informative hydrographs and trend tests presented in previous minimum flows report by Hood et al. 2011. Having worked in estuarine ecology, I think the eight-month October to May dry season discussed in the current report is too broad for some ecological applications, and examining trends in other flow parameters can be meaningful from a resource management perspective. On pages 4-22 to 4-29, the previous minimum flows report showed some interesting results for trend tests and hydrographs for various yearly percentile flows, which clearly show a rise in values for the yearly 10th, 25th, and 50th percentile flows starting in the mid-1970s. As concluded in the current report, the previous report found no significant change in the higher flows. However, trend tests on monthly flows showed an increase for the dry season months of November, December, April and May. The previous report also showed hydrographs and trend results for moving average flows for various durations from 3 to 120 days, which clearly showed significant increases in their yearly minimum values (e.g, the lowest 60-day moving average flow within each year).

Frankly, I think it would be valuable to repeat such graphical and trend analyses for key flow parameters in the current report and see what the updated results look like, but will defer to the District. However, at a minimum, the current report should at least refer to some of the findings in the previous report, acknowledging the flow data end in 2010.

In the discussion of the effects of agriculture on flows in the river, the current District report should cite and briefly mention the paper by Flannery et al. (1991). I am not saying this to see my name in lights, but rather this was a very large effort that was funded by grants the District received from the Florida Department of Environmental Protection that involved the District, the University of South Florida, the USGS, and land use mapping specialists from the Florida Marine Research Institute. The USGS installed three new streamflow gages in the watershed and baseflow and runoff rates were compared from six sub-basins. Extensive water quality monitoring was conducted and nutrient loading rates were compared from these sub-basins. Water quality sampling of 21 sites was also conducted in May 1988 and May 1990, which showed where mineralized water of groundwater origin was entering the river.

The current report can qualify that these data were collected when the quantities of excess agricultural water entering the river was near maximum. On page 4-31, the previous District report has a very short paragraph about this study, and in a previous section described that since that report was produced there have been improvements in agricultural water use practices and a reduction in excess irrigation water entering the streams. The current District report provides a good summary of changes in land use and water use efficiency and the plot of residuals from the baseline flow analysis (Figure 5-2 on page 105) is very effective. Overall, the findings of the watershed assessment in the late 1980s supports the District's findings and that paper (Flannery et al. 1991) should be cited and quickly summarized in a short paragraph in the current report. A pdf of that paper is submitted along with this review.

Florida Power and Light

Because they utilize an off-stream reservoir and have long used withdrawal schedules linked flow rates, the FP&L facility has been an example of progressive water resource management. Along with the Peace and Alafia Rivers, ecological results and management applications from the Little Manatee River are featured in the 2002 journal article about the percent-of-flow method (Flannery et al, 2002), which is also submitted with this review.

Having said that, the withdrawal schedule that FP&L now uses will have to be revised to comply with the proposed minimum flows, and the description of their withdrawal schedule in the previous minimum flows report is much more informative than the discussion in the current report. In particular, the frequency that the emergency withdrawal schedule has been used and the quantities that were withdrawn from the river is well described in the previous minimum flows report. Again, the District could update and enhance the discussion of the FP&L withdrawals in the current report, or at a minimum, refer to the previous report (Appendix A) which provides a history of the changes in the diversion schedule and the frequency of use for the emergency schedule, acknowledging those data end in 2009.

At a minimum, the District needs to support their statement on page 44 that FP&L withdrawals have been less in recent years. The previous report listed an average water withdrawal by FP&L of 9.1 cfs for the 1976-2009 period, pointing out that includes the initial filling of the

reservoir. The previous report also mentioned this average withdrawal rate was largely driven by the diversion of high flows, as no withdrawals occurred on 71 percent of the days during that period. The District could easily characterize diversions by FPL during recent years, and at an absolute minimum, report an average diversion value for 2010 to 2020.

I was very involved in the re-evaluation and the revision of the FP&L withdrawal schedule, and toward the end of this peer review process, will offer some thoughts on further revision of their schedule to comply with the minimum flows. As a sneak preview, I think it would ecologically counter-productive to restrict FP&L to the 13% and 11% allowable freshwater flow reductions at flows in block 3. Reasons will be presented later, but if the final percent allowable reduction for estuarine minimum flows is greater at high flows, that is what FP&L should be regulated on. Tentative for now, but should be the way to go.

Mosaic land use and diversions

On page 44, the current report has a short paragraph about the permitted discharge by Mosaic Company for their phosphate mining operations and cites a report from 2012 (FDEP, 2012) to support the statement that the discharge has been limited for several years. Clearly, any characterization of discharges from the D-001 outfall needs to be updated.

As with FP&L, a good description of Mosaic's land use and hydrographs and characterization of the discharges for 1996 to 2009 is provided in the previous District report (pages 4-18 to 4-22). That report described why it would be difficult to create a baseline flow record adjusted for these discharges, so that was not done as part of that study. On page 4-20, the previous report shows an excellent map that showed the status of various categories of the Mosaic Company's lands (e.g., mined, reclaimed, preserved) and described the status of these land use categories and the percentages of the river watershed they represented.

In Section 2.2, the current District report generally characterizes extractive land covers, but provides no information on the status of those lands, such as what is currently and previously mined, reclaimed, preserved, or other. The land use maps that are shown have Extractive land use included as part of Urban and Built-Up, but Table 2-1 has the acreages of Extractive separately quantified over time. The previous District report states that Mosaic owns 26% of the Little Manatee River watershed. Given that a quarter of the watershed is owned by a phosphate mining company, it would improve the current District report to provide a more comprehensive update on the status of Mosaic's land holdings and the projections for future mining.

The District could cite the section on phosphate mining in the previous minimum flows report, but qualify that those results and projections are out of date and may no longer apply. At a minimum, the District needs to access the discharge records for the D-001 outfall and present an updated hydrograph and statistics for those discharges.

Nitrogen trends

In Section 3.3.2 (pages 54-56) the current report presents information on concentrations and trends for various forms of nitrogen measured by the Environmental Protection Commission of Hillsborough County (EPCHC). With the exception of organic nitrogen at freshwater station 113 at the Highway 301 bridge, concentrations were either decreasing or showed no trend. These results are encouraging, and it is good that the tidal section of the Little Manatee River has very little hypoxia (low dissolved oxygen concentrations). With regard to chlorophyll *a*, concentrations generally do not indicate impairment, but as will be discussed in the next review I submit, there are periodically very high chlorophyll *a* concentrations in the upper reaches of the tidal river and the potential effects of flow reductions need to be examined further. But that is for another day.

For now, I think it would be useful for the minimum flows to very briefly point out while that nitrogen concentrations have generally been either decreasing or non-trending in recent years, water in the Little Manatee River is nitrogen enriched compared to decades prior to the 1970s. Historical data presented as part of the late 1980s watershed assessment (Flannery et al. 1991) found that nitrate-nitrite concentrations have increased greatly since the mid-1970s, which corresponds to the increase in agricultural land use. The previous minimum flows report also reported an increase in nitrate-nitrite concentrations measured by the USGS, but the data ended in 1999 (pages 5-4 and 5-5). Increases in specific conductance, which are shown in Figure 12 in Flannery et al. (1991) and Figure 4-23 in the previous minimum flows report, show this same temporal trend, indicating the effect of agricultural land and water use on the river.

Also, during the 1988-1989 study period, the phosphate mining operations were largely inactive and the Ft. Lonesome station in the river upper river sub-basin served somewhat as a control site. Nitrogen concentrations and loading rates from that sub-basin were much less than from downstream sub-basins where there was much more agriculture. The point of this is the current minimum flows report could have one or two sentences that say that although nitrogen has been non-trending or decreasing in recent years, historical data indicate the the river is nitrogen enriched compared to before the 1970s (Flannery et al. 1991, Hood et al. 2011)

P 103 – Excess flows and adjustment of the baseline flow record.

The consultant (JEI) did a very nice job on the method for adjusting the gaged flows to develop a baseline flow record, which was an improvement over the method used in the previous District report. However, it is interesting the previous peer review panel did not criticize the method for adjusting the baseline record in the first minimum flows report, but they waxed at length about the use of benchmark flow periods. Regardless, the current method for adjusting the gaged flow to come up with baseline flows is very useful and the plot of residuals and the LOESS curve plotted in Figure 5-2 (page 105) is very informative. Also, with regard to benchmark flows issue, that is handled well in Section 6.5 in the current report in which the estuarine fish habitat analyses were conducted over four different multi-year periods.

Figure 5-3 on page 106 in the current District report is interesting in that there are large increases in excess flows during July to September, when irrigation rates are small or not occurring. This likely occurs because the excess irrigation raises water levels in the surficial aquifer, which can persist into the wet season and increase runoff potential. Also, the change from more natural land covers to agriculture can result in greater runoff from rainfall events.

In Figure 5-3 (page 106) the current District report cites the Lower Myakka River minimum flows report (Flannery et al. 2007). However, all the work on the excess flows was done by Interflow Engineering, which was presented and cited in the District's Lower Myakka River report. The current Little Manatee report should cite their work, such as Interflow Engineering LLC (2008 or 2009). Panel member Dr. Loper who conducted that work, can review the District's Lower Myakka minimum flows report and conclude which of the three references for Interflow Engineering cited therein should be used.

Also, the caption for the figure should say agricultural excess flows in the Myakka River, because Interflow also simulated total excess flows from all land use changes. In that regard, since it was based on overall rainfall runoff relationships, the baseline corrections done by Janicki Environmental are for total excess flows, though I suspect the predominant source of the excess flows results from agricultural land and water use.

A few basic graphics of a table to describe the flow regime of the Little Manatee River

The current report could benefit from presenting a few simple graphics and a table to describe the basic streamflow characteristics of the Little Manatee River. Such hydrologic information is important for not only understanding the seasonal and flow duration characteristics of the river, but also for understanding how application of the minimum flows will affect the ecology the river.

A plot of average monthly flows needs to be included to characterize the seasonal flow characteristics of the river. Two figures from page 4-12 in the previous minimum flows report are presented on the following page. This should be updated for the current report. Obviously, the yellow line in the second figure mimics the average monthly flows in the top graphic, but it is helpful to demonstrate how flows are lagged with regard to seasonal rainfall during some months of the year.

Also, as previously described, the Little Manatee River has a relatively high rate of basin runoff, a spikey response to rainfall events, and a relatively low rate of baseflow. These flow characteristics are manifested in the graphs on the following page where the difference in average monthly flows between the spring dry season and late summer flows is among the highest in the region. As will be described later in this review, the springtime dry season is especially important to the ecology of the freshwater river and the estuary and flow reductions must be managed very carefully during that time of year.

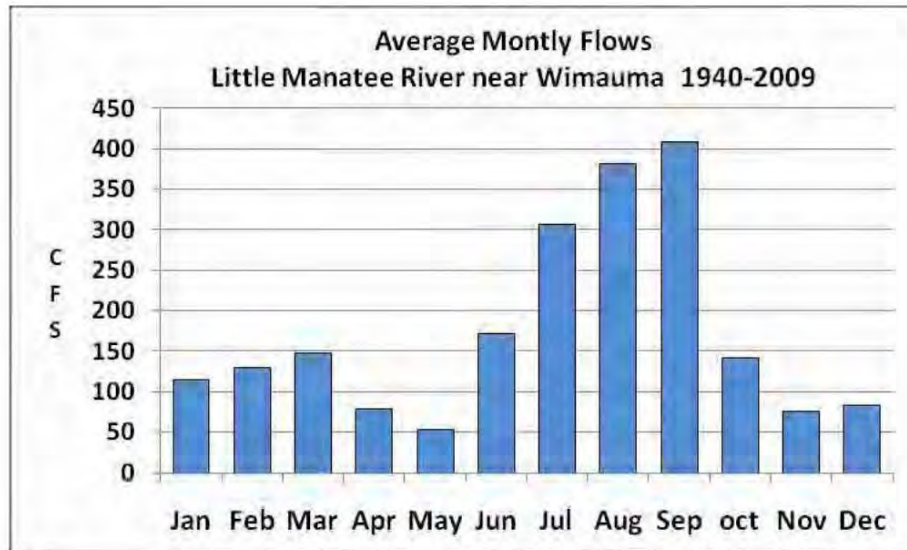


Figure 4-9. Average monthly rates of flow for the Little Manatee River near Wimauma for the years 1940-2009.

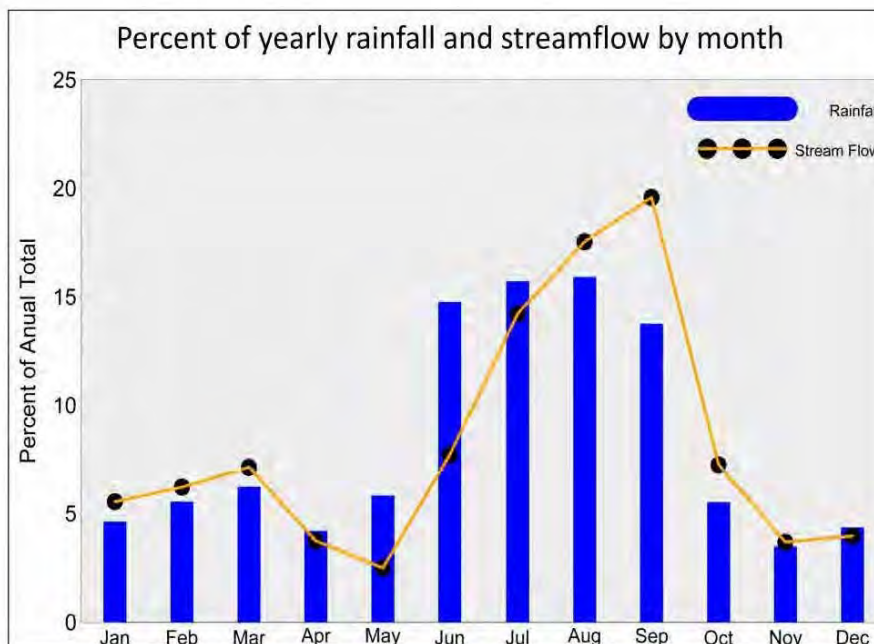


Figure 4-10. The percentage of yearly rainfall and streamflow by month for the Little Manatee River watershed and the LMR Wimauma gage.

4-12

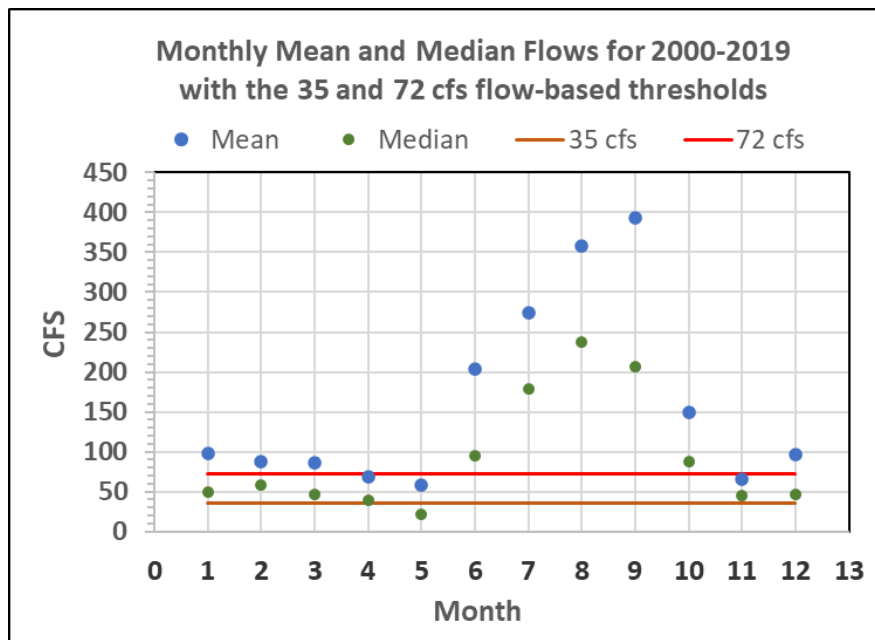
Figures 4-9 and 4-10 from the previous minimum flows report (Hood et al., 2011)

Also, in application of the percent-of-flow method it is very important to understand the seasonal flow duration characteristics of the river, particularly how often the different flow-based blocks will be in effect. In the second paragraph on page 103 the current report states “For reference, 35 cfs is the 34th non-exceedance percentile and 72 cfs is the 60th non-exceedance percentile.” This is one of the most important findings in the report, and in general, the amounts of time that flows will be within the various flow-based blocks needs more description and emphasis in the report.

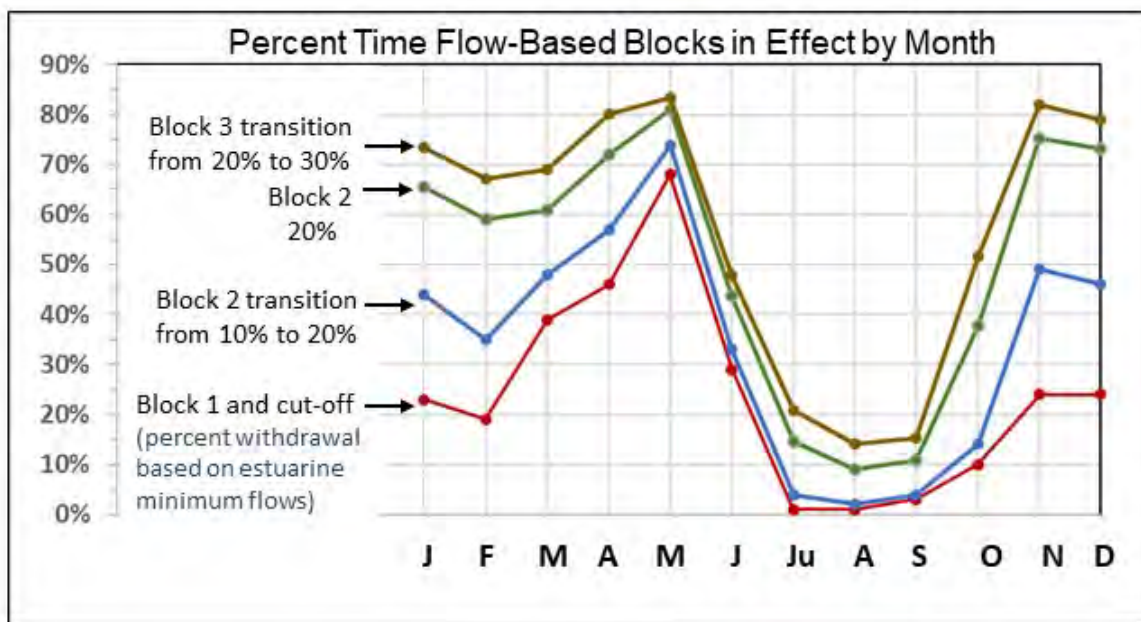
As part of such a description, it would be also helpful to see present a flow duration curve (cumulative distribution function) for the baseline and uncorrected flows for the 1976 to recent period. Both data sets should include corrections for FP&L withdrawals from the river. Also, various percentiles from these two flow records could listed in in a table, as in Table 2 in the first peer review report (Appendix B) or Table 4-2 (page 4-11) in the previous minimum flows report. The current report does show a flow duration curve and some percentile flows for the unadjusted flows at the USGS streamflow gage for four different time periods, but a similar table for baseline and observed flows together would be helpful.

Also, this critical hydrologic information is included in the Sections 5 and 6 of the report. It is probably too late now, but reorganization of the report to put the hydrologic characterization, including the adjustment for baseline flows, in Chapter 2 would be helpful, from where it could be referred to as needed later in the report.

Although flow durations for the entire period of analysis are important, it also useful to see how the flow-based blocks correspond to different seasons in the year. The 35 cfs threshold between blocks 1 and 2 and the 72 cfs threshold between blocks 2 and 3 are show in the figure below along with the average and median flows for each month for a recent 20-year period. It is apparent there are very large differences between months in how frequently flows in the river will be within the different flow-based flows, which has important implications for the ecological effects of the minimum flows.



The figure below shows how often the flow-based blocks would be in effect on a monthly basis. Note that lines are included for the transition between blocks 1 and 2 and between blocks 2 and 3. This is because the full percentage flow reduction for a given block cannot be achieved until flows get to a certain flow rate. For example, using the proposed minimum flows for the estuarine lower river, a 30% flow reduction at 77 cfs in block 3 would result in less flow than a 20% flow reduction at 70 cfs in block 2. Therefore, minimum flows rules typically provide for a transition range between blocks. This operations plan is feasible and is how water user permits for withdrawals from rivers using the percent-of-flow method are currently managed, as the utilities know for each rate of daily flow the amount they can withdraw.



The region below each line is the percent of time that flow reduction, or a lesser flow reduction, will be in effect. For example, in January flows are less than the block 1 cutoff 35 cfs threshold 23 percent of the time. Flows are in the block 2 transition 21 percent of the time, which is the difference between the blue and red lines (44% and 23%, respectively). Full block 2 flow reductions for January will be in effect of 22 percent of the time (66% minus 44%). Flows are fully in block three above the brown line, or 100 percent minus the value of the brown line, which would be 27% of the time (100% – 73%) for January.

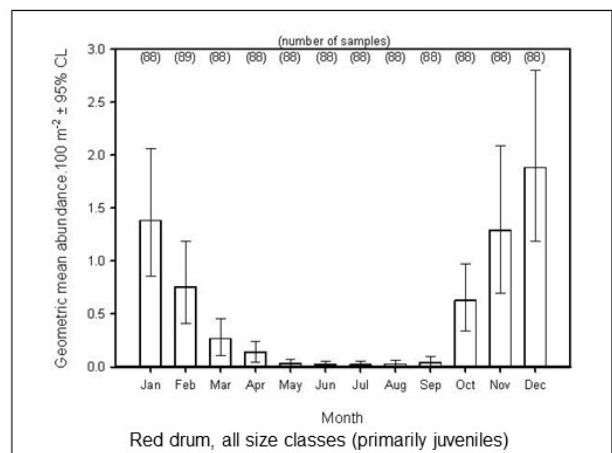
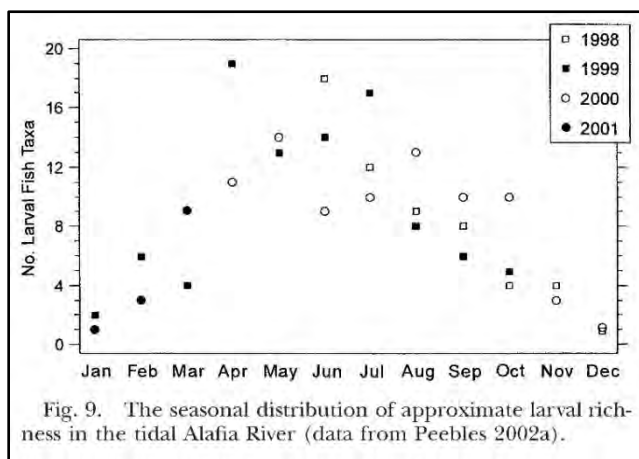
Given the large differences in seasonal flows, it is striking how often the different flow blocks will be in effect in the various months. On average, flows are below the 35 cfs low flow cutoff 68% of the time in May, but only 3% of the time in September. Conversely, flows are in block 3 for 85% of the time in September. However, it is emphasized that these are average conditions over 20 years, and flows can be above or below a given threshold for longer periods of time in a specific year.

Seasons are still relevant

As previously described in this review and the document I submitted on October 6th, the District has gone to flow-based blocks for both the freshwater and estuarine reaches of the river. This is a first, for the District has previously used seasonal blocks for freshwater systems.

I support this approach, but emphasize the District continue to consider seasonal factors in their minimum flows analyses. I was not involved in the earlier PHABSIM evaluations of for freshwater systems, but apparently some freshwater fish species have a strong seasonal component to their reproductive cycles and habitat use patterns.

There are also strong seasonal factors in estuaries, with two figures shown below as examples. It has been repeatedly shown in tidal rivers, with an example shown for the Lower Alafia, that the number of larval fish taxa increases rapidly in the spring due to seasonal fish spawning. Based on estuarine considerations, the journal article by Flannery et al. (2002) suggested that flow reductions should be most restrictive in the spring (article submitted with this review). On the other hand, as shown below, the migration of red drum juveniles into the Little Manatee River occurs in the fall and winter (from MacDonald et al. 2007 cited in the current minimum flows report).



Seasonal factors are also important for water quality in estuaries, as hypoxia is often most frequent in the summer during times of high water temperatures. Similarly, low flows and increasing water temperatures often contribute to large phytoplankton blooms in the spring.

All things considered, I think the flow-based approach proposed for the Little Manatee River is appropriate for the tidal portion of the river, in part because using the percent-of-flow method withdrawals in the springtime will be very low. However, as I recommended in the review submitted on October 6th, I strongly recommend that flow-based blocks be evaluated separately for the freshwater and estuarine sections of the river.

I also think the flow-based approach has important advantages for the freshwater section of the river, but I have not worked on the freshwater biological communities in the river and I defer to the District and the review panel. However, for both freshwater and estuarine systems, I suggest the District continue to evaluate seasonal factors and incorporate them in the minimum flows as needed.

Summary Points

- For some topics, the previous minimum flows report is very informative and the current report should refer to it, although it would be better to repeat those analyses or presentations
- It is probably too late, but the report could be reorganized to put the method for baseline flow creation and flow duration characteristics in Chapter 2 with the other hydrologic information
- The differences between seasonal low and high flows in the Little Manatee are among the highest in the region, so it should not be characterized as having moderate to high baseflow
- The discussion of the AMO has less relevance to the Little Manatee than some other rivers
- Chapter 2 should be slightly reorganized to present the flow hydrographs first, then discuss possible causative factors
- Some time series plots of flows on semi-log scale should be changed to an arithmetic scale
- Some of the trend analyses for flow parameters presented in the first minimum flows report should be repeated or at least referred to
- The report should reference the watershed assessment done by the District in the late 1980s as it was a very large effort that supports the District's current findings regarding flows in the river
- The description of Florida Power and Light's withdrawals from the river should be expanded, or at least refer to the previous District report and list an average withdrawal rate since 2010
- The description of the current status of Mosaic Company's land holdings and rates of outfall discharge should be expanded, or at least refer to the previous District report and update the discharge records at the outfall
- The report should acknowledge that while water quality trends in recent years are encouraging, the Little Manatee River is nitrogen enriched compared to decades prior to the 1970s
- The report should cite Interflow Engineering regarding excess flows in the Myakka River
- The report should include some graphs of the basic hydrologic characteristics of the Little Manatee and a flow duration curve and table of percentiles for observed and baseline flows.
- The report should describe how often flows will be within the various flow blocks by month or season
- Seasons are important for biological use of both the freshwater and estuarine sections of rivers. The District should continue to evaluate seasonal relationships in their minimum flows analyses and incorporate seasonal factors in proposed minimum flow rules as necessary
- The flow-based blocks seem to work well for the Little Manatee River, in part because the resulting maximum allowable flow reductions will be small in the springtime.
- The District should establish flow-based blocks separately for the freshwater and estuarine sections of the Little Manatee River

Overview of selected technical reports about the Little Manatee River and suggested text, figures, or tables for the District's minimum flows report

Prepared by Sid Flannery, October 19, 2021

This document provides an overview of technical reports about the Lower Little Manatee River that were prepared for the District by staff from the State University System, the Florida Marine Research Institute, or Mote Marine Laboratory. I have also prepared paragraphs or single pages of text that include a figure or table that can be inserted into the minimum flows report to present findings from these reports that describe important relationships of the lower river to freshwater inflows.

These findings support the technical basis for the recommended minimum flows and provide valuable information on the physical, chemical and biological characteristics of the Little Manatee River. As described in the 2002 paper in the journal *Estuaries*, the Little Manatee was one of the three rivers on which the development of the percent-of-flow approach for minimum flows was initially based (Flannery et al. 2002). Furthermore, the tidal reach of the Little Manatee River is a State of Florida Aquatic Preserve and one of the most valued natural resources in the Tampa Bay region. As such, it would be beneficial for the report to briefly describe its biological characteristics, especially as they relate to freshwater inflows that will be affected by the proposed minimum flow rules.

1.1 Overview of Phytoplankton Reports

Dr. Gabriel Vargo of the USF College of Marine Science published two reports for the District about phytoplankton related parameters in the Little Manatee River based on just over two years of sampling from December 1987 to January 2000 (Vargo, 1989, 1991). In a separate report, he compared these data to phytoplankton related data collected from the Lower Peace and Alafia Rivers that used a similar salinity based sampling design (Vargo et al. 2004). None of these three reports are currently cited in the draft minimum flows report, but it does cite a paper that Dr. Vargo submitted to the proceedings of the BASIS 2 conference (Vargo et al. 1991).

Combined, these three reports are very informative about the relationships of different salinity zones to phytoplankton related parameters in tidal rivers, particularly the unusual characteristic of the Little Manatee in which the highest phytoplankton counts and chlorophyll *a* concentrations typically occur at the interface of fresh and brackish waters (0.5 psu), compared to other rivers where the highest phytoplankton counts and chlorophyll *a* concentrations typically occur in mesohaline waters.

In a week or so, I will present data that indicate that relationships of chlorophyll *a* to the rate of freshwater inflow and residence time in the lower river could be important to determining flow thresholds to switch between low, medium, and high minimum flow blocks for the estuarine section of the Little Manatee.

References for the three phytoplankton reports are below, including brief overviews of that work. This is followed text on page 4 that I suggest be inserted into the minimum flows report regarding the phytoplankton work on the Little Manatee River.

Vargo, G.A. 1989. Phytoplankton Studies in the Little Manatee River: Species Composition, Biomass, and Nutrient Effects on Primary Production. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

Nutrients, chlorophyll *a*, and primary production were monitored on a bi-weekly basis for one year at four moving salinity based stations in the Little Manatee River and two fixed location stations; one near the mouth of the river in Tampa Bay and one in Ruskin Inlet, an urbanized inlet to the middle reaches of the Little Manatee River estuary. Among the salinity based stations, mean chlorophyll *a* and primary production rates were greatest at the 0.5 psu station and lowest at the 18 psu station. The Little Manatee has very low N:P ratios due to high inorganic phosphorus concentrations in the river water.

Vargo, G.A. 1991. Phytoplankton studies in the Little Manatee River and Tampa Bay: Species Composition, Size Fractionated Chlorophyll, Primary Production, and Nitrogen Enrichment Studies. Report of the University of South Florida College of Marine Science prepared for the Southwest Florida Water Management District.

During the second year of a two-year study of phytoplankton populations in the Little Manatee River and adjacent waters of Tampa Bay, nutrients, size fractionated values for chlorophyll *a* and primary production rates were monitored monthly at a moving 12 psu salinity station in the river and a fixed location station in Tampa Bay. Phytoplankton populations were found to be nutrient sufficient or borderline nitrogen limited with respect to short-term photosynthesis, but long-term growth and biomass were clearly nitrogen limited based on bioassays of natural populations.

Vargo, G.A., M.B. McNeely and R. Montgomery. 2004. An Investigation of Relationships Between Phytoplankton Populations, Water Quality Parameters, and Freshwater Inflows in Three Tidal Rivers in West-Central Florida. Report of the University of South Florida College of Marine Science prepared for the Southwest Florida Water Management District.

Phytoplankton populations, nutrients and chlorophyll *a* concentrations were compared from similar, salinity based sampling designs in the Lower Alafia, Peace, and Little Manatee Rivers. Samples were collected on at least a monthly basis at the locations 0.5, 6, 12, and 18 psu surface salinity values in each river, with exception of the location of 20 psu being sampled in the Peace River. Mean phytoplankton counts were highest at the 12 psu station in the Alafia, the 6 psu station in the Peace, and the 0.5 psu station in the Little Manatee (see figure on next page). Phytoplankton counts were frequently an order of magnitude higher in the Alafia compared to the other rivers, presumably due to high nutrient loading from that watershed. In the figure on the next page, note separate axis for the Alafia River, which is an order of magnitude greater.

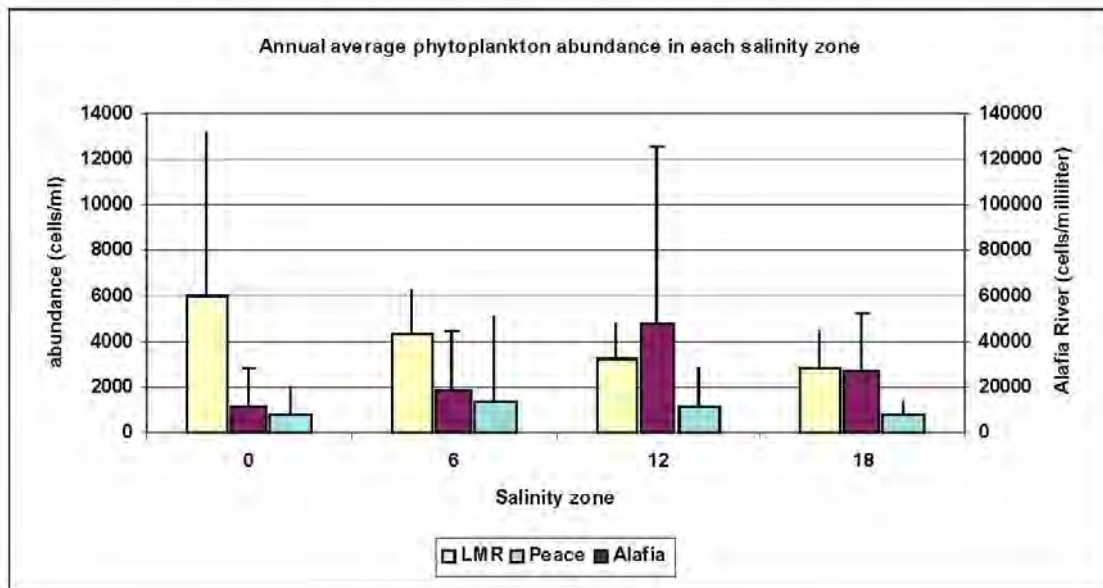


Figure X. Annual average phytoplankton abundance in the Little Manatee, Peace, and Alafia Rivers by salinity zone (20 psu for the Peace grouped with 18 psu). The Alafia is shown on a separate axis since the counts are an order of magnitude greater than the other rivers. From Vargo et al. (2004)

Mean values for chlorophyll *a* concentrations during the phytoplankton sampling periods for these rivers are listed on the following page. The much higher chlorophyll concentrations in the Alafia River are apparent, especially in mesohaline waters. Similar to the phytoplankton count data, the pattern for high chlorophyll *a* in the very low salinity zone (0.5 psu) in the Little Manatee River is again apparent, as are the high concentrations in the mesohaline zones for the Peace and Alafia. Although cell counts are higher in the mesohaline zone in the Little Manatee than in the Peace, chlorophyll *a* concentrations were higher in the Peace due to differences in the species composition of the phytoplankton between the rivers.

Comment - I think that differences in residence time for the Little Manatee contribute to it having its highest phytoplankton abundance and chlorophyll *a* concentrations at the 0.5 psu zone. The upper reaches of the Little Manatee are braided, and given the smaller rates of freshwater inflow, water moves more slowly through the tidal freshwater and oligohaline zones of the Little Manatee compared to the other rivers. All of these rivers (Peace, Alafia and Little Manatee) have residence time values that were generated from hydrodynamic model simulations.

Suggested page for phytoplankton. I think the Little Manatee minimum flows report could contain one page that ties the findings from these reports together. As an example, I have prepared three paragraphs and a table on the following page.

1.2 Phytoplankton (suggested text)

Based on just over two years of sampling spanning 1988 and 1989, the University of South Florida College of Marine Science produced two reports describing phytoplankton related parameters in the tidal reaches of the Little Manatee River and a nearby station in Tampa Bay (Vargo 1989, 1991). Data for nutrients, light penetration, chlorophyll *a*, phytoplankton species composition and primary production rates were measured at four moving salinity-based stations in the river and a fixed location station near the mouth of the river in Tampa Bay (Vargo 1989). Nutrient concentrations in the Little Manatee were characterized by very low nitrogen/phosphorus ratios (generally less than 2) due to high phosphorus concentrations in the inflowing river water. The second of these reports concluded that increased nitrogen loading could result in increased algal biomass and eutrophication in the tidal river (Vargo 1991).

In a subsequent report, (Vargo et al. 2004) compared data from the Little Manatee to phytoplankton related data collected in the Lower Peace and Alafia Rivers that were collected using a similar moving salinity-based design. The highest phytoplankton counts and chlorophyll *a* concentrations typically occurred at the interface of fresh and brackish waters (0.5 psu salinity) in the Little Manatee, whereas the highest cell counts and chlorophyll *a* concentrations typically occurred in mesohaline waters (6 and 12 psu salinity) in the Peace and Alafia (Table x). Using a separate data set for the Alafia, Vargo et al. (1991) compared chlorophyll *a* concentrations and primary production rates for the Little Manatee, the Alafia, and a nearby station in Tampa Bay.

| Table X. Means, number of observations (N) and periods of data collection for chlorophyll <i>a</i> concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers, adapted from Vargo et al. (2004). | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------|--------------|---------------|------------------------------------------|
| | | Salinity-based stations | | | |
| | N | 0.5 psu | 6 psu | 12 psu | 18 psu or 20 psu (Peace only) |
| | | Chlorophyll <i>a</i> (µg/l) | | | |
| Little Manatee (12/87 - 01/90) | 36 | 20.5 | 13.7 | 8.5 | 4.0 |
| Peace - same time period as Little Manatee | 24 | 8.9 | 22.1 | 31.5 | 7.9 |
| Peace - same time period as Alafia | 36 | 6.3 | 23.4 | 22.6 | 15.2 |
| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |

The high chlorophyll *a* concentrations at the freshwater/brackish water interface in the Little Manatee may be related to comparatively long residence times there, which were simulated as part of the development of the hydrodynamic EFDC model for the river (Huang and Liu 2007, Huang et al. 2010, 2011). These comparatively long residence times are related to the braided morphology of the river between kilometers 12 and 16, where the water slows compared to the upstream freshwater reach. These findings and data presented in this report indicate chlorophyll *a* concentrations in the upper reaches of the tidal river could be sensitive to the effects of freshwater flow reductions.

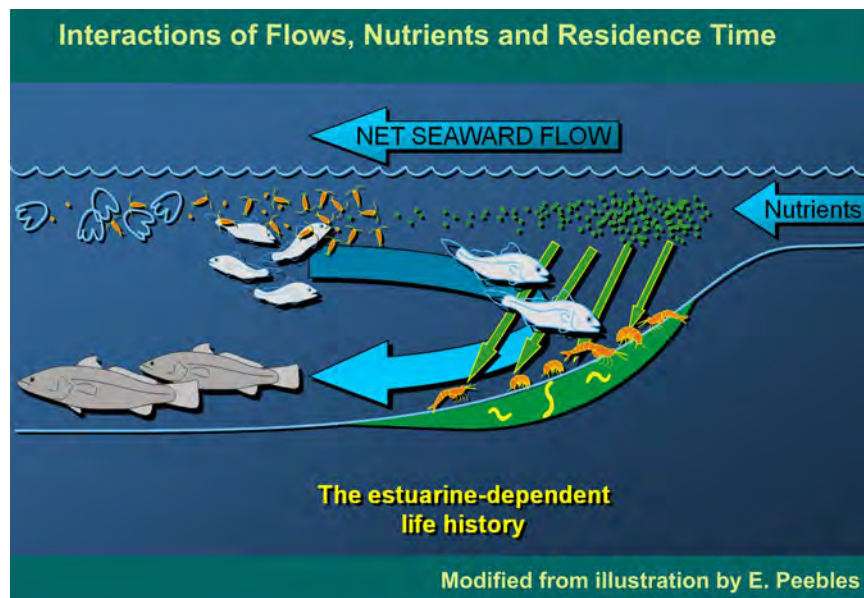
2.1 Overview – Zooplankton Report

Zooplankton were sampled in the estuarine section of the Little Manatee River during 1988 and 1989 concurrently at the same stations as the ichthyoplankton work performed by Dr. Ernst Peebles. Five stations were sampled ranging from the mouth of the river to kilometer 14.2, with another station located at a nearby site in Tampa Bay. The second of these two reports is the more comprehensive of the two and should be briefly described in the District report.

Rast, J.R. and T. L. Hopkins. 1989. The Zooplankton of the Little Manatee River Estuary, Florida. First yearly report. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

Rast, J.P., M.E. Flock, T. T. Sutton and T. L. Hopkins. 1991. The Zooplankton of the Little Manatee River Estuary: Species Composition, Distribution, and Relationships with Salinity and Freshwater Discharge. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

In contrast to fish and benthic macroinvertebrate studies, which have been conducted in many rivers, this is the only true zooplankton study in the region's tidal rivers and it is very informative. The second report describes the abundance and distribution of zooplankton, which for many species are more abundant in the lower reaches of the tidal river. Following the tidal river engine concept developed by Peebles (illustration below), this is where the larval stages of many fishes are concentrated early in their life history when they feed on zooplankton. As they grow to juveniles, these fishes migrate to lower salinity waters and feed more on benthic oriented prey. See the illustration below, all evidence I've seen indicates this conceptual model is generally true.



The abundance of zooplankton in higher salinity waters in the lower river probably also results in increased grazing of phytoplankton and contributes to the tendency for chlorophyll *a* concentrations to be lower and more stable near the mouth of the river. Conversely, ungrazed phytoplankton blooms in lower salinity waters probably results in more deposition (see illustration).

The District minimum flows report could briefly summarize the zooplankton study. Along with one table, this would fit on one page and not substantially affect the pagination of the report. Suggested text for a brief discussion of the zooplankton is provided on the following page

Go to next page

2.2 Zooplankton (Suggested text)

Zooplankton in the Lower Little Manatee River were studied during 1988 and 1989 by the University of South Florida College of Marine Science (Rast et al. 1991). These data were collected concurrently with the ichthyoplankton work in the lower river (Peebles and Flannery, 1992), at the same five locations that ranged from kilometers 0 to 14.2, plus a nearby station in Tampa Bay. This project provides valuable information for the abundance and distribution of major zooplankton groups in the lower river, including; holoplankton (entire life cycle in the water column), meroplankton (in the water column for only a portion of their life cycle), tycho-plankton (swept off of the river bottom) and hypoplankton (swim off the bottom for a limited amount of time).

Average values for the abundance and estimated biomass of these zooplankton groups are listed in Table X. Holoplankton and meroplankton had their highest values and biomass near the mouth of the river and Tampa Bay, whereas combined tycho-hypoplankton had highest values in the middle and upper parts of the lower river (year 1 only as two stations were discontinued in year 2).

Table X. Average density (numbers/m³) and biomass (in parentheses as mg dry weight/m³) for total holoplankton, meroplankton and tycho-hypoplankton for 25 trips from 1/29/88 – 1/31/89

| | Bay or River Kilometer | | | | | |
|----------------------------------|------------------------|-------------------|-------------------|-------------------|------------------|-----------------|
| | Tampa Bay | 0.0 | 3.8 | 7.1 | 10.3 | 14.3 |
| Holoplankton | 309,000 (147.7) | 235,000 (87.6) | 177,000 (44.5) | 150,000 (34.4) | 84,300 (15.1) | 29,700 (5.7) |
| Meroplankton | 40,900 (23.8) | 12,000 (6.5) | 4,350 (3.9) | 3,540 (1.7) | 4,220 (3.6) | 1,490 (1.0) |
| <u>Tycho-hypoplankton</u> | 1,520 (3.7) | 1,290 (3.5) | 1,390 (22.6) | 5,820 (11.3) | 4,590 (12.7) | 1,530 (3.1) |

Zooplankton are very important prey for the early life stages of many fishes, and their abundance in the river is important to the nursery function provided for many estuarine dependent fish species. Based on 48 total samples, the report by Rast et al. (1991) provided informative plots of zooplankton density versus salinity and the rate of freshwater inflow for eleven dominant species or taxonomic groups (e.g., *Acartia tonsa*, *Oithona colcarva*, copepod nauplii, polychaete larvae).

The numbers and biomass of the major zooplankton groups were also plotted vs. salinity and freshwater inflow at the five stations in the river and Tampa Bay. The response of the different species or groups to inflow and salinity differed, with the abundance of several taxa or groups associated with the lower part of the river increasing upstream with decreased freshwater inflow. On the other hand, benthic harpacticoid copepods maintained relatively high abundance in the upper river stations except for very high flow events. In general, this project provides very useful information on how zooplankton species and communities respond to changes in salinity and freshwater inflow, which can affect fish nursery use of the lower river and is related to the establishment of minimum flows.

3.1 Overview – Mollusk Report

Dr. Ernest Estevez of Mote Marine Laboratory performed a field intensive survey of the distribution of mollusks in subtidal and intertidal habitats in the Little Manatee River during August 2006. The draft minimum flows report has one sentence on page 78 that cites Estevez (2006) and states this work was performed, but mentions no findings from the study.

The minimum flows report should provide one table and a brief description of the findings of the Mote study for three reasons. First, the mollusk communities show clear gradients with regard to salinity in the river, which supports the District's use of salinity as a parameter for determining the minimum flows. Secondly, the report describes the distribution of oyster bars in the river, which are important for shoreline stability, improving water quality, and creating habitat for reef associated fauna in the tidal river. Lastly, as previously discussed, the Lower Little Manatee River is an aquatic preserve and the District report should describe the biological communities of the lower river, especially as they relate to freshwater inflows and the determination of minimum flows.

Based on mollusk studies conducted within the District, noted invertebrate biologist Dr. Paul Montagna of Texas A&M University was the senior author of the journal article below that assessed the relationship of salinity to the distribution of mollusk species in tidal creeks and rivers in the region. This study can also be cited along with a discussion of the Mote Marine Study.

Montagna, P. A., E. D. Estevez, T. A. Palmer and M. S. Flannery. 2008. Meta-analysis of the relationship between salinity and molluscs in tidal river estuaries of southwest Florida, U.S.A. *American Malacological Bulletin* 24:101-115.

Two short paragraphs about the Mote study and Montagna et al. findings are provided on the following page, including one figure. I suggest that this text or something similar, including the figure, be included in minimum flows report to enhance the biological information presented for the river and provide additional support of the recommended minimum flows

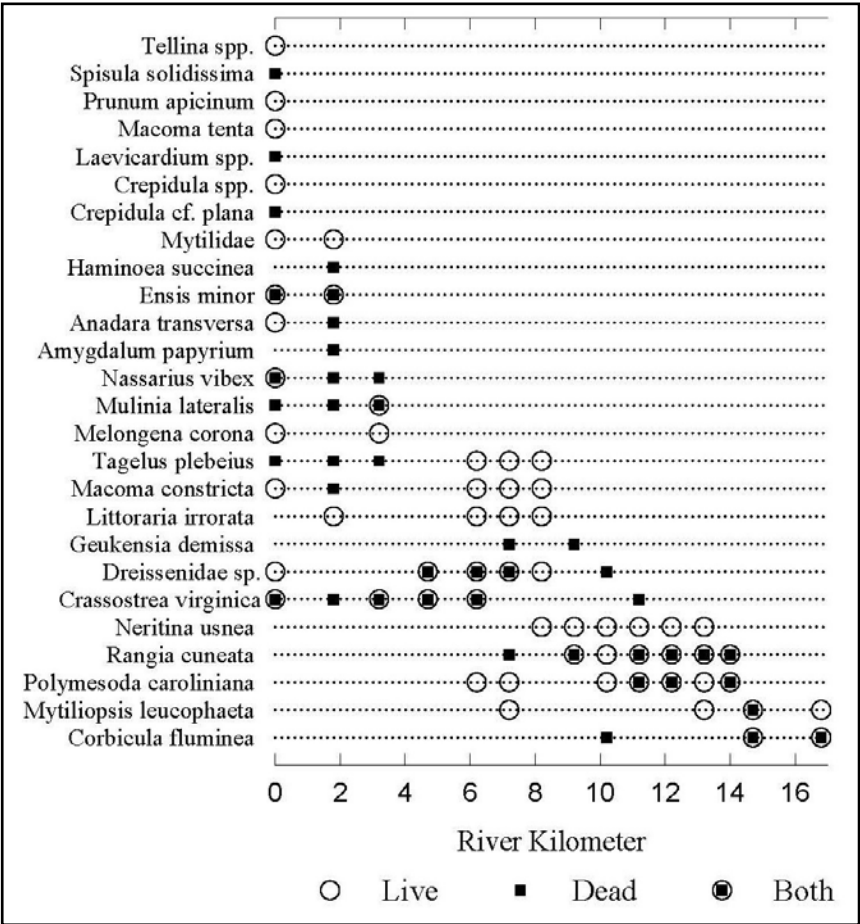
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3.2 Mollusks (Suggested Text)

In August of 2006, Dr. Ernest Estevez of Mote Marine Laboratory performed a survey of the distribution of mollusk species in subtidal and intertidal habitats in the Lower Little Manatee River that identified both live mollusks and dead mollusk material (Estevez 2006). Sampling transects were established at 15 locations in the river ranging between river kilometers 0.4 and 16.8. In addition to their presence within the sampling transects, the distribution of oysters in the river was visually described, with large oyster reefs most conspicuous between kilometers 3 and 5 and in the back bays. Smaller oyster reefs with mostly dead material were near the river mouth, with small reefs widely distributed upstream to near kilometer 11, where only dead material was found.

A total of 26 mollusk species or taxa were found (Table x), which is similar to the species richness found using similar methods in other tidal rivers in the District. Mollusk species showed district distributional patterns in relation to salinity gradients in the lower river. In a study of mollusk communities from eleven tidal tributary systems within the District, Montagna et al. (2008) found that salinity was the primary factor affecting the distribution and species composition of mollusk communities.

Table X. Distribution of mollusk species vs. kilometer in the Little Manatee River, including subtidal and intertidal samples with live mollusks and dead mollusk material, from Estevez (2006).



4.1 Overview – Vegetation in the lower river floodplain.

Section 4.1.2 in the draft minimum flows report describes vegetation communities along the tidal reach of the Lower Little Manatee River. The first sentence in the section says that estuarine conditions extend 15 miles (24 kilometers) upstream from the river mouth, but that is incorrect. Based on extensive field work, Peebles and Flannery (1992) report that brackish waters (>1 psu) typically do not extend farther than 16 to 18 kilometers upstream. Also, as described on page 17 in the minimum flows report, minor tidal fluctuations in water levels can sometimes occur about 1 kilometer upstream of the US 301 bridge, but brackish water does not extend nearly that far.

The description of vegetation communities in the river on pages 69 and 70 in the draft report is pretty good and it references the previous minimum flows report from 2011 (Hood et al. Appendix A). Such a description may be in Hood et al., but I ran out of time and could not find such a discussion in that report which focuses on the freshwater section of the river. However, other reports that can be cited that describe vegetation along the lower river (Peebles and Flannery 1992, Clewell et al. 2002).

Most importantly, vegetation communities along the tidal reach of the Little Manatee River were mapped by the Florida Marine Research Institute (FMRI 1997), with reference the given below. This study focused on five tidal rivers including the Little Manatee. Ground truthing was conducted on the Little Manatee and the report contains a very detailed map of vegetation communities along the river and a discussion of the distribution of plant species and communities.

Florida Marine Research Institute. 1997. Development of GIS-based vegetation maps for the tidal reaches of five gulf coast rivers. Report prepared by the Florida Department of Environmental Protection Florida Marine Research Institute for the Southwest Florida Water Management District.

I showed a slide of the vegetation map from this project at the kick-off meeting of the peer review panel on October 5th. I strongly recommend the minimum flows report include the FMRI map and cite the report that produced it, as it is much more detailed than the FLUCCS vegetation map shown in the draft report. In that regard, it better supports the District's recommended minimum flows that are based on the maintenance of low salinity habitats. The aerial photography on which the FMRI map is based was taken in 1990, but from my frequent trips on the river it does not appear that vegetation in this part of the river had changed or been altered significantly since that time.

If the District prefers, it could still include the FLUCCS map shown on page 70, but also present the more detailed FMRI map. The report could qualify that map was based on photography from 1990, but it is unlikely that vegetation in this section of the river has changed significantly since that time. This map is impressive and I suggest it be displayed full page with landscape orientation as shown on the following page. This would follow nicely the discussion on pages 69 to 71 in the draft minimum flows report. That discussion could possibly be slightly improved in a second round of edits, but getting the FMRI map and citation in the minimum flows report is very important, in no small part because the District should highlight the excellent work it has funded.

Major Vegetation Communities along the Lower Little Manatee River

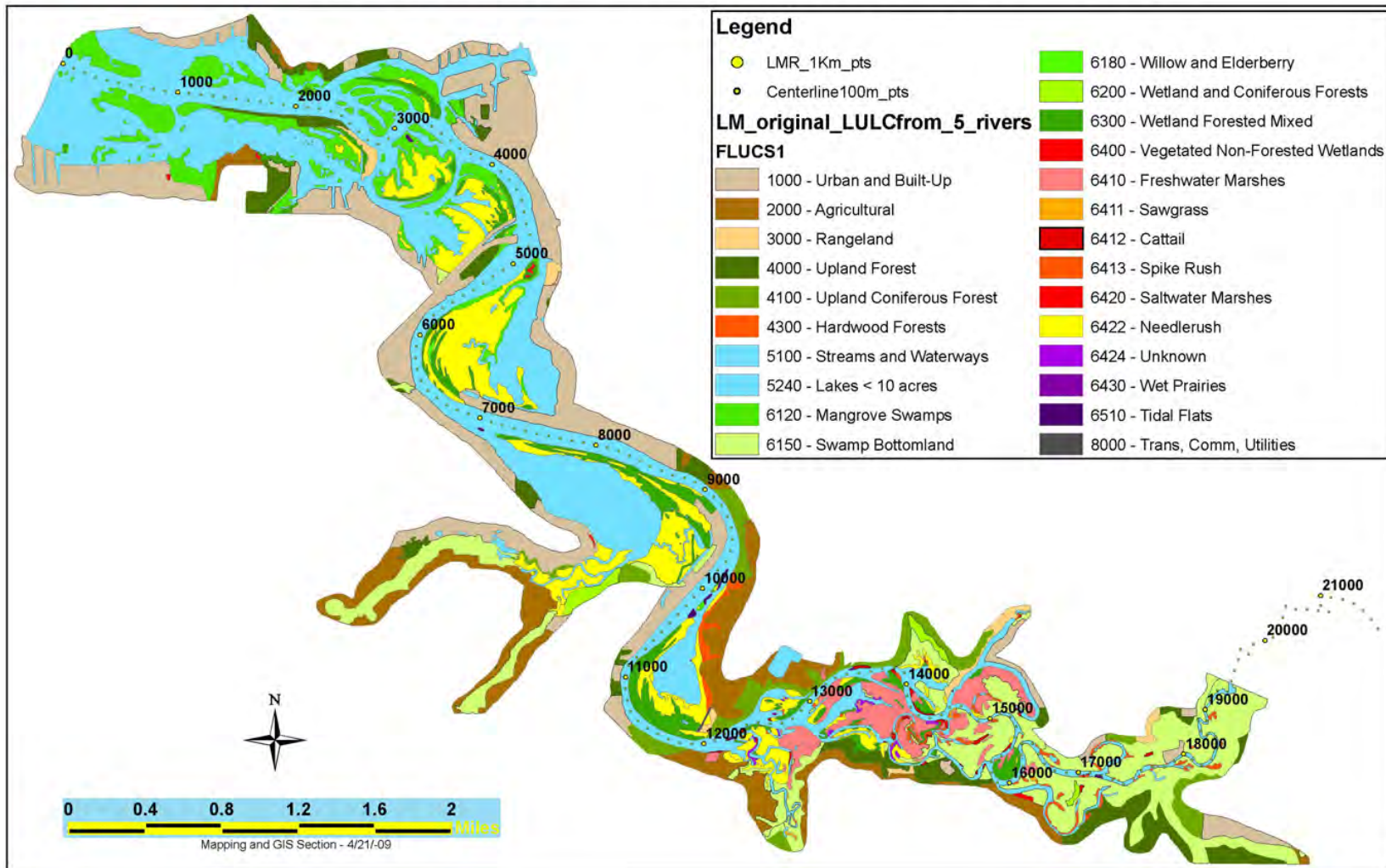


Figure X. Major vegetation communities along the Little Manatee River from FMRI (1997), with channel distances in meters.

5.1 Overview - Residence time analyses

In Section 5.4.5 the draft minimum flows report has a good description of EFDC hydrodynamic model for the Lower Little Manatee River that was developed by faculty and staff from FSU (Huang and Liu 2007). As in other tidal rivers (Alafia, Myakka, Lower Peace), model simulations of changes in salinity were a key analytical approach used to determine the minimum flows.

What the minimum flows report does not describe is that this project also included residence time simulations for the lower that were described in the project report (Huang and Liu 2007). This was pursued because the earlier minimum flows analyses for the Lower Alafia River found relationships between residence time (as water age) and very high chlorophyll *a* concentrations in sections of that tidal river. Since then, the District has made a point of having residence time simulations performed for tidal rivers, including the Lower Peace and the Little Manatee.

The project by Huang and Liu simulated residence time as Estuarine Residence Time (ERT) and Pulse Residence Time (PRT), with values of water age at ten locations in the tidal river used to calculate PRT at those locations. Two journal articles concerning residence time in the Little Manatee were also produced from this work (Huang et al. 2020, 2011), for which references are listed below.

Huang, W., X. Liu, X. Chen and M. S. Flannery. 2010. Estimating river flow effects on water ages by hydrodynamic modeling in the Little Manatee River estuary. *Journal of Environmental Fluid Mechanics* 10(1-2):197-211.

Huang, W., X. Liu, X. Chen and M. S. Flannery. 2011. Critical flow for water management in a shallow tidal river based on estuarine residence time. *Water Resources Management* 25(10): 2367-2385.

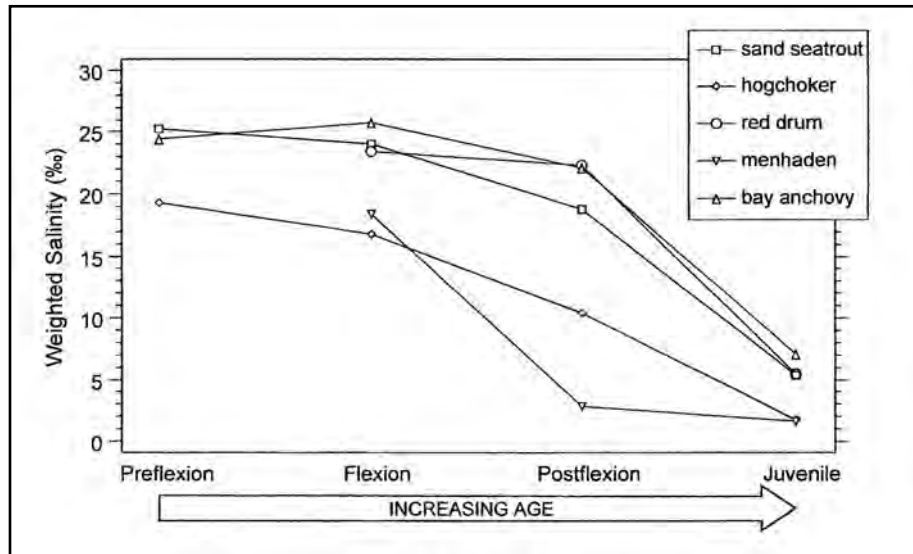
In comments I will submit in a week or so, I will recommend that further analyses be performed to evaluate flow thresholds for switching between low, medium, and high flow blocks specific to the lower river. At present, the thresholds for the flow blocks for the estuarine section of the river were based solely on freshwater analyses, which the District has never done before. This is probably not the best approach and needs to be addressed with additional analyses specific to the lower river.

In that regard, I think that examination of residence time as a function of freshwater inflow needs to be conducted, including evaluating the effects of various flow reductions on residence time. Next week, I will present some information concerning residence time (as water age) and the occurrence of high chlorophyll *a* concentrations in some segments of the tidal Little Manatee River.

But that is for another day. At this time, I recommend that the minimum flows report reference the residence time work performed by Huang and others, possibly showing the results of some residence time simulations in the minimum flows report.

6.1 Overview and suggested text for ichthyoplankton reports

On page 4.3.3 the report has one paragraph that summarizes the Ichthyoplankton work performed by Dr. Ernst Peebles of the University of South Florida College of Marine Science. This summary is good and well written, but I recommend two additions. First, the figure from Peebles and Flannery (1992) below be shown in the minimum flows report. As I mentioned at the peer review kick-off meeting, I think if there is one figure that best justifies the District's minimum flows program for tidal river estuaries, this is it.



Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages, from Peebles and Flannery (1992)

To reference this figure, the text could be added to say something like “Based on detailed microscopic work that identified early life stages as eggs, larvae, or juveniles, density weighted mean salinity values for different life stages were calculated. For a number of species, this showed a movement from higher salinity to lower salinity waters located further upstream as the species matured from larval to juvenile stages (Figure x). This occurs as these fish develop stronger swimming ability and have a change in food habits, switching from diets rich in zooplankton near the mouth of the river to more benthic food resources further upstream (Peebles 2005).” A reference for this second report is below.

Peebles, E. 2005. Review of feeding habits of juvenile estuarine dependent fishes and blue crabs: Identification of important prey. Report prepared by the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

The second addition I suggest pertains to the report by Peebles (2008). At present the draft minimum flows report has one sentence that says “These data were re-evaluated in 2008 using newly developed analytical methods (Peebles 2008).” Some of these findings in the 2008 report are very interesting and are relevant to freshwater inflow management. I suggest the District and JEI review

the summary section for this report and select two or three findings to briefly mention in the minimum flows report. I suggest “These data were re-evaluated in 2008 using new analytical methods that included analyses of organism dispersion as a function of freshwater inflow and organism associations with water masses of varying water age. The study also assessed community heterogeneity as a function of freshwater inflow and mean salinity at the sampling stations in the river.”

6.2 Overview and suggested text for Nekton sampling conducted as part of the Fisheries Independent Monitoring Program of the Florida Fish and Wildlife Conservation Commission

The consultant has done a very good job of accessing and analyzing the extensive data for nekton (fishes and free swimming macroinvertebrates) in the estuarine section of the Little Manatee River collected by the Fisheries Independent Monitoring Program (FIM) of the Florida Fish and Wildlife Conservation Commission (FFWCC or FWC). On page 93 the draft minimum flows report provides a one sentence summary of a report produced by the FFWCC for the District based on these same data collected between 1996 and 2006 (MacDonald et al. 2007). That sentence mentions this study “demonstrated the importance of the Little Manatee River estuary for providing habitat throughout the year, as peaks in juvenile abundance of offshore spawners, juvenile nearshore spawners, estuarine spawners, and tidal-river residents occurred in different seasons (MacDonald et al. 2007).”

Though this characterization is helpful, I suggest the minimum flows report could mention a couple other analyses or data presentations from the MacDonald et al. (2007) report. Also, it is not critical, but one page of figures from that report could be shown to highlight the types of information that are presented in it. I suggest something like below, including the figures for Red drum shown on the following page.

“This report also provides useful analyses and tabular and graphical presentations of the abundance and distribution response of various species in relation to freshwater inflow, plus the size classes, salinity at capture, and abundance of species in different sections and habitats in the lower river. As an example, a series of graphics for the seine catch of Red drum (*Sciaenops ocellatus*) from MacDonald et al. (2007) are shown on the following page.” (see figure on the following page).

Sciaenops ocellatus (Red drum), Seines

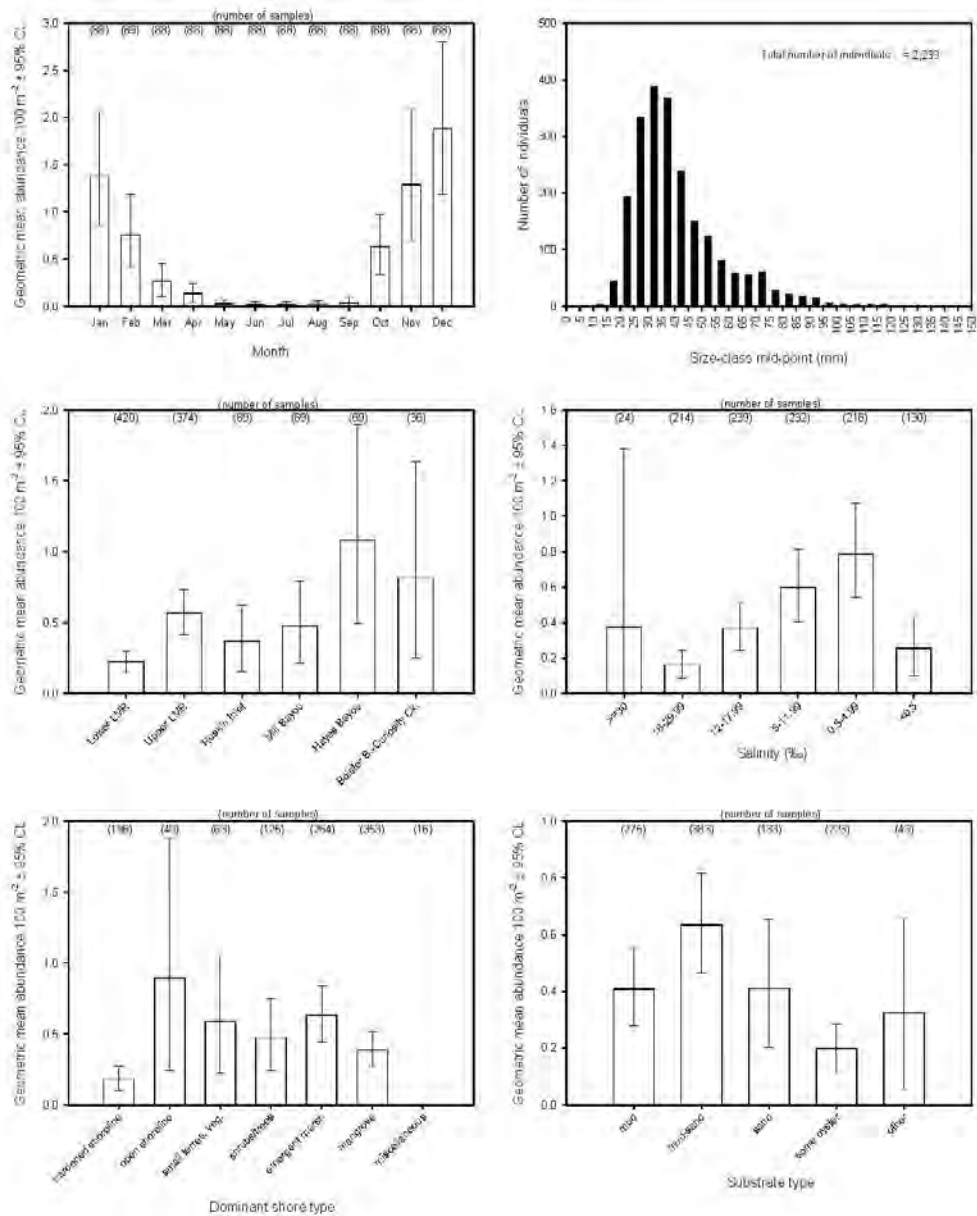


Figure 71. Abundance of *Sciaenops ocellatus* (red drum) in shoreline habitats of the Little Manatee River watershed (FIM SRS survey, January 1996–December 2006).

Figure X. Graphics for the seine catch of Red drum (*Sciaenops ocellatus*) in the Lower Little Manatee River reprinted from MacDonald et al. (2007).

6.3 Multi-River Fish Reports

Both FFWCC and USF prepared reports for the District that analyzed data pooled for the 18 or so rivers they studied for the District. The consultant might find some useful results in these reports that are relevant to the findings presented in the Little Manatee minimum flows report. References for these reports are below.

Hollander, D. and E.B. Peebles. 2004. Estuarine Nursery Function of Tidal Rivers in West-Central Florida: Ecosystem Analyses Using Multiple Stable Isotopes. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

Peebles, E.B. 2005. Review of Feeding Habits of Juvenile Estuarine-Dependent Fishes and Blue Crabs: Identification of Important Prey. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

Burghart, S.E. and E.B. Peebles. 2011. A Comparison of Spring-Fed and Surface-Fed Estuaries: Zooplankton, Ichthyoplankton, and Hyperbenthos. Report of the University of South Florida College of Marine Science for the Southwest Florida Water Management District.

Gunther, C.B., T.C. MacDonald and R.H. McMichael. 2011. Comparison of Nekton Community Structure Among Spring- and Surface-Fed Estuarine Rivers of Florida's West Coast. Report prepared by the Florida Fish and Wildlife Conservation Commission for the Southwest Florida Water Management District.

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Eric DeHaven](#); [Adrienne E. Vining](#); [Xinjian Chen](#); [Jordan D. Miller](#); [Chris Zajac](#); [Kristina Deak](#); [Gabe I. Herrick](#); [Lei Yang](#); [Danielle Rogers](#); [Philip Rhinesmith](#); [mburke](#); [esherwood](#); [Karlen, David](#); [Ernst Peebles](#); [ash](#); [Dougherty, Janet](#); [Wessel Mike](#); [Tony Janicki \(tjanicki@janickienviromental.com\)](#)
Subject: Overview of reports about the Little Manatee River and suggested material for the minimum flows report
Date: Tuesday, October 19, 2021 3:24:28 PM
Attachments: [Overview and suggested text to describe technical reports about the Little Manatee River.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Attached is a document I prepared that provides an overview of several technical reports about the Little Manatee River and provides text the District could include in the minimum flows report to briefly summarize their relevant findings. Would you please upload this email and the attached document to the minimum flows WebForum and inform the Little Manatee minimum flows peer review panel that they are there.

As the attached document describes, I think the District report would benefit greatly from citing and briefly describing the referenced reports for they contain findings that describe the biological communities in the river, including their relationships with salinity gradients and freshwater inflows. In that regard, I think they provide important information that supports the establishment of minimum flows.

Also, the Little Manatee River is part of a State of Florida Aquatic Preserve and is a very highly valued resource in the Tampa Bay region. It therefore benefits the District to summarize information about its biological communities, especially as they are related to salinity gradients and freshwater inflows.

Five of these reports are currently not cited in the draft minimum flows report, while some others are mentioned only very briefly. In addition to biological communities, Section 5.1 in my document pertains to residence time analyses that were performed as part of the development of the EFDC model for the Little Manatee River, which is described in the final report for that project (Huang and Liu, 2007).

I plan to virtually attend tomorrow's meeting of the Little Manatee peer review panel and would like to address them for several minutes to briefly describe the contents of the three documents I have submitted.

Thanks very much,
Sid Flannery

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Eric DeHaven](#); [Adrienne E. Vining](#); [Xinjian Chen](#); [Jordan D. Miller](#); [Chris Zajac](#); [Kristina Deak](#); [Gabe I. Herrick](#); [Lei Yang](#)
Subject: Document to sent to the District tonight, hopefully can be uploaded tomorrow
Date: Tuesday, October 26, 2021 3:33:05 PM

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Tonight I will send to the District a pdf file that contains graphics I created related to the determination of flow thresholds to identify low, medium, and high minimum flow flow blocks for the estuarine section of the Little Manatee River.

That email and attached document will be your email inbox first thing tomorrow morning. If you could upload it to the minimum flows WebForum tomorrow morning that would be very helpful, as I could tell the review panel during the public comment period that the document is up and available for their review.

Thanks,
Sid

Graphics related to the evaluation of flow thresholds for flow-based blocks for minimum flows for the estuarine section of the Little Manatee River



Submitted by Sid Flannery, October 27, 2021

Overview and organization of this document

This document provides a set of graphics and brief text related to the determination of flow rates that can serve as thresholds to identify low, medium, and high flow blocks for minimum flows for the estuarine section of the Little Manatee River. It is being submitted as part of the independent peer review that is being conducted for the draft minimum flows report for the Little Manatee River published by the Southwest Florida Water Management District (the District).

As part of the review process, I have been commenting as a private citizen and have previously submitted three sets of documents to District staff and the peer review panel for their consideration. My comments that will be presented to the peer review panel meeting on October 27, 2021 are attached as an Appendix to this document.

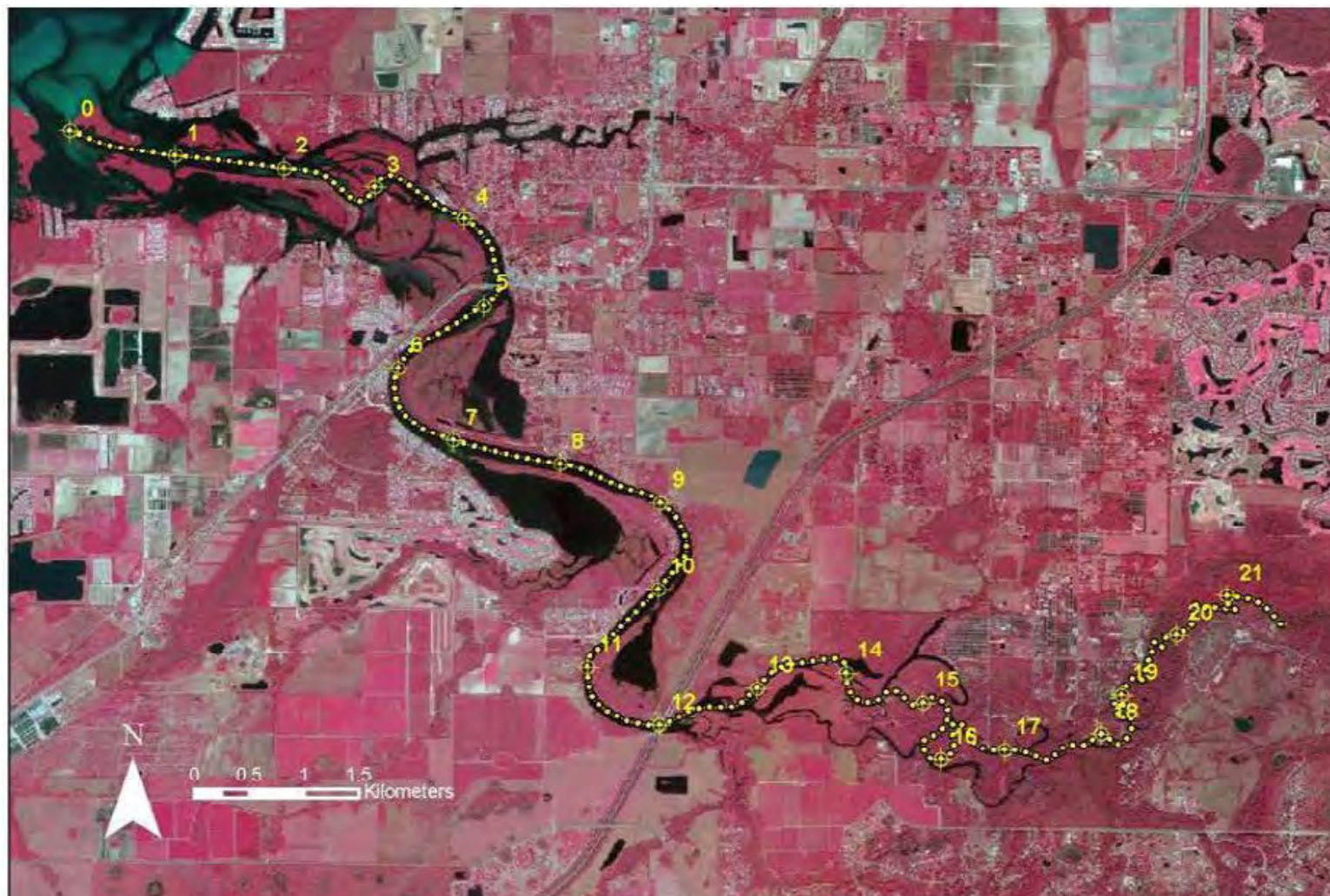
The draft minimum flows report for the Little Manatee identifies flow rates of 35 and 72 cfs to serve as thresholds to identify low, medium, and high flow blocks for the minimum flows. These flow rates were based solely on analyses of the freshwater reach of the river, but they are being applied to the estuarine reach of the river as well. As my comments in the Appendix state, the District has never done that before, and I strongly recommend that thresholds to identify flow-based blocks be evaluated separately for the freshwater and estuarine sections of the river. Those comments also describe a type of analysis that was done for the first determination of minimum flows for the Lower Peace River that I think should be performed for the Little Manatee to assess appropriate flow blocks for the estuarine reach of the river.

Given the very short time frame of the peer review process, the graphics presented in this document were put together very quickly and are by no means a comprehensive set of graphics related to this topic. I'm sure there are other relationships that could be examined. I did not have time to review biological information for the river in this regard, but plots of chlorophyll *a* vs. flow are included, which I think are very meaningful.

Many of the graphics have a reference line for 72 cfs, which was visually approximated using power point. As the Appendix states, I think the 72 cfs is clearly too low to serve as a threshold to identify the high flow block for the estuarine section of the Little Manatee. Some brief text is included with some of the graphics, particularly for chlorophyll *a*. All text was also prepared quickly and is not a thorough treatment of these relationships.

For evaluating any apparent shifts or inflexion points in the data, readers should consider the following graphics essentially represent a baseline condition. That is, the application of minimum flows will reduce the flows, basically moving the relationships to the left. For example, with the proposed minimum flows, a flow of 70 cfs could be reduced to 56 cfs and a flow of 110 cfs could be reduced to 77 cfs. Therefore, in considering what might be an appropriate threshold to switch between flow-based blocks, the threshold should include a buffer that is slightly above the apparent inflexion point in order to best manage a sensitive flow range.

For reference, a centerline map of the Little Manatee River is shown on the next page.



Centerline map of the Lower Little Manatee River with distances in kilometers

Chlorophyll *a*

I have not had time to review appendices to the minimum flows report the deal with water quality, so I don't know if they contain graphics or analyses similar to what I have presented below. Regardless, it is very informative to plot chlorophyll *a* concentrations versus freshwater inflow in tidal rivers. When doing so, the relationships with inflow in the Little Manatee are similar to what have been observed in other tidal rivers for which there are abundant chlorophyll data (Lower Alafia, Lower Peace), with one difference that is discussed on the following page.

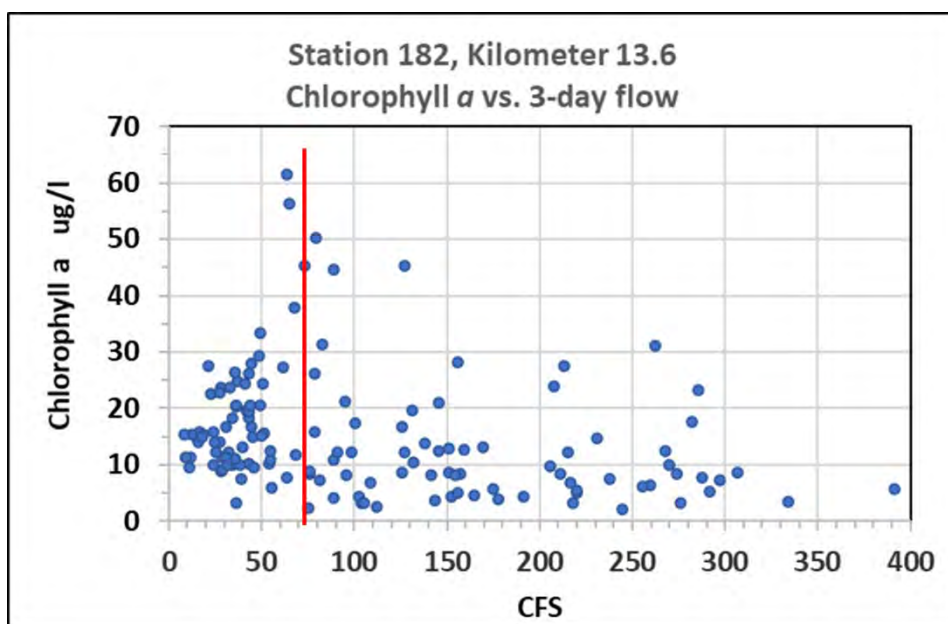
As part of the peer review process, I submitted a document titled *Overview and suggested text to describe technical reports about the Little Manatee River* that was posted on the minimum flows WebForum under public comments. That document provides citations and brief descriptions of District sponsored studies of phytoplankton related parameters (including chlorophyll *a*) in the estuarine reach of the Little Manatee, with one study also including data from the Lower Peace and Alafia rivers. I have not had time to access those data, but can make some comparisons and conclusions based on previously published findings.

The graphics below are taken from water quality sites monitored the Environmental Protection Commission of Hillsborough County (EPCHC, often referred to simply as EPC) that were presented in the draft minimum flows report. The EPC is to be highly commended for expanding their water quality sampling network to add three new data collection sites in the Little Manatee, starting in 2009. These data, plus the longer-term site at Station 112, provide very extensive monthly water quality data at those four locations in the tidal Little Manatee River.

Go to next page

The figure below is from station 182, located in the braided oligohaline section of the river near kilometer 13.6. The pattern that is shown is typical of the upstream reaches of tidal rivers, in that high chlorophyll concentrations are not frequently observed at very low flows (20 to 30 cfs below) probably due to low nutrient loading. However, when flows increase, high chlorophyll concentrations can occur due to greater nutrient loading, with residence times that are still fairly long allowing phytoplankton blooms to develop.

However, at higher flows, high chlorophyll *a* concentrations are not frequently observed as water is moving through these upper reaches of the tidal river fairly rapidly with low residence times. Water color also increases at high flows, which limits light penetration. This tendency would be shown more clearly if the horizontal axis below was expanded to include higher flows, but the emphasis on this graphic is on lower flows. Three-day flow is the average flow for the day of sampling and the preceding two days.



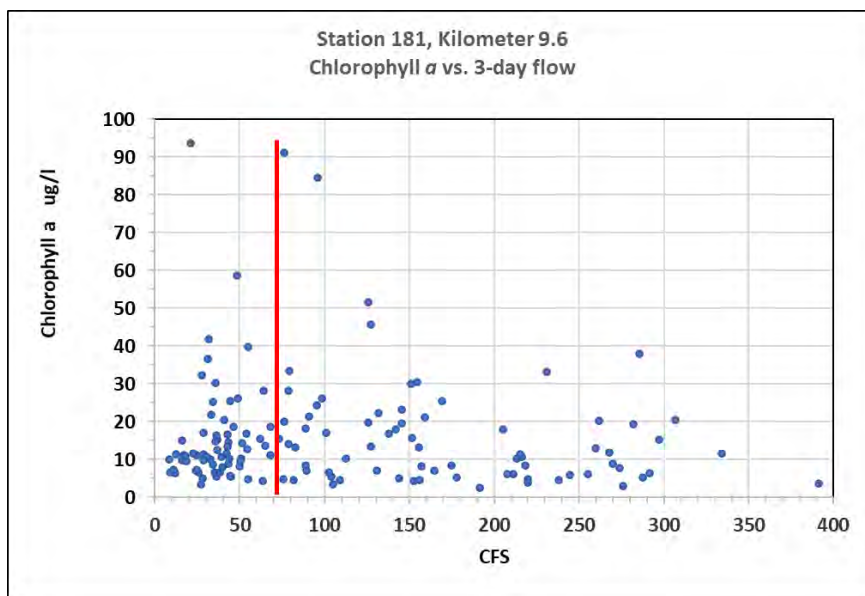
A red reference line is shown in the figure above at approximately 72 cfs, which is the threshold to switch from the medium to high flow block in the proposed minimum flows, which will allow a change in percent withdrawals from 20 percent to 30 percent. Again, this threshold was based solely on analyses of the freshwater reach of the river upstream of US highway 301. As shown in the figure above, 72 cfs is right in the middle of the flow range of when very high chlorophyll *a* concentrations can occur at this location.

What is interesting about the Little Manatee is that peak chlorophyll *a* concentrations often occur in very low salinity waters, even close to the tidal interface between fresh and brackish waters. As described in the *Overview and suggested text* document, peak chlorophyll *a* concentrations often occur in mesohaline waters in the tidal reaches of the Peace and Alafia Rivers. It appears

this difference in the Little Manatee is that water slows down considerably in the braided section of the river upstream of I-75, with longer residence times there compared to the upper reaches of other tidal rivers.

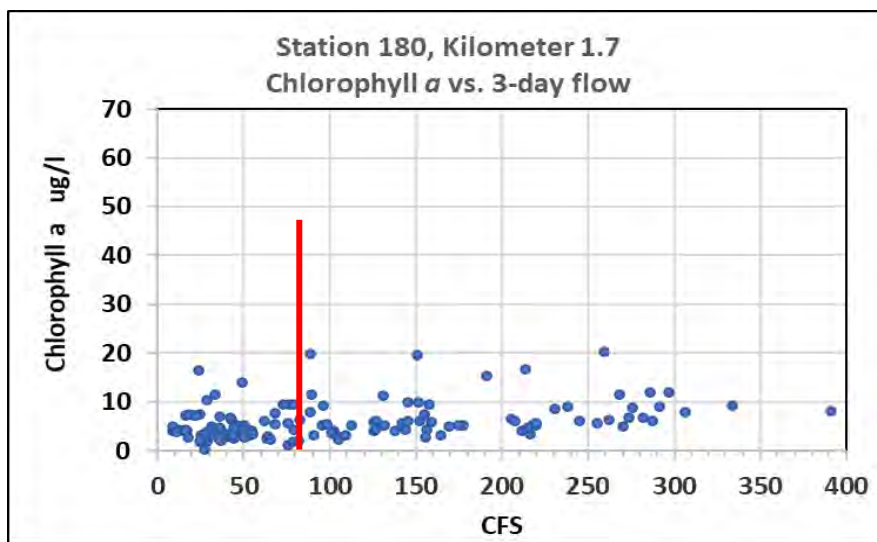
As part of the development of the EFDC hydrodynamic model for the Little Manatee, Drs. Huang and Liu of Florida State University did residence time simulations for the river that are summarized in the *Overview* document that was previously submitted. The District has also done residence time analyses in the Lower Peace and Alafia Rivers, with the minimum flows report for the Lower Alafia presenting a good discussion of the relationships of residence time to chlorophyll *a* in that river.

The relationship of flow to chlorophyll *a* will change at different locations in a tidal river due to changes in the volume of the estuary, residence time, available nutrients, light penetration and tidal exchange with the bay. Plots are presented for EPC stations 181 and 180 in the following discussion, with data shown below for station 181, which is located near kilometer 9.6.



The highest peak chlorophyll *a* concentrations in the Little Manatee recorded by the EPC are at Station 181. High concentrations above 80 $\mu\text{g/l}$ were limited to when three-day average flows were less than 100 cfs, with two concentrations above 90 $\mu\text{g/l}$ at flows below 77 cfs. The minimum flows report has a time series plot of yearly geometric means for chlorophyll *a* that shows that during some years, the FDEP impairment threshold of an annual geometric mean of 11 $\mu\text{g/l}$ is exceeded at this station. I agree with some review panel comments that this threshold is probably too low for productive tidal rivers. However, individual chlorophyll *a* concentrations can be strongly affected by the rate of freshwater inflow, and the occurrence of problematic very high chlorophyll concentrations from large phytoplankton blooms can be exacerbated by flow reductions in sensitive flow ranges in various sections of a tidal river.

The graph below is for station 180, which is located near 1.7 kilometers upstream of the mouth of the river. For easier comparison to the other figures, the Y axis is taken up to 70 $\mu\text{g/l}$. It is obvious that chlorophyll *a* concentrations are much lower at this location and have a very different relationship with freshwater inflow, due likely to the volume of the estuary, tidal flushing from the bay, and limited available nutrients at low flows. However, at this location there is a tendency for slightly higher chlorophyll *a* concentrations at higher flows, as nutrient delivery from the watershed is increased.



It should be noted that the Little Manatee River has been enriched with nitrogen due to human activities in the watershed. The draft minimum flows report found that with the exception of organic nitrogen at one site, trends for various forms of nitrogen have either been showing no trend or decreasing at EPC stations in the lower river in recent years. However, as described in the document I submitted titled *Technical review of the Little Manatee River flow characterization*, as part of a large study of the Little Manatee River watershed that was conducted by the District and other agencies in the late 1980s, long-term nitrogen data indicated that agriculture activities have increased nitrate concentrations in the river considerably compared to decades prior to the mid-1970s. Given that the river is nitrogen enriched, it is important to carefully manage the effects of flow reductions on excessive phytoplankton blooms and high chlorophyll *a* concentrations in the river.

Again, I have not had time to review the appendices to the minimum flows report that deal with water quality, but the data for stations 181 and 182 in the mid to upper reaches of the tidal river indicate the 72 cfs threshold to switch to 30 percent withdrawals is too low, as it could exacerbate excessive phytoplankton blooms in that part of the river. New analyses should be conducted to develop a threshold for a high flow block for the estuary based on relationships in the lower river, rather than from the freshwater reach where the 72 cfs flow threshold was derived.

SALINTY

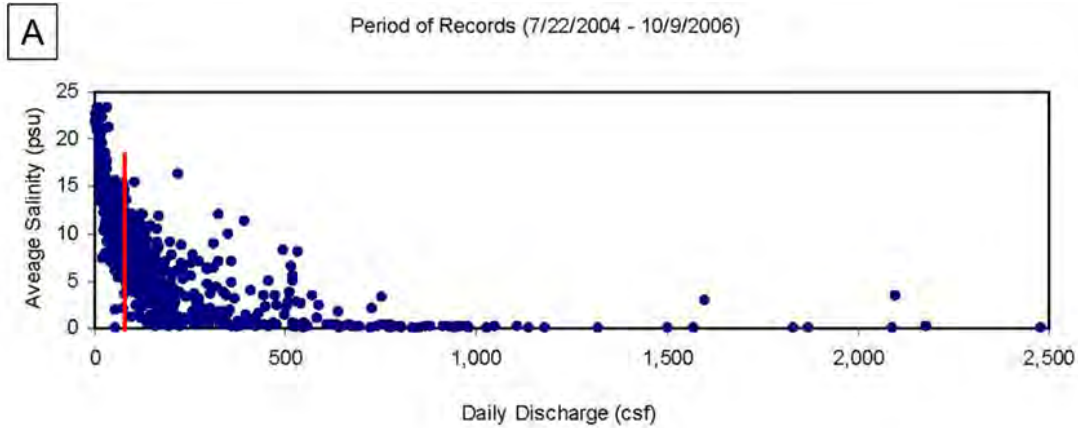


Figure 15. Salinity versus daily discharge for the USGS 02300546 gage, Little Manatee Rive at Ruskin, FL (RKM = 8.3)

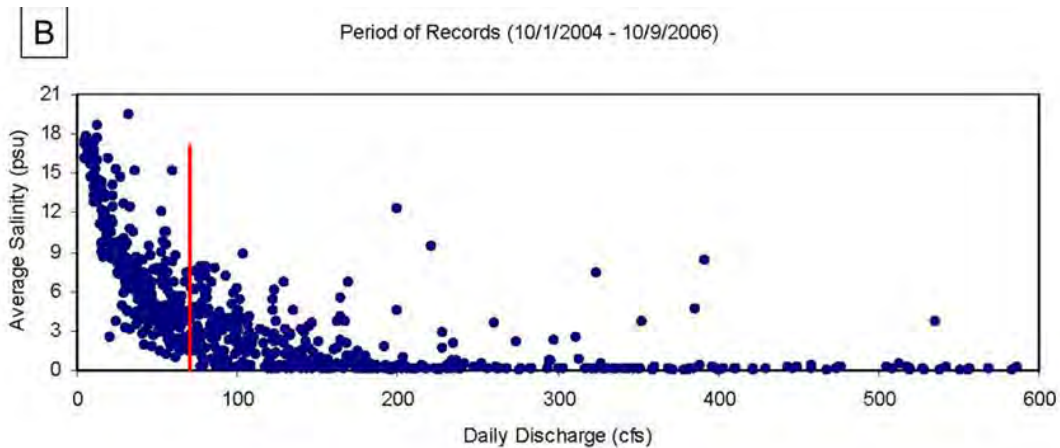
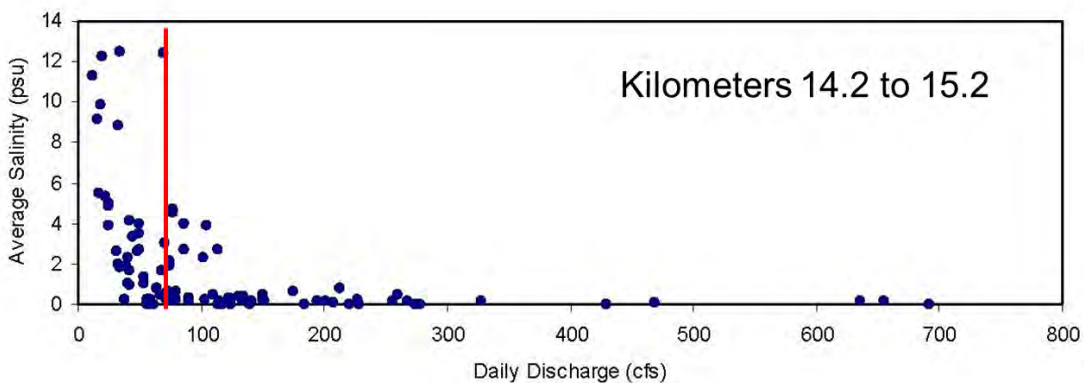
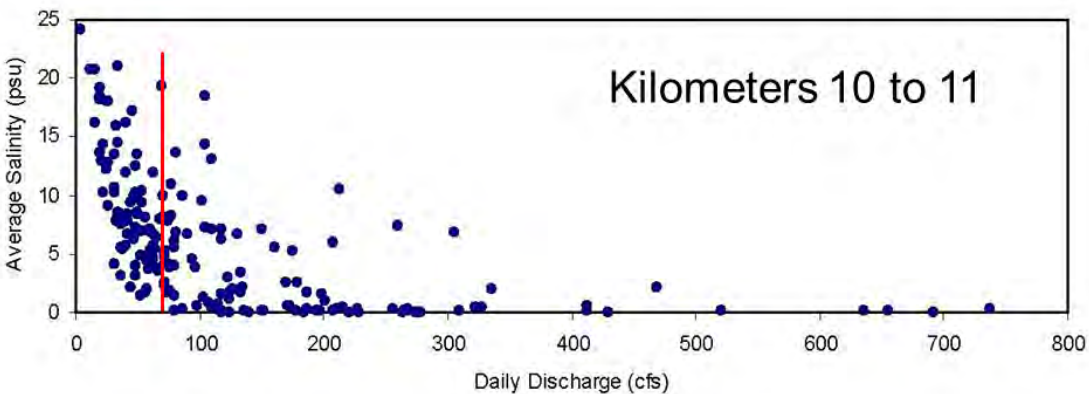
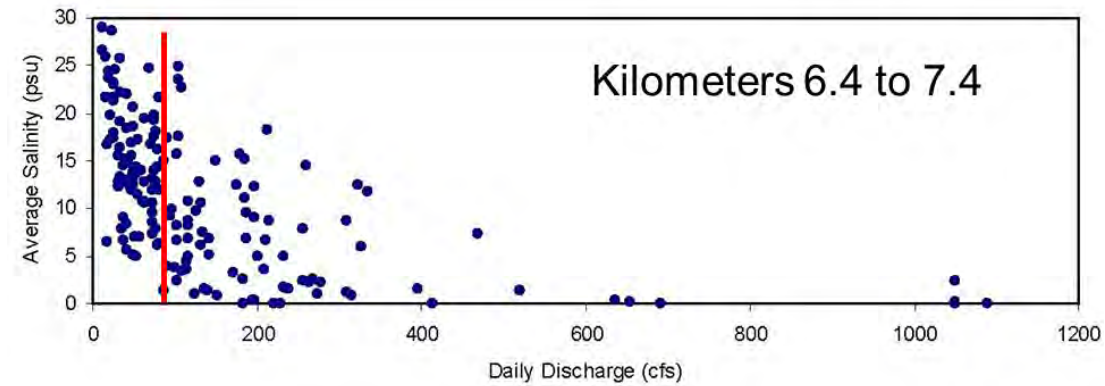


Figure 16. Salinity versus daily discharge for the USGS 02300542 gage, Little Manatee River at I-75 near Ruskin, FL (RKM = 12.1)

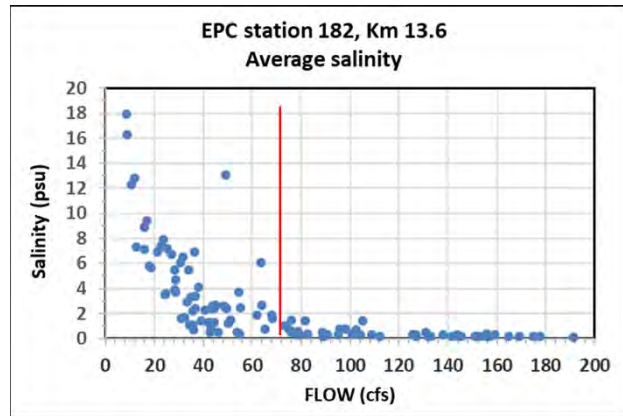
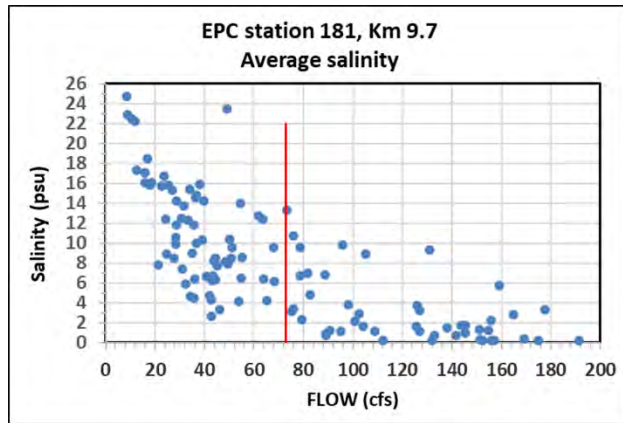
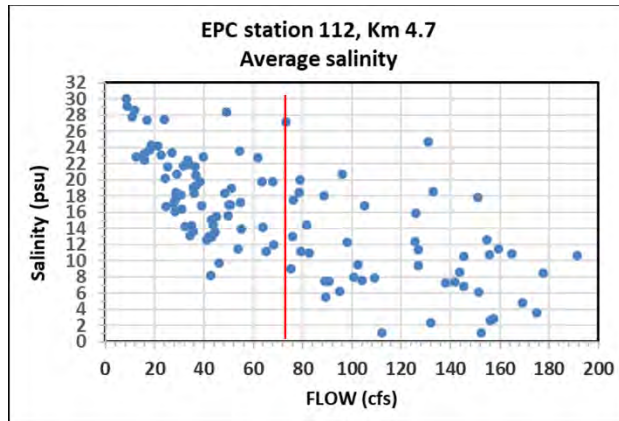
Red reference lines inserted at approximately 72 cfs

The USGS operated a series of continuous salinity recorders in the river to support the development of the EFDC hydrodynamic model for the river during 2004 to 2006. Plots of average daily salinity from the top and bottom sensors at each location are shown above for two recorders located at kilometers 8.3 and 12.1. The recorder at 12.1 is at the I-75 bridge, which is just downstream of the braided zone of the river that contains abundant oligohaline marshes that grade upstream to tidal freshwater marshes and forest. Salinity is very responsive to flow in the range of 72 cfs at this location, with the response dampening at higher flows.



Red Line reference lines inserted at approximately 72 cfs

These graphics on this page are average salinity values from vertical profiles taken by the District and other parties between March 1985 and October 2006. I don't think that 72 cfs represents a good high flow threshold to increase withdrawals, as salinity is very responsive to flow reductions at these sites near that flow value, with a dampened and flatter response at higher flows. Considering that for the most recent twenty year period, 72 cfs has been exceeded 52 percent of the time, a higher threshold to identify high flows would be more appropriate for this estuarine system.



The graphics above are from the Hillsborough County EPC's water quality stations in the tidal river that have been monitored since 2009. At these stations, EPC measures salinity at top, middle and bottom depths, with the average of these values shown above. For station 181 (middle graph), 72 cfs again appears to be too low to serve as a high flow threshold compared to a higher flow rates. The data at station 182 seem more supportive of the 72 cfs threshold, but these salinity values are lower than some average values for kilometers 14.2 to 15.2 reported by the District shown on the previous page. This might be because the District frequently sampled near high tide, or possibly because the District took salinity profiles at surface and 1 meter intervals.

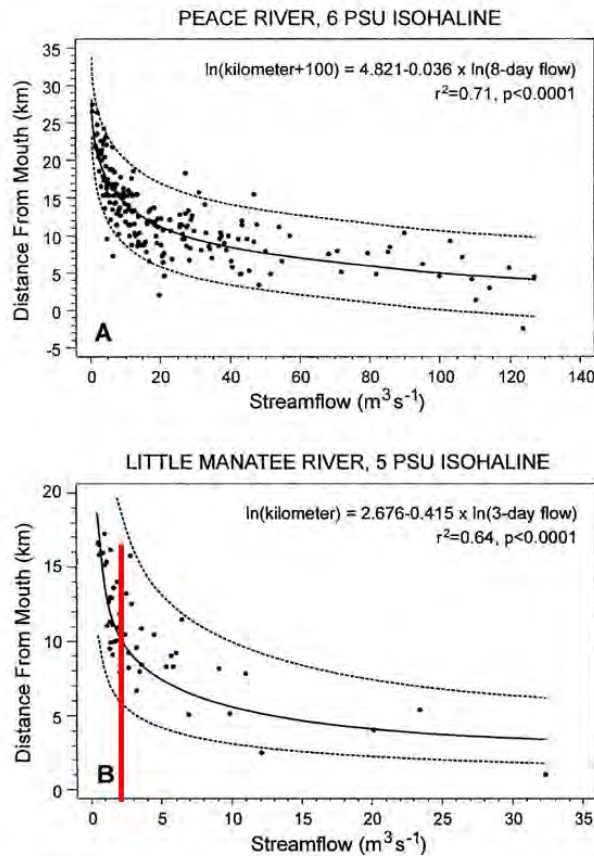


Fig. 3. Regressions of freshwater inflow with (A) the location of the 6 psu surface isohaline in the Peace River (adapted from Janicki Environmental 2001) and (B) the location of the 5 psu surface isohaline in the Little Manatee River (adapted from Peebles and Flannery 1992), with the 95% confidence limits for the predicted values. Regressions are plotted using non-transformed data.

The Figure above shows the strong nonlinear response that salinity isohalines can have with regard to changes in freshwater inflow. The red reference line for the Little Manatee River is near 2 m³/sec, which is equivalent to a flow of 72 cfs. Note there are three occurrences of the surface 5 psu isohaline between kilometers 13 and 16 near a flow rate of 72 cfs and others just below that flow rate. This graphic was taken from an article by Flannery et al (2002) in the journal *Estuaries* that dealt with the percent of flow method, which is referenced in the District's draft minimum flows report.

It should be noted the Little Manatee was one of the three estuarine rivers that provided data and findings that were very important to the initial development of the percent-of-flow method for regulating withdrawals and determining minimum flows for tidal rivers.

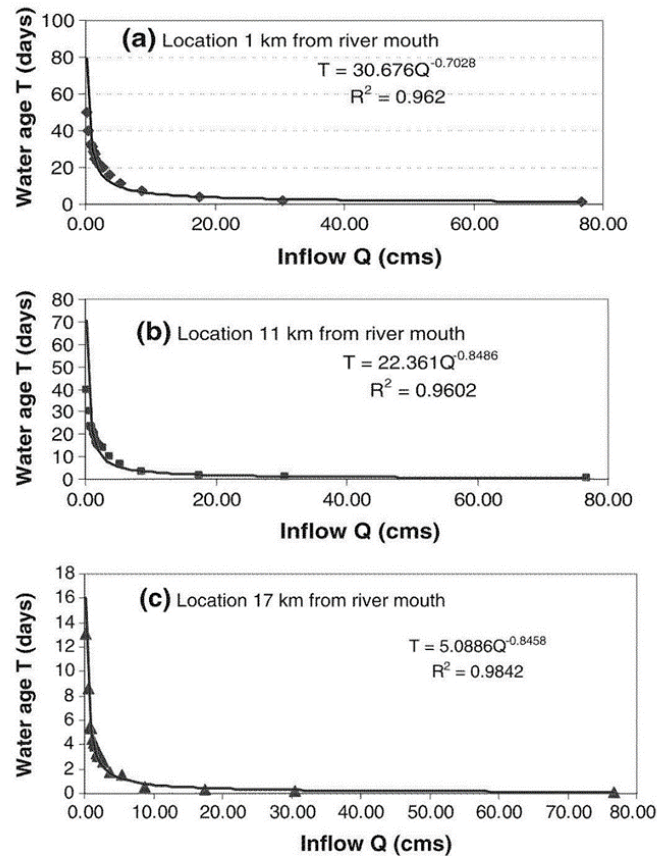


Fig. 9 Tidally-averaged water ages T (days) in responses to river inflows Q (m^3/s) at different locations along the river main channel. Least-square regressions were done by using power law. Data were obtained from hydrodynamic model simulations

The graphic above was taken from a journal article about water age simulations in the Little Manatee River by Huang et al. (2010) that is cited in the *Overview* document. Water age is a form of residence time, that is the travel time of fresh water from the head of the estuary to a given location, with three sites shown above. The horizontal axes in these figures cover a very high range of flows in m^3/sec (for reference 72 cfs is equal to about 2 m^3/sec and 4 m^3/sec equal to about 141 cfs). Even so, the strong nonlinear response of water age at low flows river is clearly apparent at these locations. The Lower Alafia minimum flows report found that water age can be an important factor affecting very high chlorophyll concentrations.

I did not have time to analyze relationships between chlorophyll a and water age in the Little Manatee, but the relationships of chlorophyll a with flow shown on pages 5 and 6 are probably due in part to differences in water age at low, medium, and high flows. As such, the nonlinear response of residence time and water age to freshwater inflow should be considered in determining what are truly high flows for the estuarine section of the river. In my opinion, 72 cfs is too low a value for identifying high flows in that regard.

Finally, it interesting to note that the peer review panel for the previous minimum flows report included a graphic that indicated that simulations of residence time and water age can be important for assessing phytoplankton abundance in estuarine rivers. The graphic below was taken from page 9 in that report, with red arrows inserted to highlight the suggested work for hydrodynamic modeling for salinity and water age analysis.

I believe that in fairly short order, the data for the estuarine reach of the Little Manatee River can be reassessed to come up with a threshold to identify high flows that much better protects the lower river from significant harm, compared to the proposed 72 cfs threshold which is clearly too low.

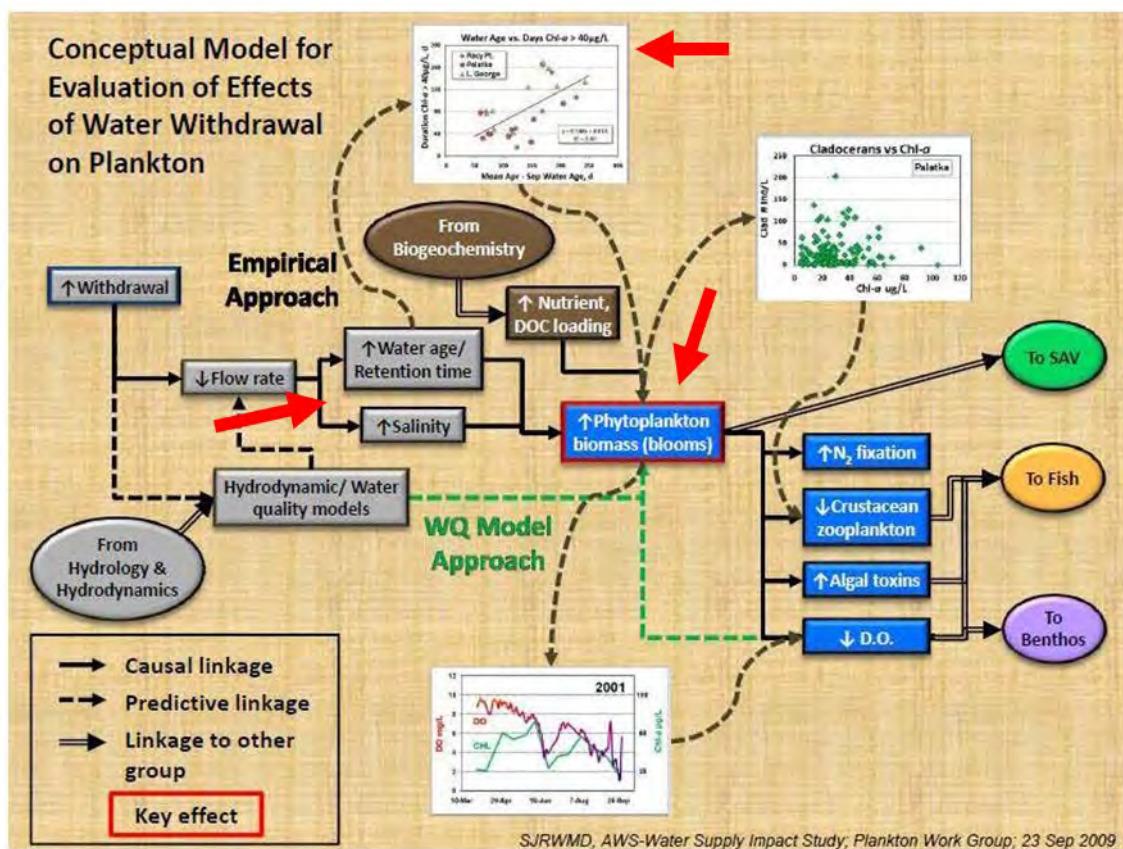


Figure 2. Multidisciplinary studies for assessing water withdrawal impacts on plankton.

(SJR WMD 2009)

Figure adapted from Figure 2 in the peer review report for the previous minimum flows report for the Little Manatee River

APPENDIX

Verbal comments to be given at the Little Manatee River minimum flows peer review meeting, October 27, 2021

By Sid Flannery

Good afternoon. Today I would like to talk about the need to establish flow based, minimum flow blocks separately for the freshwater and estuarine sections of the Little Manatee River. I support the use of flow-based blocks, but on the Little Manatee the District based the thresholds for identifying low, medium, and two high flow blocks strictly on analyses of the freshwater section of the river, and then applied three of those same flow blocks to the estuary. Well this is a first, as the District has never done that before, and it is a serious misstep for the Little Manatee River and sets a bad precedent.

The District has previously used flow-based blocks to establish minimum flows for a number of estuarine rivers in the region. For example, last year, the District adopted minimum flows for the Lower Peace River for the second time, using three flow-based blocks that were based on salinity relationships in the estuarine section of the river.

The important thing is for these other tidal rivers, low flow cutoffs and flow-based blocks for the estuarine sections of the rivers were based on relationships of freshwater inflow to variables and parameters within the estuary.

An important factor to consider is that the response of many variables in estuarine rivers to freshwater inflow is nonlinear. Even if you take a fixed percentage of daily flow, say 20 percent, the relative effects of those withdrawals on habitats and other factors can be much greater at low flows than at high flows. Therefore, when applying the percent of flow method in a tidal river, you have to see if there are sensitive flow ranges for the response of different variables to freshwater inflow.

In that regard, I prepared a series of graphs of different variables vs. flow in the Lower Little Manatee that the District uploaded to the minimum flows WebForum this morning. I think the low flow cutoff of 35 cfs for the lower river is suitable, and similar to the 40 cfs cutoff currently in effect for the Florida Power Light withdrawals, which I was involved in evaluating years ago based on estuarine relationships.

However, the 72 cfs threshold for switching from medium to high flow blocks clearly looks to be too low for the lower river, as 72 cfs is in a very sensitive flow range for some important variables, particularly in the low salinity reaches of the river.

Also, based on gaged flows at US 301 for the last twenty years, flows would have been above 72 cfs fifty-two percent of the time. The estuarine section of the Little Manatee has a surface area of 2.2 square miles, and for the ecological functions, 72 cfs is not a high rate of inflow for an estuary of this size.

I strongly suggest the review panel recommend that flow rates to identify low, medium, and high flow blocks be evaluated separately for the fresh and estuarine sections of the Little Manatee. Given the modeling tools that have been developed, I think this could be done fairly quickly.

There is an interesting parallel to this. When minimum flows for the Lower Peace River were evaluated for the first time in 2010, the Section Manager wanted the minimum flows for the lower river to use seasonal blocks. As a check, we examined how the percent withdrawals for seasonal blocks 2 and 3 would perform if they were applied during low flows, which would have happened fairly frequently. We found that at low flows, the percentage withdrawals for seasonal blocks 2 and 3 would cause greater than a 15 percent change in salinity based habitats, but at higher flows they did not. Based on those findings, the first adopted rule for the Lower Peace River had a flow threshold that seasonal blocks 2 and 3 could not be applied until flows in the river went above 625 cfs.

That type of analysis could be done for the Little Manatee. For example, for a 30% withdrawal, for each day calculate the percent reduction in low salinity habitats relative to baseline, then plot these results vs. the corresponding rates of baseline flow. You will find that at some rate of increased flow, these withdrawals will not cause more than a 15 percent change in habitat, while at lower flows they will. You could examine these results to determine a threshold for identifying high flows. I expect that a similar approach could be taken the estuarine fish habitat analysis as well.

Also, From the water management perspective, it is entirely practical to implement minimum flows rules that differ between the fresh and estuarine reaches of rivers, in fact that has been the standard District practice for years.

I hope the panel can review the documents that I have prepared for today and previous meetings, which can be found under the public comments section of the Webforum, as I think they provide very useful information pertaining to review of the draft report and the proposed minimum flows.

Finally, the Little Manatee River below Highway 301 is a State of Florida Aquatic Preserve and the crown jewel of the rivers flowing to Tampa Bay. If you are going to protect this valuable estuarine resource from significant harm, you need examine flow-based blocks that are analyzed specifically for this estuarine system.

Graphics related to the evaluation of flow thresholds for flow-based blocks for minimum flows for the estuarine section of the Little Manatee River



Submitted by Sid Flannery, October 27, 2021

Overview and organization of this document

This document provides a set of graphics and brief text related to the determination of flow rates that can serve as thresholds to identify low, medium, and high flow blocks for minimum flows for the estuarine section of the Little Manatee River. It is being submitted as part of the independent peer review that is being conducted for the draft minimum flows report for the Little Manatee River published by the Southwest Florida Water Management District (the District).

As part of the review process, I have been commenting as a private citizen and have previously submitted three sets of documents to District staff and the peer review panel for their consideration. My comments that will be presented to the peer review panel meeting on October 27, 2021 are attached as an Appendix to this document.

The draft minimum flows report for the Little Manatee identifies flow rates of 35 and 72 cfs to serve as thresholds to identify low, medium, and high flow blocks for the minimum flows. These flow rates were based solely on analyses of the freshwater reach of the river, but they are being applied to the estuarine reach of the river as well. As my comments in the Appendix state, the District has never done that before, and I strongly recommend that thresholds to identify flow-based blocks be evaluated separately for the freshwater and estuarine sections of the river. Those comments also describe a type of analysis that was done for the first determination of minimum flows for the Lower Peace River that I think should be performed for the Little Manatee to assess appropriate flow blocks for the estuarine reach of the river.

Given the very short time frame of the peer review process, the graphics presented in this document were put together very quickly and are by no means a comprehensive set of graphics related to this topic. I'm sure there are other relationships that could be examined. I did not have time to review biological information for the river in this regard, but plots of chlorophyll *a* vs. flow are included, which I think are very meaningful.

Many of the graphics have a reference line for 72 cfs, which was visually approximated using power point. As the Appendix states, I think the 72 cfs is clearly too low to serve as a threshold to identify the high flow block for the estuarine section of the Little Manatee. Some brief text is included with some of the graphics, particularly for chlorophyll *a*. All text was also prepared quickly and is not a thorough treatment of these relationships.

For evaluating any apparent shifts or inflexion points in the data, readers should consider the following graphics essentially represent a baseline condition. That is, the application of minimum flows will reduce the flows, basically moving the relationships to the left. For example, with the proposed minimum flows, a flow of 70 cfs could be reduced to 56 cfs and a flow of 110 cfs could be reduced to 77 cfs. Therefore, in considering what might be an appropriate threshold to switch between flow-based blocks, the threshold should include a buffer that is slightly above the apparent inflexion point in order to best manage a sensitive flow range.

For reference, a centerline map of the Little Manatee River is shown on the next page.



Centerline map of the Lower Little Manatee River with distances in kilometers

Chlorophyll *a*

I have not had time to review appendices to the minimum flows report the deal with water quality, so I don't know if they contain graphics or analyses similar to what I have presented below. Regardless, it is very informative to plot chlorophyll *a* concentrations versus freshwater inflow in tidal rivers. When doing so, the relationships with inflow in the Little Manatee are similar to what have been observed in other tidal rivers for which there are abundant chlorophyll data (Lower Alafia, Lower Peace), with one difference that is discussed on the following page.

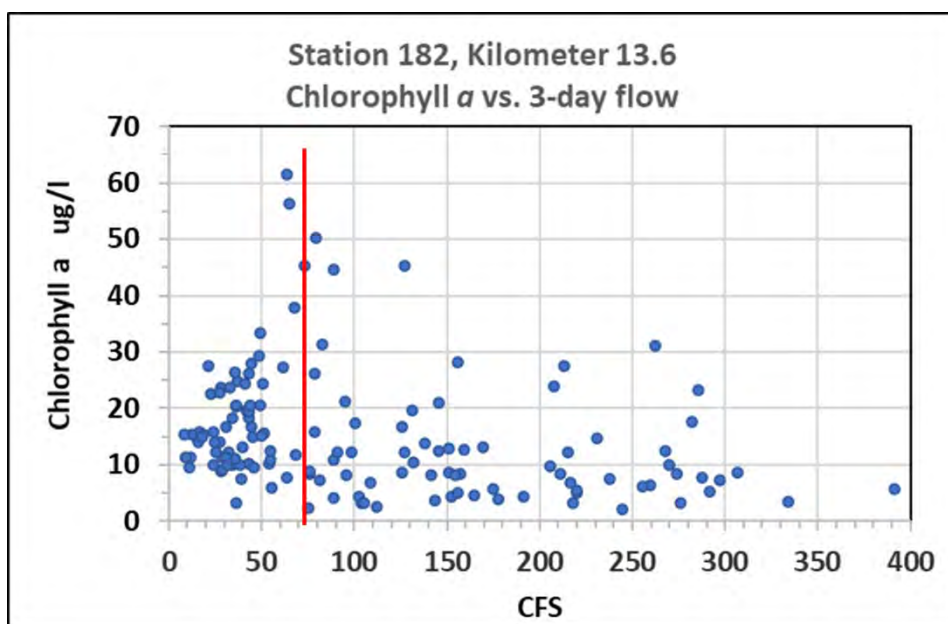
As part of the peer review process, I submitted a document titled *Overview and suggested text to describe technical reports about the Little Manatee River* that was posted on the minimum flows WebForum under public comments. That document provides citations and brief descriptions of District sponsored studies of phytoplankton related parameters (including chlorophyll *a*) in the estuarine reach of the Little Manatee, with one study also including data from the Lower Peace and Alafia rivers. I have not had time to access those data, but can make some comparisons and conclusions based on previously published findings.

The graphics below are taken from water quality sites monitored the Environmental Protection Commission of Hillsborough County (EPCHC, often referred to simply as EPC) that were presented in the draft minimum flows report. The EPC is to be highly commended for expanding their water quality sampling network to add three new data collection sites in the Little Manatee, starting in 2009. These data, plus the longer-term site at Station 112, provide very extensive monthly water quality data at those four locations in the tidal Little Manatee River.

Go to next page

The figure below is from station 182, located in the braided oligohaline section of the river near kilometer 13.6. The pattern that is shown is typical of the upstream reaches of tidal rivers, in that high chlorophyll concentrations are not frequently observed at very low flows (20 to 30 cfs below) probably due to low nutrient loading. However, when flows increase, high chlorophyll concentrations can occur due to greater nutrient loading, with residence times that are still fairly long allowing phytoplankton blooms to develop.

However, at higher flows, high chlorophyll *a* concentrations are not frequently observed as water is moving through these upper reaches of the tidal river fairly rapidly with low residence times. Water color also increases at high flows, which limits light penetration. This tendency would be shown more clearly if the horizontal axis below was expanded to include higher flows, but the emphasis on this graphic is on lower flows. Three-day flow is the average flow for the day of sampling and the preceding two days.



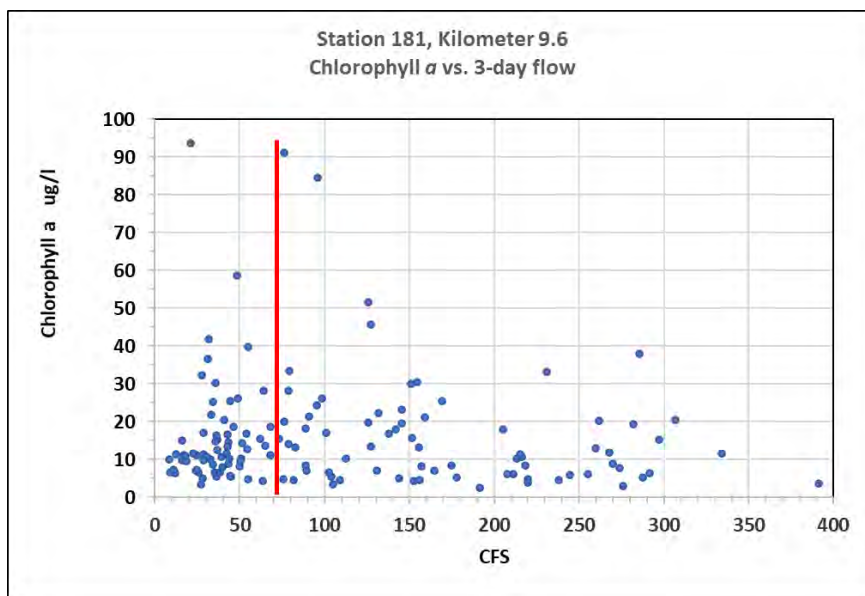
A red reference line is shown in the figure above at approximately 72 cfs, which is the threshold to switch from the medium to high flow block in the proposed minimum flows, which will allow a change in percent withdrawals from 20 percent to 30 percent. Again, this threshold was based solely on analyses of the freshwater reach of the river upstream of US highway 301. As shown in the figure above, 72 cfs is right in the middle of the flow range of when very high chlorophyll *a* concentrations can occur at this location.

What is interesting about the Little Manatee is that peak chlorophyll *a* concentrations often occur in very low salinity waters, even close to the tidal interface between fresh and brackish waters. As described in the *Overview and suggested text* document, peak chlorophyll *a* concentrations often occur in mesohaline waters in the tidal reaches of the Peace and Alafia Rivers. It appears

this difference in the Little Manatee is that water slows down considerably in the braided section of the river upstream of I-75, with longer residence times there compared to the upper reaches of other tidal rivers.

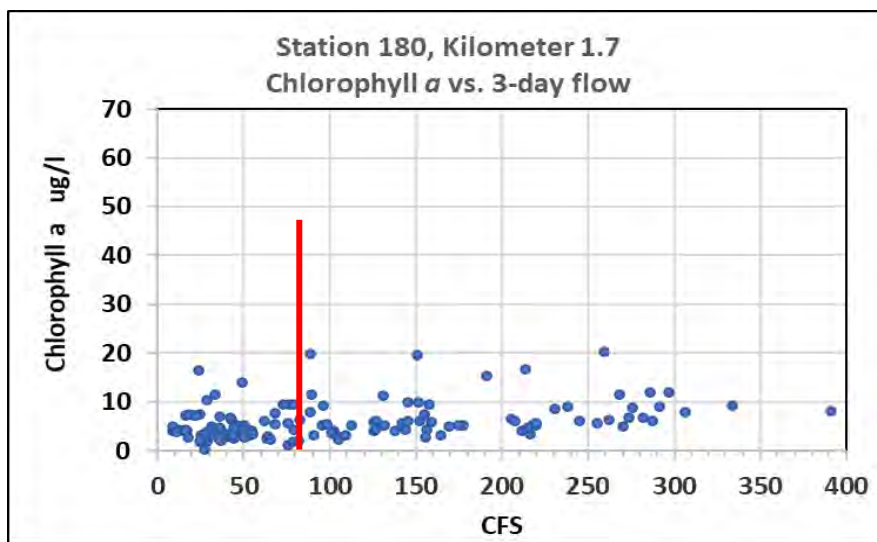
As part of the development of the EFDC hydrodynamic model for the Little Manatee, Drs. Huang and Liu of Florida State University did residence time simulations for the river that are summarized in the *Overview* document that was previously submitted. The District has also done residence time analyses in the Lower Peace and Alafia Rivers, with the minimum flows report for the Lower Alafia presenting a good discussion of the relationships of residence time to chlorophyll *a* in that river.

The relationship of flow to chlorophyll *a* will change at different locations in a tidal river due to changes in the volume of the estuary, residence time, available nutrients, light penetration and tidal exchange with the bay. Plots are presented for EPC stations 181 and 180 in the following discussion, with data shown below for station 181, which is located near kilometer 9.6.



The highest peak chlorophyll *a* concentrations in the Little Manatee recorded by the EPC are at Station 181. High concentrations above 80 $\mu\text{g/l}$ were limited to when three-day average flows were less than 100 cfs, with two concentrations above 90 $\mu\text{g/l}$ at flows below 77 cfs. The minimum flows report has a time series plot of yearly geometric means for chlorophyll *a* that shows that during some years, the FDEP impairment threshold of an annual geometric mean of 11 $\mu\text{g/l}$ is exceeded at this station. I agree with some review panel comments that this threshold is probably too low for productive tidal rivers. However, individual chlorophyll *a* concentrations can be strongly affected by the rate of freshwater inflow, and the occurrence of problematic very high chlorophyll concentrations from large phytoplankton blooms can be exacerbated by flow reductions in sensitive flow ranges in various sections of a tidal river.

The graph below is for station 180, which is located near 1.7 kilometers upstream of the mouth of the river. For easier comparison to the other figures, the Y axis is taken up to 70 $\mu\text{g/l}$. It is obvious that chlorophyll *a* concentrations are much lower at this location and have a very different relationship with freshwater inflow, due likely to the volume of the estuary, tidal flushing from the bay, and limited available nutrients at low flows. However, at this location there is a tendency for slightly higher chlorophyll *a* concentrations at higher flows, as nutrient delivery from the watershed is increased.



It should be noted that the Little Manatee River has been enriched with nitrogen due to human activities in the watershed. The draft minimum flows report found that with the exception of organic nitrogen at one site, trends for various forms of nitrogen have either been showing no trend or decreasing at EPC stations in the lower river in recent years. However, as described in the document I submitted titled *Technical review of the Little Manatee River flow characterization*, as part of a large study of the Little Manatee River watershed that was conducted by the District and other agencies in the late 1980s, long-term nitrogen data indicated that agriculture activities have increased nitrate concentrations in the river considerably compared to decades prior to the mid-1970s. Given that the river is nitrogen enriched, it is important to carefully manage the effects of flow reductions on excessive phytoplankton blooms and high chlorophyll *a* concentrations in the river.

Again, I have not had time to review the appendices to the minimum flows report that deal with water quality, but the data for stations 181 and 182 in the mid to upper reaches of the tidal river indicate the 72 cfs threshold to switch to 30 percent withdrawals is too low, as it could exacerbate excessive phytoplankton blooms in that part of the river. New analyses should be conducted to develop a threshold for a high flow block for the estuary based on relationships in the lower river, rather than from the freshwater reach where the 72 cfs flow threshold was derived.

SALINTY

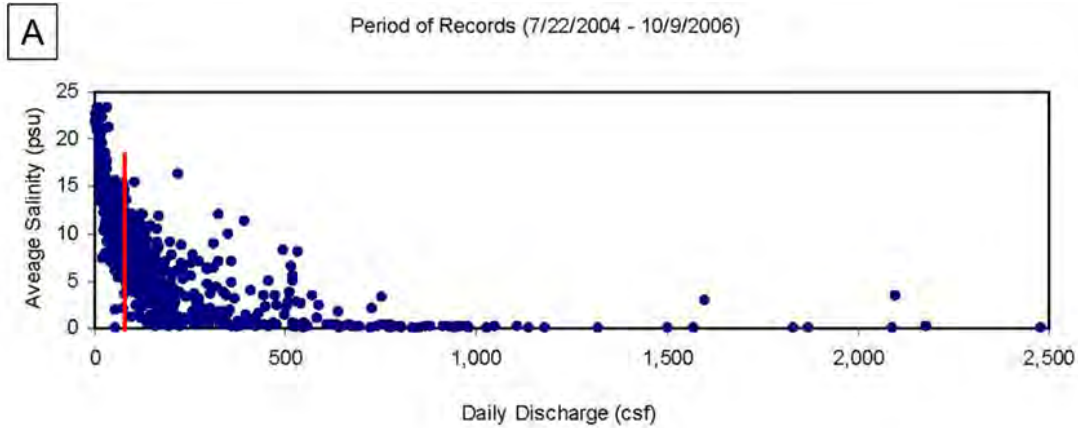


Figure 15. Salinity versus daily discharge for the USGS 02300546 gage, Little Manatee Rive at Ruskin, FL (RKM = 8.3)

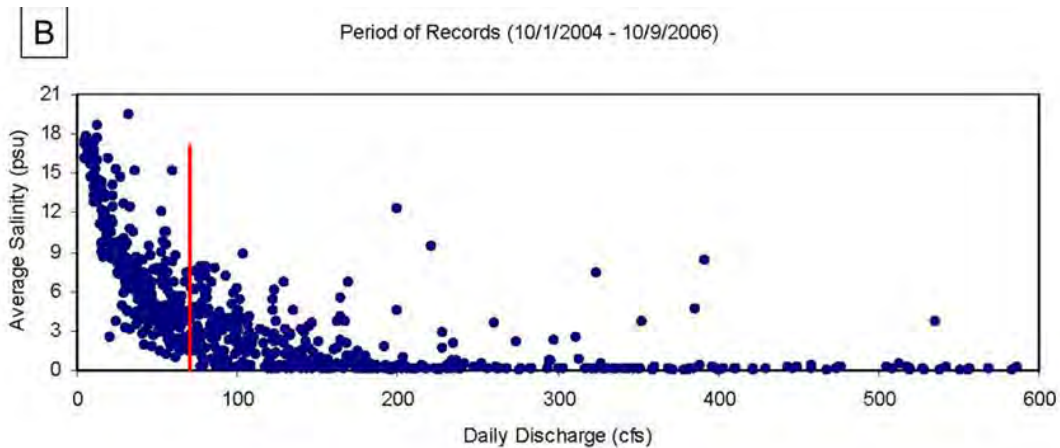
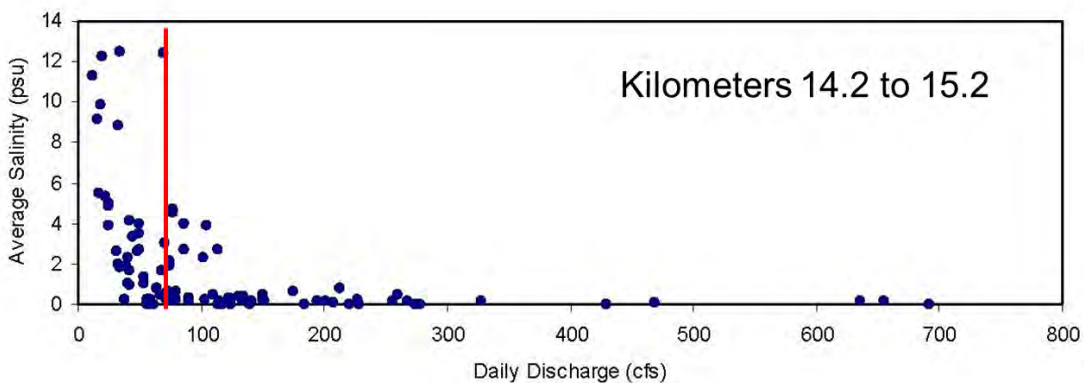
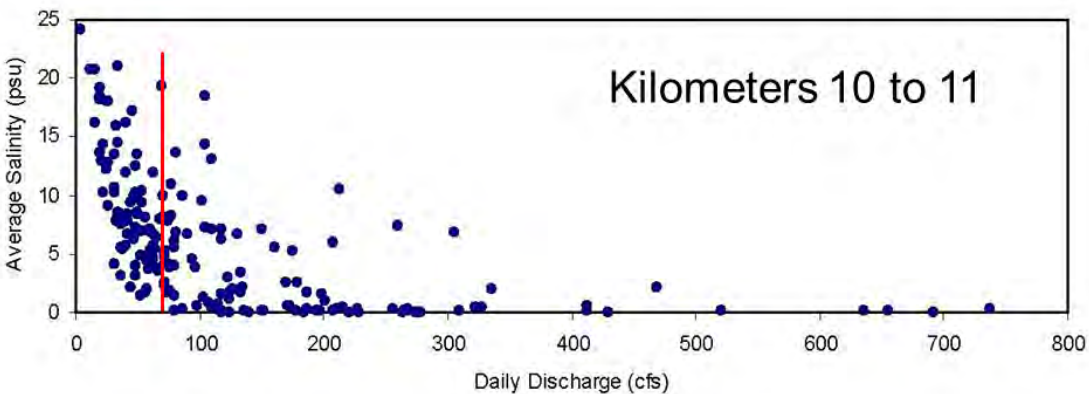
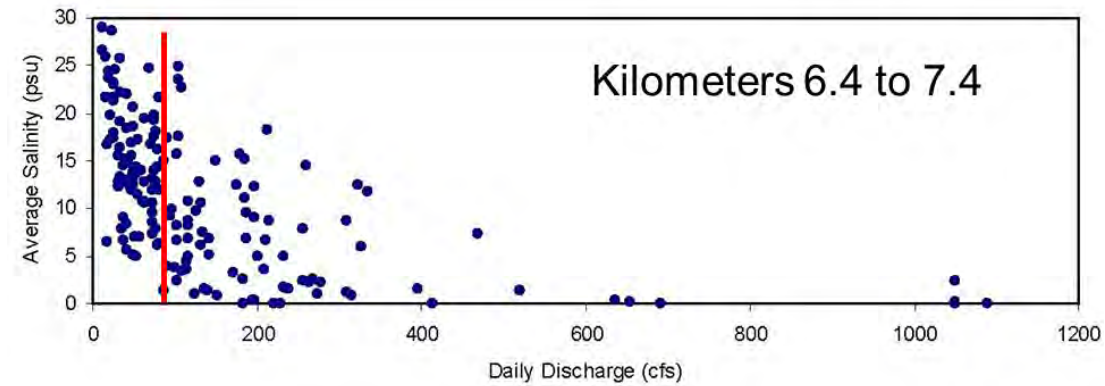


Figure 16. Salinity versus daily discharge for the USGS 02300542 gage, Little Manatee River at I-75 near Ruskin, FL (RKM = 12.1)

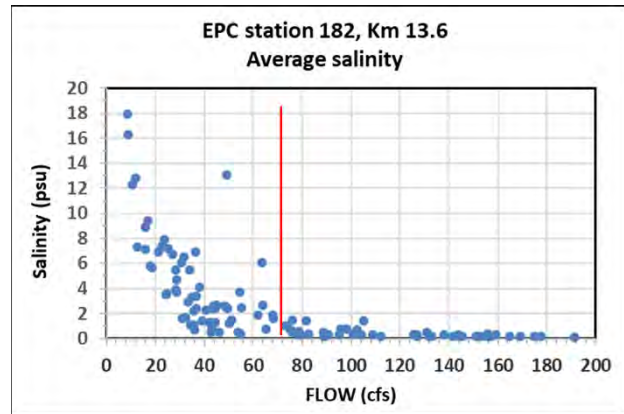
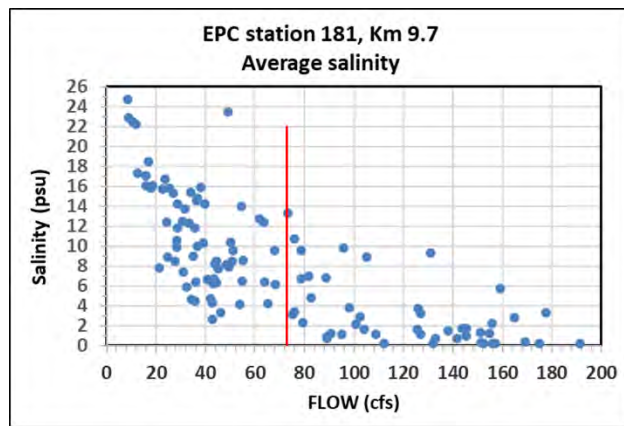
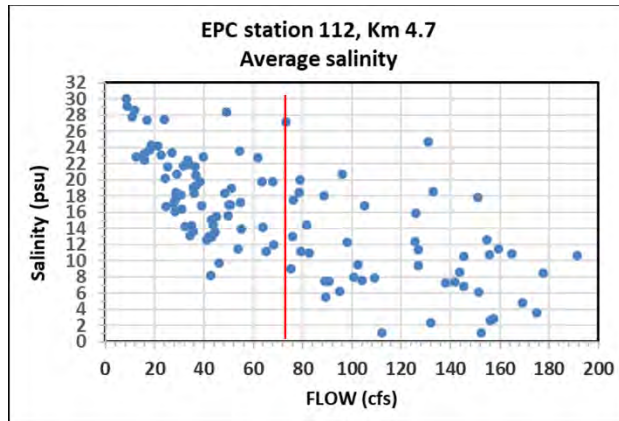
Red reference lines inserted at approximately 72 cfs

The USGS operated a series of continuous salinity recorders in the river to support the development of the EFDC hydrodynamic model for the river during 2004 to 2006. Plots of average daily salinity from the top and bottom sensors at each location are shown above for two recorders located at kilometers 8.3 and 12.1. The recorder at 12.1 is at the I-75 bridge, which is just downstream of the braided zone of the river that contains abundant oligohaline marshes that grade upstream to tidal freshwater marshes and forest. Salinity is very responsive to flow in the range of 72 cfs at this location, with the response dampening at higher flows.



Red Line reference lines inserted at approximately 72 cfs

These graphics on this page are average salinity values from vertical profiles taken by the District and other parties between March 1985 and October 2006. I don't think that 72 cfs represents a good high flow threshold to increase withdrawals, as salinity is very responsive to flow reductions at these sites near that flow value, with a dampened and flatter response at higher flows. Considering that for the most recent twenty year period, 72 cfs has been exceeded 52 percent of the time, a higher threshold to identify high flows would be more appropriate for this estuarine system.



The graphics above are from the Hillsborough County EPC's water quality stations in the tidal river that have been monitored since 2009. At these stations, EPC measures salinity at top, middle and bottom depths, with the average of these values shown above. For station 181 (middle graph), 72 cfs again appears to be too low to serve as a high flow threshold compared to a higher flow rates. The data at station 182 seem more supportive of the 72 cfs threshold, but these salinity values are lower than some average values for kilometers 14.2 to 15.2 reported by the District shown on the previous page. This might be because the District frequently sampled near high tide, or possibly because the District took salinity profiles at surface and 1 meter intervals.

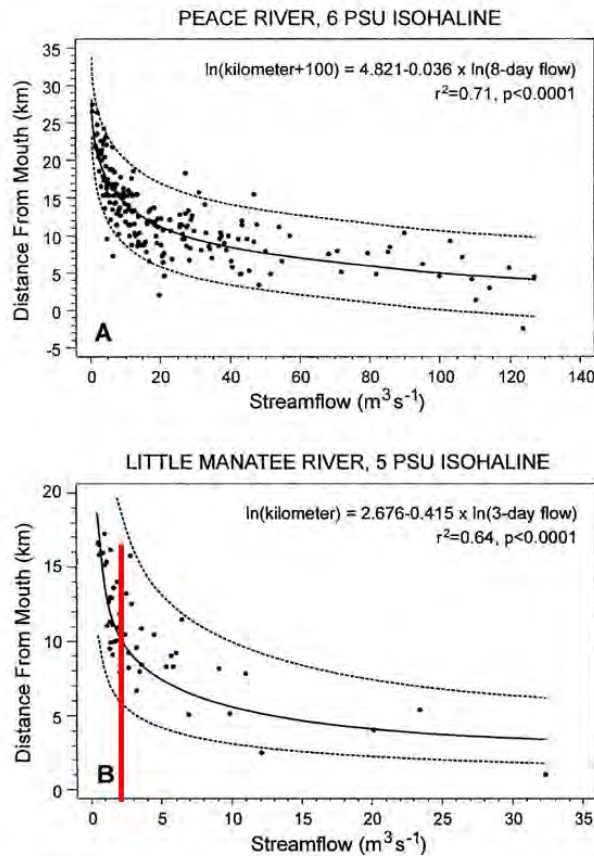


Fig. 3. Regressions of freshwater inflow with (A) the location of the 6 psu surface isohaline in the Peace River (adapted from Janicki Environmental 2001) and (B) the location of the 5 psu surface isohaline in the Little Manatee River (adapted from Peebles and Flannery 1992), with the 95% confidence limits for the predicted values. Regressions are plotted using non-transformed data.

The Figure above shows the strong nonlinear response that salinity isohalines can have with regard to changes in freshwater inflow. The red reference line for the Little Manatee River is near 2 m³/sec, which is equivalent to a flow of 72 cfs. Note there are three occurrences of the surface 5 psu isohaline between kilometers 13 and 16 near a flow rate of 72 cfs and others just below that flow rate. This graphic was taken from an article by Flannery et al (2002) in the journal *Estuaries* that dealt with the percent of flow method, which is referenced in the District's draft minimum flows report.

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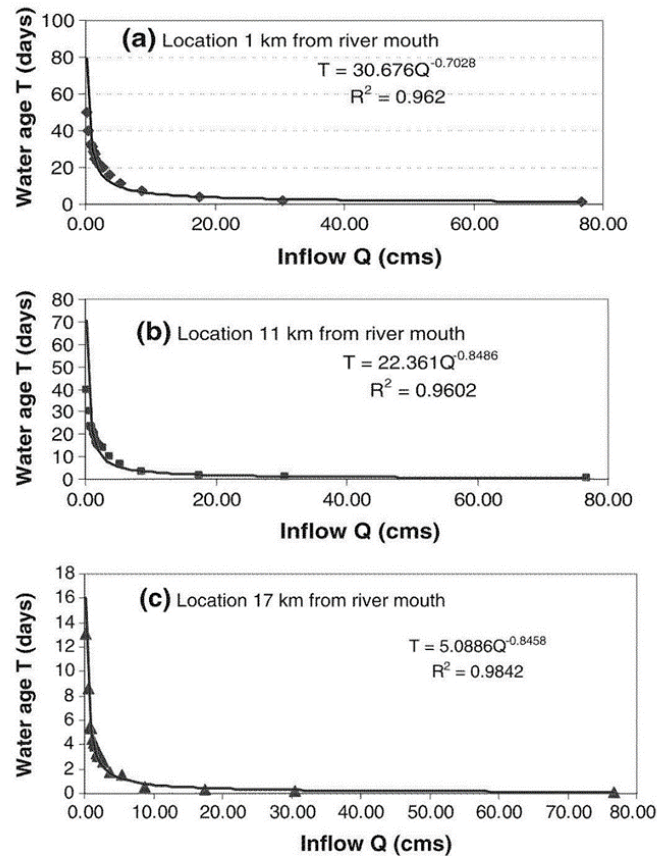


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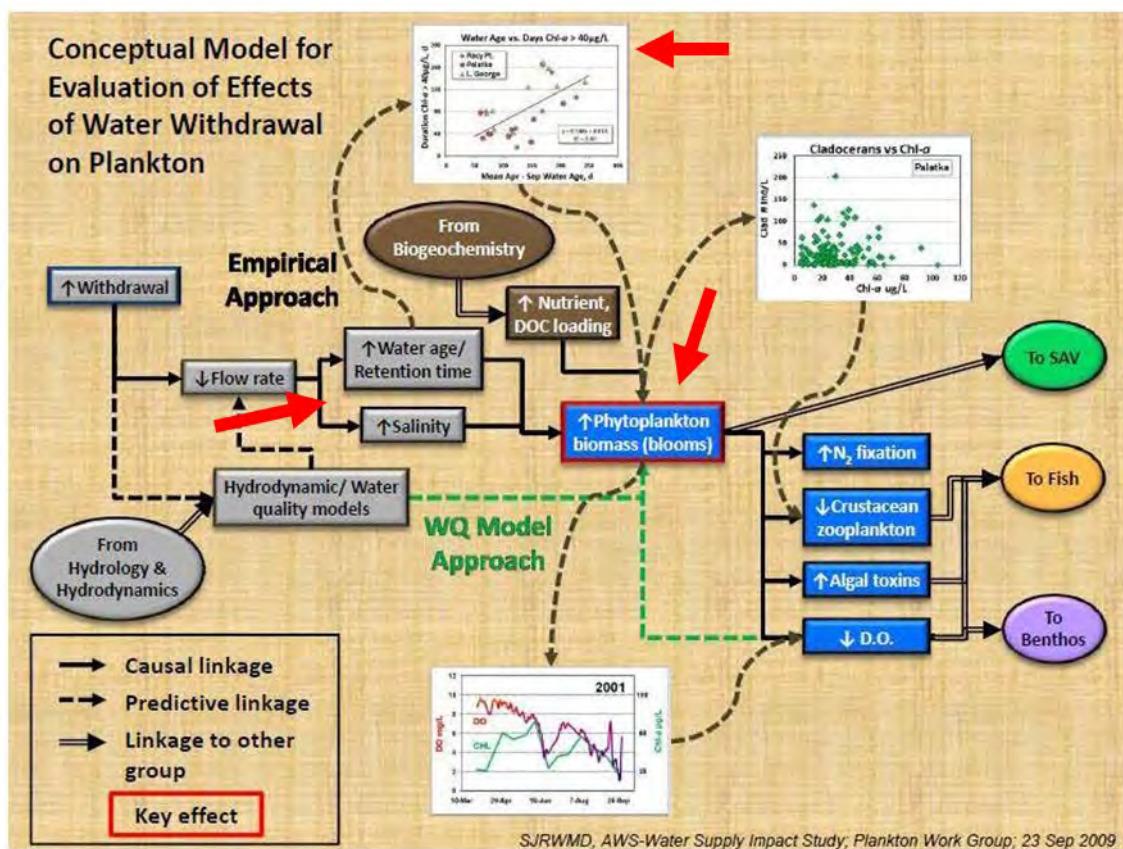


Figure 2. Multidisciplinary studies for assessing water withdrawal impacts on plankton.

(SJR WMD 2009)

Figure adapted from Figure 2 in the peer review report for the previous minimum flows report for the Little Manatee River

APPENDIX

Verbal comments to be given at Little Manatee River minimum flows peer review meeting, Oct. 27, 2021

By Sid Flannery

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The important thing is in all these other rivers, low flow cutoffs and flow-based blocks for the tidal sections of the rivers were based relationships of freshwater inflow to variables and parameters within the estuary.

An important factor to consider is that the response of many important variables in estuarine rivers is nonlinear. Even if you take a fixed percentage of daily flow, say 20 percent, the relative effects of those withdrawals on habitats and other factors can be much greater at low flows than at high flows. Therefore, when applying the percent of flow method in a tidal river, you have to see if there are sensitive flow ranges for the response of different variables to freshwater inflow.

In that regard, I prepared a series of graphs of different variables vs. flow in the Little Manatee that the District uploaded to the minimum flows WebForum this morning. I think the low flow cutoff of 35 cfs for the Little Manatee is adequate, and similar to the 40 cfs cutoff currently in effect for the Florida Power Light withdrawals, which I was involved in evaluating years ago based on estuarine relationships.

However, the 72 cfs threshold for switching from medium to high flow blocks clearly looks to be too low. Based on the graphs that were uploaded today and other analyses, 72 cfs is in a very sensitive flow range for some important variables, particularly in the low salinity reaches of the river.

Also, based on gaged flows at US 301 for the last twenty years, flows would have been above 72 cfs fifty-two percent of the time. The estuarine section of the Little Manatee has a surface

area of 2.2 square miles, and for the ecological functions, 72 cfs is not a high rate of inflow for an estuary of this size.

I strongly suggest the review panel recommend that flow rates to identify low, medium, and high flow blocks for minimum flows be evaluated separately for the fresh and estuarine sections of the Little Manatee. Given the modeling tools that have been developed, I think this could be done fairly quickly and the District could issue a purchase order or contract with Janicki Environmental to do this work.

There is an interesting parallel to this. When minimum flows for the Lower Peace River were evaluated for the first time in 2010, the Section Manager wanted the minimum flows for the lower river to use seasonal blocks. As a check, we examined how the percent withdrawals for seasonal blocks 2 and 3 would perform if they were applied during low flows, which would have happened fairly frequently. We found that at low flows, the percentage withdrawals specified for seasonal blocks 2 and 3 would cause greater than a 15 percent change in salinity based habitats, but at higher flows they did not. Based on those findings, the first adopted rule for the Lower Peace River had a flow threshold that seasonal blocks 2 and 3 could not be applied until flows went above a flow rate of 625 cfs.

That type of analysis could be done for the Little Manatee. For example, for a 30% withdrawal, for each day calculate the percent reduction in low salinity habitat relative to baseline, then plot these results vs. the corresponding rates of baseline flow. You will find that at some rate of increased flow, these withdrawals will not cause more than a 15 percent change in habitat, while at lower flows they will. You could examine these results to determine a threshold for identifying high flows, just like we did for the Lower Peace. I expect that a similar approach could be taken the estuarine fish habitat analysis as well.

Also, From the water management perspective, it is entirely practical to implement minimum flows rules that differ between the fresh and estuarine reaches of rivers, in fact that has been the standard District practice for years.

Finally, the Lower Little Manatee River below Highway 301 is a State of Florida Aquatic Preserve and the crown jewel of the rivers flowing to Tampa Bay. If you are going to protect this valuable estuarine resource from significant harm, you need to examine flow-based blocks that were analyzed specifically for this estuarine system.

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Eric DeHaven](#); [Adrienne E. Vining](#); [Xinjian Chen](#); [Jordan D. Miller](#); [Chris Zajac](#); [Kristina Deak](#); [Gabe I. Herrick](#); [Lei Yang](#); [Danielle Rogers](#); [Philip Rhinesmith](#); [mburke](#); [esherwood](#); [Karlen, David](#); [Ernst Peebles](#); [ash](#); [Dougherty, Janet](#); [Wessel Mike](#); [Tony Janicki \(tjanicki@janickienviromental.com\)](#); [Nancy Stevens](#); [Ernie Estevez](#)
Subject: Graphics and comments for Little Manatee River peer review
Date: Wednesday, October 27, 2021 7:31:40 AM
Attachments: [Graphics and comments for Little Manatee River peer review from Sid Flannery, 10_27_2021.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Attached is a set of graphics I prepared related to the ongoing peer review of the minimum flows for the Little Manatee River. The document also includes the verbal comments I plan to give at today's peer review meeting. Would you please upload this email and the attached file to the minimum flows WebForum.

These graphics and comments concern the need to evaluate flow-based thresholds that identify low, medium, and high flow blocks separately for the freshwater and estuarine sections of the Little Manatee. As described in the attached document, I think the 72 cfs threshold for identifying high flows, which was based on the freshwater section of the river, is clearly too low for the estuarine section of the Little Manatee.

Thanks,
Sid

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Xinjian Chen](#); [Jordan D. Miller](#); [Chris Zajac](#); [Kristina Deak](#); [Gabe I. Herrick](#); [Lei Yang](#); [mburke](#); [esherwood](#); [Karlen, David](#); [Ernst Peebles](#); [ash](#); [Wessel Mike](#); [Tony Janicki \(tjanicki@janickienvronmental.com\)](#); [Nancy Stevens](#)
Subject: Re: Graphics and comments for Little Manatee River peer review
Date: Wednesday, October 27, 2021 4:03:35 PM
Attachments: [Graphics and comments for Little Manatee River peer review from Sid Flannery, 10_27_2021, 4 PM.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

In going through my presentation, I noticed that a couple of clarifications were needed in the Appendix of the document I submitted earlier today, which were my verbal comments at today's peer review meeting. I made those changes prior to speaking, so they are reflected in the attached document. Could you replace on the WebForum my document titled *Graphics and comments for Little Manatee River peer review from Sid Flannery, 10_27_21*. The attached replacement file ends with 4 PM in the title.

I would like to point out that none of the material in the Graphics section of the document changed, only some small wording changes in the Appendix.

Thanks,
Sid

Comments for the November 3, 2021 Little Manatee River minimum flows peer review meeting
Prepared by Sid Flannery

Note – Four paragraphs that will not be verbally presented on 11/3/21 due to time constraints are shown in blue font

Today I would like to speak about how minimum flows are implemented using flow-based blocks. The review panel is considering whether the flow blocks should, or should not be, the same for the fresh and estuarine sections of the Little Manatee.

Well, they are not entirely the same in the currently proposed rule, which is shown in the table below. Note that in Block 3 the freshwater minimum flows have a second high flow threshold of 174 cfs that is highlighted in yellow, which is not assigned to the estuarine minimum flows. You can subtract the numbers shown in red to calculate the percent withdrawals in each block. So, for block 3 in the freshwater section, flows cannot be reduced by more than 13 or 11 percent depending on the rate of flow. Further downstream, flows to the lower river cannot be reduced by more than 30 percent at flows above 72 cfs.

Table 6-9. Proposed minimum flows for the Little Manatee River.

| | Block 1 (≤ 35 cfs) | Block 2 (> 35 cfs and ≤ 72 cfs) | Block 3 (> 72 cfs) |
|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Upper Little Manatee River (Headwaters to Highway 301) | 90% of the flow on the previous day | 80% of the flow on the previous day | 87% of the flow on the previous day when the previous day's flow was > 72 cfs and ≤ 174 cfs, or 89% of the flow on the previous day when the previous day's flow was > 174 cfs |
| Lower Little Manatee River (Highway 301 to Tampa Bay) | 90% of the flow on the previous day | 80% of the flow on the previous day | 70% of the flow on the previous day |
| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

So, let's hypothetically change the threshold to switch from block 2 to block 3 for the lower river from 72 cfs to 120 cfs. We still have the 13 and 11 percent limits to withdrawals in block 3 in the freshwater section, but flow reductions to the lower river cannot exceed 20 percent until flows go above 120 cfs, when percent withdrawals can increase to 30 percent. This is very simple and straightforward and poses no water management complications whatsoever.

There are two factors that typically make the percent-of-flow method very practical within the District. Estuaries in the region are generally not as sensitive to ecological impacts from flow reductions as are freshwater rivers, and minimum flows adopted for estuarine rivers usually allow for the same, or more

often, greater percent withdrawals than for the corresponding freshwater sections. And, it is an obvious point, but the estuary is always downstream. If these two types of ecosystems were interspersed along the river channel it could be complicated, but that is not the case.

If we are to protect both the freshwater and estuarine sections of our rivers, it is critical to first evaluate the most effective flow blocks separately for these two very different ecosystems, then write the rules accordingly. Based on years of experience applying the percent-of-flow method, that has not been a problem yet and I don't foresee it being a problem in the future.

For years the District has included flow-based blocks in estuarine minimum flow rules based on analyses of relationships within those tidal rivers. However, with the Little Manatee, the District for the first time has developed blocks based solely on the freshwater section of the river and then assigned three of those same blocks to the estuarine section as well.

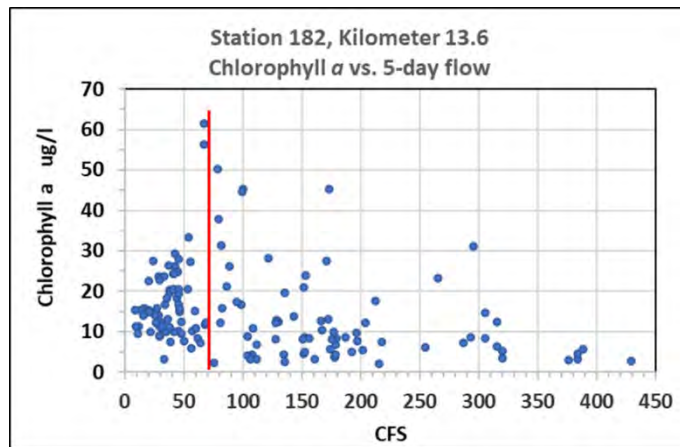
Assigning 72 cfs as the high flow block for the estuary does not allow for the evaluation of important ecological relationships in the lower river above that flow rate, which by the way, was near the median flow for the river for the last 20 years. Many of these relationships at higher flows are important to the ecological functions of the estuarine section of the river.

Last week, Dr. Ernst Peebles of USF said that the combined zooplankton/ichthyoplankton catch in the lower river showed a shift around 100 cfs. Also last week, I discussed that many variables in estuaries respond to freshwater inflow in a nonlinear manner and submitted a document to the WebForum that contained plots for salinity and other parameters in the lower river vs. freshwater inflow. Those plots showed these parameters respond strongly to flow reductions near 72 cfs, but more gradually at higher flow rates, where the relative ecological effects of flow reductions would be smaller. Such relationships could be evaluated to develop a revised block 3 for the lower river.

For example, upstream of I-75 there are widespread oligohaline marshes dominated by freshwater species that have some salt tolerance, such as sawgrass and cattails. The inundation of these marshes with fresh water in the wet season is important to their health and productivity. Plots of salinity versus flow in the graphics document show that salinity is very sensitive to flow reductions at 72 cfs in this reach of the river, but not so much at flows above 100 to 150 cfs.

Go to next page

The graph below is a plot of chlorophyll *a* vs. five-day average flow at the EPC station located about one and a half kilometers upstream of the I-75 bridge. The red reference line is the block 3 threshold at 72 cfs. It is clear that chlorophyll concentrations are near maximum in this flow range. Although trends in nutrients have been encouraging in recent years, longer term data have shown the Little Manatee has been significantly enriched with nutrients from human activities in the watershed. Given that, 72 cfs does not look to be a good place to switch from block 2 to block 3 and increase the withdrawal rate from 20 to 30 percent, slowing the water down in this sensitive flow range. But again, estuarine relationships were not evaluated in the determination of the flow blocks.



A very useful analysis is to examine daily output from the EFDC model to see in what flow range does a specific percent withdrawal rate cause reductions in low salinity habitats greater than 15 percent, similar to what was done for the Lower Peace River. I suspect the fish habitat analysis could be used in a similar manner.

In closing, over the last 30 years the District had spent considerable time, effort, and money to conduct detailed technical investigations of the relationships of streamflow to the ecology of freshwater and estuarine rivers. In doing so, it has developed the very progressive percent-of-flow method, which has been successfully applied to many rivers.

However, the percent-of-flow method is at a critical juncture right now. The topic of whether the flow blocks have to be the same for fresh and estuarine sections of rivers is extremely important and the Little Manatee could be viewed a precedent. Based on a number of ecological factors and practical water management considerations, I strongly believe that flow blocks for fresh and estuarine sections of rivers need to be evaluated separately. Again, the District has evaluated flow blocks for tidal rivers based on relationships within those estuaries in the past, and there is no real practical water management reason to discontinue that now.

It looks like the review of the Little Manatee River minimum flows report is on a very fast track. I suggest the panel take additional time to consider further the flow blocks issue. The panel could get input from other parties, continue discussions with District staff, and consider some other analyses. There is no real need to hurry on the minimum flows for this truly outstanding river, and the flow blocks issue is a critical factor that needs to be thoroughly assessed.

RE: Comments for submittal to Little Manatee River minimum flows peer review panel

Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>

Wed 10/6/2021 12:53 PM

To: Sid Flannery <sidflannery22@gmail.com>

Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Adrienne E. Vining <Adrienne.Vining@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Lei Yang <Lei.Yang@swfwmd.state.fl.us>; mburke <mburke@tbep.org>; esherwood <esherwood@tbep.org>; Ernst Peebles <epeeble@usf.edu>; Karlen, David <Karlen@epchc.org>; Dougherty, Janet <doughertyj@epchc.org>; ash <ash@epchc.org>; Mike Wessel (MWessel@janickienvironmental.com) <MWessel@janickienvironmental.com>; Tony Janicki (tjanicki@janickienvironmental.com) <tjanicki@janickienvironmental.com>

Thanks Sid. I will upload the email and files to the WebForum.

Kym

From: Sid Flannery <sidflannery22@gmail.com>

Sent: Wednesday, October 6, 2021 9:52 AM

To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>

Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Adrienne E. Vining <Adrienne.Vining@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Lei Yang <Lei.Yang@swfwmd.state.fl.us>; mburke <mburke@tbep.org>; esherwood <esherwood@tbep.org>; Ernst Peebles <epeeble@usf.edu>; Karlen, David <Karlen@epchc.org>; Dougherty, Janet <doughertyj@epchc.org>; ash <ash@epchc.org>; Mike Wessel (MWessel@janickienvironmental.com) <MWessel@janickienvironmental.com>; Tony Janicki (tjanicki@janickienvironmental.com) <tjanicki@janickienvironmental.com>

Subject: Comments for submittal to Little Manatee River minimum flows peer review panel

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

Kudos to you and the District for facilitating an excellent kick-off meeting of the Little Manatee River minimum flows peer review panel. Attached is a pdf of the complete comments I had hoped to present to the panel yesterday, but time ran out before I could finish them.

As described in the italicized preface to the comments, I added two paragraphs and one slide based on work conducted by Dr. Gabriel Vargo of the University of South Florida College of Marine Science (retired). I also encourage readers to review the important section about separate flow-based thresholds for the freshwater and estuarine sections of the river, which begins on page 3.

The three slides that are referenced in my comments are also attached. Please provide this email and the attached documents to the minimum flows peer review panel for the Little Manatee River. Thanks to the District for conducting the peer review and considering public comment. I anticipate submitting additional comments to the panel, so please keep me apprised of the dates of future panel meetings.

Thanks again,
Sid

Table 6-9. Proposed minimum flows for the Little Manatee River.

| | Block 1 (< 35 cfs) | Block 2 (> 35 cfs and ≤ 72 cfs) | Block 3 (> 72 cfs) |
|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| Lower Little Manatee River (Highway 301 to Tampa Bay) | 90% of the flow on the previous day | 80% of the flow on the previous day | 70% of the flow on the previous day |
| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

Verbal comments for November 3 Little Manatee River minimum flows peer review meeting.

Prepared by Sid Flannery

Today I would like to speak about how minimum flows are implemented using flow-based blocks. The review panel is considering whether the flow blocks should, or should not be, the same for the fresh and estuarine sections of the Little Manatee.

Well, they are not entirely the same in the currently proposed rule, which is shown in the table on your screen (below). Note that in Block 3 the freshwater minimum flows have a second high flow threshold of 174 cfs that is highlighted in yellow, which is not assigned to the estuarine minimum flows. You can subtract the numbers shown in red to calculate the percent withdrawals in each block. So, for block 3 in the freshwater section, flows cannot be reduced by 13 or 11 percent depending on the rate of flow. Further downstream, flows to the lower river cannot be reduced by more than 30 percent at flows above 72 cfs.

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| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

So, let's hypothetically change the threshold to switch from block 2 to block 3 for the lower river to 120 cfs. We still have the 13 and 11 percent limits to withdrawals in block 3 in the freshwater section, but flow reductions to the lower river cannot exceed 20 percent until flows go above 120 cfs, when percent withdrawals can increase to 30 percent. This is very simple and straightforward and poses no water management complications whatsoever.

If we are to protect both the freshwater and estuarine sections of our rivers, it is critical to first evaluate the most effective flow blocks separately for these two very different ecosystems, then write the rules accordingly. Based on years of experience applying the percent of flow method to existing water use permits, I don't think that having separate flow blocks for the fresh and estuarine sections of a river would cause complications for water management, and changing the block 3 threshold for the lower Little Manatee certainly would not.

For years the District has included flow-based blocks in estuarine minimum flow rules based on analyses of relationships within those tidal rivers. However, with the Little Manatee, the District for the first time has assigned flow blocks developed for the freshwater section of the river to the estuarine section as well.

Assigning 72 cfs as the high flow block for the estuary does not allow for the evaluation of important ecological relationships in the lower river above that flow rate, which by the way, was near the median flow for the river for the last 20 years. Many of these relationships at higher flows are important to the ecological functions of the lower river, which could be evaluated to come up with a revised block 3.

For example, last week Dr. Peebles said that combined zooplankton/ichthyoplankton catch in the lower river showed a shift in community heterogeneity around 100 cfs. Last week, I submitted to the WebForum a series of plots of salinity, residence time, isohaline position, and chlorophyll *a* versus freshwater inflow that showed these parameters respond strongly to freshwater inflow near 72 cfs, but less acutely at slightly higher flow rates, which could be evaluated to develop a revised block 3. Given some the discussions the panel has been having, the plots of chlorophyll *a* versus freshwater inflow are particularly interesting in that regard.

Also, a very useful analysis is to examine daily output from the EFDC model see in what flow range does a specific percent withdrawal rate cause reductions in low salinity habitats greater than 15 percent, similar to what was done for the Lower Peace River. I suspect the fish habitat analysis could be used in a similar manner.

In closing, over the last 30 years the District had spent considerable time, effort, and money to conduct detailed technical investigations of the relationships of streamflow to the ecology of freshwater and estuarine rivers. In doing so, it has developed the very progressive percent of flow method, which has been successfully applied to many rivers.

However, the percent of flow method is at a critical juncture right now. The topic of whether the flow blocks have to be the same for fresh and estuarine sections of rivers is extremely important and the Little Manatee could be viewed a precedent. Based on a number of ecological factors and practical water management considerations, I strongly believe that flow blocks for fresh and estuarine sections of rivers need to be evaluated separately. At a minimum, you don't want to simply apply the blocks that were developed for the freshwater section of a river to the estuary, as was done for the Little Manatee.

It looks like the review of the Little Manatee River minimum flows report is on a very fast track. I suggest the panel take additional time to consider further the flow blocks issue. The panel could get input from other parties, continue discussions with District staff, and consider some other analyses. There is no real need to hurry on this minimum flow on this very valuable river, and this is a critical factor that needs to be thoroughly assessed.

Verbal comments for November 3 Little Manatee River minimum flows peer review meeting.

Prepared by Sid Flannery (ADDED PARAGRAPHS IN BLUE)

Today I would like to speak about how minimum flows are implemented using flow-based blocks. The review panel is considering whether the flow blocks should, or should not be, the same for the fresh and estuarine sections of the Little Manatee.

Well, they are not entirely the same in the currently proposed rule, which is shown in the table on your screen (below). Note that in Block 3 the freshwater minimum flows have a second high flow threshold of 174 cfs that is highlighted in yellow, which is not assigned to the estuarine minimum flows. You can subtract the numbers shown in red to calculate the percent withdrawals in each block. So, for block 3 in the freshwater section, flows cannot be reduced by 13 or 11 percent depending on the rate of flow. Further downstream, flows to the lower river cannot be reduced by more than 30 percent at flows above 72 cfs.

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| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

So, let's hypothetically change the threshold to switch from block 2 to block 3 for the lower river to 120 cfs. We still have the 13 and 11 percent limits to withdrawals in block 3 in the freshwater section, but flow reductions to the lower river cannot exceed 20 percent until flows go above 120 cfs, when percent withdrawals can increase to 30 percent. This is very simple and straightforward and poses no water management complications whatsoever.

There are two factors that typically make the percent of flow method very workable within the District. Estuaries in the region are generally not as sensitive to ecological impacts from flow reductions as are freshwater rivers, and minimum flows adopted for estuarine rivers usually allow for the same, or more often, greater percent withdrawals than for the corresponding freshwater sections. And, it is an obvious point, but the estuary is always downstream. If these two types of ecosystems were interspersed along the river channel it could be complicated, but that is not the case.

If we are to protect both the freshwater and estuarine sections of our rivers, it is critical to first evaluate the most effective flow blocks separately for these two very different ecosystems, then write the rules accordingly. Based on years of experience applying the percent of flow method to existing water use permits, I don't think that having separate flow blocks for the fresh and estuarine sections of a river would cause complications for water management, and changing the block 3 threshold for the lower Little Manatee certainly would not.

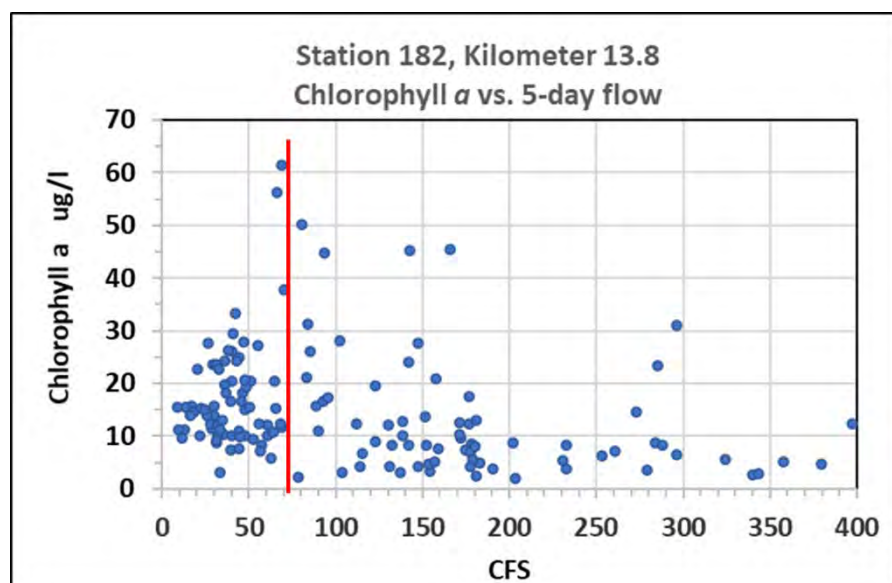
For years the District has included flow-based blocks in estuarine minimum flow rules based on analyses of relationships within those tidal rivers. However, with the Little Manatee, the District for the first time has assigned flow blocks developed for the freshwater section of the river to the estuarine section as well.

Assigning 72 cfs as the high flow block for the estuary does not allow for the evaluation of important ecological relationships in the lower river above that flow rate, which by the way, was near the median flow for the river for the last 20 years. Many of these relationships at higher flows are important to the ecological functions of the lower river, which could be evaluated to come up with a revised block 3.

For example, last week Dr. Ernst Peebles said that the combined zooplankton/ichthyoplankton catch in the lower river showed a shift in community heterogeneity around 100 cfs. Last week I also submitted to the WebForum a series of plots of salinity and other parameters vs freshwater inflow that showed these parameters respond strongly to freshwater inflow near 72 cfs, but less acutely at slightly higher flow rates, which could be evaluated to develop a revised block 3.

For example, upstream of I-75 there are widespread oligohaline marshes dominated by freshwater plants that have some salt tolerance such as sawgrass and cattails. The inundation of these marshes with fresh water in the wet season is important to their health and productivity. Plots of salinity versus flow in the graphics document show that salinity is very sensitive to flow reductions at 72 cfs in this reach of the river, but not so much at flows above 100 to 150 cfs.

The graphics document also includes plots of chlorophyll *a* concentrations versus flow at three locations in the river. Due to a combination of factors, the response of chlorophyll *a* vs. flow differs greatly between the lower and upper sections of the tidal river. At the two uppermost stations, 72 cfs is in the flow range where chlorophyll *a* reaches peak values in the range of 40 to 90 ug/l (data from kilometer 13.8 shown below, some higher values observed at kilometer 9.6). It could be argued whether that represents an ecological imbalance or not, but in my opinion, 72 cfs is not a flow rate where there should be an increase in the percent withdrawal.



Also, a very useful analysis is to examine daily output from the EFDC model see in what flow range does a specific percent withdrawal rate cause usually reductions in low salinity habitats greater than 15 percent, similar to what was done for the Lower Peace River. I suspect the fish habitat analysis could be used in a similar manner.

In closing, over the last 30 years the District had spent considerable time, effort, and money to conduct detailed technical investigations of the relationships of streamflow to the ecology of freshwater and estuarine rivers. In doing so, it has developed the very progressive percent of flow method, which has been successfully applied to many rivers.

However, the percent of flow method is at a critical juncture right now. The topic of whether the flow blocks have to be the same for fresh and estuarine sections of rivers is extremely important and the Little Manatee could be viewed a precedent. Based on a number of ecological factors and practical water management considerations, I strongly believe that flow blocks for fresh and estuarine sections of rivers need to be evaluated separately. At a minimum, you don't want to simply apply the blocks that were developed for the freshwater section of a river to the estuary, as was done for the Little Manatee.

It looks like the review of the Little Manatee River minimum flows report is on a very fast track. I suggest the panel take additional time to consider further the flow blocks issue. The panel could get input from other parties, continue discussions with District staff, and consider some other analyses. There is no real need to hurry on this minimum flow on this very valuable river, and this is a critical factor that needs to be thoroughly assessed.

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Gabe I. Herrick](#); [Xinjian Chen](#); [Lei Yang](#); [Kristina Deak](#); [Chris Zajac](#)
Subject: DRAFT presentations for Little Manatee peer review meeting tomorrow
Date: Tuesday, November 2, 2021 7:59:49 AM
Attachments: [Nov. 3 presentation - 6.5 minutes DRAFT.pdf](#)
[Nov. 3 presentation - 5 minutes DRAFT.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Attached are two draft versions of the comments I would like to give as part of the public comments period at the Little Manatee River minimum flows peer review meeting tomorrow. One version is 5 minutes long while the other is 6.5 minutes long.

The 6.5 minute version has three short paragraphs that are shown in blue font. Given the importance of flow blocks issue and its very timely nature, I think it would be better to give the 6.5 minute version, in part because it addresses two topics that have been mentioned by the panel with either incomplete or misleading information (chlorophyll *a* concentrations and marsh vegetation upstream of I-75).

I will give whichever presentation the District allows, but prefer the 6.5 minute version. Please let me know today which version I can give and I will resubmit a document later today for posting to the minimum flows WebForum. The graph(s) in the presentations will be submitted as separate files for showing at the meeting.

Thanks,
Sid

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Gabe I. Herrick](#); [Xinjian Chen](#); [Lei Yang](#); [Kristina Deak](#); [Chris Zajac](#); [Adrienne E. Vining](#); [Jordan D. Miller](#); [Randy Smith](#); phillip.rhinesmith@swfwmd.state.fl.us; [Danielle Rogers](#)
Subject: Re: DRAFT presentations for Little Manatee peer review meeting tomorrow
Date: Tuesday, November 2, 2021 11:47:27 AM
Attachments: [Email from Sid Flannery 100621.pdf](#)
[Sid Flannery Comments 100621.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

I will restrict my comments to 5 minutes tomorrow. However, this afternoon I will send you my final 6.5 minute version and request that it be posted to the WebForum prior to tomorrow's meeting.

In the mean time, I noticed that my email and comments that were submitted on October 6th are found in the WebForum under the category of *Peer review panel teams kickoff meeting, October 5, 2021*. It might be better to move or copy that email and comments to the Public Comments category. Pdfs of the email and comments that you posted 25 days ago are attached.

Thanks again,
Sid

On Tue, Nov 2, 2021 at 10:10 AM Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us> wrote:

Good Morning Sid,
Thanks for providing comments. Please limit your comments to no more than 5 minutes during the public comment period at the end of tomorrow's meeting.
Best regards,
Kym

From: Sid Flannery <sidflannery22@gmail.com>
Sent: Tuesday, November 2, 2021 7:59 AM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Lei Yang <Lei.Yang@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>
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Subject: Comments for Little Manatee River minimum flows peer review meeting on November 3, 2021
Date: Tuesday, November 2, 2021 3:24:45 PM
Attachments: [Minimum flows table.pdf](#)
[Comments from Sid Flannery for the Little Manatee River peer review meeting, Nov. 3, 2021.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff,

Tomorrow I plan to address the peer review panel for the Little Manatee River minimum flows during the public comments portion of the meeting. Attached is a written version of my comments. However, in this written version I have included three paragraphs and one figure that I won't be showing tomorrow due to time constraints.

As described in the note at the top of the document, these paragraphs are shown in blue font in the document. I think those paragraphs provide very valuable information and encourage those interested in the minimum flows for the Little Manatee to read them as part of my complete comments.

Also attached is a pdf of a table I would like shown as part of my presentation tomorrow. I think it would be best to first call it up on screen, then I will begin my comments.

Would you please post this email and the attached document and table to the minimum flows WebForum prior to tomorrow's meeting. It is possible I might slightly modify my verbal comments tomorrow, but they will be taken from the attached document.

Thanks as always,
Sid

Public comments by Sid Flannery at the Little Manatee River minimum flows peer review meeting on 10/5/21 (not completed at the meeting due to time constraints)

Below is a transcript of the complete comments I had hoped to give at the peer review panel meeting on October 5, 2021, but ran short on time. I have added two paragraphs about the work by Dr. Gabriel Vargo and have supplied one additional slide I would like sent to the peer review panel with this document. The other two slides that were shown at the meeting are also submitted and all three slides are shown at the end of this document.

I encourage readers to review the information about Dr. Vargo's work and the important topic of separate flow thresholds for freshwater and estuarine sections of the river that starts on page 3, which I did not have time to cover in my public comments at the meeting.

My name is Sid Flannery, and as I introduced myself earlier, I am a retired Chief Environmental Scientist with the District's minimum flows program, where I worked many years on the hydrobiological flow relationships of the Little Manatee River. I managed nine different consultant research or analysis projects for the river and have probably spent 50 plus field days on the lower portions of the Little Manatee.

I want to first acknowledge how hard and conscientiously District staff works on the minimum flows reports, for they are under a very challenging schedule for the adoption of the minimum flow rules.

I quickly read through the minimum flows report for the Little Manatee, and based on further review, I will submit a series of questions and comments to the District. I will request that these questions and comments be provided to the peer review panel via the minimum flows web-board.

Today, I want to briefly discuss two aspects of the minimum flows report, the first of which I think is pretty easy to address, and the second which may require some new analyses.

The first topic is the report does not cite nor describe some important earlier technical reports that were prepared for the District about the Little Manatee River which provide very useful information regarding its ecological relationships with freshwater flows. I think these reports need to be cited and briefly summarized in the District report. Importantly, I don't think that concise summaries of these reports will change the recommended minimum flows and it should be fairly easy to incorporate them in the format of the District report. Inclusion of this material will improve the public and the technical community's understanding of the freshwater flow relationships of the Little Manatee River, and therefore better support the recommended minimum flows.

I have got two slides I want to show you in this regard (*a third slide has been added since I spoke*).

On page 70, the District report shows a land cover map for the lower, tidal reach of the Little Manatee River using the Florida Land Use, Cover, and Forms Classification System, also known

as FLUCCS. However, there is much better information available for the river, for in the 1990's the District contracted the State of Florida Marine Research Institute to do detailed mapping of vegetation communities in five tidal rivers, including the Little Manatee.

This slide (at end of this document) shows the vegetation communities that were mapped as part of that project. Note that compared to the FLUCCS codes shown in the District report, the low salinity plant communities are identified with much greater resolution, including *Typha*, *Cladium*, *Acrostichum*, freshwater marshes and other communities. It is worth noting that on the Little Manatee and other tidal rivers, the District has rightly emphasized the protection of low salinity zones, such as < 2 psu salinity. This is particularly relevant on the Little Manatee for it has a highly braided zone above kilometer 12, which has a very high degree of shoreline length per river kilometer. This zone of the river is one of the real unique areas in southwest Florida and its health is closely linked to the minimum flows. This is the map that needs to be used in the District report and work that produced it needs to be cited.

Also, in 1988 and 1989, the District received grants from the Florida Department of Environmental Protection to examine the linkages between the Little Manatee River watershed and its receiving estuary. That project included a two-year study of ichthyoplankton communities in the tidal reach of the river, which involved the early life stages of estuarine fishes. This was conducted by Dr. Ernst Peebles of the University of South Florida College of Marine Science and it is briefly described on page 99 in the District report, followed by a table of the 30 most abundant fish life stages captured during the study. It should be noted this study also quantified the abundance of many invertebrates caught in the plankton net that are important fish food organisms.

There are other valuable findings from this project that could also be briefly summarized in the District report. The next slide is from that project. I think If there is one slide that best supports the District's minimum flows program for tidal rivers, this is it. It shows mean salinity at capture for the immature life stages for five species of fish in the Little Manatee, with age increasing toward the right. The first three are larval stages, as many important estuarine dependent species spawn in the bay or gulf or near the mouths of rivers.

As these fishes grow to juveniles and develop stronger swimming ability, they move into low salinity waters. This, about as effectively as anything, justifies the use of the low salinity habitats as a parameter for establishing minimum flows. There are some other aspects of the ichthyoplankton report for the Little Manatee that are valuable, but at a minimum this graphic needs to go into the District report.

There are four other papers or reports (one a group of three related reports) that need to be cited and summarized in the District report. Of particular significance is important primary production work done by Dr. Gabriel Vargo of the University of South Florida College of Marine Science.

On page 56, the District report shows yearly mean chlorophyll *a* concentrations at five stations in the Little Manatee monitored by the Environmental Protection Commission of Hillsborough

County, including four in the estuarine reach of the river. The report states the spatial pattern shown between these stations is typical of tidal rivers. Well not exactly, the Little Manatee is unusual in that regard and there are reasons for it. The table below, which is also submitted as a slide, is adapted from a report that Dr. Vargo prepared for the District that compares chlorophyll and phytoplankton relationships in the Little Manatee, Alafia, and Peace Rivers.

| Means, number of observations (N) and periods of data collection for chlorophyll <i>a</i> concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers. | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------|--------------|---------------|------------------------------------------|
| | | Salinity-based stations | | | |
| | N | 0.5 psu | 6 psu | 12 psu | 18 psu or 20 psu (Peace only) |
| | | Chlorophyll <i>a</i> (µg/l) | | | |
| Little Manatee (12/87 - 01/90) | 36 | 20.5 | 13.7 | 8.5 | 4.0 |
| Peace - same time period as Little Manatee | 24 | 8.9 | 22.1 | 31.5 | 7.9 |
| Peace - same time period as Alafia | 36 | 6.3 | 23.4 | 22.6 | 15.2 |
| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |

The Alafia and Peace have the more typical pattern of high chlorophyll *a* concentrations at the 6 and 12 psu zones, while the Little Manatee frequently has its highest values near the freshwater/brackish water interface. This is likely due to comparatively longer residence times in the braided reach of the river which allows phytoplankton blooms to develop. The effects of changes on freshwater inflows on excessive phytoplankton blooms can be an important factor to consider in minimum flows analyses, as was done for the Lower Alafia. I think we are okay on the Little Manatee in that regard, but the three reports that Dr. Vargo prepared for the District need to be cited and briefly summarized in the minimum flows report.*

The citation and summaries of these and a few other reports can be very brief, one or two paragraphs with a figure or table. These concise and informative summaries will improve the public and technical community's understanding of the freshwater inflow relationships of the Little Manatee River and better support the technical justification of the minimum flows.

Assessment of separate thresholds for flow-based blocks for the freshwater and estuarine sections of the Little Manatee River

I want to change topics now and discuss the use of flow-based blocks in the District report. I strongly support the use of flow-based blocks, but they probably should be identified separately for the freshwater and estuarine reaches of the river. For most rivers, the District has previously produced separate reports for the freshwater and estuarine reaches of each river using different analytical methods, such as for the Alafia, Peace and Myakka Rivers. For many

* The District report cites a paper by Vargo et al. (1991) in the Proceedings of the BASIS 2 Symposium, but the reports for the District provide other valuable findings with the third report completed after BASIS 2.

years the District used a seasonal block approach for the freshwater rivers, with three seasonal blocks corresponding to low, medium, and high flows. For example, if it was February, you assumed flows were in the medium range and you applied the minimum flow percentages for that time of year.

On page 103 the District report makes a good case that this method has serious limitations, for flows in any season can be above or below the expected seasonal flow range for prolonged periods of time. A much simpler and more direct way to avoid this is to use flow-based blocks, in which minimum flow percentages are defined for different flow ranges, an approach which the District has recommended for the Little Manatee, which I strongly support.

Flow based minimum flows have previously been determined by the District for estuarine rivers, such as the Lower Pithlachascotee and the Lower Peace. In these rivers, the relationships of variables to freshwater inflow within the estuary were examined to determine ranges of flows where different percent withdrawal limits should be applied. Combined with a low flow cutoff, this is a very effective way to largely preserve natural flow characteristics, protect the estuary from significant harm, and make water proportionately more available as flows increase.

The problem with the Little Manatee River report is that flow thresholds of 35 and 72 cfs were based solely on environmental analyses of the freshwater reach of the river. These flow thresholds are then applied to the estuarine reach of lower river as well. This is a first, as the District has never done this before, and it is probably not the best approach.

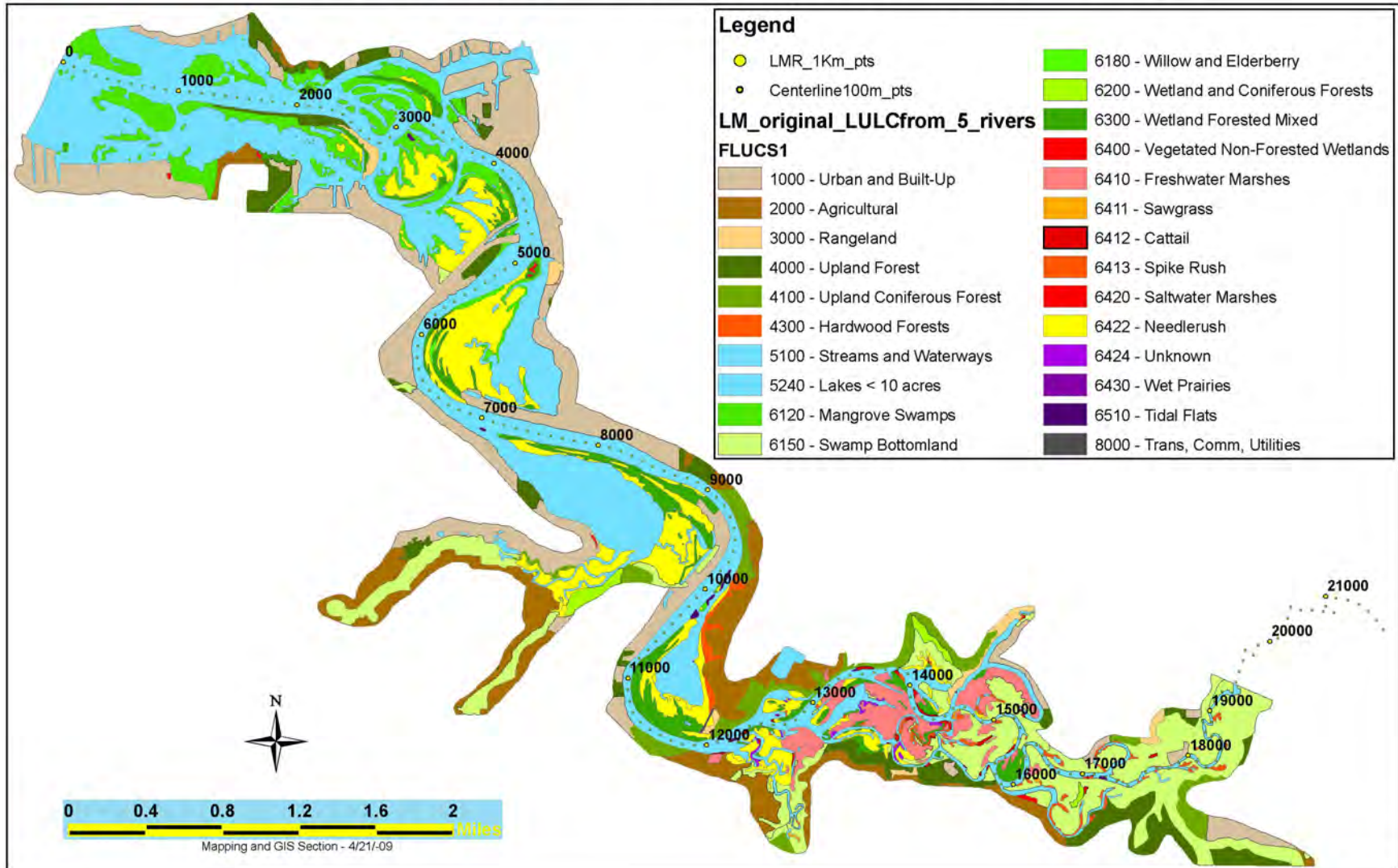
As was done for the Lower Pithlachascotee and Lower Peace Rivers, the response of key variables in the estuary to freshwater inflows should be examined separately for a series of flow ranges. Flow thresholds can then be identified to switch percent allowable flow reductions. Practical and ecologically effective flow thresholds for the estuarine portion of the Little Manatee might be similar to the flow thresholds identified for the freshwater reach, but you don't know until you analyze the data in that manner.

If necessary, the application of separate thresholds for flow-based blocks for the freshwater and estuarine reaches of a rivers is very feasible from a management perspective and can easily be applied, especially on a small river like the Little Manatee.

I recommend the District conduct further analyses to examine the response of low salinity zones and the environmental favorability functions for fishes in the lower river to freshwater inflow, and determine if separate thresholds for flow-based blocks in the estuarine section of the Little Manatee River are needed. The Lower Little Manatee River is an Outstanding Florida Water, an Aquatic Preserve, and is the jewel of tidal rivers flowing to Tampa Bay. It warrants a high degree of protection and the best analyses possible.

Three slides begin on the following page

Major Vegetation Communities along the Lower Little Manatee River



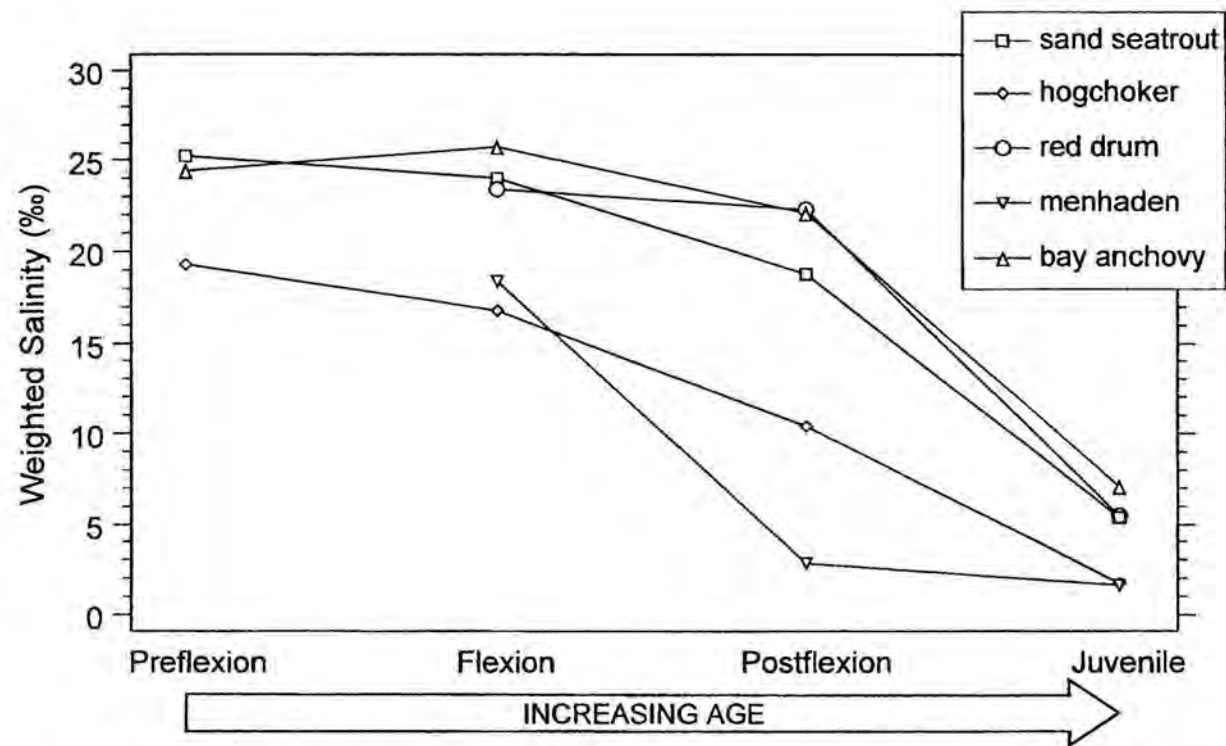
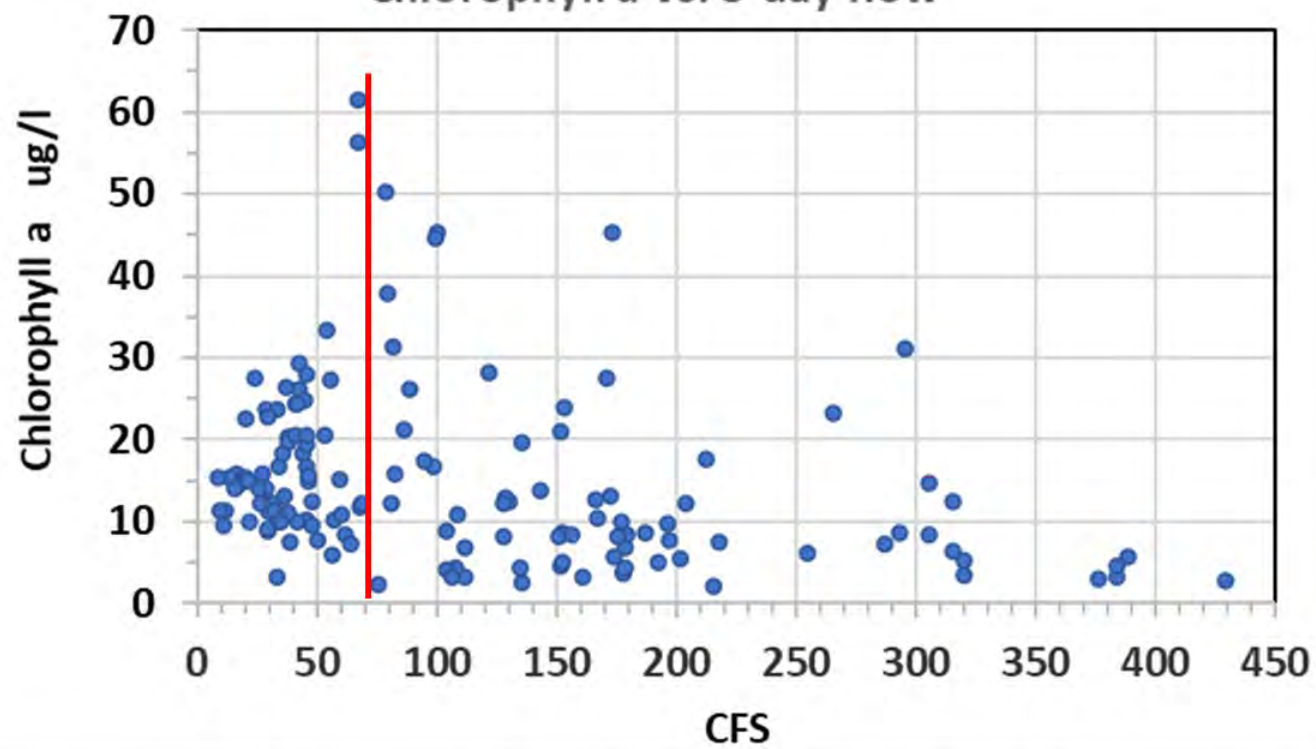


Fig. 5. Decreasing mean salinity at capture during fish development in the Little Manatee River. Preflexion, flexion, and postflexion are successive larval stages (Peebles and Flannery 1992).

| Means, number of observations (N) and periods of data collection for chlorophyll <i>a</i> concentrations at four moving salinity-based stations in the tidal reaches of the Little Manatee, Peace, and Alafia Rivers. | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----------------------------|-------|--------|----------------------------------|
| | | Salinity-based stations | | | |
| | N | 0.5 psu | 6 psu | 12 psu | 18 psu or 20 psu (Peace only) |
| | | Chlorophyll <i>a</i> (µg/l) | | | |
| Little Manatee (12/87 - 01/90) | 36 | 20.5 | 13.7 | 8.5 | 4.0 |
| Peace - same time period as Little Manatee | 24 | 8.9 | 22.1 | 31.5 | 7.9 |
| Peace - same time period as Alafia | 36 | 6.3 | 23.4 | 22.6 | 15.2 |
| Alafia (01/99 - 12/01) | 36 | 15.3 | 63.4 | 95.7 | 43.7 |

Station 182, Kilometer 13.6
Chlorophyll *a* vs. 5-day flow



Comments for the November 3, 2021 Little Manatee River minimum flows peer review meeting
Prepared by Sid Flannery

Note – Four paragraphs that will not be verbally presented on 11/3/21 due to time constraints are shown in blue font

Today I would like to speak about how minimum flows are implemented using flow-based blocks. The review panel is considering whether the flow blocks should, or should not be, the same for the fresh and estuarine sections of the Little Manatee.

Well, they are not entirely the same in the currently proposed rule, which is shown in the table below. Note that in Block 3 the freshwater minimum flows have a second high flow threshold of 174 cfs that is highlighted in yellow, which is not assigned to the estuarine minimum flows. You can subtract the numbers shown in red to calculate the percent withdrawals in each block. So, for block 3 in the freshwater section, flows cannot be reduced by more than 13 or 11 percent depending on the rate of flow. Further downstream, flows to the lower river cannot be reduced by more than 30 percent at flows above 72 cfs.

Table 6-9. Proposed minimum flows for the Little Manatee River.

| | Block 1 (≤ 35 cfs) | Block 2 (> 35 cfs and ≤ 72 cfs) | Block 3 (> 72 cfs) |
|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Upper Little Manatee River (Headwaters to Highway 301) | 90% of the flow on the previous day | 80% of the flow on the previous day | 87% of the flow on the previous day when the previous day's flow was > 72 cfs and ≤ 174 cfs, or 89% of the flow on the previous day when the previous day's flow was > 174 cfs |
| Lower Little Manatee River (Highway 301 to Tampa Bay) | 90% of the flow on the previous day | 80% of the flow on the previous day | 70% of the flow on the previous day |
| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

So, let's hypothetically change the threshold to switch from block 2 to block 3 for the lower river from 72 cfs to 120 cfs. We still have the 13 and 11 percent limits to withdrawals in block 3 in the freshwater section, but flow reductions to the lower river cannot exceed 20 percent until flows go above 120 cfs, when percent withdrawals can increase to 30 percent. This is very simple and straightforward and poses no water management complications whatsoever.

There are two factors that typically make the percent-of-flow method very practical within the District. Estuaries in the region are generally not as sensitive to ecological impacts from flow reductions as are freshwater rivers, and minimum flows adopted for estuarine rivers usually allow for the same, or more

often, greater percent withdrawals than for the corresponding freshwater sections. And, it is an obvious point, but the estuary is always downstream. If these two types of ecosystems were interspersed along the river channel it could be complicated, but that is not the case.

If we are to protect both the freshwater and estuarine sections of our rivers, it is critical to first evaluate the most effective flow blocks separately for these two very different ecosystems, then write the rules accordingly. Based on years of experience applying the percent-of-flow method, that has not been a problem yet and I don't foresee it being a problem in the future.

For years the District has included flow-based blocks in estuarine minimum flow rules based on analyses of relationships within those tidal rivers. However, with the Little Manatee, the District for the first time has developed blocks based solely on the freshwater section of the river and then assigned three of those same blocks to the estuarine section as well.

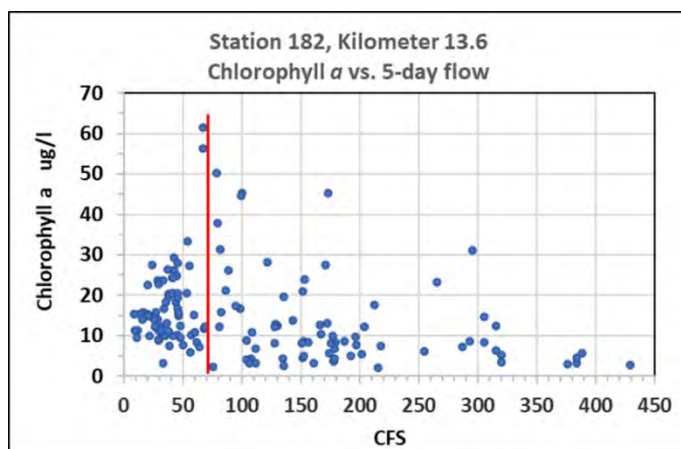
Assigning 72 cfs as the high flow block for the estuary does not allow for the evaluation of important ecological relationships in the lower river above that flow rate, which by the way, was near the median flow for the river for the last 20 years. Many of these relationships at higher flows are important to the ecological functions of the estuarine section of the river.

Last week, Dr. Ernst Peebles of USF said that the combined zooplankton/ichthyoplankton catch in the lower river showed a shift around 100 cfs. Also last week, I discussed that many variables in estuaries respond to freshwater inflow in a nonlinear manner and submitted a document to the WebForum that contained plots for salinity and other parameters in the lower river vs. freshwater inflow. Those plots showed these parameters respond strongly to flow reductions near 72 cfs, but more gradually at higher flow rates, where the relative ecological effects of flow reductions would be smaller. Such relationships could be evaluated to develop a revised block 3 for the lower river.

For example, upstream of I-75 there are widespread oligohaline marshes dominated by freshwater species that have some salt tolerance, such as sawgrass and cattails. The inundation of these marshes with fresh water in the wet season is important to their health and productivity. Plots of salinity versus flow in the graphics document show that salinity is very sensitive to flow reductions at 72 cfs in this reach of the river, but not so much at flows above 100 to 150 cfs.

Go to next page

The graph below is a plot of chlorophyll *a* vs. five-day average flow at the EPC station located about one and a half kilometers upstream of the I-75 bridge. The red reference line is the block 3 threshold at 72 cfs. It is clear that chlorophyll concentrations are near maximum in this flow range. Although trends in nutrients have been encouraging in recent years, longer term data have shown the Little Manatee has been significantly enriched with nutrients from human activities in the watershed. Given that, 72 cfs does not look to be a good place to switch from block 2 to block 3 and increase the withdrawal rate from 20 to 30 percent, slowing the water down in this sensitive flow range. But again, estuarine relationships were not evaluated in the determination of the flow blocks.



A very useful analysis is to examine daily output from the EFDC model to see in what flow range does a specific percent withdrawal rate cause reductions in low salinity habitats greater than 15 percent, similar to what was done for the Lower Peace River. I suspect the fish habitat analysis could be used in a similar manner.

In closing, over the last 30 years the District had spent considerable time, effort, and money to conduct detailed technical investigations of the relationships of streamflow to the ecology of freshwater and estuarine rivers. In doing so, it has developed the very progressive percent-of-flow method, which has been successfully applied to many rivers.

However, the percent-of-flow method is at a critical juncture right now. The topic of whether the flow blocks have to be the same for fresh and estuarine sections of rivers is extremely important and the Little Manatee could be viewed a precedent. Based on a number of ecological factors and practical water management considerations, I strongly believe that flow blocks for fresh and estuarine sections of rivers need to be evaluated separately. Again, the District has evaluated flow blocks for tidal rivers based on relationships within those estuaries in the past, and there is no real practical water management reason to discontinue that now.

It looks like the review of the Little Manatee River minimum flows report is on a very fast track. I suggest the panel take additional time to consider further the flow blocks issue. The panel could get input from other parties, continue discussions with District staff, and consider some other analyses. There is no real need to hurry on the minimum flows for this truly outstanding river, and the flow blocks issue is a critical factor that needs to be thoroughly assessed.

Table 6-9. Proposed minimum flows for the Little Manatee River.

| | Block 1 (< 35 cfs) | Block 2 (> 35 cfs and ≤ 72 cfs) | Block 3 (> 72 cfs) |
|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| Lower Little Manatee River (Highway 301 to Tampa Bay) | 90% of the flow on the previous day | 80% of the flow on the previous day | 70% of the flow on the previous day |
| Upper and Lower Little Manatee River | No surface water withdrawals are permitted when flows are ≤ 35 cfs | | |

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Doug Leeper](#); [Lei Yang](#); [Xinjian Chen](#); [Gabe I. Herrick](#); [Jordan D. Miller](#); [Danielle Rogers](#); [Philip Rhinesmith](#)
Subject: Second slide for my presentation
Date: Wednesday, November 3, 2021 6:33:32 AM
Attachments: [Chlorophyll a graph.pdf](#)
[Minimum flows table.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

Attached is a graph I would like to be shown as part of my comments to the Little Manatee peer review panel today. It will be about half-way through my comments and I will say "second slide please." As I emailed yesterday, I also submitted a table I would like shown at the beginning of my comments, which is attached again.

Please confirm that these two slides can be used as part of my comments today. It might be useful to also post these two files to the minimum flows WebForum along with the longer written version of my comments I sent yesterday. I plan to stay within the five minute limit today.

Thanks again,
Sid

From: [Sid Flannery](#)
To: [Kym Holzwart](#); [Gabe I. Herrick](#)
Cc: [Doug Leeper](#); [Chris Zajac](#); [Xinjian Chen](#); [Lei Yang](#); [Jordan D. Miller](#); [Danielle Rogers](#); [Philip Rhinesmith](#)
Subject: Revised version of complete comments
Date: Wednesday, November 3, 2021 7:50:38 AM
Attachments: [Comments from Sid Flannery for the Little Manatee peer review meeting, Nov. 3, 2021 new.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym,

In going over my comments for today's meeting, I made some revisions to my complete set of comments that I sent yesterday. Please upload the attached version of my complete comments, in which the file name ends with the word "new." The same email from yesterday would still apply.



















If you have already uploaded the complete comments from yesterday, simply replace it with this one.

Thanks again,
Sid



















This is print screen of the folder *Received from HSW* which should be under that back then was known as the D Drive, under the folders *Rivers/LMR/HSW* under a large folder of my stuff that was left on the D drive.

I created a new folder at home you will not see there, which is *New Shell Point regression stuff*. I copied files that look relevant to the regression stuff to that folder for convenience. The next page has a print screen of the contents of that folder.

Three pages total

| ts > District From D > Rivers > LMR > HSW > Received from HSW > | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------|-----------|--|
| Name | Date modified | Type | Size | |
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|  Jan 18 2008 CD | 3/4/2021 3:53 PM | File folder | | |
|  June 2008 CD | 11/4/2021 5:43 AM | File folder | | |
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|  corrected shell stage from wenrui | 3/27/2008 11:51 AM | Text Document | 1,634 KB | |
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|  Little manatee Summary of Isohaline Regression Models | 6/11/2008 1:40 PM | Adobe Acrobat D... | 12 KB | |
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|  meter_profile_database.sas7bdat | 11/12/2007 10:27 AM | SAS7BDAT File | 3,873 KB | |
|  meter_profile_database | 11/9/2007 3:33 PM | WinRAR ZIP archive | 723 KB | |
|  Salinity prediction using synthetic tides at Shell Point - 03312008 update | 3/31/2008 2:44 PM | Microsoft Excel 97... | 23,730 KB | |
|  Salinity_predictions_using_synthetic_tides_at_ShellPoint_03312008 | 3/31/2008 5:36 PM | WinRAR ZIP archive | 7,129 KB | |
|  Synthetic tides at Shell Point with Dec 1999 | 1/21/2008 10:45 PM | Text Document | 1,671 KB | |
|  Uncorrected tides Dec 1999 | 3/27/2008 1:01 PM | Text Document | 1,671 KB | |
|  uncorrected_Shell_tide | 3/27/2008 1:13 PM | Microsoft Excel 97... | 3,853 KB | |
|  Vertical Profile Meter Database - for Sid | 10/12/2007 10:50 AM | Microsoft Excel 97... | 3,611 KB | |

Print screen of folder called *New Shell Point regression stuff* I created at home from files under the folder described on the previous page. There is probably plenty of files here that are not relevant to the question of how the model boundary condition for additional years was created, which is basically described in my email of Nov. 4, 2021 and will be discussed with a follow up phone call

| Name | Date modified | Type | Size |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------|-----------|
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|  corrected shell stage from wenrui | 3/27/2008 11:51 AM | Text Document | 1,634 KB |
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|  Draft Report_06-10-2008 | 9/13/2010 10:19 AM | Adobe Acrobat D... | 119 KB |
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|  Synthetic tides at Shell Point with Dec 1999 | 1/21/2008 10:45 PM | Text Document | 1,671 KB |
|  Table 3. Summary of Isohaline Regression Models | 6/11/2008 1:40 PM | Adobe Acrobat D... | 12 KB |
|  Table 4. Summary of Fixed Location Salinity Models | 6/11/2008 1:40 PM | Adobe Acrobat D... | 49 KB |
|  Tables 1 & 2 | 6/11/2008 1:40 PM | Adobe Acrobat D... | 59 KB |
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|  uncorrected_Shell_tide | 3/27/2008 1:13 PM | Microsoft Excel 97... | 3,853 KB |

This is a print screen of the folder *Model runs* under the *Rivers/LMR folder* that was on the D drive. I think the Huang_PO scope is useful

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| | sal output 2000 - 2005 runs | 3/4/2021 3:54 PM | File folder | |
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| | FSU P-2 Purchase Order Payment 2 DRAFT | 9/29/2013 8:33 AM | Microsoft Excel 97... | 45 KB |
| | Huang_PO_scope | 10/8/2010 1:59 PM | Microsoft Word 9... | 30 KB |
| | invoice2012-8-15 | 8/15/2012 9:10 AM | Adobe Acrobat D... | 9 KB |
| | PO_scope_Huang_salinity_modeling | 3/1/2011 4:04 PM | Microsoft Word 9... | 33 KB |
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| | Synthetic tides at Shell Point _no 1999 | 1/17/2008 9:13 AM | Text Document | 1,639 KB |
| | Synthetic tides at Shell Point with Dec 1999 | 1/21/2008 11:45 PM | Text Document | 1,671 KB |

From: [Sid Flannery](#)
To: [Xinjian Chen](#); [Lei Yang](#)
Cc: [Doug Leeper](#); [Kym Holzwart](#)
Subject: Little Manatee boundary condition analysis
Date: Thursday, November 4, 2021 11:43:03 AM
Attachments: [Print screen of possible boundaray conditon regression related files \(way too inclusive\).docx](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Xinjian and Lei,

In response to the panel question regarding the boundary condition for the extended model runs for the EFDC model, I have attached a WORD file that is a print screen of files I left behind on what was D drive back then where the relevant information can be found. I am 90% certain of what the relevant files are, and give the short version below. I don't have time to double check them today, but can look again tomorrow. The print screen contains lots of other files, but I did have time to isolate the relevant files out.

Or, since Lei was HSW and worked on this project back then, I'll just leave it to her to figure it all out.....Just kidding!!!

The short version is that Wenrui Huang provided synthetic tides for Shell Point for 2000 forward that were based on a harmonic analysis he did. There are two files for a PO scope of work to Dr. Huang that appear to be largely duplicates. They describe the overall approach including generation of the synthetic tides. Files of the tide values are also included. Those files are on page 3 of the attached file.

The next files are shown on the first two pages of the attached WORD file. The second page shows files copied from other folders, so you will also see them listed elsewhere.

From measured data at the Shell Point USGS recorder between 2004 and 2006, HSW used tide (water levels), salinity, freshwater inflow and monthly salinity data for Tampa Bay, which they interpolated to get daily values, to develop a regression to predict 15 minute values for salinity at that location. Starting at the bottom of page 10, the file *Draft report _06_10_2008* has a description of modeling to predict salinity at Shell Point while the file *Table 4* looks to be a summary of the fixed location salinity models.

HSW then used that regression with the synthetic tides and the same explanatory variables (freshwater inflow, interpolated bay salinity) to predict salinity at Shell point for 2000 forward. The file *Salinity prediction using synthetic.....update* file looks to have the final salinity predictions, which look to be hourly. Those values were then used to run the EFDC

model for 2000 forward.

That is it for me today - I will look in more detail again tomorrow. Lei may actually have some recollection of this work.

Have a fine weekend.

Sid

From: [Sid Flannery](#)
To: [Doug Leeper](#)
Cc: [Kym Holzwart](#); [Chris Zajac](#); [Xinjian Chen](#); [Gabe I. Herrick](#); [Jordan D. Miller](#); [Kristina Deak](#)
Subject: Output files for Little Manatee EFDC model runs
Date: Tuesday, November 9, 2021 5:53:40 AM

[EXTERNAL SENDER] Use caution before opening.

Hello Doug and District staff,

If possible, I would like to receive selected output files from the EFDC model runs for the Little Manatee River minimum flows project. I expect these are for model runs that have already been conducted and no additional model runs will be needed.

The information I would like to receive is described below. It would be nice to get the different flow scenarios and salinity zone values as separate files, but I expect the original files may have values for salinity zones in addition to the ones I am asking for. Or, the output files may contain flow scenarios in addition to the ones I am asking for. Receiving such large files would be fine as long as I can identify and query out the values for the salinity zones and flow scenarios I am interested in.

I would like to receive daily values for bottom area and water volume from the EFDC model runs from January 2000 to June 2005. The salinity zones I am interested in are < 2psu, < 5 psu, <10 psu, and <15 psu. If the values are in increments smaller than daily, that is okay as I can calculate daily average values from those values.

The flow scenarios I would like to receive are baseline, and the 15 percent, 20 percent, 25 percent, 30 percent, and 35 percent flow reductions not including the 35 cfs low-flow cutoff.

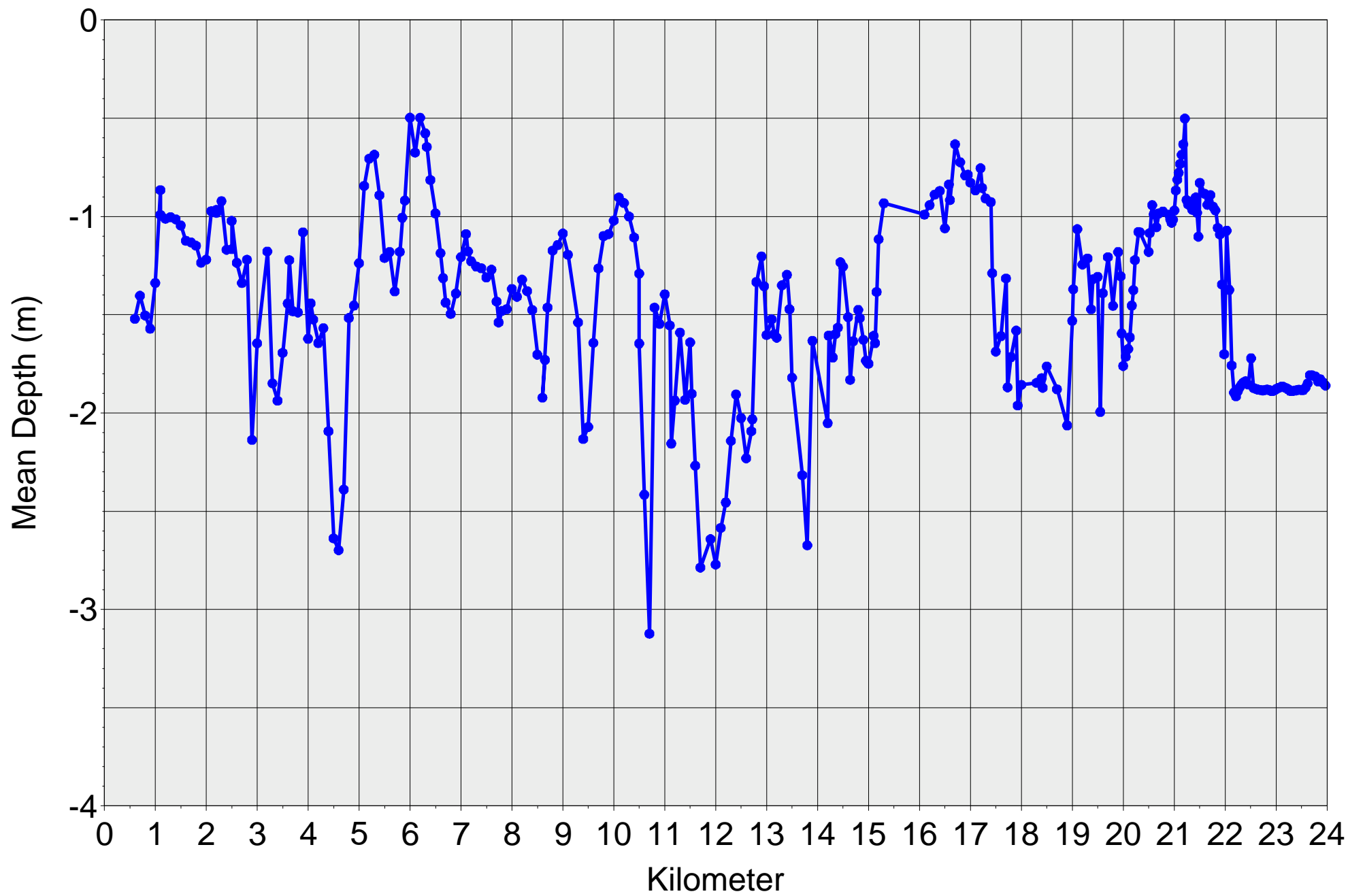
I would also like to receive the output for any of these same percentage flow reductions that included the 35 cfs low-flow cutoff.

I will also need to flow values on which these values were based, at least for the baseline scenario, with the flows for the other scenarios being helpful as well. The ungaged flows should be the same for all the scenarios, so I believe the flows that I need for the baseline and the flow reduction scenarios will be the flows at the USGS gage at the US 301 bridge.

If possible, SAS files would be very helpful, but I can work with EXCEL files or tab or comma delimited text files. Please contact me if I can provide any clarification for this request.

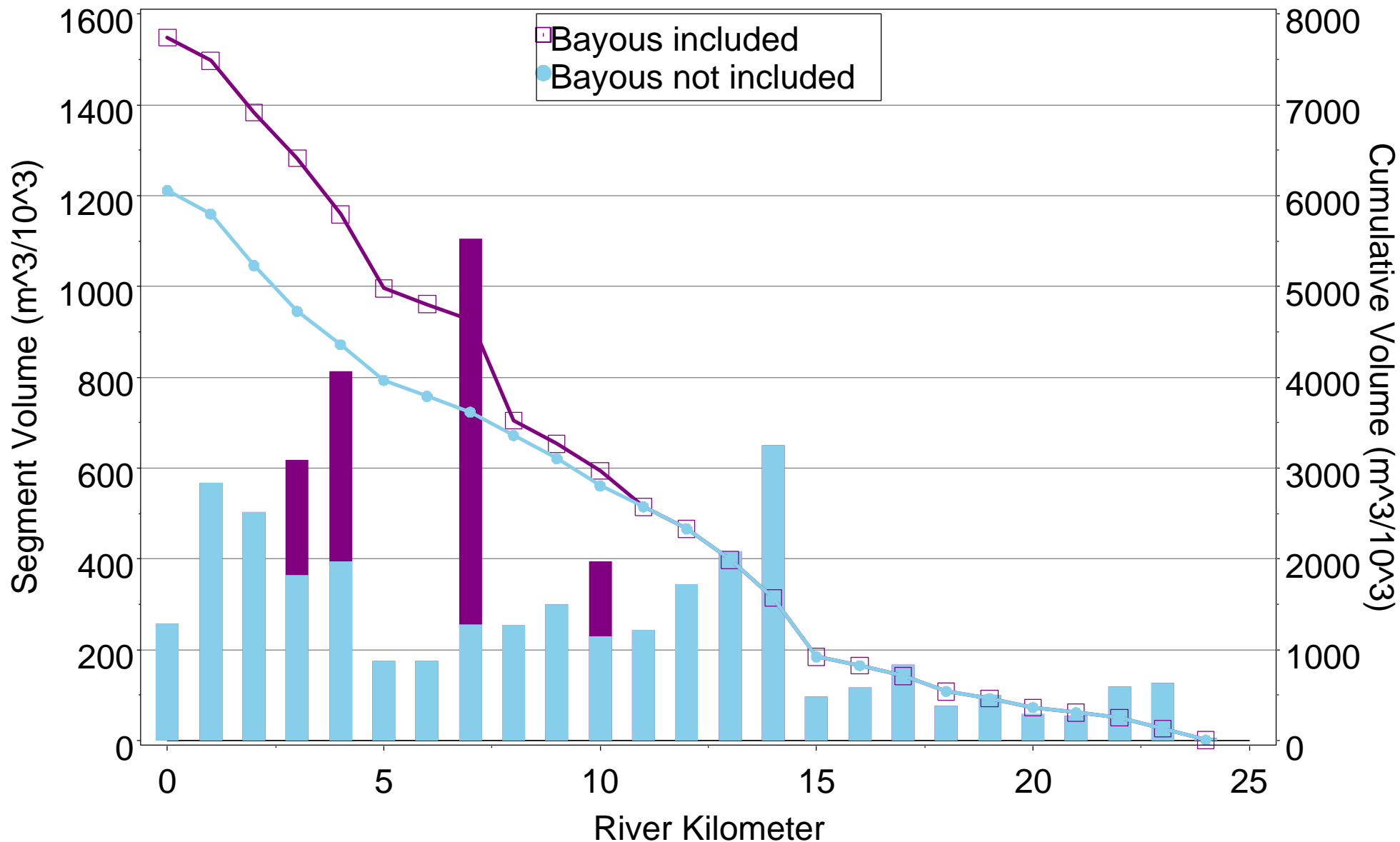
Thanks very much for your time and whatever the District can provide.

Sid
813-245-0331



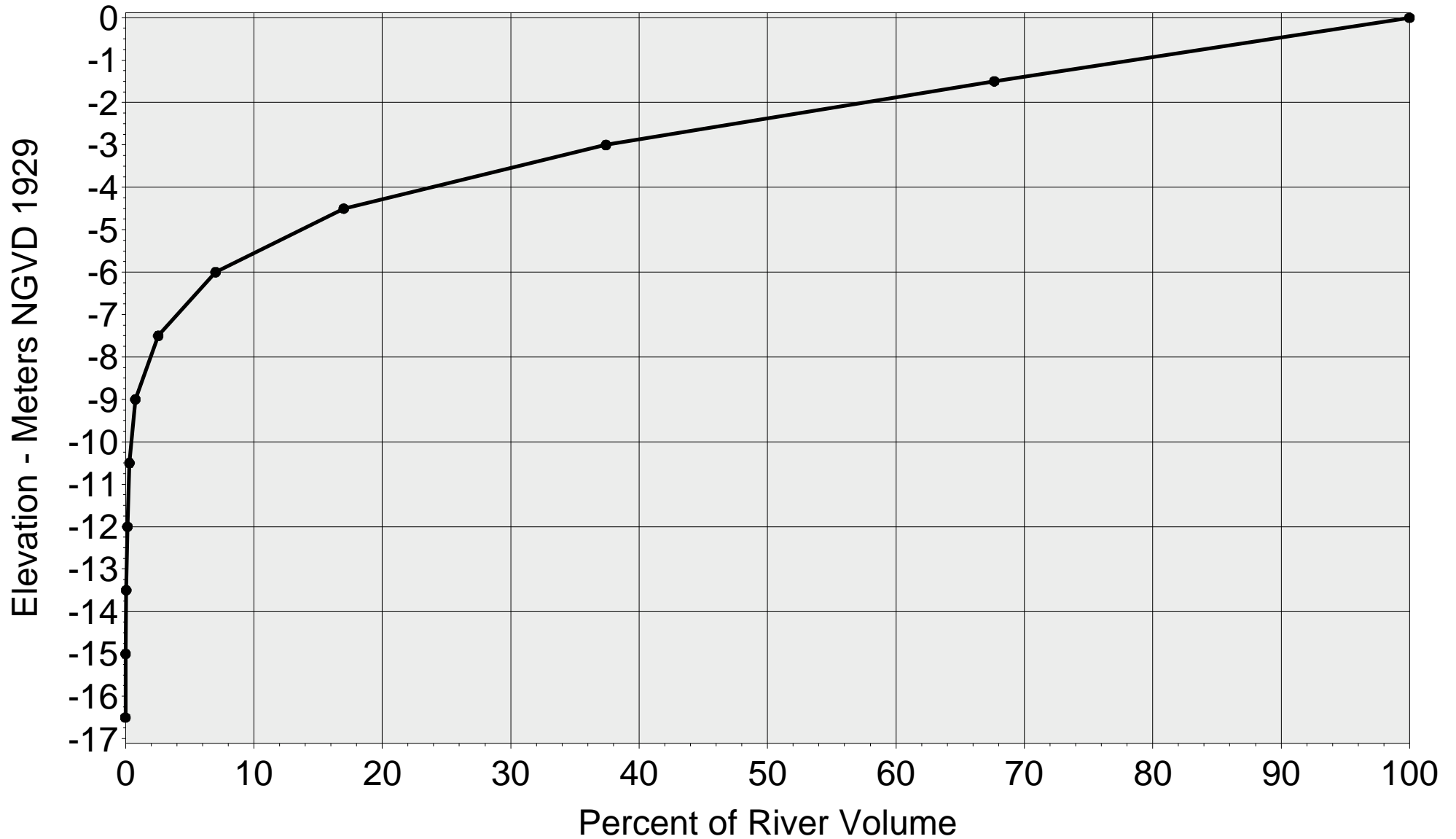
Little Manatee River - KM 0.6 to 24.0

Segment Volumes and Cumulative Water Volumes in 1 KM River Segments



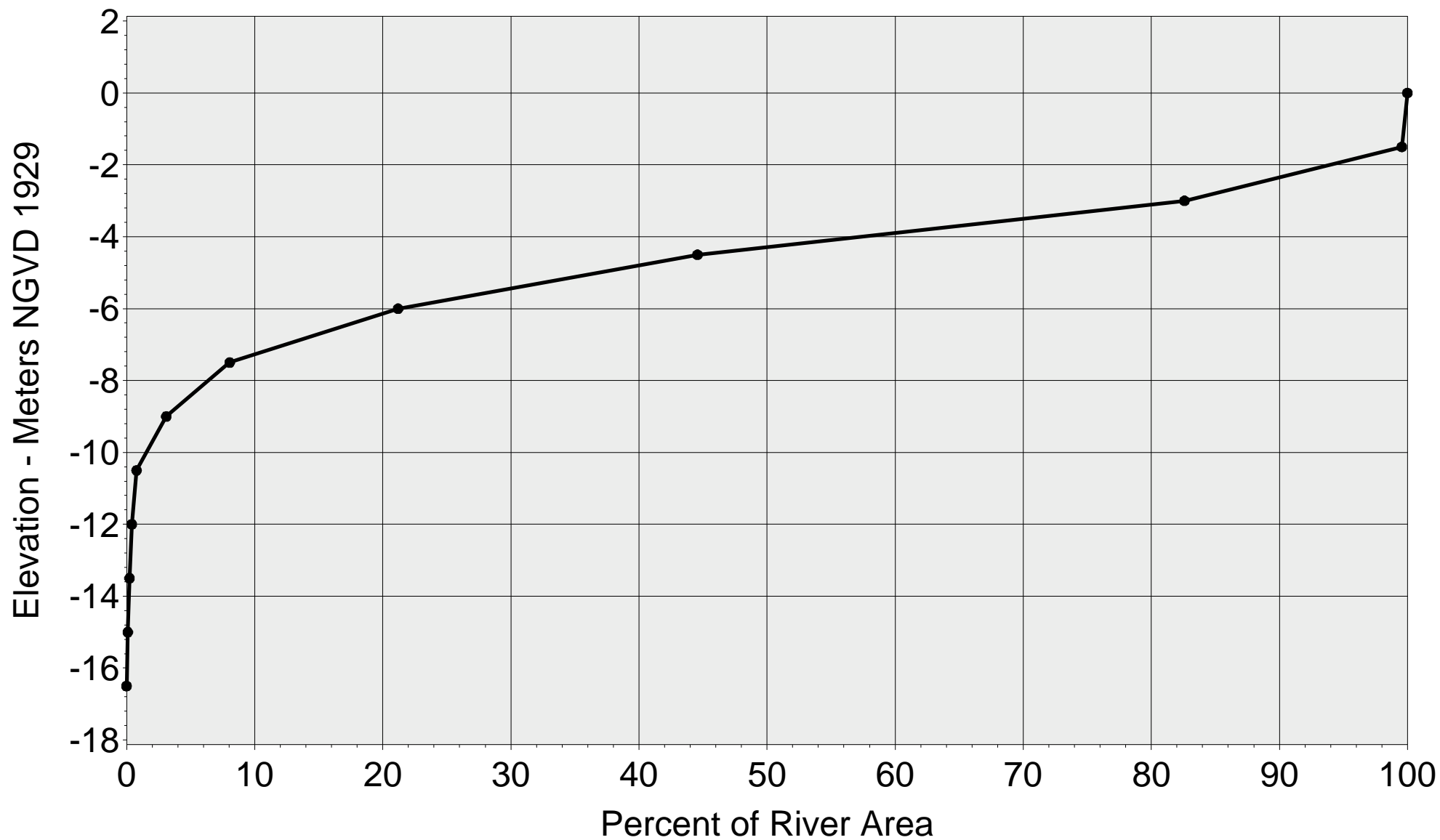
Little Manatee River - KM 0.6 to 24.0

Percent of River Volume vs. Elevation

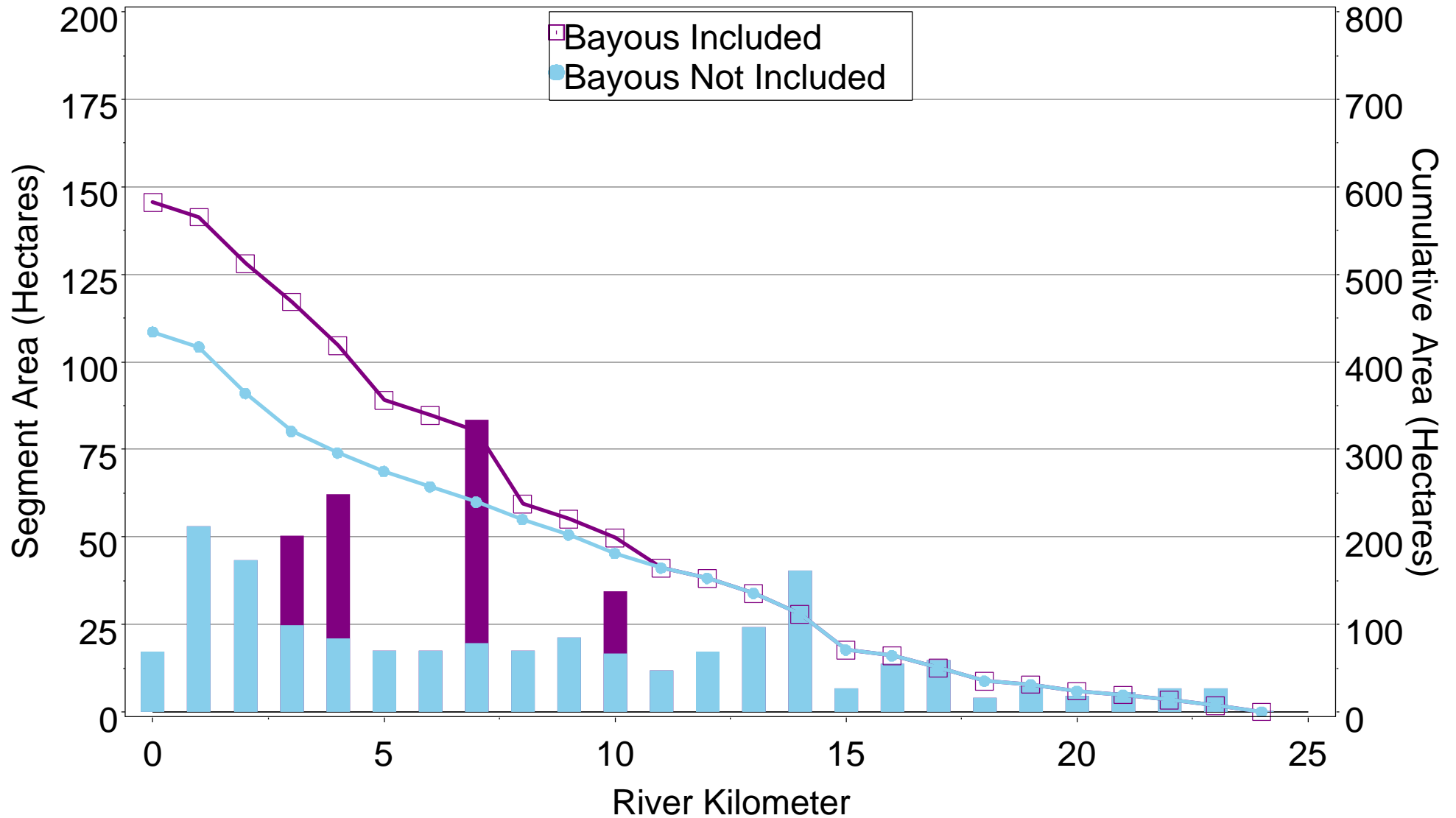


Little Manatee River - KM 0.6 to 24.0

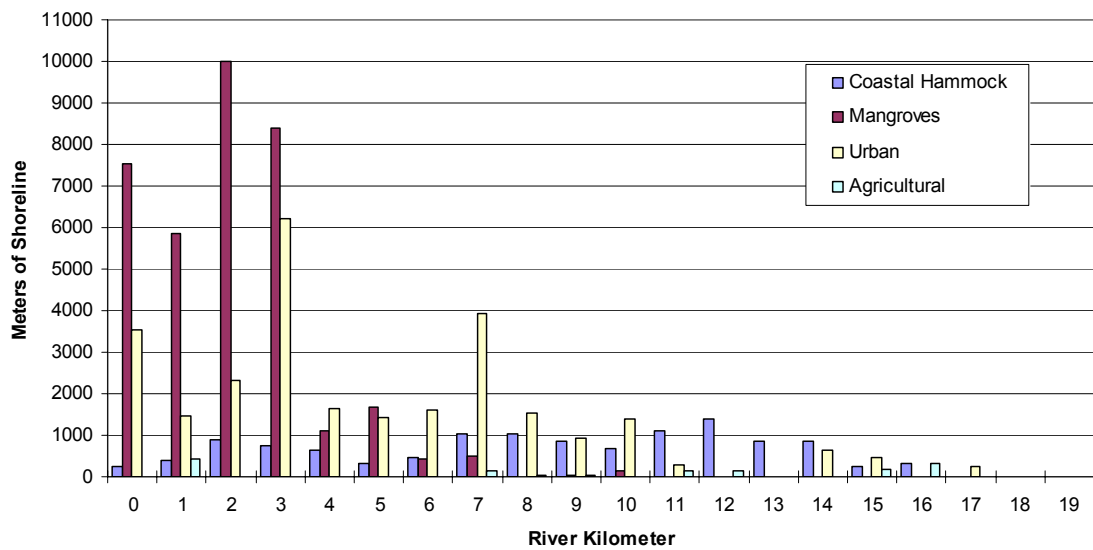
Percent of Area vs. Elevation



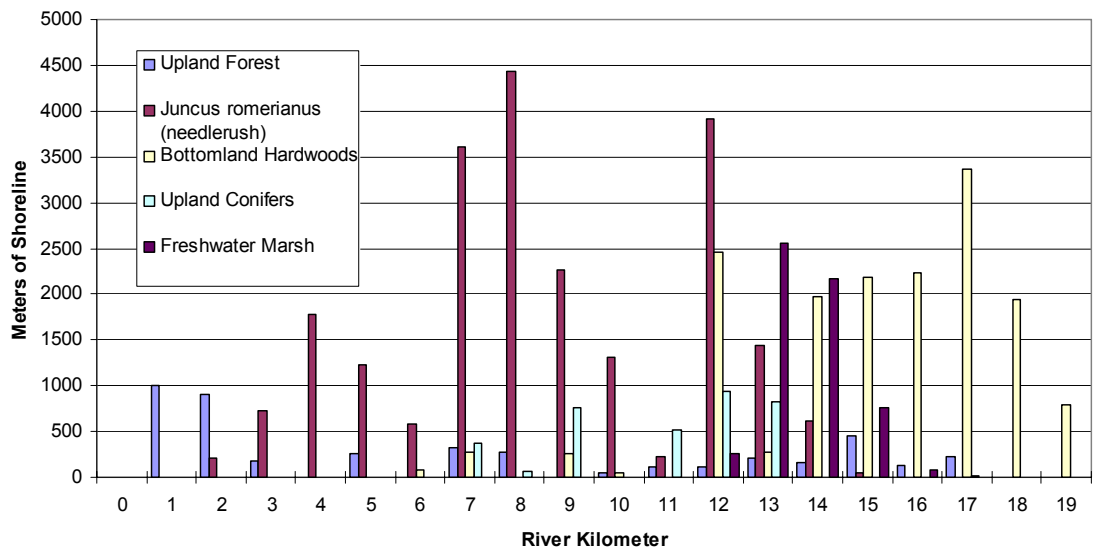
Little Manatee River
Segment Areas and Cumulative Areas at 0.0m NGVD Elevation
River Kilometer 0.6 to 24.2



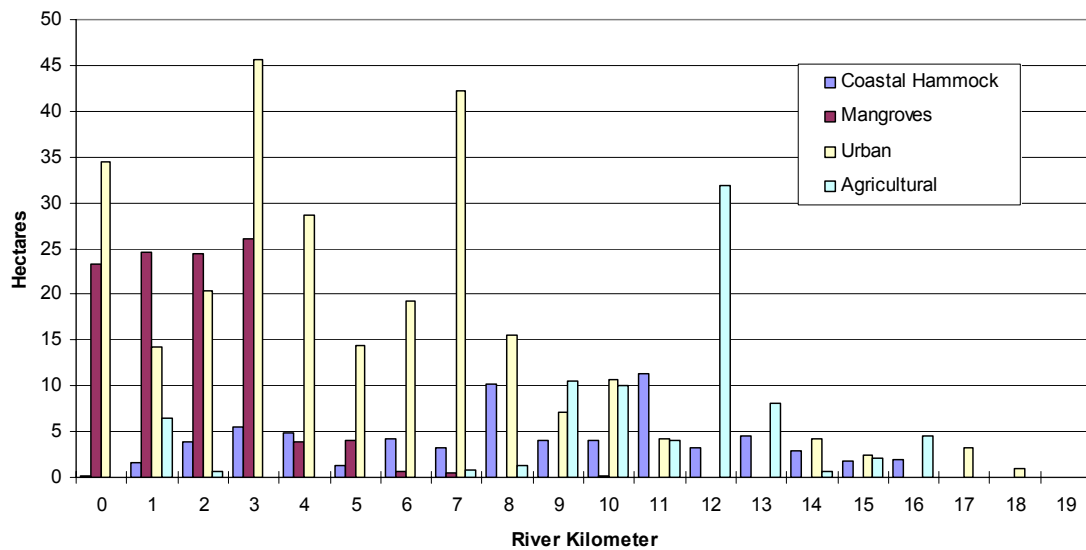
Little Manatee River - KM 0.0 to 19.3
Coastal Hammock, Mangroves, Urban, and Agricultural Shorelines



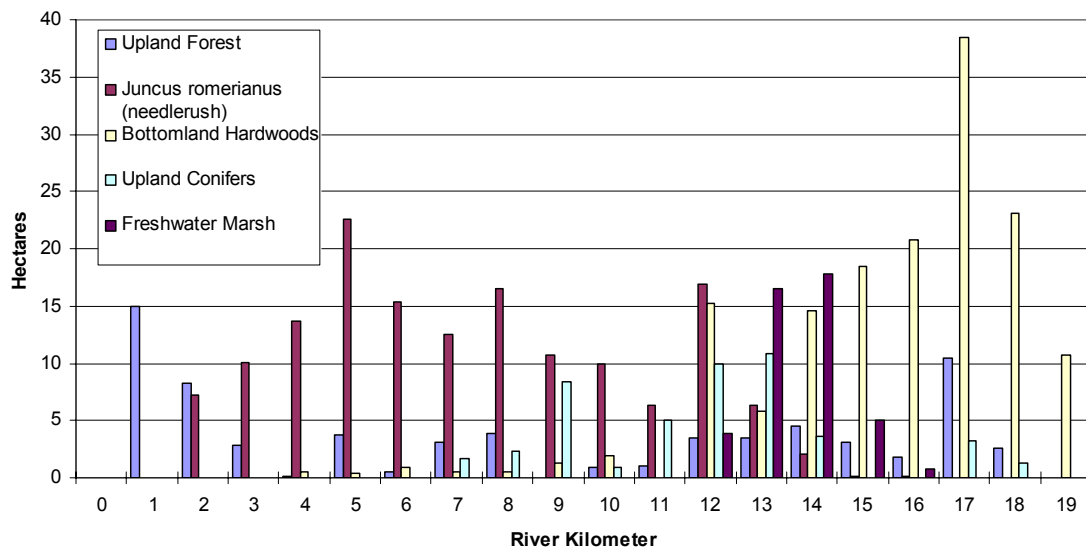
Little Manatee River - KM 0.0 to 19.3
Upland Forest, *Juncus roemerianus*, Bottomland Hardwood, Upland Conifer, and Freshwater Marsh Shorelines



Little Manatee River - KM 0.0 to 19.3
Coastal Hammock, Mangroves, Urban, and Agricultural Area

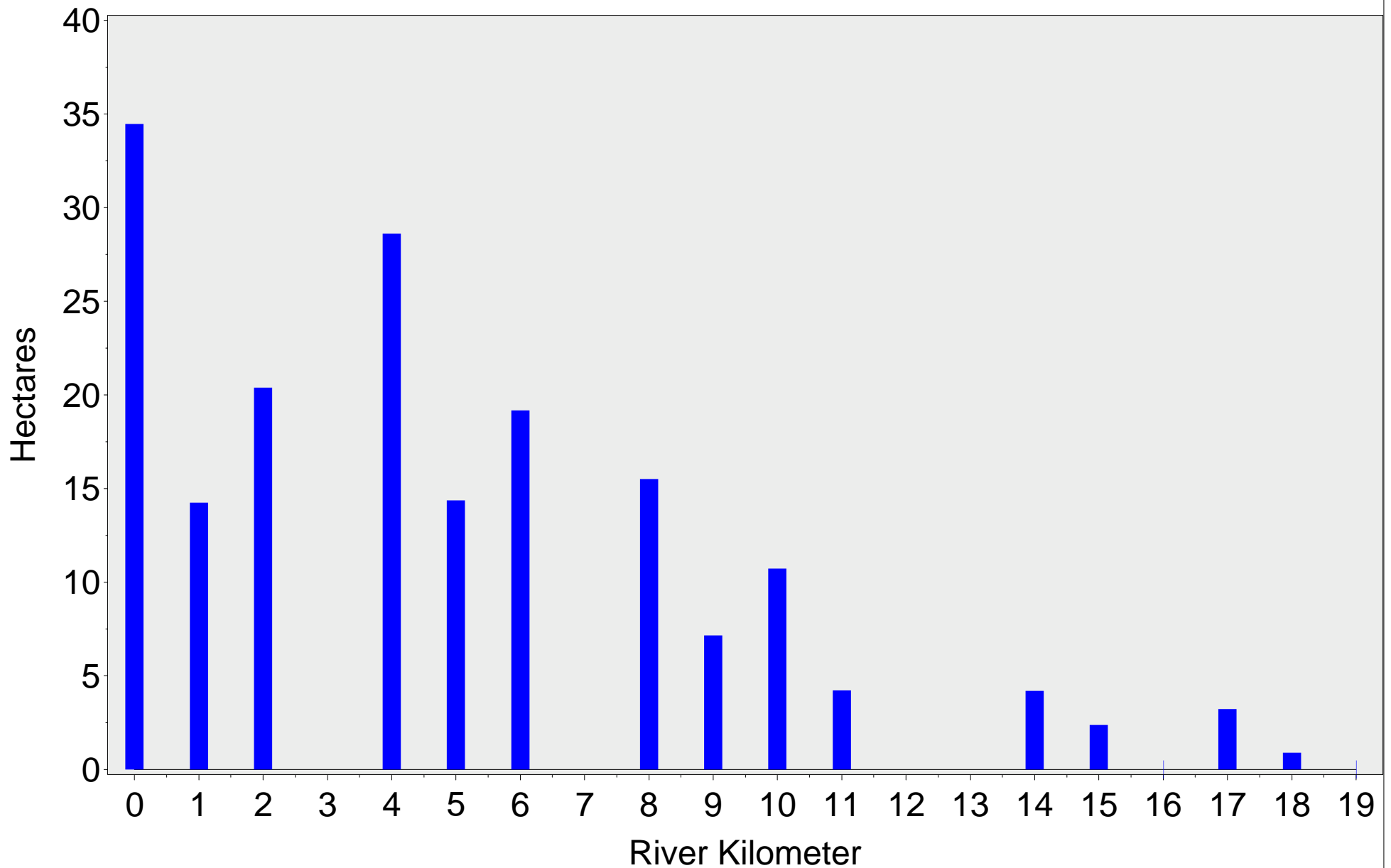


Little Manatee River - KM 0.0 to 19.3
Upland Forest, *Juncus roemerianus*, Bottomland Hardwood, Upland Conifer, and Freshwater Marsh Area



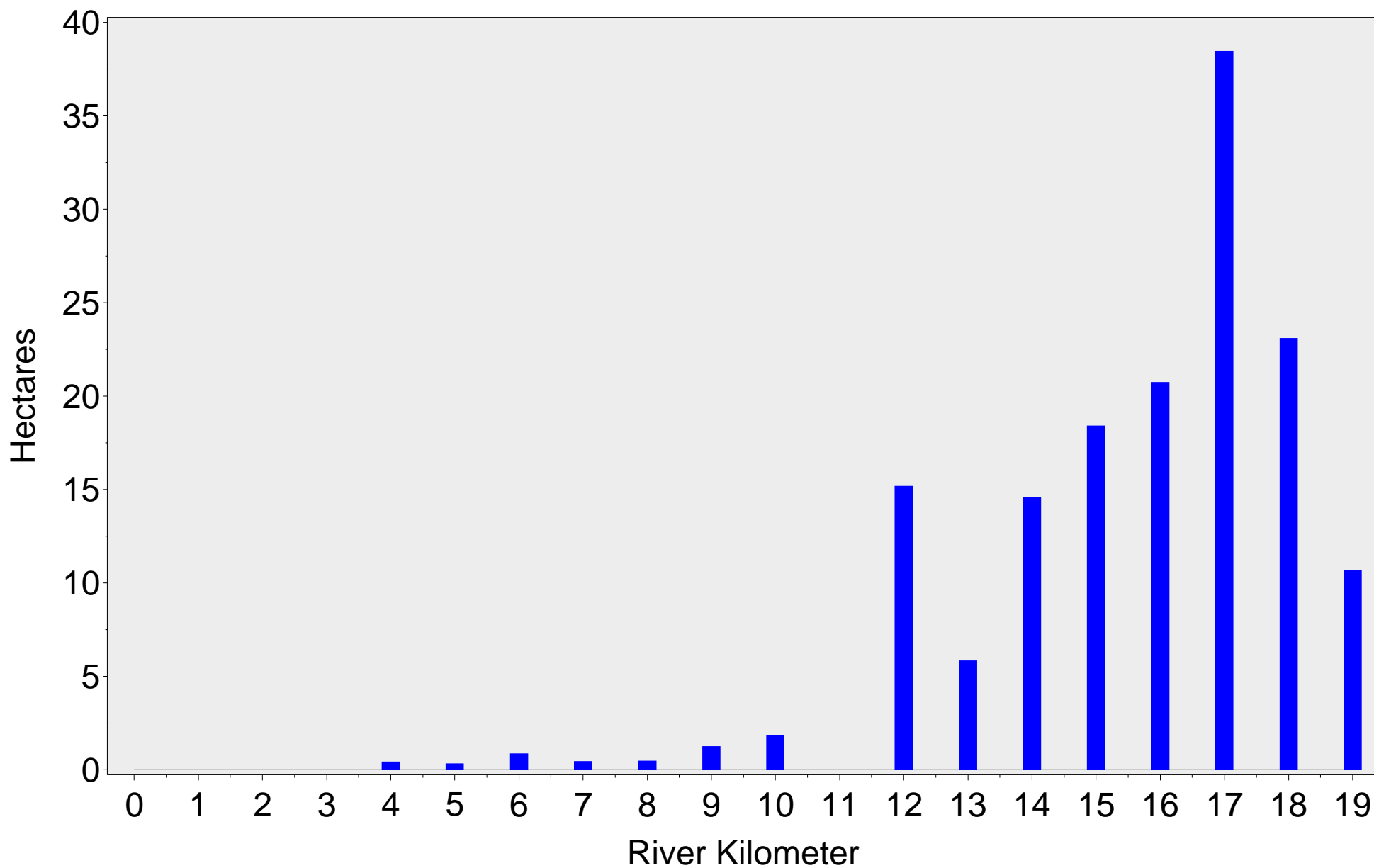
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Urban



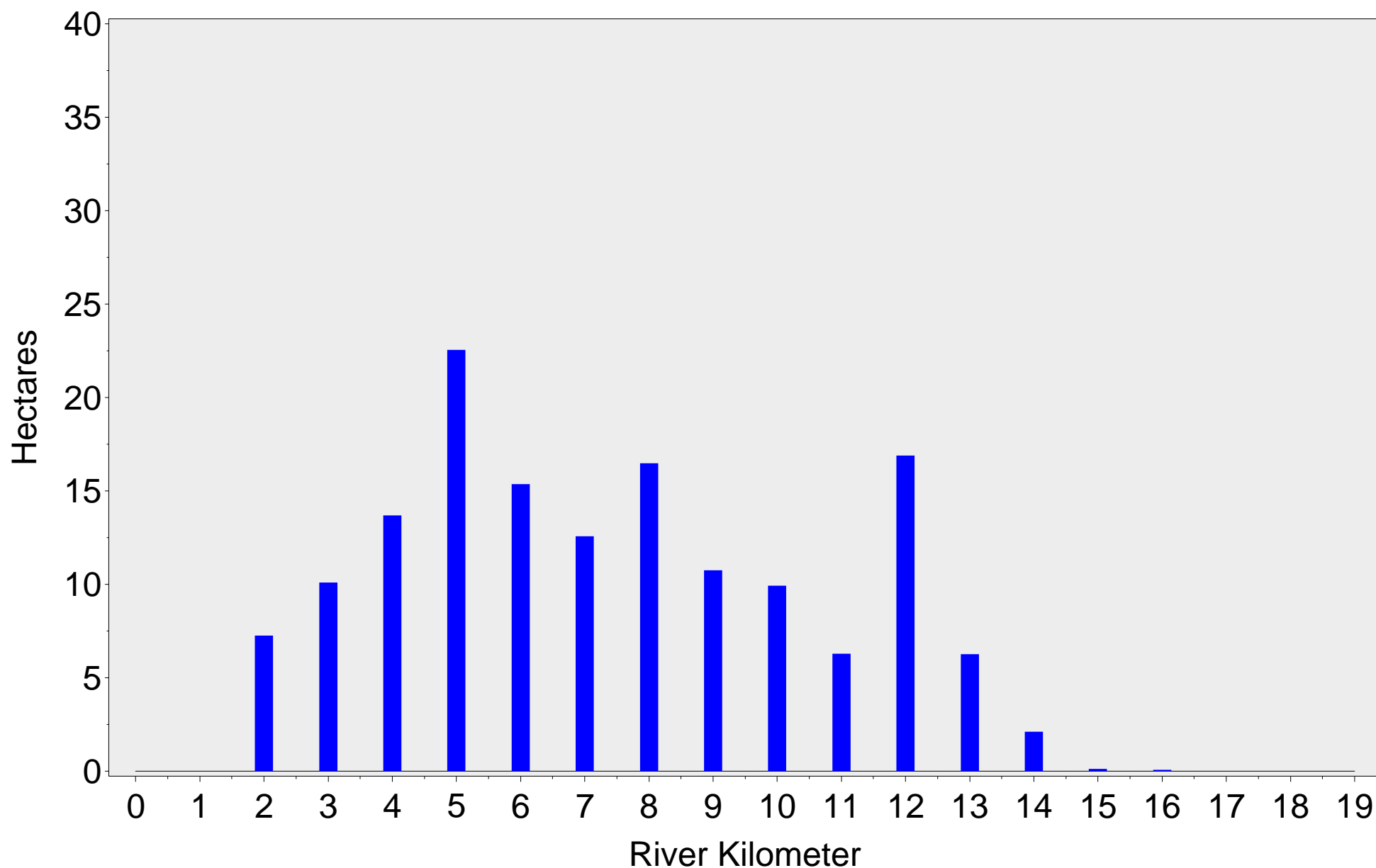
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Bottomland Hardwoods



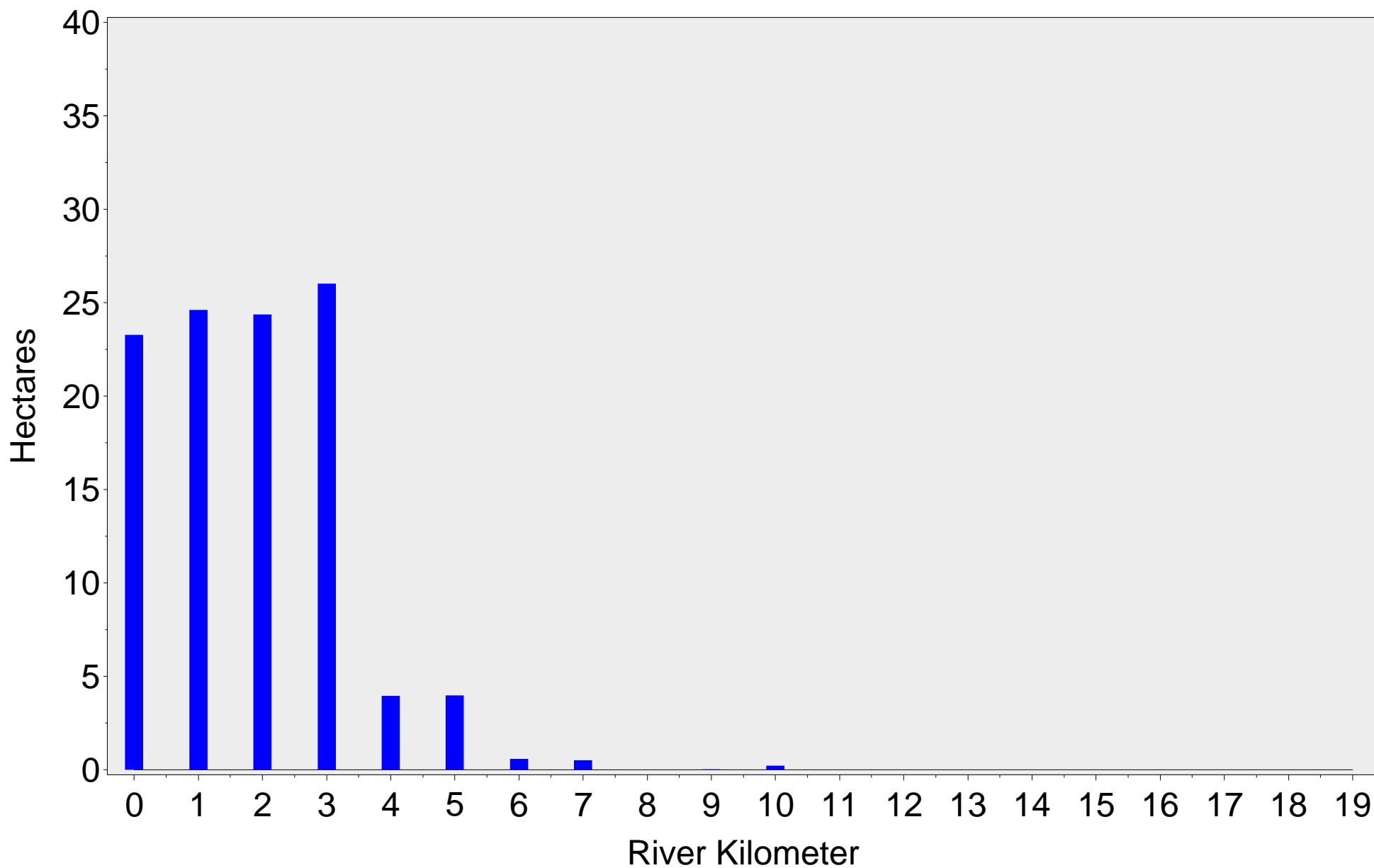
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as *Juncus roemerianus*(needlerush)



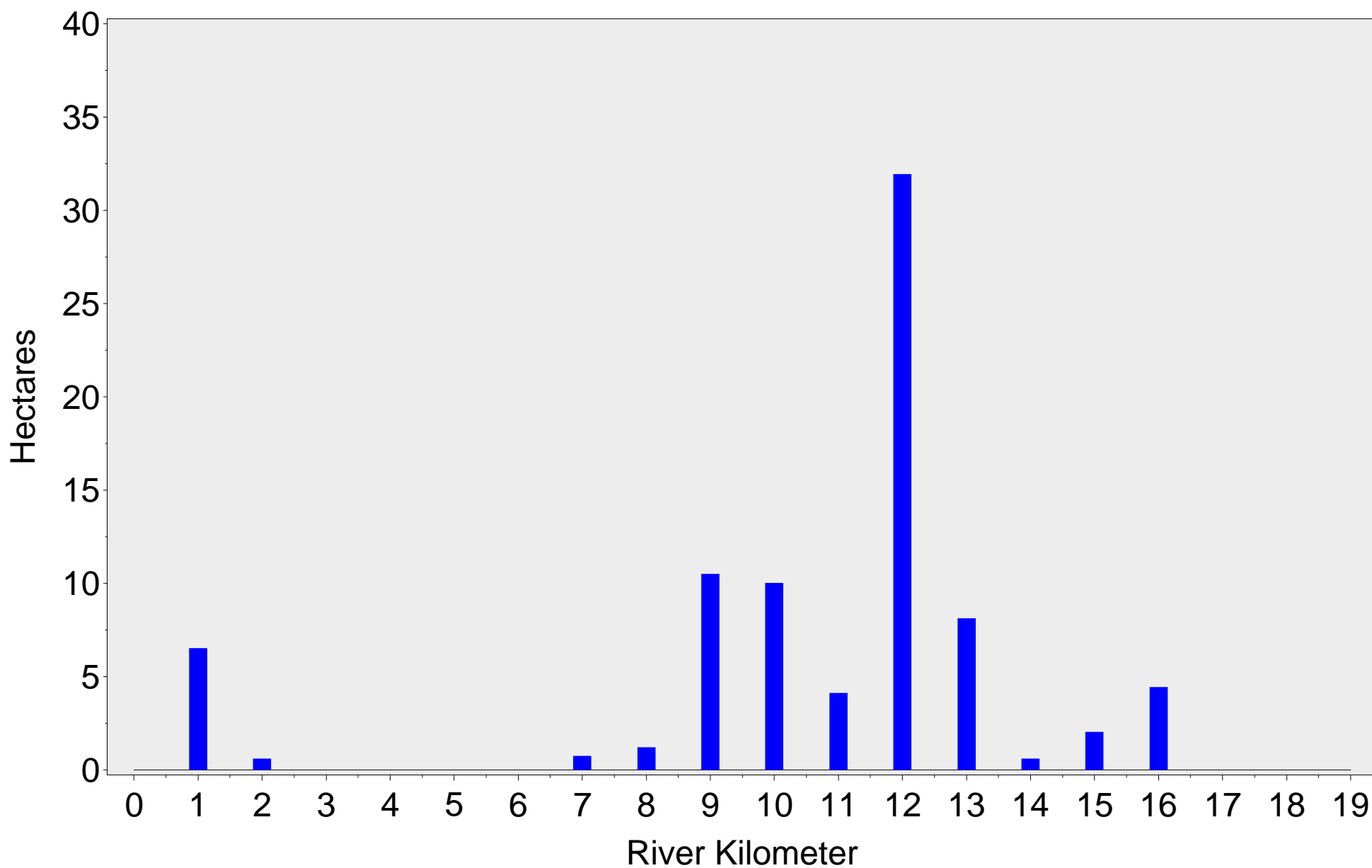
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Mangroves



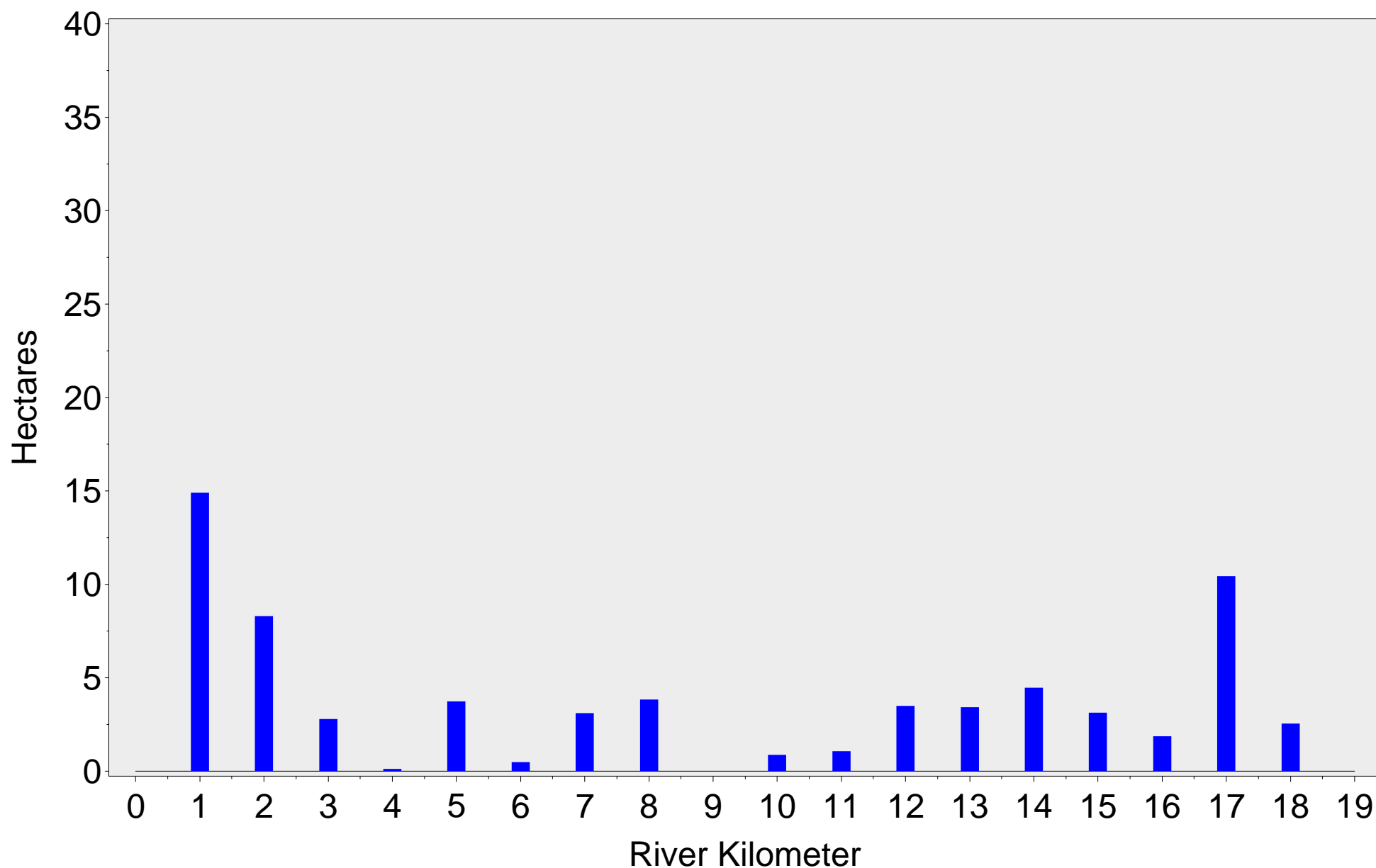
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Agricultural



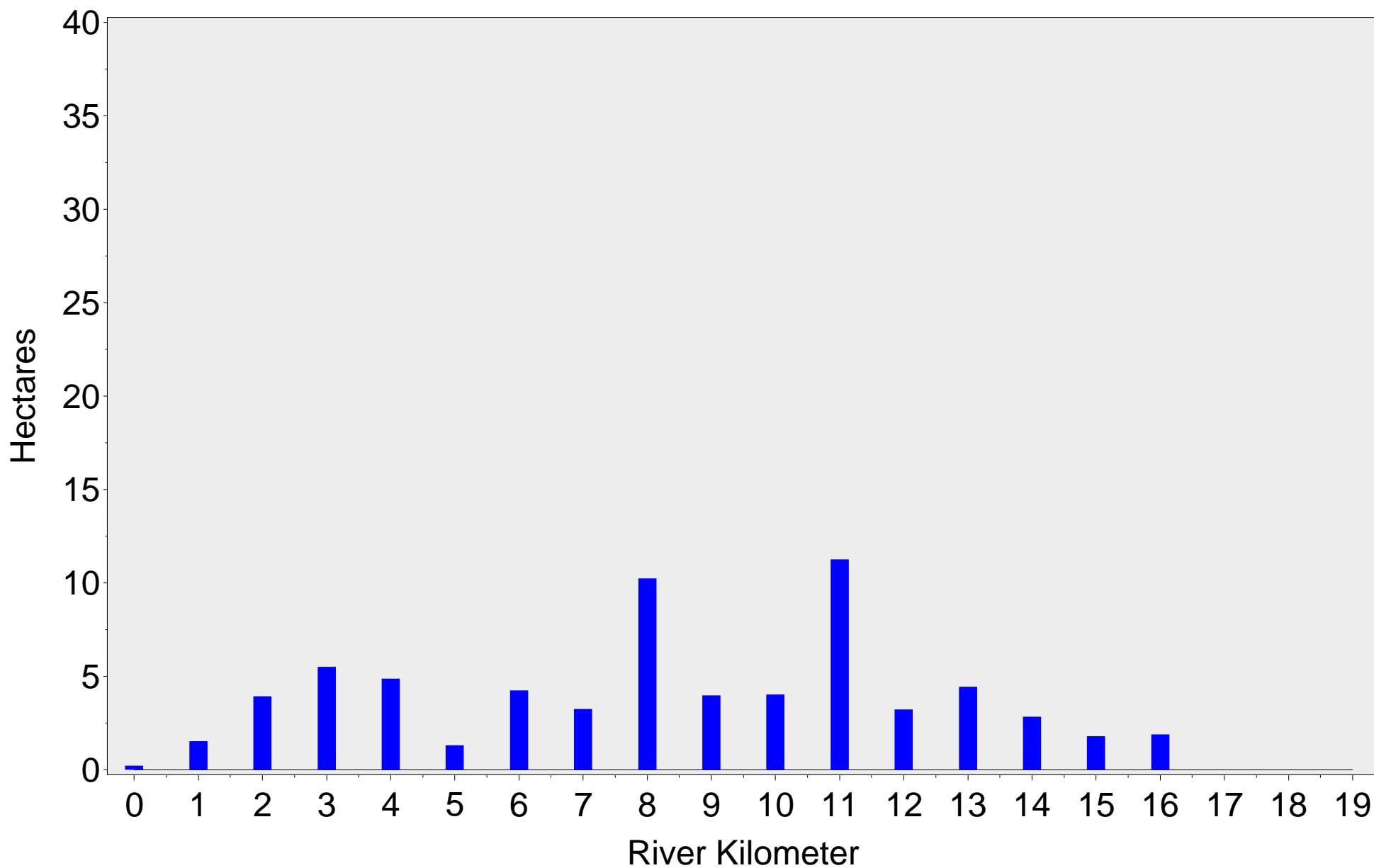
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Upland Forest



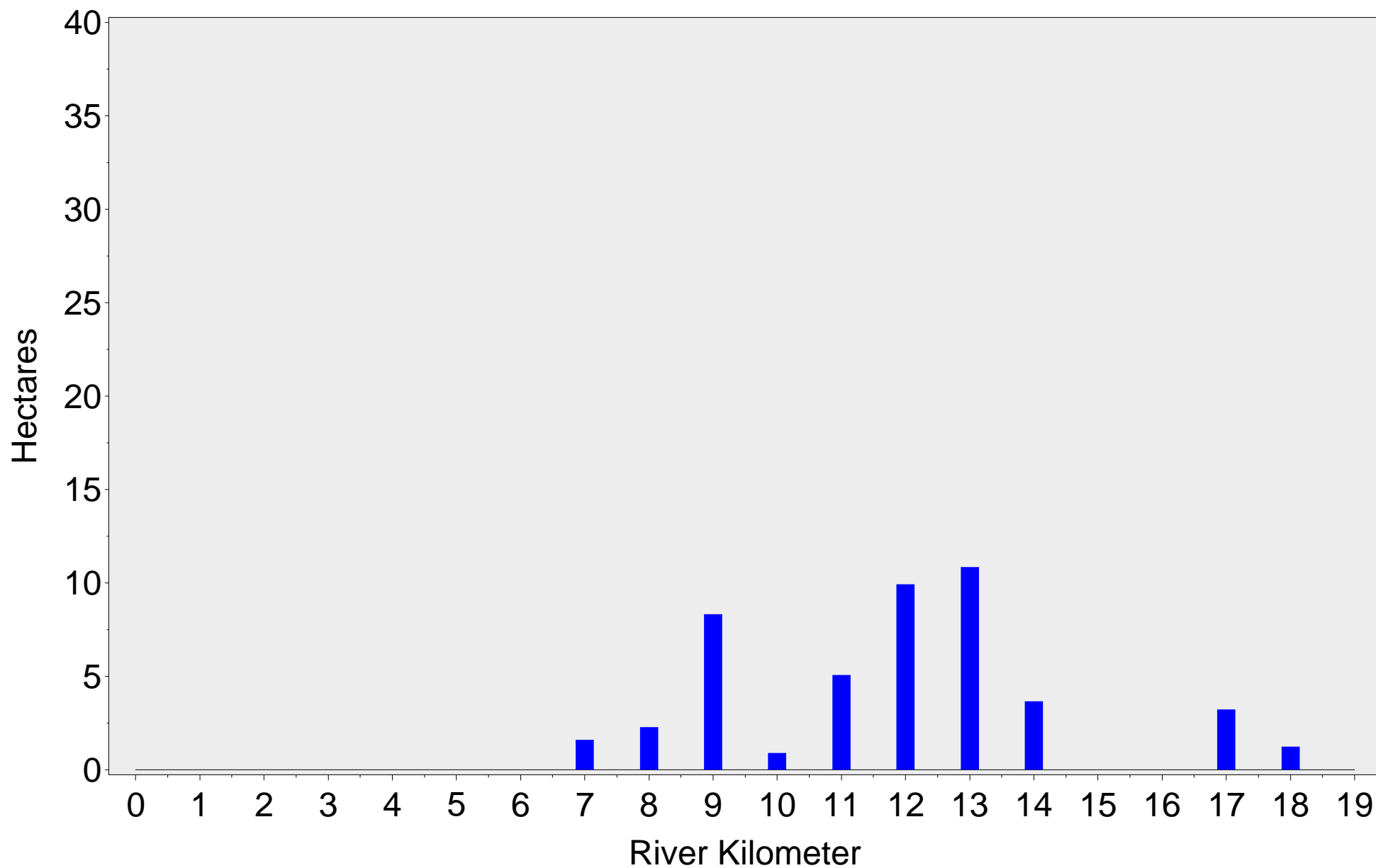
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Coastal Hammock



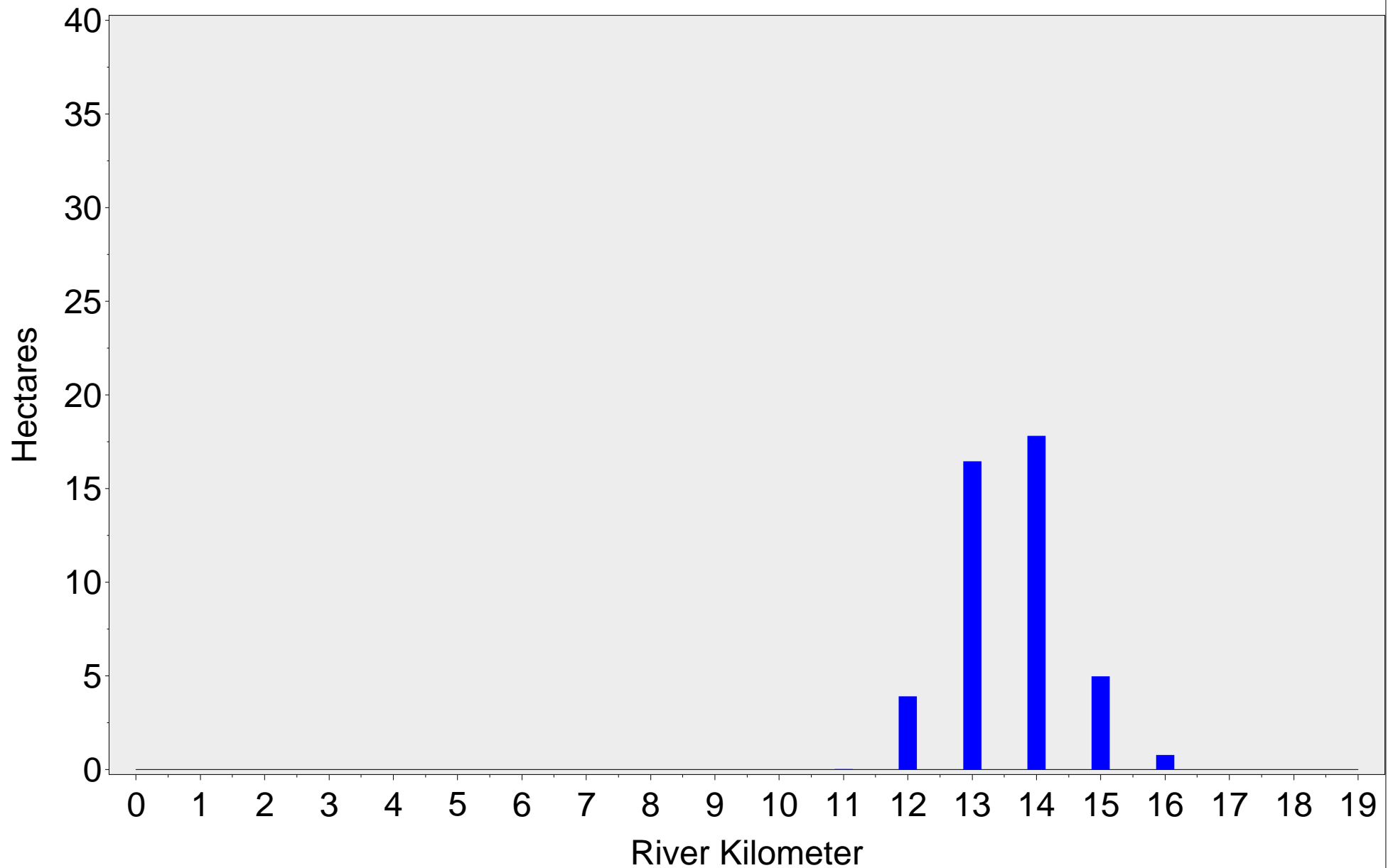
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as Upland Conifers



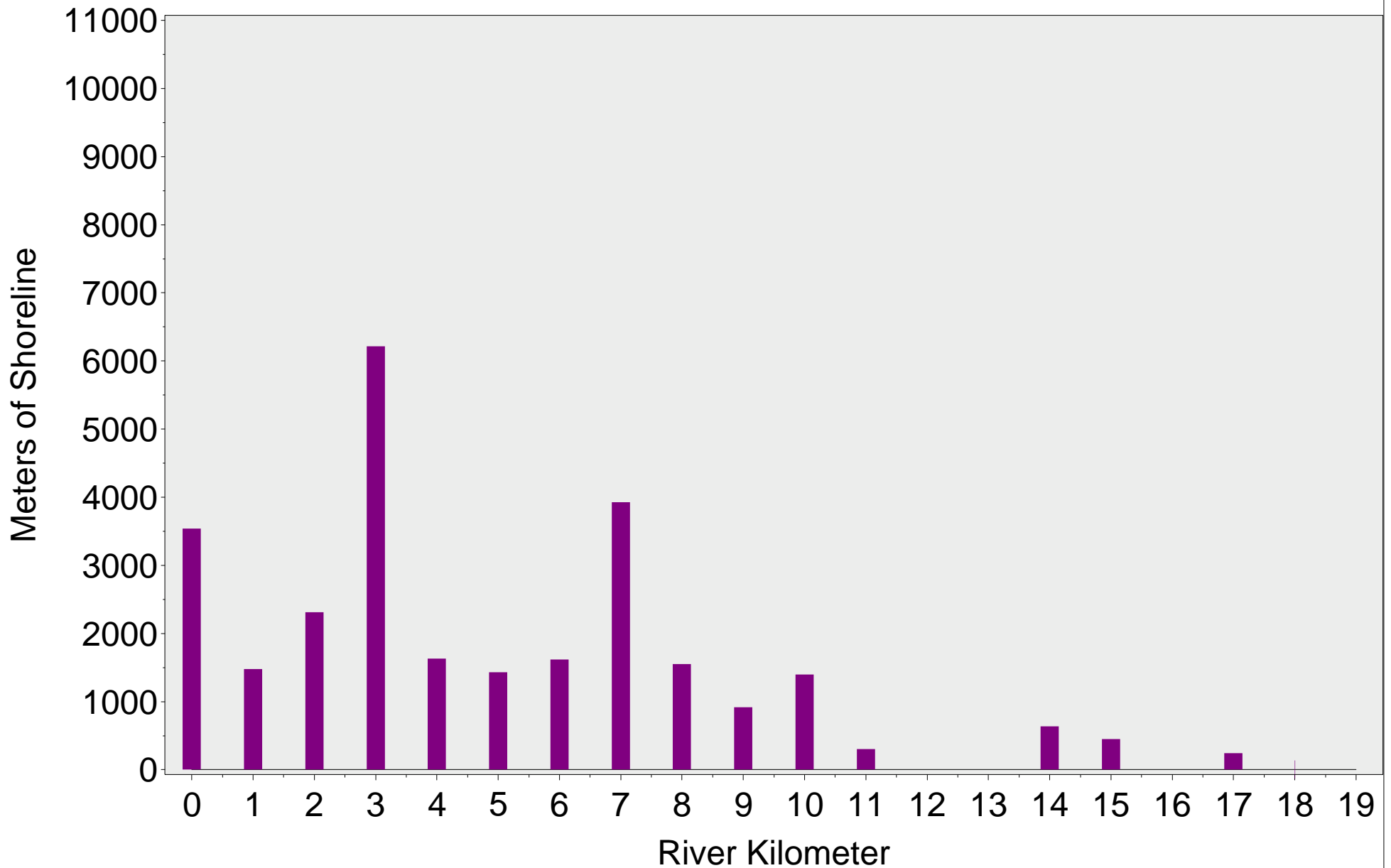
Little Manatee River - KM 0.0 to 19.3

Area of Shoreline Classified as freshwater marsh



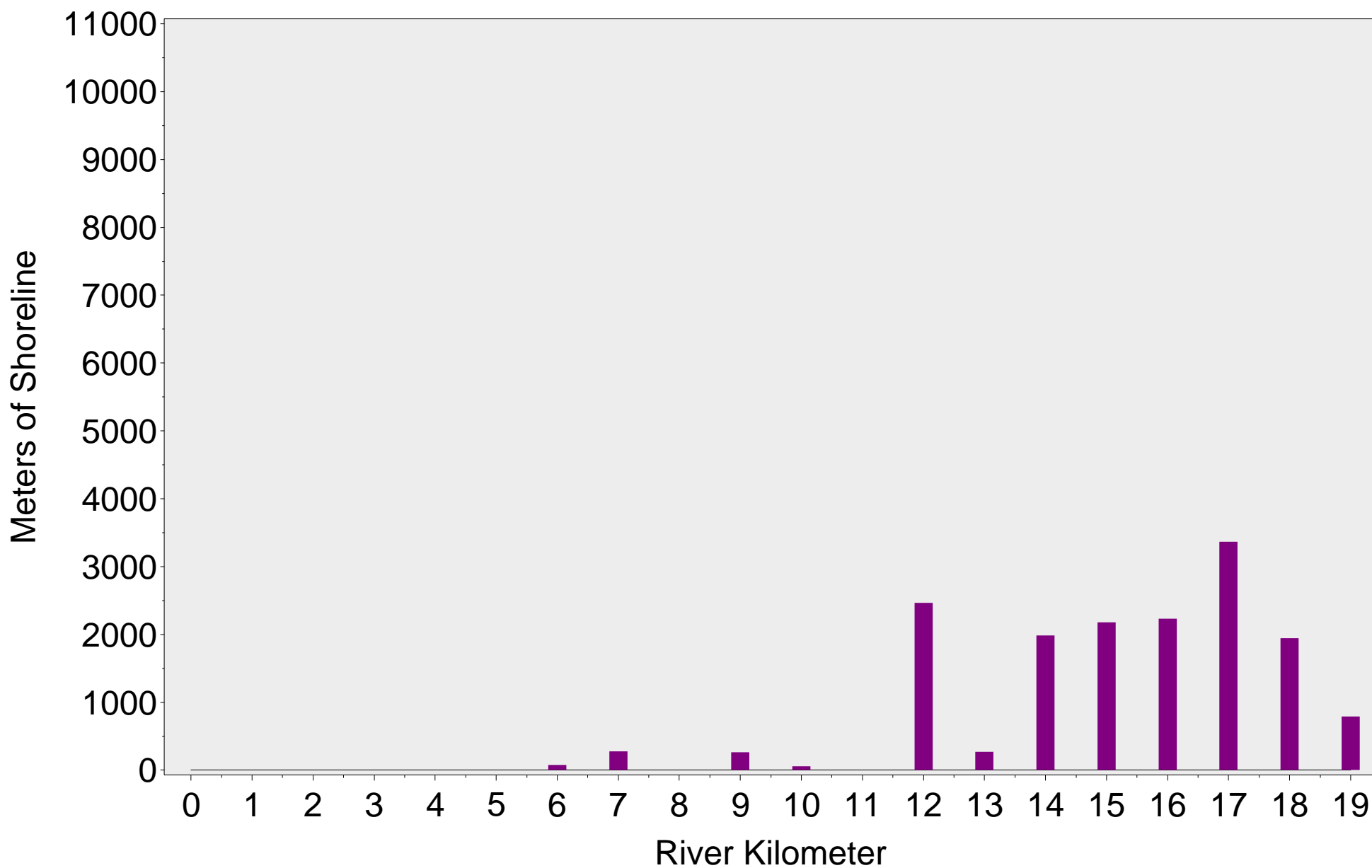
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Urban



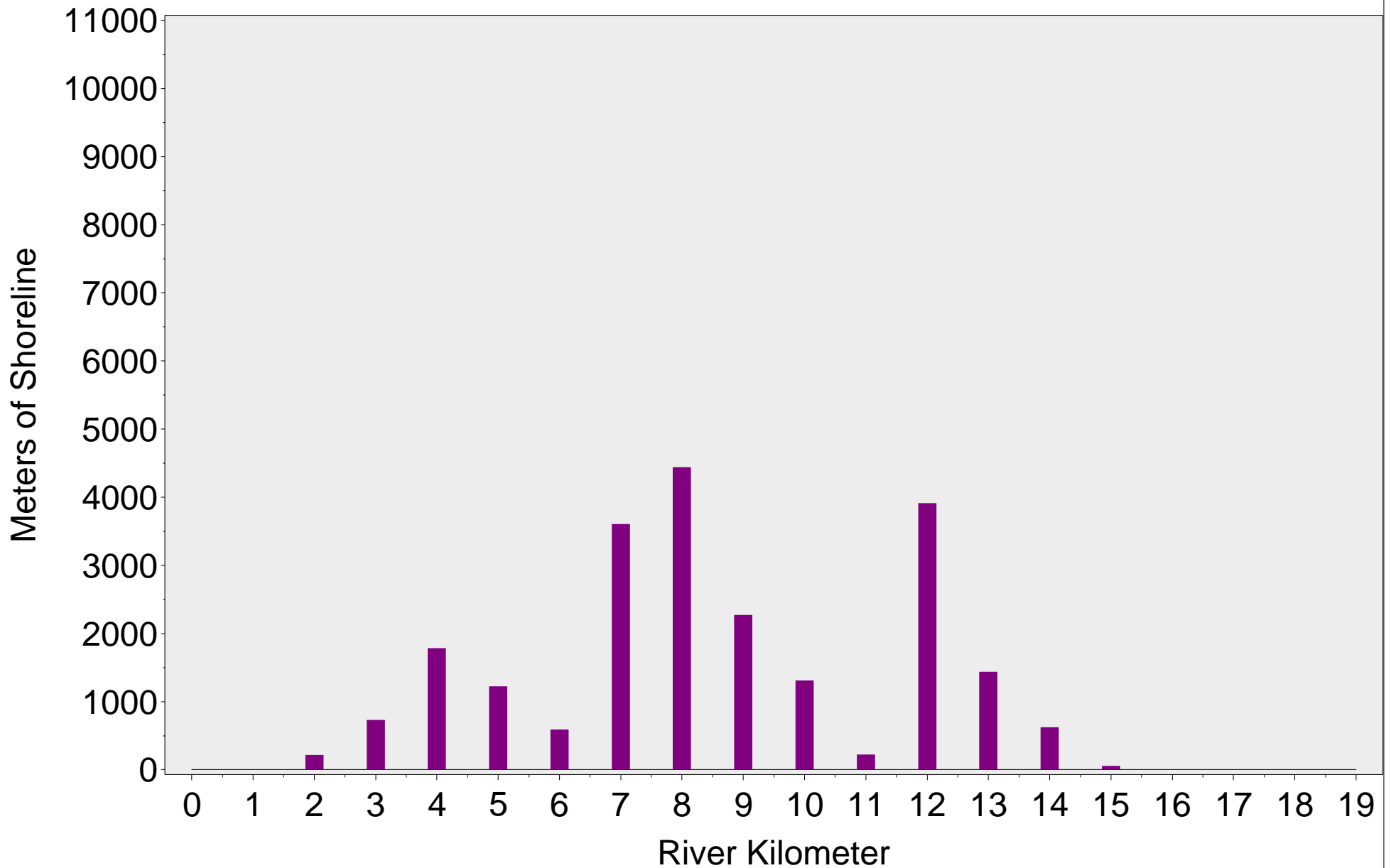
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Bottomland Hardwoods



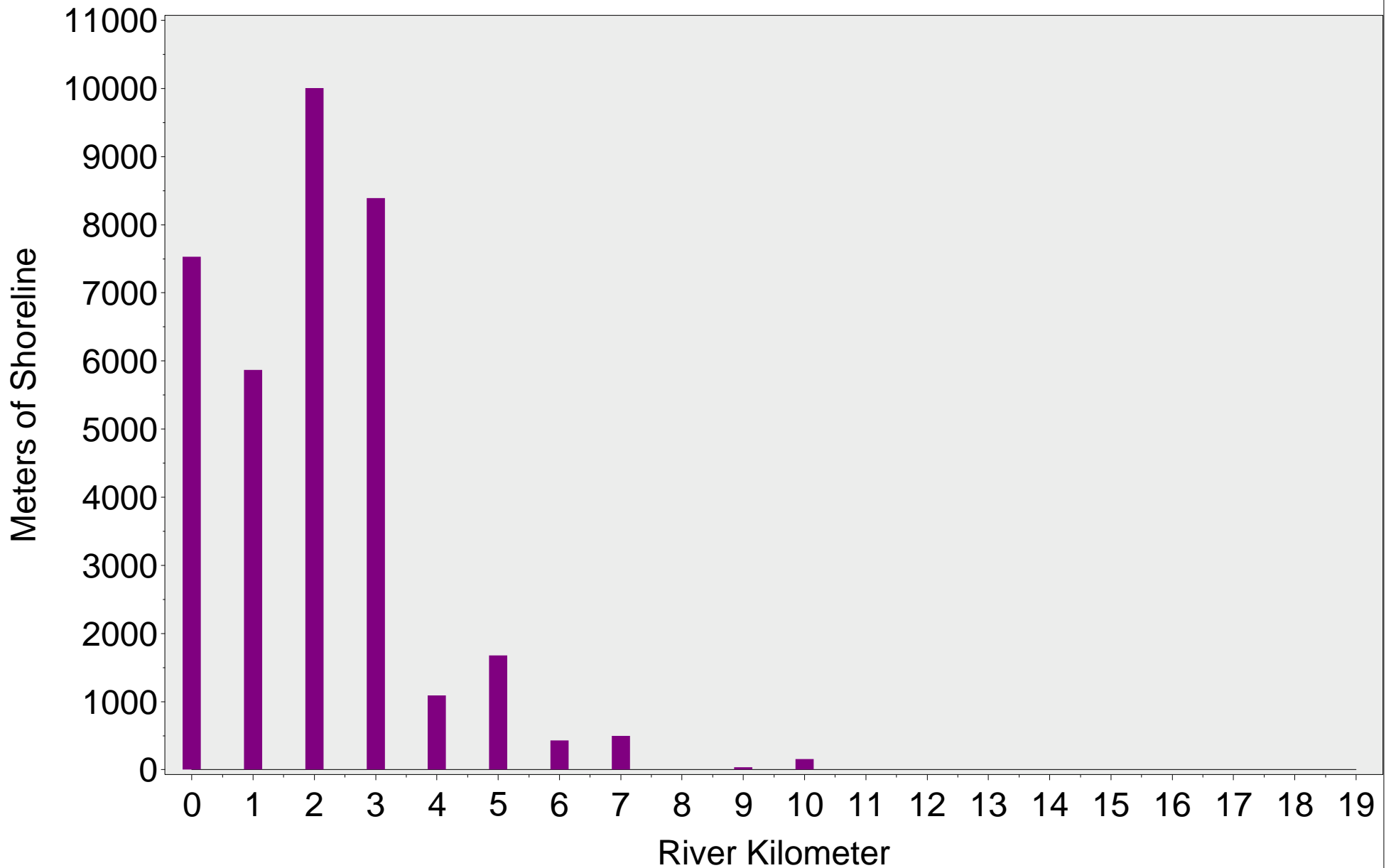
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as *Juncus roemerianus*(needlerush)



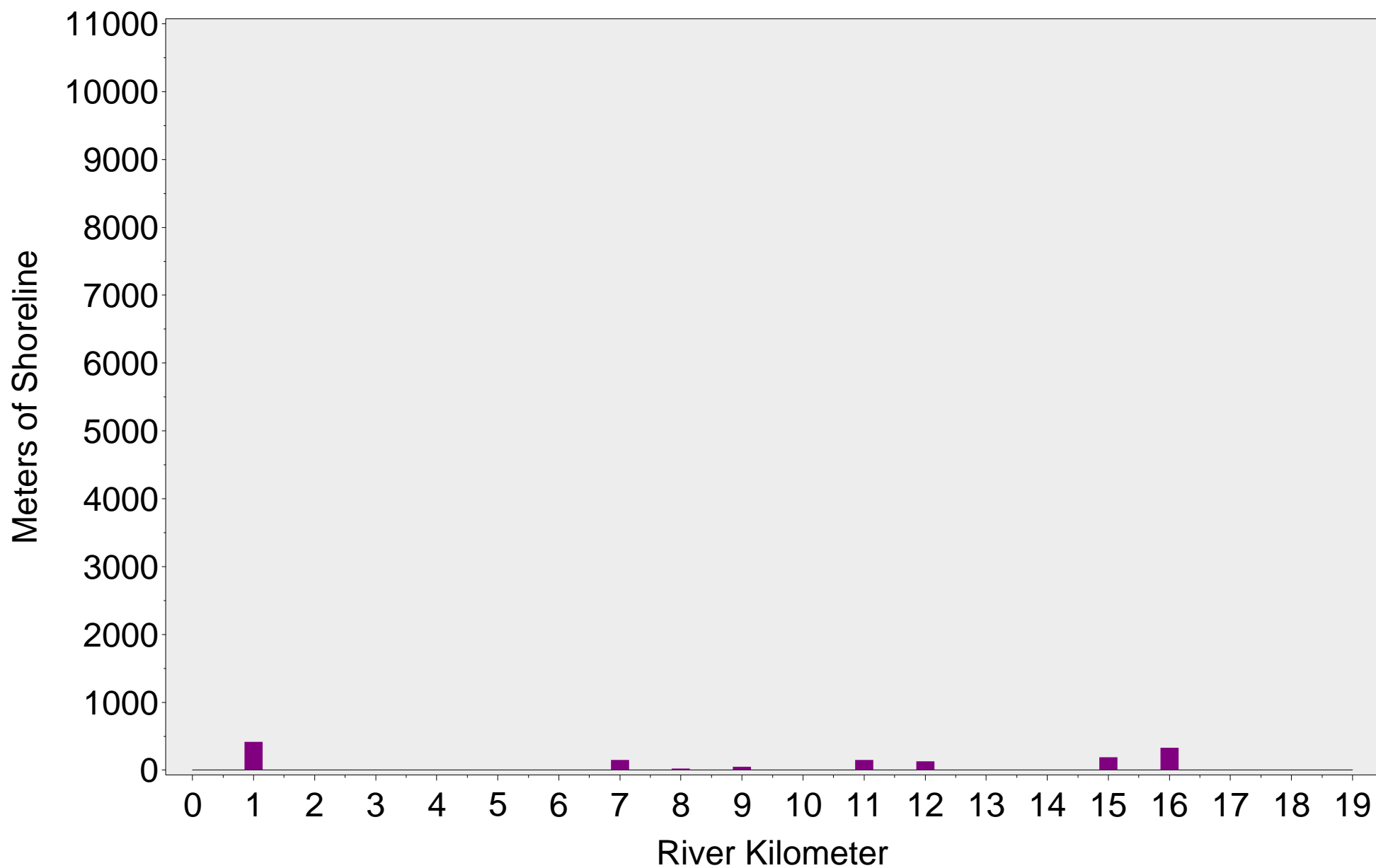
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Mangroves



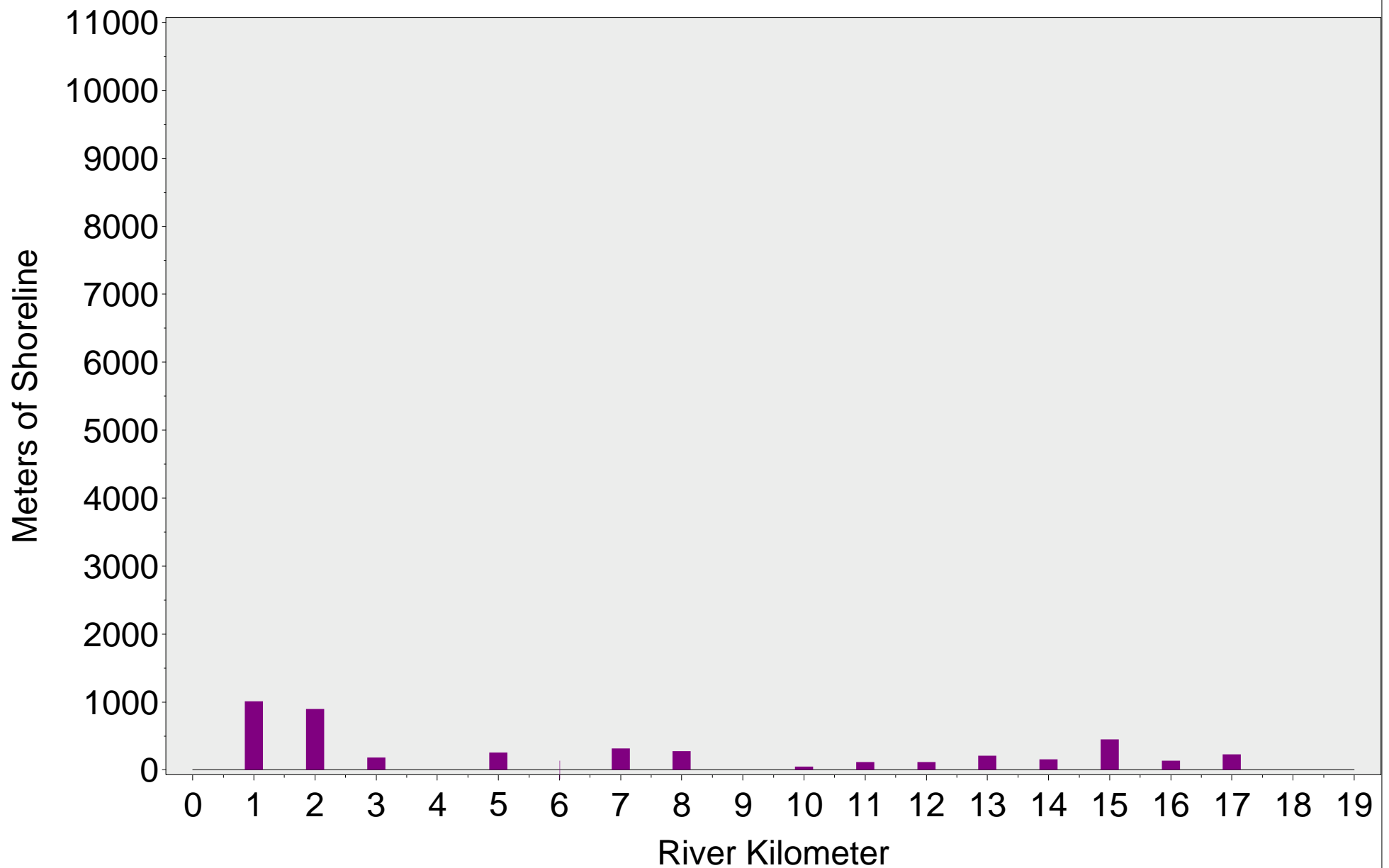
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Agricultural



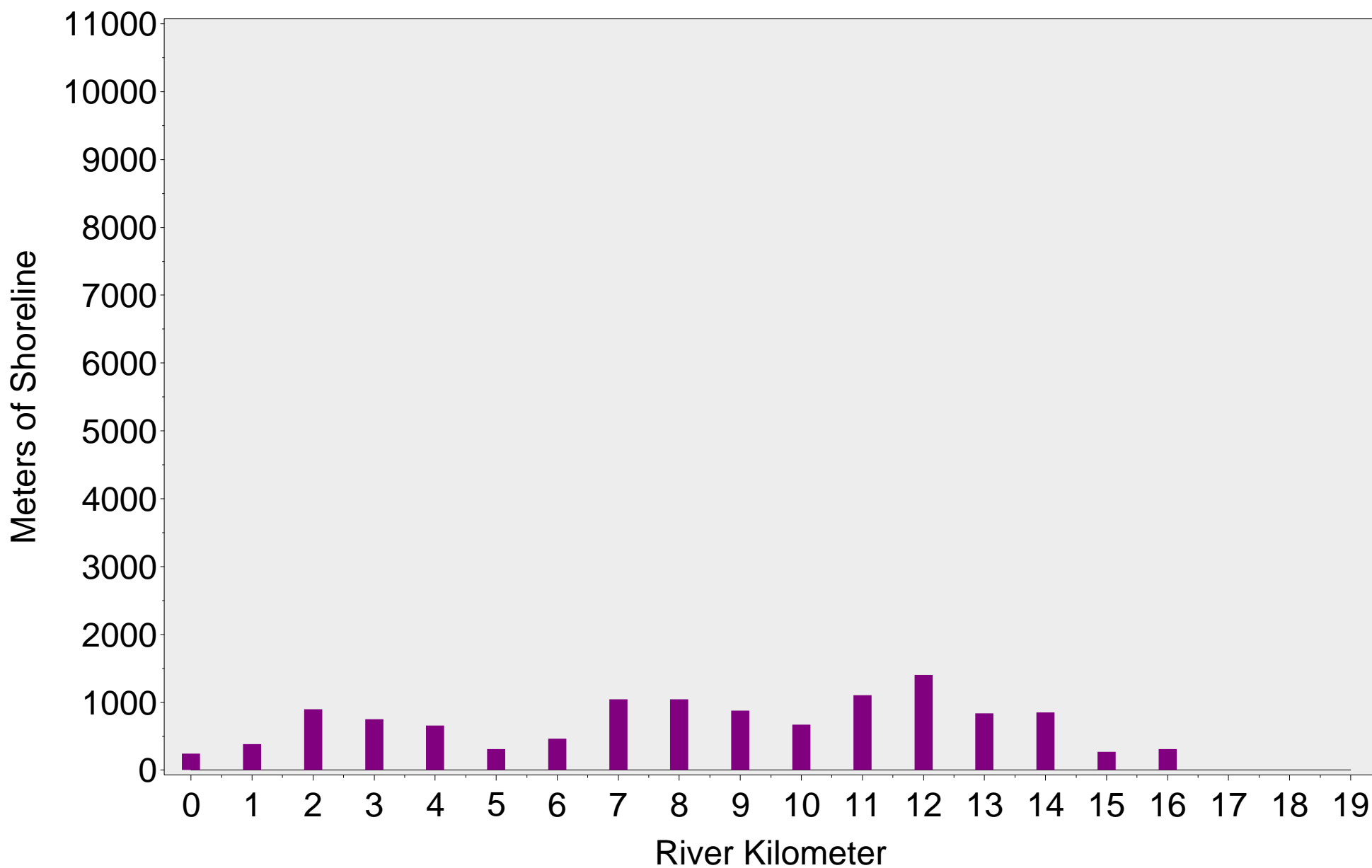
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Upland Forest



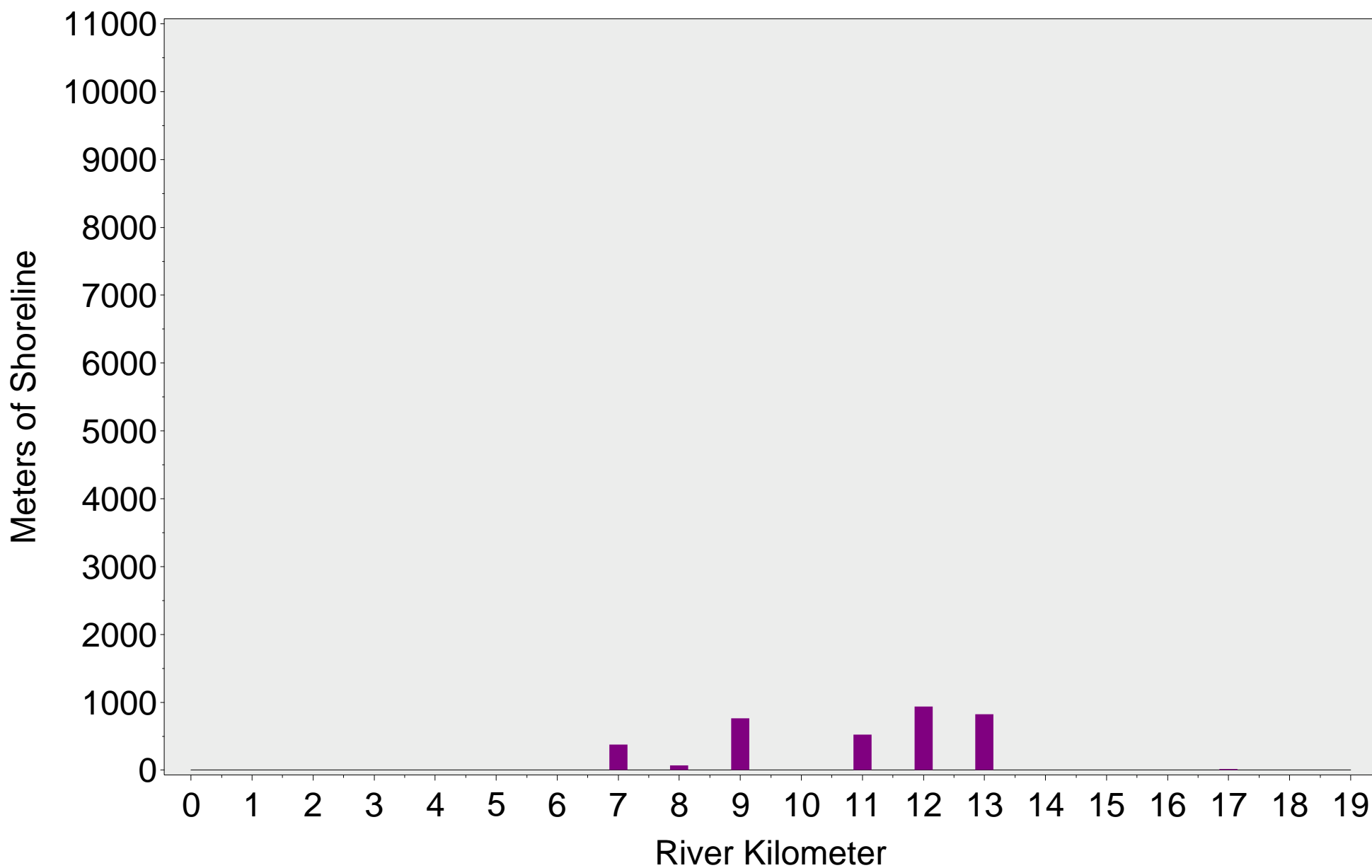
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Coastal Hammock



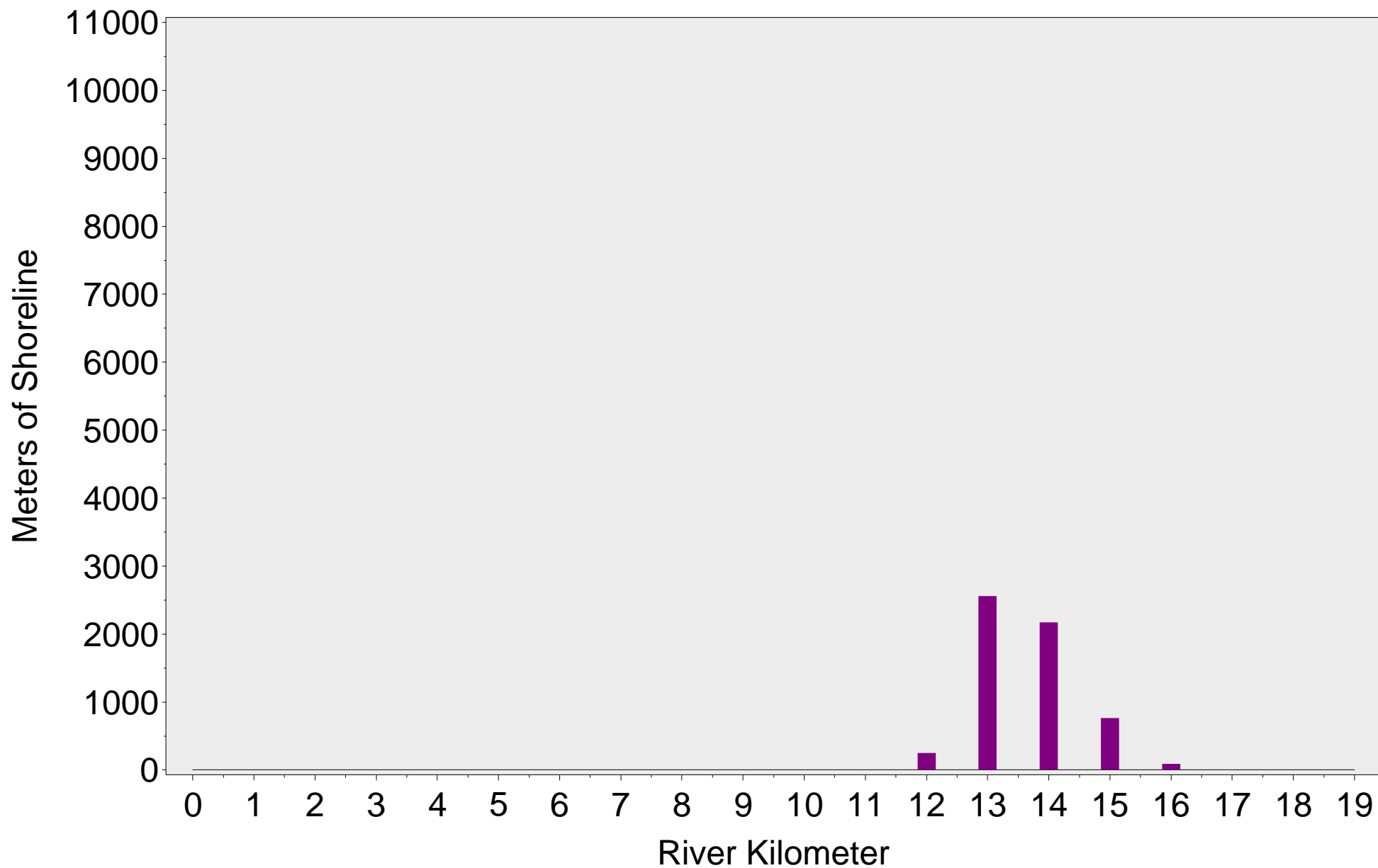
Little Manatee River - KM 0.0 to 19.3

Length of Shoreline Classified as Upland Conifers

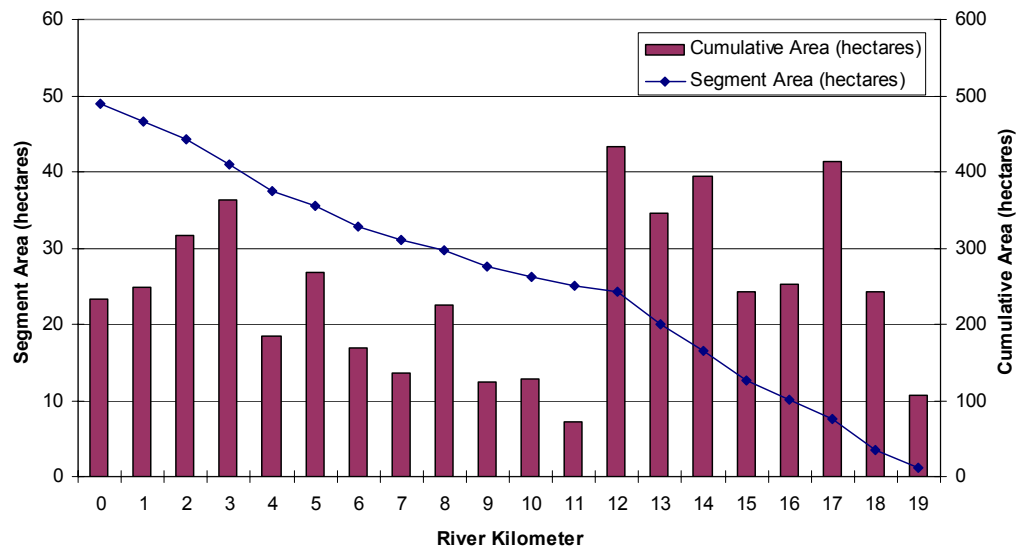


Little Manatee River - KM 0.0 to 19.3

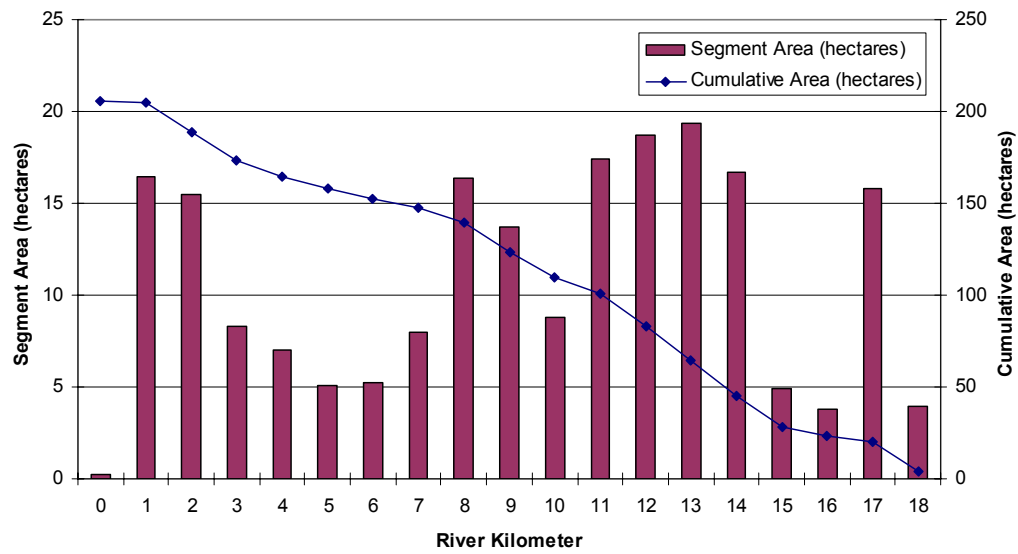
Length of Shoreline Classified as freshwater marsh



Little Manatee River - KM 0.0 to 19.4
Area of Wetland Shoreline per River Kilometer

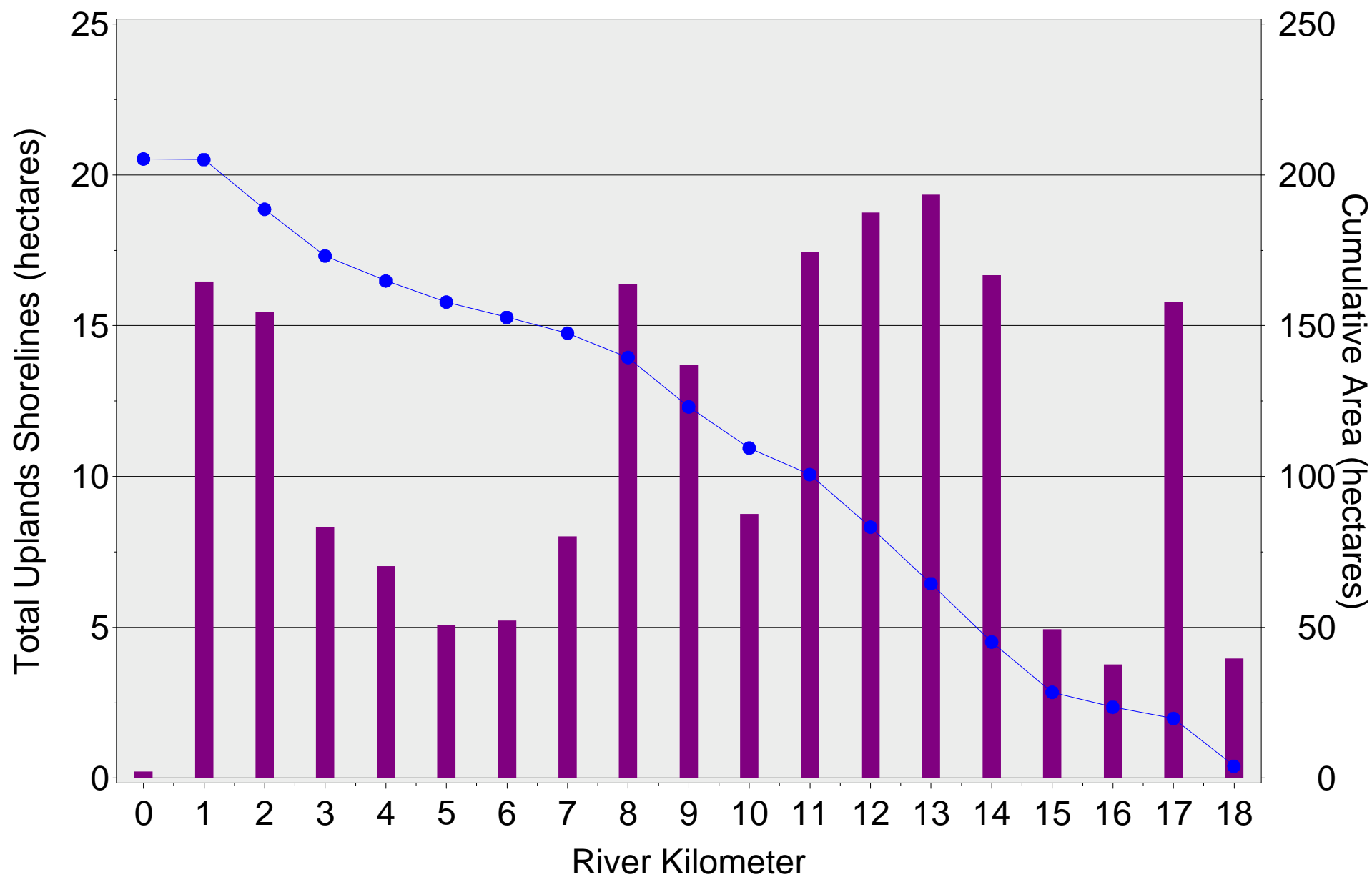


Little Manatee River - KM 0.2 to 18.8
Area of Upland Shoreline per River Kilometer



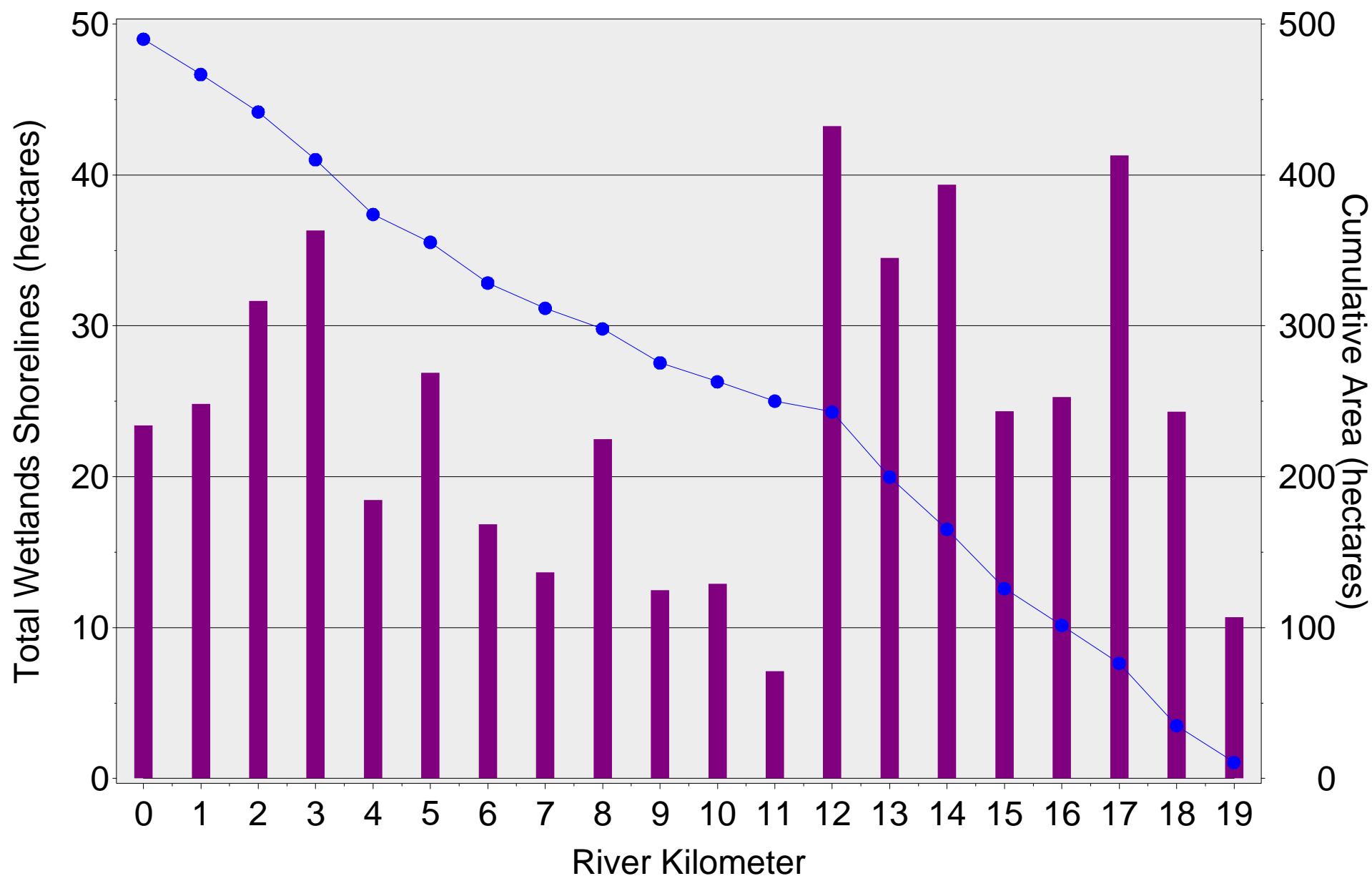
Little Manatee River - KM 0.0 to 19.4

Area of Upland Shoreline



Little Manatee River - KM 0.0 to 19.4

Area of Wetland Shoreline

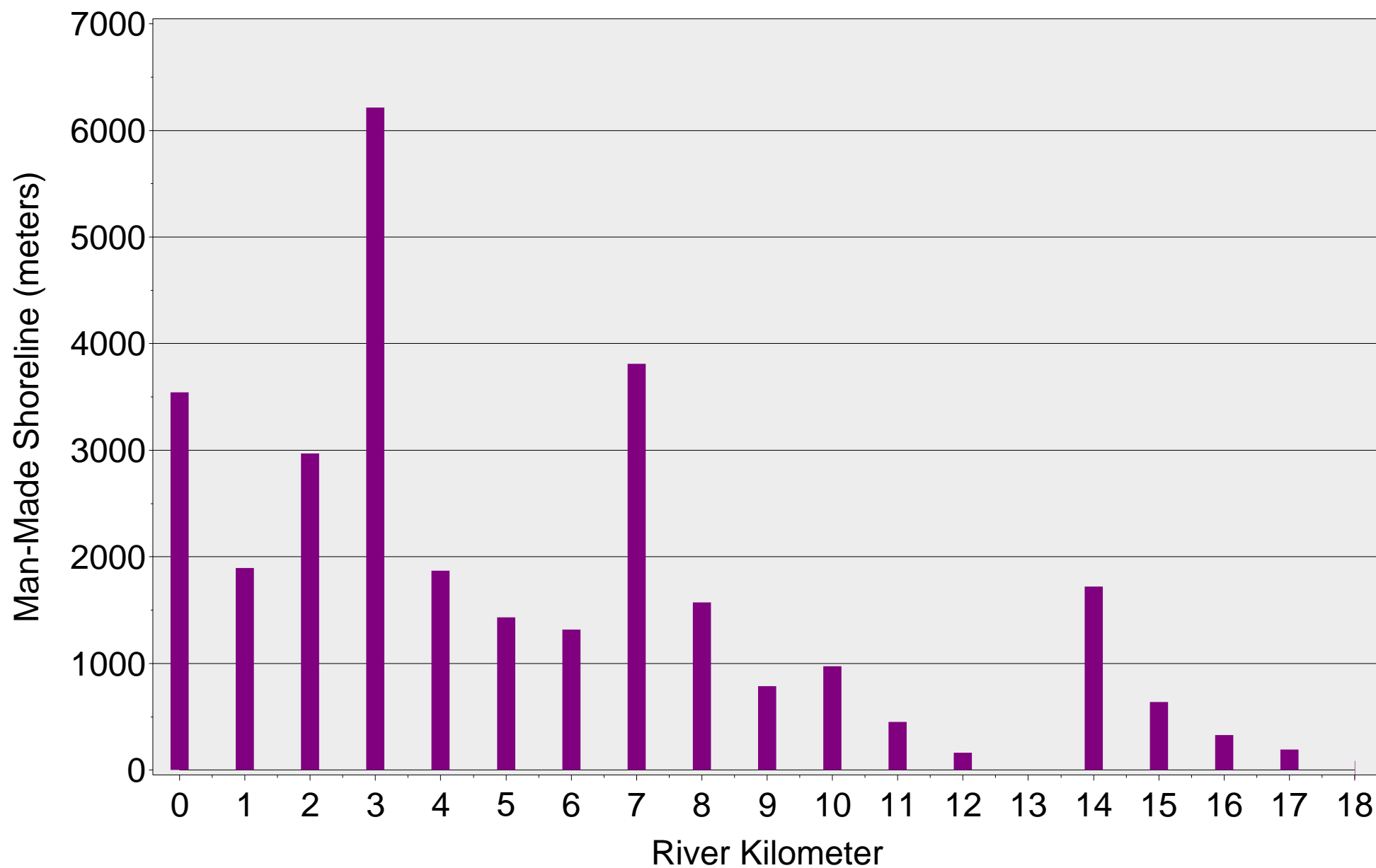


Area of Major Shoreline Plant Communities Along the Little Manatee River Shoreline

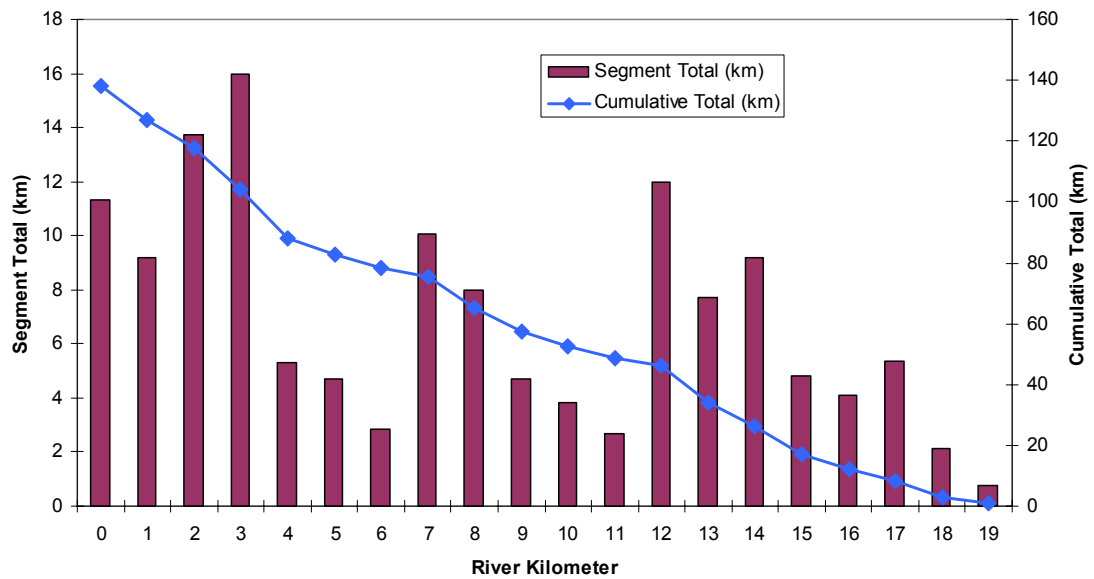
| Species or Group | Area (hectares) | Percent of Total |
|--------------------------------|--------------------|------------------------|
| Urban | 267.63 | 25.6% |
| Bottomland Hardwoods | 152.91 | 14.6% |
| Juncus roemerianus(needlerush) | 150.54 | 14.4% |
| Mangroves | 107.64 | 10.3% |
| Agricultural | 81.02 | 7.8% |
| Upland Forest | 68.80 | 6.6% |
| Coastal Hammock | 68.78 | 6.6% |
| Upland Conifers | 47.21 | 4.5% |
| Freshwater Marsh | 44.01 | 4.2% |
| Range | 14.76 | 1.4% |
| Echinochloa | 9.97 | 1.0% |
| Wetland Conifers | 8.93 | 0.9% |
| Upland Hardwoods | 5.29 | 0.5% |
| Marsh with Cladium (sawgrass) | 4.56 | 0.4% |
| Typha (cattail) | 3.38 | 0.3% |
| Leatherfern | 2.35 | 0.2% |
| Juncus and Leatherfern | 1.91 | 0.2% |
| Tidal Flat | 1.65 | 0.2% |
| Wetland Marsh | 0.88 | 0.1% |
| Cladium (sawgrass) | 0.72 | 0.1% |
| Saltmarsh | 0.48 | 0.0% |
| Sabal Palmetto | 0.47 | 0.0% |
| Utilities | 0.39 | 0.0% |
| Wet Prairie | 0.06 | 0.0% |

Little Manatee River - KM 0.0 to 19.9

Distribution of Man-Made Shoreline

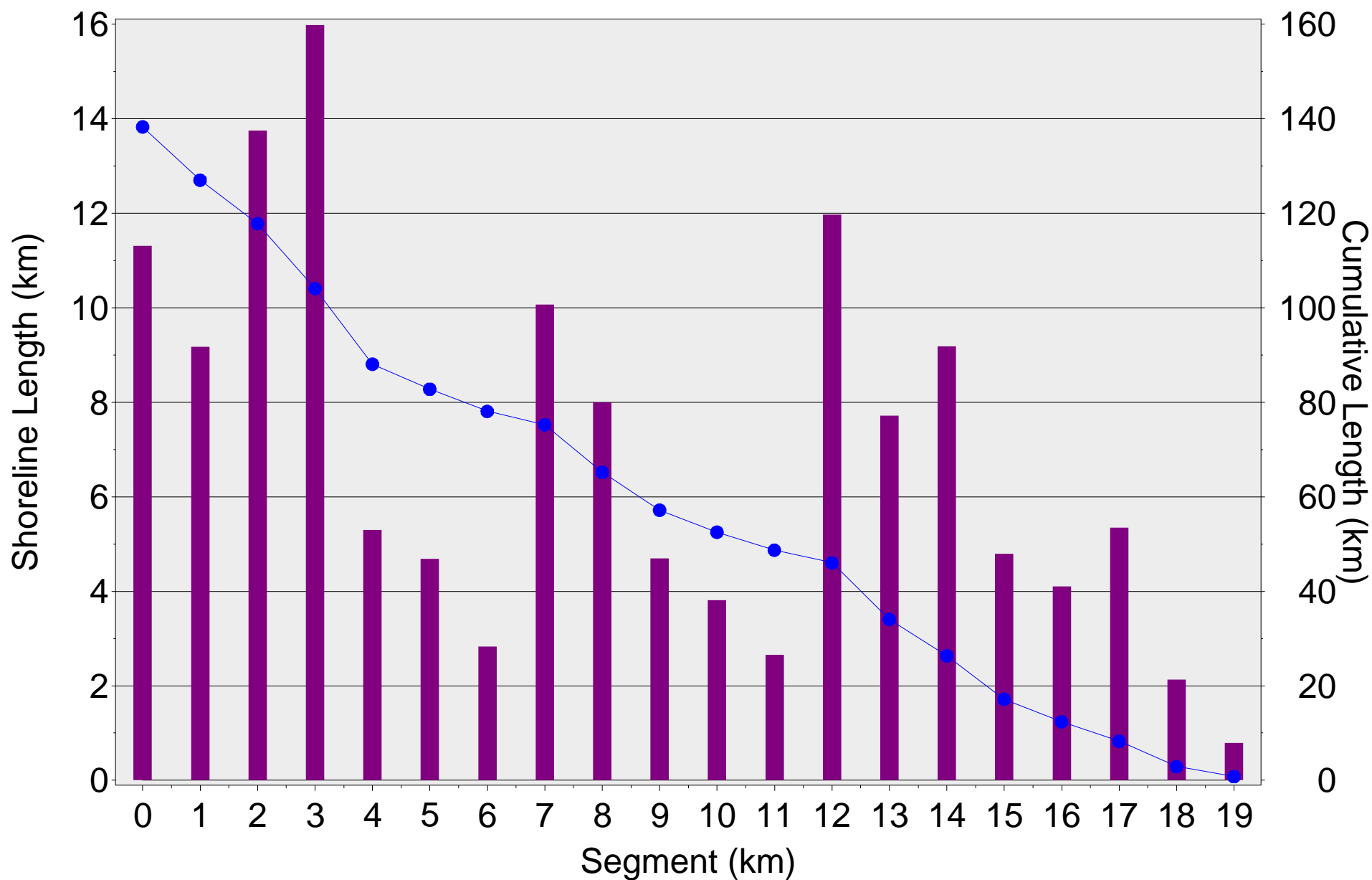


Little Manatee River - KM 0.0 to 19.3
Kilometers of Shoreline per 1.0 KM Segment



Little Manatee River - KM 0.0 to 19.3

Kilometers of Shoreline per 1 Km Segment



Bathymetric Survey at Anclote River System and Little Manatee River System

Final Report

Submitted by

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Tampa, FL 33620
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February 3, 2006

INTRODUCTION

This bathymetric survey project included two river systems: the Anclote River system and the Little Manatee River system. The Anclote River system includes 1) the Anclote River and all the side creeks, 2) the Anclote estuary, and 3) the nearly all the navigable tidal creeks in the estuary. The Little Manatee River system includes 1) the Little Manatee River and all the side creeks, 2) the Little Manatee River estuary, and 3) the nearly all the navigable tidal creeks in the estuary. The project included two tasks: 1) mapping of the shoreline and 2) surveying of the bathymetry.

The shoreline configuration was mapped in the field using a RTK (Real-Time Kinematics) global positioning system (GPS). The shoreline position was obtained by navigating the survey vessel along the shoreline. The bathymetry was measured using a synchronized precision echo sounder with the GPS. Sections across the water body and centerlines were surveyed.

STUDY AREA

The project area along Anclote River, extending roughly 15 river miles, is shown in Figure 1. The project area along Little Manatee River, extending to Highway 301, is shown in Figure 2. All the navigable side creeks were included in the survey. The project was composed of two consecutive portions: shoreline mapping and bathymetry survey. The bathymetry measurements included cross-section surveys spaced at 500 ft or less and one centerline survey. To cover the entire stretch of the river, the GPS base station was established at four locations. Nearly all the navigable side creeks and tidal creeks in the down stream of the river were included in the survey.

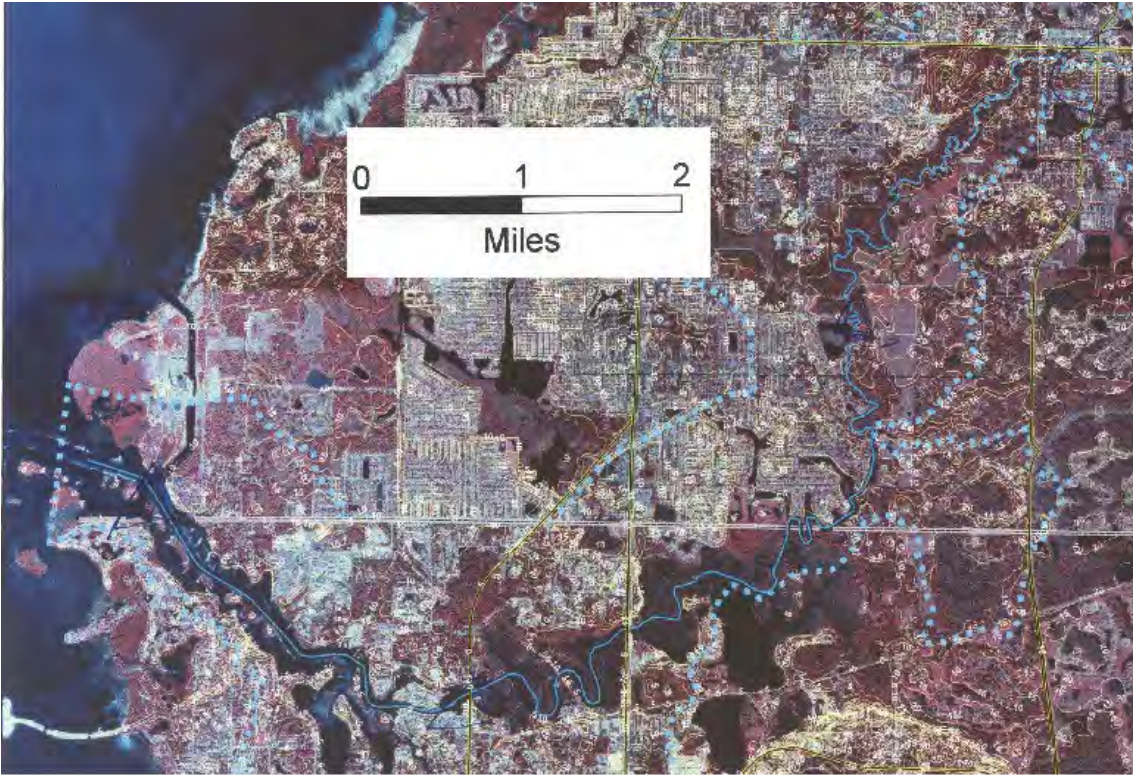


Figure 1. Anclote River project area.

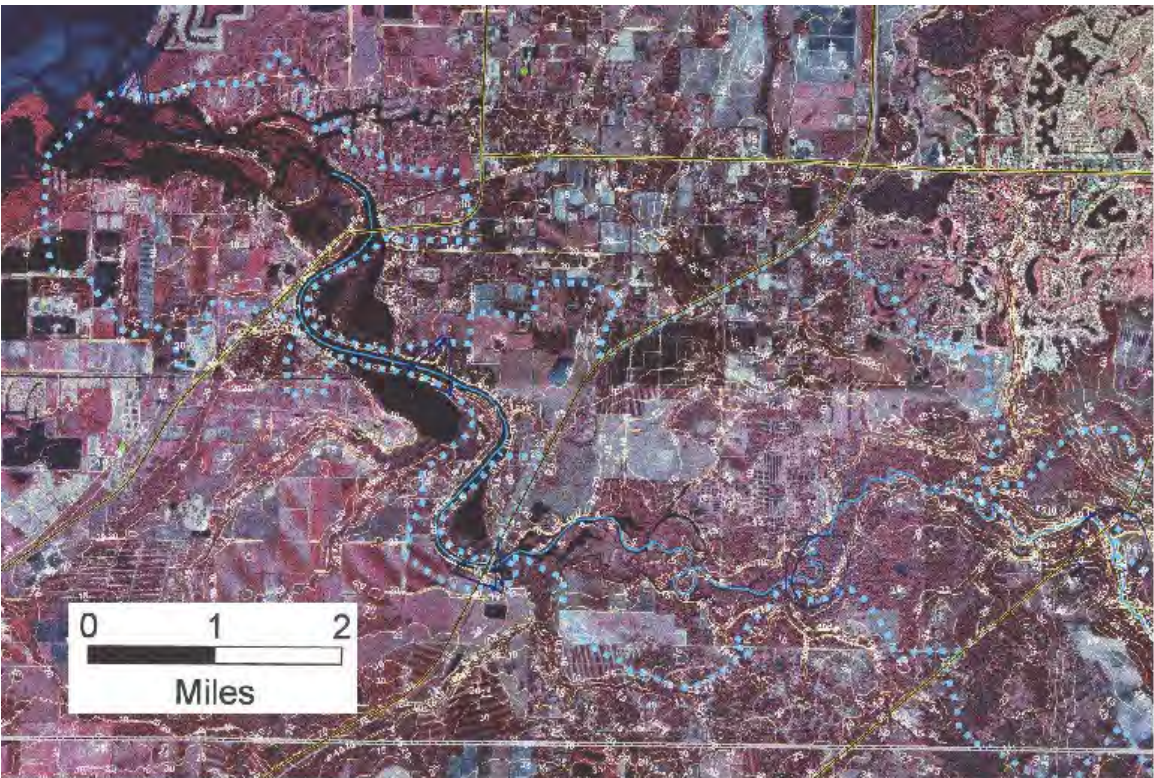


Figure 2. Little Manatee River project area.

FIELD METHODOLOGY

A 24-ft pontoon boat and a 14-ft aluminum boat were used for the shoreline and bathymetry survey (Figure 3). Both boats require only 1 ft (0.3 m) or less draft, but needs calm water to operate. The smaller boat was used to survey the shoreline and most of the narrow tidal creeks and the upper stretch of the river. These boats are ideal for this project.



Figure 3. The survey vessels, upper: the pontoon boat; lower: the 14-ft aluminum boat.

Shoreline Mapping

The shoreline was mapped with the RTK GPS mounted on board the survey vessels. The shoreline positions were obtained by navigating the survey vessel as close to the vegetated shoreline as possible. In the present study, the shoreline is defined as the clear boundary between vegetated land and water. Same definition would apply to digitize shoreline from aerial photos or maps. Given the relatively low tidal range, typically less than 3 ft (1 m), the shoreline (as defined here) position is not significantly influenced by tidal water-level variations in most areas. The shoreline survey was mostly conducted during high tide. Most of the vegetated boundary remains clear regardless of tidal stage.

The shoreline survey was conducted using the 14-ft boat (Figure 3 lower). The shoreline mapped here is typically 3 to 6 ft from the actual vegetation line along the riverbank (Figure 3). Given the typical width of several hundred feet, this limitation should not have any significant influence on the mapping of the river configuration. However, this limitation may induce considerable uncertainty in the shoreline position at some of the narrow creeks, simply because 3- to 6-ft length equals a considerable portion of the creek width.

A portion of the upper stretch of the Little Manatee River is very heavily vegetated with tall trees. The dense overhanging trees caused some problem for the GPS to receive adequate satellite information. Therefore, the survey could not be conducted at a few locations although shoreline and bathymetry were obtained along most of this stretch. Due to these gaps in the data, this stretch of the river is not completely continuous (some small gaps) on the GIS map.

The positions of the shoreline were corrected during the data processing phase by manually moving the survey points about 4.5 feet (1.5 m) landward, as discussed and agreed with the SWFWMD researchers. No elevation values were assigned to this “edited” shoreline position. Water depth was measured during the mapping of the shoreline. These water depths were used in the mapping of the bathymetric contours.

The GPS system was sampled at 1 Hz, or roughly 4 to 6 ft (1.2 to 2.0 m) per point along the shoreline. This close spacing reduced the uncertainty of interpolation between points. Given the complicated shoreline configuration, closely spaced sampling is important for accurate mapping.

Additional uncertainties in the shoreline mapping were caused by obstacle intrusions, both natural and artificial. Along some parts of the populated shoreline, the protruding boat docks caused some uncertainties for shoreline mapping (Figure 4). The survey vessel had to be navigated around the docks. The relative errors caused by the boat docks are not high because they tend to concentrate in areas with relatively wide water body.

The shoreline mapping is also influenced by various protruding natural objects, particularly overturned tree trunks. These tree trunks might become dangerous navigational hazard because many of them extending underwater. The survey vessel had to be navigated around them. Another shoreline-mapping obstacle is the low overhanging trees, especially those “horizontally-growing” palm trees (Figure 5). It was not possible for the survey vessel to be navigated under the trees. Therefore, the vessel had to deviate from the shoreline to avoid the trees.

Some of the obvious shoreline intrusions, e.g., those that created a sharp concave shape along an otherwise straight stretch of shoreline, were corrected in the lab during the

processing of the shoreline data. Also, field notes were taken at some of the substantial intrusions. These were also corrected based on the field notes.



Figure 4. Protruding boat docks caused some problem in shoreline mapping.



Figure 5. Protruding palm trees caused some problem in the shoreline mapping.

These obstacles, both artificial and natural, did not have significant influence on the overall shoreline mapping. Their impacts were mostly scarce and local. Limited by the scope and budget of the present project, most of their locations were not marked in the shoreline mapping. These artificial and natural protruding obstacles had minimal impact on the bathymetry survey. The survey lines were selected such that the obstacles were avoided.

Bathymetry Survey

The bathymetry was measured with a narrow-beam (2.8 degrees) echo sounder. The narrow beam sensor was designed to obtain accurate depth measurement over steep slope, which is ideal for the present project. The sensor was mounted at 0.59 ft (18 cm) below the water surface on the pontoon boat and 0.52 ft (16 cm) below on the aluminum boat (Figure 6). The sensor has a minimum range of approximately 1 ft (30 cm). Therefore, the minimum measurable water depth for the present system is roughly 1.6 ft (50 cm).

Under most circumstances, the survey lines are roughly perpendicular to the shoreline (Figure 7). The survey lines were space at 500 ft (150 m) or less to ensure adequate spatial coverage. Additional survey lines were added at areas with complicated bathymetry. Some of the creeks are too narrow, e.g., less than 80 ft (25 m) wide. A large portion of the creek could not be covered by the survey vessel simply because the sensor was mounted in the middle of the vessel. In this case, in addition to cross sections, a survey line following a zigzag pattern along the creek was added. A centerline was surveyed over the entire project area.

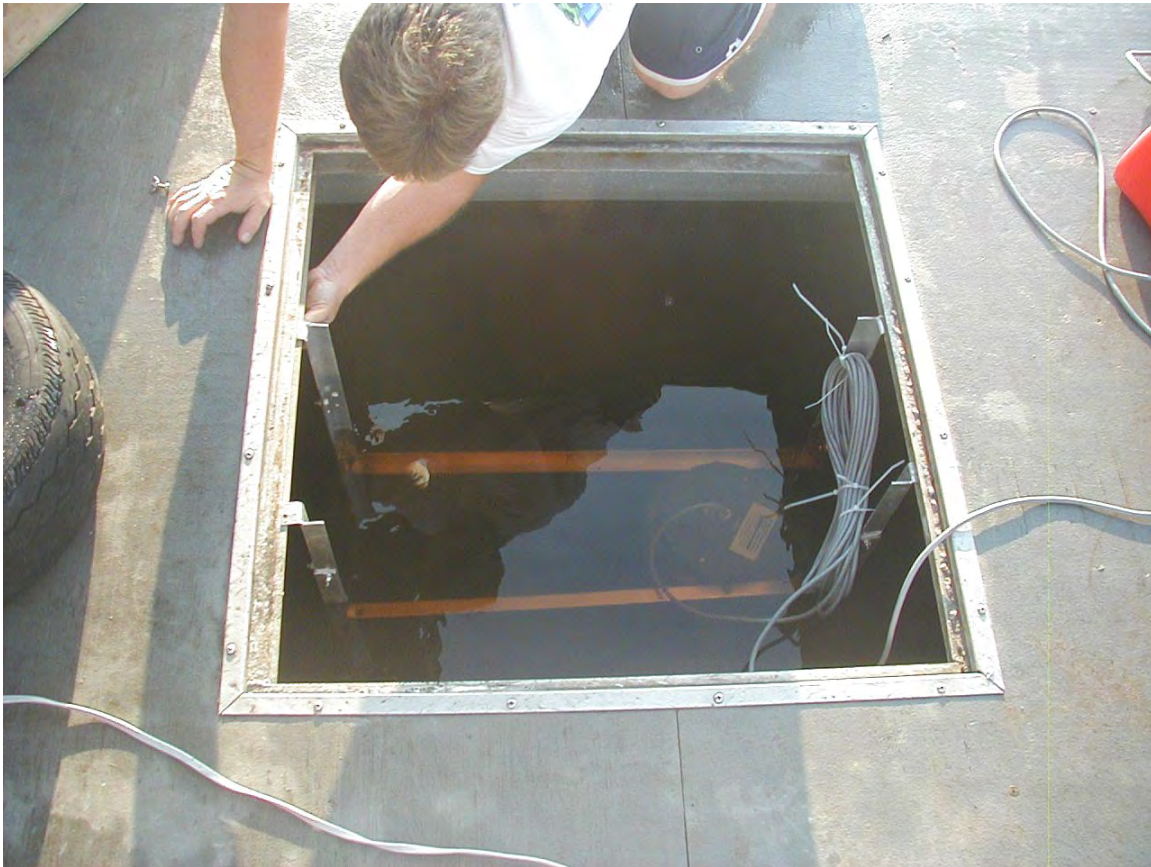


Figure 6. The survey echo sounder was mounted at 18 cm below water surface.

The echo sounder was sampled at 1 Hz, i.e., one measurement every second, or roughly one measurement every 3 to 8 ft (1.0 to 2.4 m). This close sampling interval was adopted to ensure detailed spatial coverage, especially in the river channel. The echo sounder is synchronized and co-located with the GPS system. The GPS yields horizontal position, in terms of latitude and longitude, and the echo sounder provides water depth measured at the same time as the geographic position. Although the system is capable of faster-than-1-Hz sampling, it was not adopted to avoid excessive data, which may add unnecessary work during data processing.



Figure 7. Surveying cross sections.

Several sources may induce errors in the survey. The echo sounder sometimes became unstable in shallower water, mostly when water depth became shallower than 2 ft (0.6 m) in combination with relatively rough conditions. Occasionally, the echo sounder will return a reading of zero. These erroneous readings were removed during the data processing. The reason for the zero reading is not clear.

Occasionally, the echo sounder returned a reading that was apparently twice the water depth (Figure 8). This seems to be caused by multiple reflections of the sound signal, i.e., the signal was reflected back and forth twice between the bottom and the sensor. Very rarely the signal was reflected back and forth for more than two times. These points were corrected by simply dividing the multiple reflections by two. A computer routine

was developed to correct these apparent multi-reflections. The program will check the general trend of water depth and compare with adjacent depth. If a point was approximately twice of those adjacent measurement, it would be corrected by dividing by two (or three or four under rare occasions). Figure 8 illustrates the multiple reflections and the corrected water depth (solid square). The reason for the multiple reflections is not clear. Bottom conditions, e.g., hard sand and oyster-reef bottom versus soft mud bottom, may have some influences.

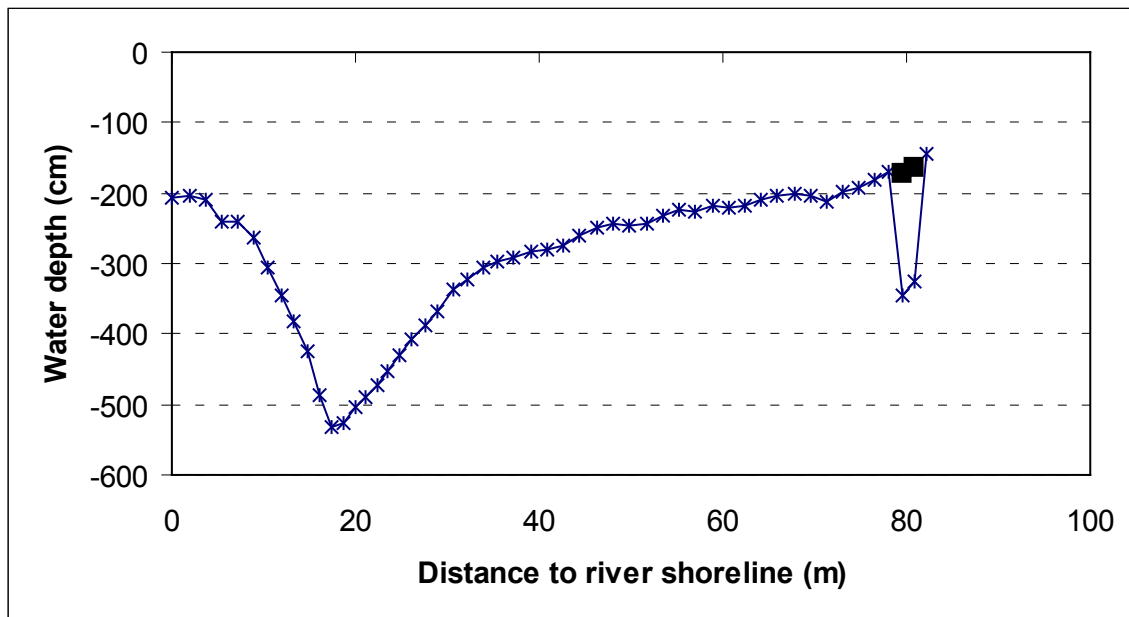


Figure 8. Multiple reflections in the echo sounder record. The solid squares are corrected water depth. An example of a cross section at Peace River (from an earlier SWFWMD project).

Because the echo sounder is mounted on a floating platform, wave motions can cause errors in the measurement. Various software packages are available to remove uncertainties caused by wave motion. Typically, a certain filter is applied to remove regulated wave motions. For the present project, influences of wave motions were minimal due to the relatively restricted water bodies.

The field operation over relatively open water, e.g., in the estuaries, was conducted during calm conditions to minimize influences of waves. No field operation was conducted when the waves were higher than 1 ft. The waves in the project area were largely local-wind generated, with short wavelength and wave period. Most of the time, the wavelength is shorter than the length of the survey vessel. Motions caused by these short waves are not apparent in the record and are not possible to remove. Given that all the field operations were conducted with waves far less than 1 ft, it was decided that wave-motion filtering was not necessary and was not likely to improve the data accuracy.

Wave motions seemed to have some influence on the performance of the echo sounder. Under relatively rough conditions, more zero readings and more multiple reflections were observed. The reason for the reduced sensor performance under rough conditions is not clear. The wave motion may also induce pitch and roll of the survey vessel. The influences of the pitch and roll are not apparent in the data record. It was difficult to detect because of the short wave period and wavelength, which tend to induce rather irregular motion. No procedure was adopted to remove the potential influence of pitch and roll. Their influences are believed to be negligible for this project.

Another uncertainty associated with the floating platform survey was caused by the tidal water-level variations. Nearly the entire study area is influenced by tides, both astronomical and meteorological. To improve the sensor performance, especially in shallow areas, the field operations were mostly conducted during high tides. It is necessary to remove the influence of tidal water-level variations. This is conducted using simultaneous tide measurements. The USGS maintains a suit of tide gages throughout

the entire study area. The tide measurements from the closest USGS tide gages were used to remove the tide influence and to refer the measured water depth to NGVD29.

Data Format and Organization

The horizontal latitude and longitude positions were recorded by the GPS in reference to NAD83. The latitude and longitude positions were converted to Florida State Plane coordinates (NAD 83) and UTM 17, in meters, using the CORPSCON software developed by the U.S. Army Corps of Engineers. The digital files are submitted in the formats of Excel spreadsheet and ASCII Text. The data are submitted in four sets includes:

Set I: Surveyed data, which include

- a) Surveyed shoreline positions in Florida State Plane and UTM 17 coordinates in meters and elevations in centimeters (NGVD29 – cm);
- b) Surveyed centerline positions in Florida State Plane and UTM 17 coordinates in meters and elevations in centimeters (NGVD29 – cm);
- c) Surveyed cross-sections in State Plane and UTM17 Northing in meters, State Plane and UTM17 Easting in meters, and elevation in centimeters (NGVD29-cm);

Set II: Edited data, which include

- a) Edited shoreline positions in UTM17 coordinates in meters with no elevation information;
- b) Edited centerline positions in UTM17 coordinates in meters and elevations in centimeters (NGVD29 – cm), largely the same as the surveyed data;

- c) Edited cross-sections in UTM17 Northing in meters, UTM17 Easting in meters, and elevation in centimeters (NGVD29-cm), largely the same as the surveyed data;
- Set III: GIS maps including the bathymetry contour and shoreline maps of the entire project area, in UTM17 coordinate system.
- Set IV: JPG format of the GIS maps including the bathymetry contour and shoreline maps of the entire project area.

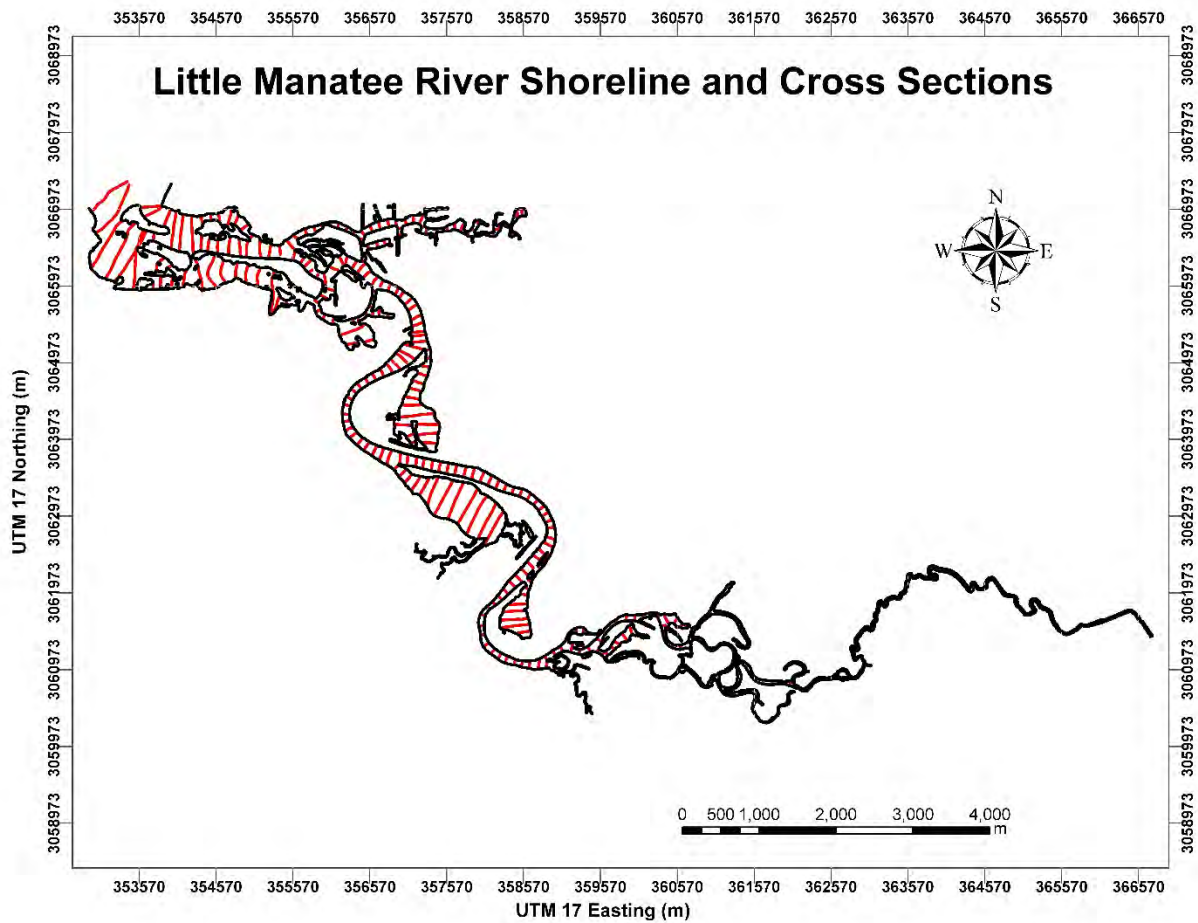
The GIS maps are preliminary in the sense that detailed work to improve the map presentation was not conducted. However, the data processing was completed (except the possibility of USGS revising the tide data, the data can be revised relatively easily). The details of the contour maps can also be improved by improving the data interpolation schemes in areas with complicated sinuosity. However, the overall bathymetric characteristics are clearly reflected in the present maps. It is beyond the scope of this project to produce detailed local bathymetry maps although the coverage of the field data is adequate to do so. It is worth emphasizing that the bathymetry here is interpreted by the USF researchers and may be different from other interpretations, although the differences are expected to be minor.

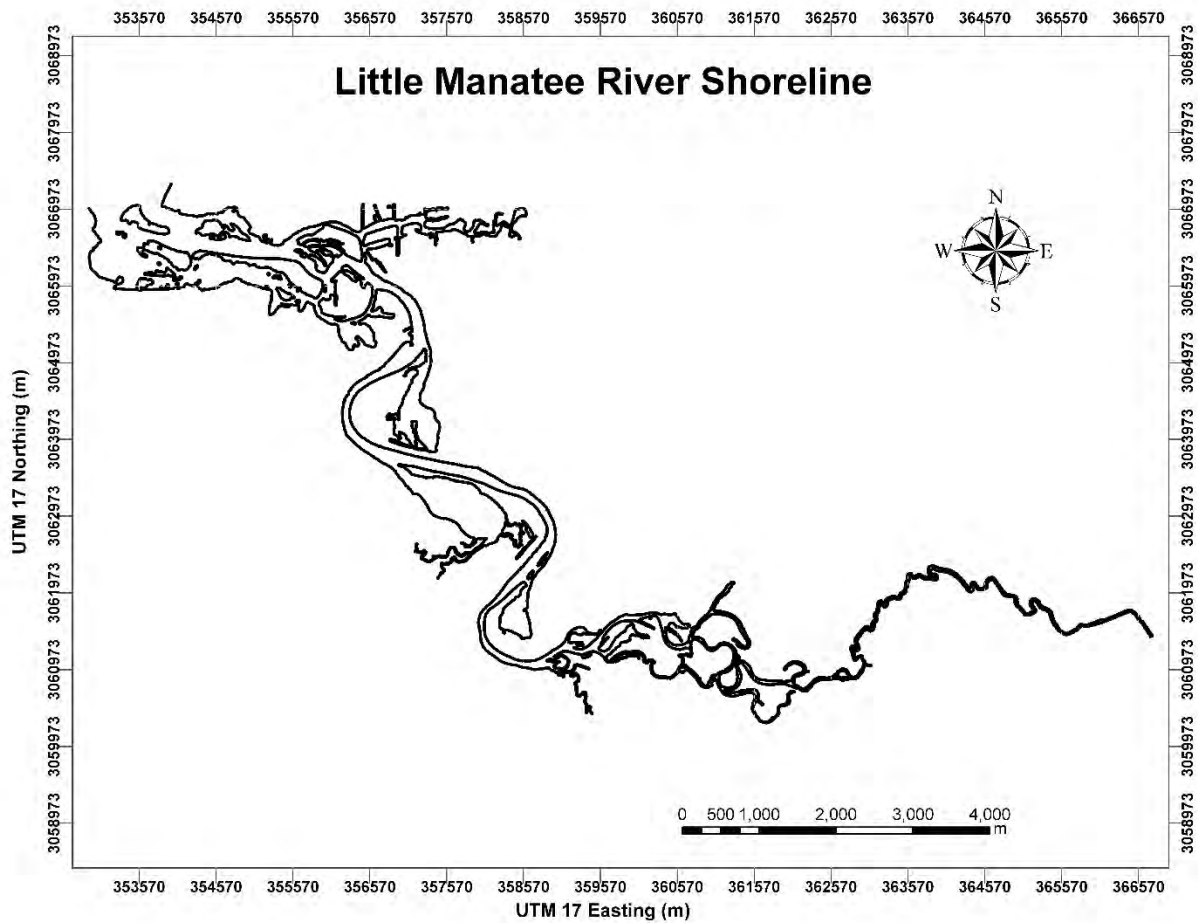
Deliverables

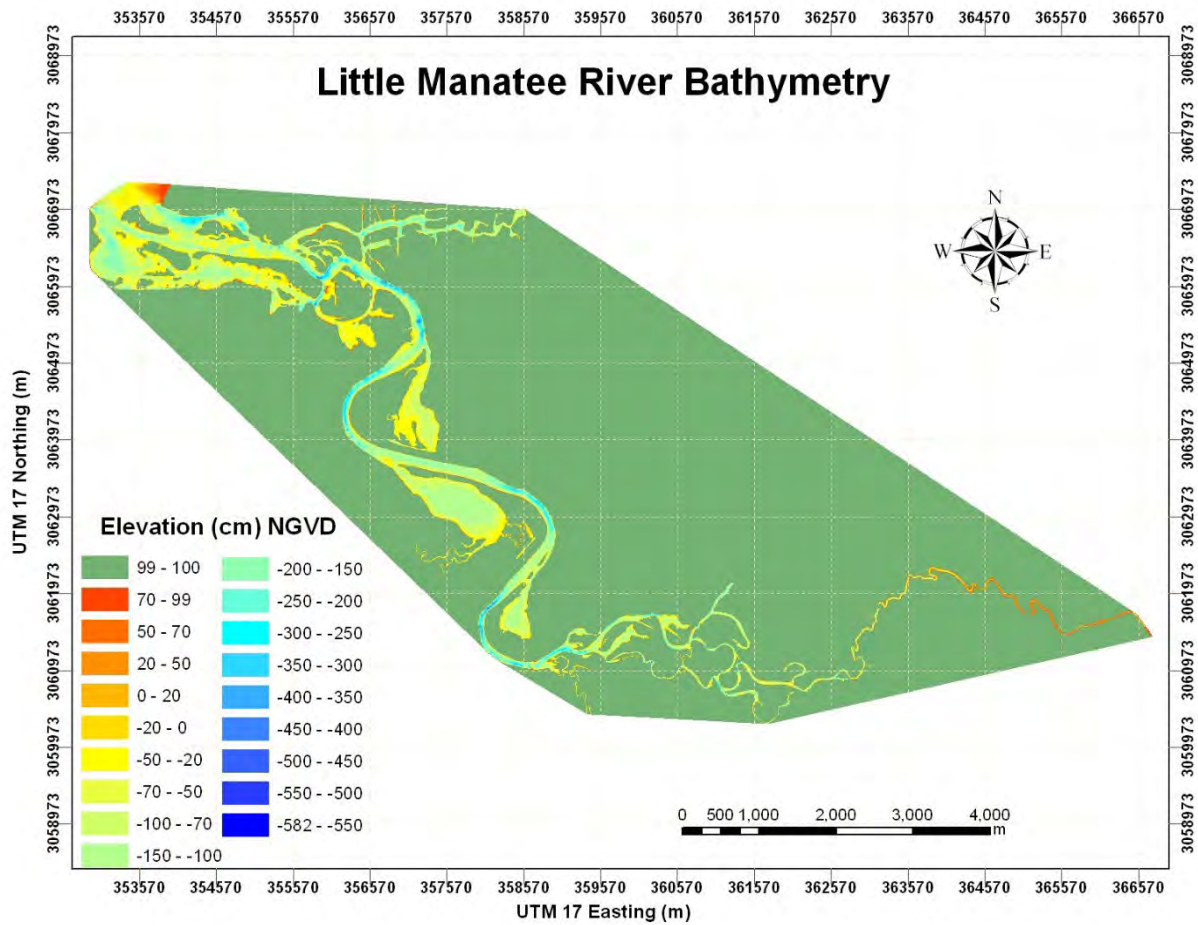
The final deliverables include a final report, consisting of two parts. Part I (this volume) documents the field operation procedures, data processing schemes, estimates of uncertainties, and data organization. Part II (accompanying volume) includes the GIS

maps (in UTM17 Coordinates in meters, bathymetry in centimeters) printed on large papers.

All the processed data are delivered on one CD with each set as one folder.







From: [Sid Flannery](#)
To: [Doug Leeper](#); [Kym Holzwart](#); [Xinjian Chen](#); [Mike Wessel \(MWessel@janickienvironmental.com\)](#)
Subject: Bathymetry and shoreline stuff
Date: Thursday, November 18, 2021 3:01:47 PM
Attachments: [Little Manatee and Anclote final bathymetry report.doc](#)
[Little Manatee morphology and vegetation plots.pdf](#)

[EXTERNAL SENDER] Use caution before opening.

Hello all,

I just talked with Doug about EFDC model output files and will reply about that tomorrow morning. In short, I can wait for the revised model runs.

In the meantime, Doug and I were talking about the bathymetry data for the Little Manatee and I brought up the bathymetry report and data sets that Ping Wang of USF did for the District. I am sure that you all, especially Xinjian, are aware of that. This is the bathymetry data from USF that were provided to FSU for construction of the EFDC model. Again, I expect you have those files, and if not, Xinjian can find them in the files I left behind.

I have attached three jpgs from the USF bathymetry work plus the WORD file of the final USF report. It looks like USF did go into the side channels quite a bit.

I have also attached a pdf of some combined graphs taken from the bathymetry data that Allan Willis generated for the District when he was Atkins. I think the area and volume plots could be helpful.

There are also shoreline plots, but I am thinking they must have come from the vegetation work that FWRI did for the District as the vegetation is classified into different groups. The vegetation plots are more than you need, but it was easier than sorting them out.

As I told Doug, I will submit to the District a document by the Monday after Thanksgiving that lists data and graphics I think would be useful, including some of these graphics.

Sid

From: [Sid Flannery](#)
To: [Doug Leeper](#)
Cc: [Kym Holzwart](#); [Chris Zajac](#); [Xinjian Chen](#); [Gabe I. Herrick](#); [Jordan D. Miller](#); [Kristina Deak](#); [Mike Wessel](#)
(MWessel@janickienviromental.com)
Subject: Re: Output files for Little Manatee EFDC model runs
Date: Friday, November 19, 2021 11:08:12 AM

[EXTERNAL SENDER] Use caution before opening.

Hello Doug,

It was good talking with you yesterday. Regarding my request for EFDC model output files that is described in the email stream below, I would be happy to wait until the revised model runs are completed for the Little Manatee River. When convenient after that, I would like to receive the revised output files for the model runs described below. As I also mentioned below, I would like to get the gaged flow records that correspond with each model run.

On another note, if you have files handy for the Florida Power and Light daily withdrawals from the river from 2010 forward, could you please send them to me. If staff do not have these files readily available, there is no need to generate them, as I will not request such files if they are not already at hand.

Thanks again,
Sid

On Tue, Nov 9, 2021 at 3:56 PM Doug Leeper <Doug.Leeper@swfwmd.state.fl.us> wrote:

Got it, Sid. I'll be in touch with you regarding this data request.

Doug Leeper

MFLs Program Lead

Southwest Florida Water Management District

2379 Broad Street

Brooksville, FL 34604

1-800-423-1476 or 352-796-7211, ext. 4272

doug.leeper@watermatters.org or doug.leeper@swfwmd.state.fl.us

From: Sid Flannery <sidflannery22@gmail.com>

Sent: Tuesday, November 9, 2021 5:53 AM

To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>

Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>

Subject: Output files for Little Manatee EFDC model runs

Hello Doug and District staff,

If possible, I would like to receive selected output files from the EFDC model runs for the Little Manatee River minimum flows project. I expect these are for model runs that have already been conducted and no additional model runs will be needed.

The information I would like to receive is described below. It would be nice to get the different flow scenarios and salinity zone values as separate files, but I expect the original files may have values for salinity zones in addition to the ones I am asking for. Or, the output files may contain flow scenarios in addition to the ones I am asking for. Receiving such large files would be fine as long as I can identify and query out the values for the salinity zones and flow scenarios I am interested in.

I would like to receive daily values for bottom area and water volume from the EFDC model runs from January 2000 to June 2005. The salinity zones I am interested in are < 2psu, < 5 psu, <10 psu, and <15 psu. If the values are in increments smaller than daily, that is okay as I can calculate daily average values from those values.

The flow scenarios I would like to receive are baseline, and the 15 percent, 20 percent, 25 percent, 30 percent, and 35 percent flow reductions not including the 35 cfs low-flow cutoff.

I would also like to receive the output for any of these same percentage flow reductions that included the 35 cfs low-flow cutoff.

I will also need to flow values on which these values were based, at least for the baseline scenario, with the flows for the other scenarios being helpful as well. The ungaged flows should be the same for all the scenarios, so I believe the flows that I need for the baseline and the flow reduction scenarios will be the flows at the USGS gage at the US 301 bridge.

If possible, SAS files would be very helpful, but I can work with EXCEL files or tab or comma delimited text files. Please contact me if I can provide any clarification for this request.

Thanks very much for your time and whatever the District can provide.

Sid

813-245-0331

From: [Sid Flannery](#)
To: [Doug Leeper](#)
Cc: [Kym Holzwart](#); [Chris Zajac](#); [Xinjian Chen](#); [Gabe I. Herrick](#); [Jordan D. Miller](#); [Kristina Deak](#); [Mike Wessel](#) ([MWessel@janickienviromental.com](#)); [Amanda J. Siff](#); [Valerie Jordan](#); [Shellie Ferreira-Lee](#); [Adrienne E. Vining](#)
Subject: Re: Output files for Little Manatee EFDC model runs
Date: Friday, November 19, 2021 2:32:13 PM

[EXTERNAL SENDER] Use caution before opening.

Doug,
Yes, this file looks great.
Thanks very much and have a good weekend.
Sid

On Fri, Nov 19, 2021 at 2:15 PM Doug Leeper <Doug.Leeper@swfwmd.state.fl.us> wrote:

Hey Sid: Hopefully, the attached file is what you are looking for.

Doug Leeper

MFLs Program Lead

Southwest Florida Water Management District

2379 Broad Street

Brooksville, FL 34604

1-800-423-1476 or 352-796-7211, ext. 4272

doug.leeper@watermatters.org or doug.leeper@swfwmd.state.fl.us

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Sent: Friday, November 19, 2021 11:08 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>; Mike Wessel (MWessel@janickienviromental.com) <MWessel@janickienviromental.com>
Subject: Re: Output files for Little Manatee EFDC model runs

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MFLs Program Lead

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Sent: Tuesday, November 9, 2021 5:53 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Chris Zajac <Chris.Zajac@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Jordan D. Miller <Jordan.Miller@swfwmd.state.fl.us>; Kristina Deak <Kristina.Deak@swfwmd.state.fl.us>
Subject: Output files for Little Manatee EFDC model runs

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Thanks very much for your time and whatever the District can provide.

Sid

813-245-0331

From: [Sid Flannery](#)
To: [Kym Holzwart](#); [Doug Leeper](#); [Xinjian Chen](#); [Mike Wessel \(MWessel@janickienvironmental.com\)](#); [Lei Yang](#)
Cc: [Chris Zajac](#); [Randy Smith](#); [Gabe I. Herrick](#); [Danielle Rogers](#); [Kristina Deak](#); [Jordan D. Miller](#)
Subject: EFDC model output and fish EFF modeling
Date: Tuesday, November 23, 2021 1:29:21 PM

[EXTERNAL SENDER] Use caution before opening.

Hello Kym, Doug, Xinjian, Mike and Lei,

It is good to know that some revised EFDC model runs will be made for the Little Manatee River (LMR), I believe to include boundary conditions that are calculated separately for baseline flows and various flow reduction scenarios. In that regard, I have been thinking about the EFDC modeling output and the following points occurred to me. Topic #4 is not EFDC modeling per se, but is related.

1. It is not surprising that the low salinity zones (e.g., < 2 psu) are the most sensitive to flow reductions, as the newly-named Law of Proportionality is taking effect. For example, there will always be less volume upstream of the 2 psu zone than the 10 psu zone. Therefore, when a percent change in area or volume is calculated for a flow reduction scenario, the percent change will be typically greater for the 2 psu zone simply because the net change in area or volume is being divided by a smaller baseline value.

For example, the same 20 hectare change in area for both zones will result in a greater percent habitat reduction for the < 2 psu zone than for the <10 psu zone. In that regard, it could also be useful to consider the absolute changes in area or volume between flow scenarios. Possibly, this is somewhat indirectly alleviated by the EFF fish analyses described in topic 4, but absolute changes in salinity zone habitats should possibly be presented somewhere.

2. Also, on other rivers, I recall that the District evaluated changes in shoreline habitat for given salinity zones. It never seemed to be as limiting as area or volume, but it could be important for the Little Manatee. The LMR is unusual in that it has the braided zone that runs between I-75 and kilometer 17.3. This zone has abundant sensitive, oligohaline marshes dominated by freshwater plants such as sawgrass and cattail that have some salt tolerance, which upstream grade into freshwater marshes. These communities were identified by the FWRI vegetation mapping project (1997) and by the Clewell et al. (2002) field vegetation survey.

These truly are biological communities that would be related to the movement of the 2 psu isohaline. In a separate piece of correspondence I will submit before the next panel meeting, I will make the case that these

oligohaline and tidal freshwater plant communities should be considered in the determination of flow blocks for the lower river and could be considered in the determination of allowable flow reductions.

I believe the District is going to be generating additional elevation data in shoreline areas. This could be a good time in the post-processing of model output to calculate the percent change in the length of total shorelines or wetland shorelines that are upstream of various isohalines. I don't know that it needs to be done for the entire river, and possibly could be done just upstream of I-75 to a determined location.

3. This involves what is considered the head of the estuary for change in habitat calculations. I believe the EFDC model goes up to the US 301 bridge, which I recall is located approximately 25 kilometers upstream of the mouth of the river. If there are truly tidal water level fluctuations that far upstream, they are very small and likely restricted to low flows. I am not asking the District to look at it, but I wonder what the model input files show for tidal water level fluctuations at that location, as I assume FSU used 15 minute values from the USGS recorder at US 301 for model calibration. I may look at the data myself.

As I will describe in a separate piece of correspondence, there is very extensive data for salinity gradients in the lower river measured by both the District and the EPC, that total 101 sampling trips in which salinity and other meter parameters were measured at numerous stations along the length of the brackish river.

These data show that salinity rarely goes upstream of kilometer 17, and with only one observation of 1.3 psu at kilometer 18.6. The channel upstream of kilometer 18 is narrow and has the morphology of a freshwater river, although it does have some tidal water level fluctuations that diminish upstream. The panel seems to have no understanding of this as the report says that "estuarine conditions" occur below US 301 and that should be clarified.

Including area and volume data for the river up to highway 301 increases the baseline values for the river, therefore making the percent changes in habitat due to flow reductions smaller than they would be if a more downstream location was used. In that regard, in terms of calculating percent changes in area and volume of what are truly estuarine waters, including at very low flows, it might be more meaningful in the model post-processing to calculate the head of the estuary at a different location, say kilometer 20.

I realize the area and volume of the river upstream between kilometer 20 and 25 is very small. However, if shoreline habitat is used, including the reach between kilometers 20 and 25, that would inflate the shoreline values of the river that are not really affected by the flow reductions.

Limiting the upstream extent of the length of the river that is used for changes in habitat should be considered, especially for shoreline habitat. which I recommend pursuing.

4. This last topic pertains to the fish habitat modeling simulations. I have not yet gone over that closely nor the related appendices, but it looks like a very useful technique and kudos to Mike for that work. However, since the <2 psu zone has been declared the most sensitive to change, it appears the review panel seems to think it is the most critical zone for fish habitat. No, I will work up the data and submit it with another piece of correspondence, but data from the ichthyoplankton, seine, and trawl collections show that many abundant and important species have mean salinity at capture values in mesohaline waters.

On page 130 the minimum flows report says that "Only those taxa with negative responses to salinity (i.e. a negative linear coefficient) were considered for the analysis. These species, which exhibit a higher probability of occurrence at lower or mid-range salinities than at higher salinities, were considered most useful" I would think that would include taxa that are centered in mesohaline waters (e.g. snook, sheepshead) - is that correct? Also, hopefully, the change in fish EFF values would not be affected by the proportionality issue as described for topic 1 above. Would that be correct? Do the EFF values look at total habitat less than a certain salinity value, or instead calculate changes in preferred habitat that have downstream and upstream limits or salinity values. Just thinking aloud, as I will look at the fish appendices over another day.

In a week or so I plan to submit a document that provides some clarification on a few topics and also shows some salinity data from the upstream part of the study area. Then a couple of weeks later I will submit a document related to the determination of appropriate flow blocks for the lower river, which will be related in part to the distribution of the oligohaline marshes and salinity/flow relationships upstream of I-75. The response of chlorophyll *a* to flow will also be evaluated in that regard.

In the meantime, I hope the District can consider the topics in this email related to analyses of the output files from the EFDC model and the EFF fish simulations. Please let me know if you have any questions or comments about the material presented above.

Thanks for your time and have a fine Thanksgiving!!

Sid

From: [Sid Flannery](#)
To: [Kym Holzwart](#)
Cc: [Chris Zajac](#); [Randy Smith](#); [Doug Leeper](#); [Adrienne E. Vining](#); [esherwood](#); [Dave Tomasko](#); [Jennifer Hecker](#)
Subject: Re: Extending Little Manatee River Proposed Minimum Flows Peer Review period and January EAC meeting change
Date: Wednesday, December 1, 2021 10:16:57 AM

[EXTERNAL SENDER] Use caution before opening.

Hello Kym and District staff (cc's to three EAC members),

Thanks for filling me in on the delay in the Little Manatee River (LMR) minimum flows peer review panel meetings. It is good the District is revisiting the EFDC hydrodynamic salinity modeling given the comments of the panel. I expect the panel and the interested parties in the region (EPCHC, Tampa Bay Estuary Program) will appreciate that this work is being done and not mind the delay. Also, later this month I will be submitting some technical materials for the District and the panel to review and this gives me more time.

I can go with whatever the District decides on moving the Little Manatee minimum flows presentation to the EAC, but think it makes perfect sense to give the presentation at the January meeting and clearly prefer that. Last July, when I proposed the LMR minimum flows be presented at the October meeting, I suggested it could be valuable for the EAC to hear about the District's general approach without specific minimum flows recommendations, but that presentation did not occur. Since that time, the District has published a draft minimum flows report, has had four peer review panel meetings, and received comments about the minimum flows report from interested technical parties.

This seems like an opportune time to appraise the EAC of the progress on the LMR minimum flows. The District could summarize their technical approach, the proposed (but tentative) flow thresholds and minimum flows, and the status of the peer review panel process and an overview of the key panel comments. As a member of the EAC, I would quickly summarize my comments on the draft report and my technical concerns and recommendations (e.g., changing the high flow threshold for the lower river and assessing shoreline habitats in the lower river as part of the EFDC modeling).

I recall that at the last EAC meeting, a few members commented that they would like to hear about District projects while they are ongoing, rather than after the fact. This seems like the perfect opportunity to address that objective on a river in the District where there is great public interest and ongoing technical discussions and assessments.

Again, I am okay with whatever the District chooses on the date of the

LMR presentation to the EAC, but think that January is much better than April. Please let me know what you think of that suggestion.

Best wishes and Happy Holidays coming up.

Sid

On Tue, Nov 30, 2021 at 3:27 PM Kym Holzward <Kym.Holzward@swfwmd.state.fl.us> wrote:

Good Afternoon Sid,

Because the District needs more time to respond to the Little Manatee River Proposed Minimum Flows Peer Review Panel comments, which includes conducting additional modeling work, the length of the peer review period is being extended. This will result in the cancellation of the Dec. 15th and Jan. 5th public meetings of the Peer Review Panel, which will be rescheduled for some time early next year. In addition, the presentation planned for the Jan. 11, 2022 Environmental Advisory Committee meeting will be rescheduled for the next EAC meeting in April 2022. Are you OK with moving the Little Manatee presentation from the Jan. EAC meeting to the April EAC meeting?

Best regards,
Kym

Kym Rouse Holzward, M.S.
Certified Senior Ecologist
Senior Environmental Scientist
Environmental Flows and Levels Section
Natural Systems & Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604
1-800-423-1476, ext. 4295
352-796-7211, ext. 4295
kym.holzward@swfwmd.state.fl.us

Bolster Bayou area & volume below certain elevation Z (in ft, NGVD29) for each segment

| | Z (ft) | 0 | | -1.5 | | -3 | |
|-------------|---------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|
| Segment No. | Segment | Area (m ²) | Vol (m ³) | Area (m ²) | Vol (m ³) | Area (m ²) | Vol (m ³) |
| 1 | # | 5376.31 | 6121.94 | 5376.31 | 3663.89 | 3971.61 | 1450.82 |
| 2 | # | 6715.85 | 7227.65 | 6699.58 | 4158.40 | 4518.50 | 1503.81 |
| 3 | # | 23483.18 | 23380.01 | 23455.55 | 12645.61 | 16185.13 | 2837.82 |
| 4 | # | 22970.80 | 22635.18 | 22970.80 | 12132.93 | 17085.55 | 2237.11 |
| 5 | # | 30429.91 | 29418.60 | 30162.07 | 15526.45 | 23830.42 | 2702.31 |
| 6 | # | 33641.90 | 30817.27 | 32666.19 | 15510.55 | 22691.76 | 2102.21 |
| 7 | # | 36962.02 | 30792.21 | 35761.36 | 13984.66 | 13780.03 | 1050.04 |
| 8 | # | 18260.00 | 13585.70 | 18023.00 | 5255.29 | 0.00 | 0.00 |

177839.97 163978.55 175114.86 82877.77 102062.99 13884.11

177840.0 163978.5 175114.9 82877.8 102063.0 13884.1

| -4.5 | | -6 | |
|------------|-----------|------------|-----------|
| Area (m^2) | Vol (m^3) | Area (m^2) | Vol (m^3) |
| 1419.77 | 226.66 | 0.00 | 0.00 |
| 1368.65 | 210.75 | 0.00 | 0.00 |
| 889.71 | 79.49 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 |

3678.13 516.91

3678.1 516.9

Little Manatee River Area-Volume file

All values are total area and volume less than an elevation (not interval total)

Hayes, Mill, and Bolster Bayous in separate worksheet, cells where they join the river

No data for kilometer < .6

Reference elevation is NGVD 1929

| | | | | | Centerline |
|-------------------------------|------|----------|----------|--------|-------------|
| Connect to Bayous | cell | Long* | Lat* | Dx (m) | (Kilometer) |
| | 2 | -82.4817 | 27.7165 | 93.21 | 0.60 |
| | 3 | -82.4808 | 27.71627 | 87.65 | 0.70 |
| | 4 | -82.4799 | 27.71604 | 83.79 | 0.80 |
| | 5 | -82.4791 | 27.71583 | 81.49 | 0.90 |
| | 6 | -82.4783 | 27.71562 | 80.61 | 1.00 |
| | 7 | -82.4776 | 27.71541 | 82.01 | 1.10 |
| | 8 | -82.4767 | 27.71521 | 83.84 | 1.10 |
| | 9 | -82.4759 | 27.71499 | 87.64 | 1.20 |
| | 10 | -82.475 | 27.71477 | 90.45 | 1.30 |
| | 11 | -82.4741 | 27.71455 | 92.66 | 1.40 |
| | 12 | -82.4732 | 27.71431 | 94.21 | 1.50 |
| | 13 | -82.4723 | 27.71409 | 94.44 | 1.60 |
| | 14 | -82.4711 | 27.71464 | 94.53 | 1.70 |
| | 15 | -82.47 | 27.71516 | 93.05 | 1.80 |
| | 16 | -82.4691 | 27.71493 | 91.19 | 1.90 |
| | 17 | -82.4682 | 27.71471 | 87.42 | 2.00 |
| | 18 | -82.4674 | 27.71449 | 83.99 | 2.10 |
| | 19 | -82.4666 | 27.71427 | 80.73 | 2.20 |
| | 20 | -82.4658 | 27.71406 | 76.76 | 2.20 |
| | 21 | -82.4651 | 27.71385 | 74.63 | 2.30 |
| | 22 | -82.4644 | 27.71364 | 72.25 | 2.40 |
| | 23 | -82.4637 | 27.71342 | 69.5 | 2.50 |
| | 24 | -82.463 | 27.71321 | 68.74 | 2.50 |
| | 25 | -82.4624 | 27.71299 | 66.58 | 2.60 |
| | 26 | -82.4618 | 27.71278 | 63.62 | 2.70 |
| | 27 | -82.4612 | 27.71255 | 63.23 | 2.80 |
| | 28 | -82.4606 | 27.71232 | 66.4 | 2.90 |
| | 29 | -82.4595 | 27.7129 | 72.04 | 3.00 |
| | 30 | -82.4584 | 27.71332 | 78.83 | 3.20 |
| | 31 | -82.4577 | 27.71297 | 87.06 | 3.30 |
| | 32 | -82.4569 | 27.71257 | 91.22 | 3.40 |
| connect to Ruskin Inlet Bayou | 33 | -82.4561 | 27.71215 | 84.24 | 3.50 |
| | 34 | -82.4554 | 27.71176 | 74.69 | 3.60 |
| | 35 | -82.4548 | 27.71138 | 73.84 | 3.63 |
| | 36 | -82.4542 | 27.71097 | 75.87 | 3.70 |
| | 37 | -82.4536 | 27.71054 | 80.32 | 3.80 |
| | 38 | -82.4529 | 27.71005 | 88.82 | 3.90 |
| | 39 | -82.4519 | 27.70986 | 86.64 | 4.00 |
| | 40 | -82.451 | 27.70961 | 73.41 | 4.05 |
| | 41 | -82.4506 | 27.70915 | 65.86 | 4.10 |

| | | | | | |
|------------------------|----|----------|----------|--------|------|
| | 42 | -82.4501 | 27.70867 | 79.04 | 4.20 |
| | 43 | -82.4495 | 27.70803 | 105.33 | 4.30 |
| | 44 | -82.4485 | 27.70743 | 112.82 | 4.40 |
| | 45 | -82.4482 | 27.70656 | 105.8 | 4.50 |
| | 46 | -82.4481 | 27.70565 | 100.31 | 4.60 |
| | 47 | -82.4481 | 27.70473 | 105.87 | 4.70 |
| connect to Mills Bayou | 48 | -82.4484 | 27.70375 | 121.68 | 4.80 |
| | 49 | -82.4489 | 27.70285 | 104.22 | 4.90 |
| | 50 | -82.4496 | 27.7021 | 103.96 | 5.00 |
| | 51 | -82.4503 | 27.70145 | 99.56 | 5.10 |
| | 52 | -82.4511 | 27.70085 | 103.21 | 5.20 |
| | 53 | -82.4519 | 27.70035 | 94.79 | 5.30 |
| | 54 | -82.4527 | 27.69995 | 94.79 | 5.40 |
| | 55 | -82.4536 | 27.6996 | 85.53 | 5.50 |
| | 56 | -82.4544 | 27.69928 | 87.99 | 5.60 |
| | 57 | -82.4551 | 27.6989 | 77.98 | 5.70 |
| | 58 | -82.4557 | 27.6985 | 73.94 | 5.80 |
| | 59 | -82.4563 | 27.69803 | 78.58 | 5.85 |
| | 60 | -82.4567 | 27.69745 | 75.21 | 5.90 |
| | 61 | -82.457 | 27.69683 | 74.92 | 6.00 |
| | 62 | -82.4571 | 27.69615 | 78.45 | 6.10 |
| | 63 | -82.4572 | 27.69545 | 77.83 | 6.20 |
| | 64 | -82.4571 | 27.69478 | 72.63 | 6.30 |
| | 65 | -82.457 | 27.69415 | 69.56 | 6.33 |
| | 66 | -82.4568 | 27.69357 | 67.95 | 6.40 |
| | 67 | -82.4564 | 27.69303 | 75.52 | 6.50 |
| | 68 | -82.4559 | 27.69253 | 70.3 | 6.60 |
| | 69 | -82.4553 | 27.69207 | 81.24 | 6.65 |
| | 70 | -82.4547 | 27.69165 | 82.02 | 6.70 |
| | 71 | -82.454 | 27.6913 | 76.56 | 6.80 |
| | 72 | -82.4532 | 27.69095 | 90.45 | 6.90 |
| | 73 | -82.4524 | 27.6906 | 81.05 | 7.00 |
| | 74 | -82.4517 | 27.69033 | 79.2 | 7.10 |
| | 75 | -82.4509 | 27.6901 | 77.13 | 7.14 |
| connect to Hayes Bayou | 76 | -82.4501 | 27.68993 | 90.33 | 7.20 |
| | 77 | -82.4493 | 27.68978 | 80.69 | 7.30 |
| | 78 | -82.4484 | 27.68965 | 89.3 | 7.40 |
| | 79 | -82.4475 | 27.68953 | 85.57 | 7.50 |
| | 80 | -82.4467 | 27.6894 | 89.3 | 7.60 |
| | 81 | -82.4458 | 27.6893 | 89.3 | 7.70 |
| | 82 | -82.4449 | 27.68917 | 90.33 | 7.74 |
| | 83 | -82.444 | 27.68903 | 85.57 | 7.80 |
| | 84 | -82.4431 | 27.68885 | 91.36 | 7.90 |
| | 85 | -82.4422 | 27.68865 | 91.36 | 8.00 |
| | 86 | -82.4413 | 27.68845 | 91.36 | 8.10 |
| | 87 | -82.4404 | 27.68825 | 91.36 | 8.20 |
| | 88 | -82.4395 | 27.688 | 94.68 | 8.30 |
| | 89 | -82.4386 | 27.68765 | 94.8 | 8.40 |
| | 90 | -82.4378 | 27.6873 | 85.54 | 8.50 |
| | 91 | -82.437 | 27.68698 | 88 | 8.65 |
| | 92 | -82.4362 | 27.68662 | 92.34 | 8.60 |
| | 93 | -82.4354 | 27.6863 | 85.54 | 8.70 |

| | | | | | |
|--|------------|----------|----------|--------|-------|
| | 94 | -82.4345 | 27.68595 | 94.8 | 8.80 |
| | 95 | -82.4337 | 27.6855 | 96.41 | 8.90 |
| | 96 | -82.4329 | 27.68498 | 99.82 | 9.00 |
| | 97 | -82.4322 | 27.68437 | 99.94 | 9.10 |
| | 98 | -82.4315 | 27.68368 | 102.25 | 9.30 |
| | 99 | -82.431 | 27.68285 | 109.44 | 9.40 |
| | 100 | -82.4307 | 27.6819 | 112.27 | 9.50 |
| | 101 | -82.4307 | 27.68088 | 118.4 | 9.60 |
| | 102 | -82.431 | 27.67992 | 104.4 | 9.70 |
| | 103 | -82.4315 | 27.6791 | 104.23 | 9.80 |
| | 104 | -82.4321 | 27.67837 | 96.54 | 9.90 |
| | 105 | -82.4328 | 27.67772 | 93.41 | 10.00 |
| | 106 | -82.4334 | 27.6771 | 95.92 | 10.10 |
| | 107 | -82.4341 | 27.67653 | 85.12 | 10.20 |
| | 108 | -82.4347 | 27.67598 | 92.24 | 10.30 |
| | 109 | -82.4354 | 27.67543 | 88.53 | 10.40 |
| | 110 | -82.436 | 27.67488 | 85.12 | 10.50 |
| | 111 | -82.4367 | 27.67435 | 88.55 | 10.50 |
| | 112 | -82.4373 | 27.6738 | 89.11 | 10.60 |
| | 113 | -82.4379 | 27.67323 | 78.59 | 10.70 |
| | 114 | -82.4384 | 27.67265 | 82.91 | 10.80 |
| | 115 | -82.4388 | 27.67205 | 72.96 | 10.90 |
| | 116 | -82.4391 | 27.6714 | 83.25 | 11.00 |
| | 117 | -82.4393 | 27.67072 | 72.94 | 11.10 |
| | 118 | -82.4393 | 27.67005 | 78.45 | 11.13 |
| | 119 | -82.4391 | 27.66938 | 74.92 | 11.20 |
| | 120 | -82.4388 | 27.66872 | 80.36 | 11.30 |
| | 121 | -82.4384 | 27.66813 | 75.87 | 11.40 |
| | 122 | -82.4379 | 27.66763 | 77.54 | 11.50 |
| | 123 | -82.4373 | 27.66715 | 88.56 | 11.53 |
| | 124 | -82.4364 | 27.6667 | 103.61 | 11.60 |
| | 125 | -82.4354 | 27.66635 | 118.07 | 11.70 |
| | 126 | -82.4342 | 27.66613 | 119.47 | 11.90 |
| | 127 | -82.4331 | 27.6661 | 108.89 | 12.00 |
| | 128 | -82.432 | 27.66625 | 110.58 | 12.10 |
| | 129 | -82.4309 | 27.6665 | 113.38 | 12.20 |
| | 130 | -82.4299 | 27.66688 | 101.89 | 12.30 |
| | 131 | -82.429 | 27.66735 | 104.62 | 12.40 |
| | 132 | -82.428 | 27.66778 | 101.38 | 12.50 |
| | 133 | -82.4271 | 27.66797 | 84.09 | 12.60 |
| | 134 | -82.4265 | 27.66793 | 40.55 | 12.70 |
| | 135 | -82.4259 | 27.66788 | 84.4 | 12.72 |
| | 136 | -82.4251 | 27.66815 | 85.24 | 12.80 |
| | 137 | -82.4243 | 27.66842 | 69.81 | 12.90 |
| | 138 | -82.4237 | 27.66893 | 72.29 | 12.95 |
| | 139 | -82.4238 | 27.66935 | 77.55 | 13.00 |
| | 140 | -82.4232 | 27.66996 | 63.09 | 13.10 |
| | 141 | -82.4227 | 27.67042 | 78.41 | 13.15 |
| | 142 | -82.4221 | 27.67095 | 69.13 | 13.20 |
| | 143 | -82.4216 | 27.67154 | 75.77 | 13.30 |
| | 144 | -82.4209 | 27.67171 | 85.74 | 13.40 |
| | 145 | -82.4201 | 27.67187 | 83.57 | 13.45 |

| | | | | | |
|--|------------|----------|----------|-------|-------|
| | 146 | -82.4193 | 27.672 | 77.14 | 13.50 |
| | 147 | -82.4177 | 27.67211 | 79.31 | 13.70 |
| | 148 | -82.4169 | 27.67213 | 69.67 | 13.80 |
| | 149 | -82.4162 | 27.67165 | 59.58 | 13.90 |
| | 150 | -82.4156 | 27.6694 | 65.53 | 14.20 |
| | 151 | -82.415 | 27.66904 | 59.4 | 14.22 |
| | 152 | -82.4144 | 27.66901 | 54.31 | 14.30 |
| | 153 | -82.4139 | 27.66899 | 39.27 | 14.35 |
| | 154 | -82.4135 | 27.66898 | 39.96 | 14.40 |
| | 155 | -82.4131 | 27.66895 | 50.62 | 14.45 |
| | 156 | -82.4125 | 27.66893 | 60.77 | 14.50 |
| | 157 | -82.4119 | 27.66925 | 55.07 | 14.60 |
| | 158 | -82.4114 | 27.66923 | 41.29 | 14.64 |
| | 159 | -82.411 | 27.66921 | 44.73 | 14.70 |
| | 160 | -82.4105 | 27.66883 | 57.85 | 14.80 |
| | 161 | -82.4099 | 27.66845 | 60.62 | 14.83 |
| | 162 | -82.4093 | 27.66842 | 52.62 | 14.90 |
| | 163 | -82.4088 | 27.66841 | 44.41 | 14.95 |
| | 164 | -82.4084 | 27.66875 | 38.6 | 14.97 |
| | 165 | -82.408 | 27.66873 | 34.99 | 15.00 |
| | 166 | -82.4077 | 27.66872 | 32.44 | 15.10 |
| | 167 | -82.4074 | 27.66872 | 30.3 | 15.13 |
| | 168 | -82.4071 | 27.66871 | 28.84 | 15.16 |
| | 169 | -82.4068 | 27.66835 | 28.35 | 15.20 |
| | 170 | -82.4065 | 27.66799 | 28.76 | 15.30 |
| | 171 | -82.4061 | 27.6643 | 34.01 | 16.10 |
| | 172 | -82.4058 | 27.66465 | 32.35 | 16.20 |
| | 173 | -82.4056 | 27.66547 | 27.53 | 16.30 |
| | 174 | -82.4053 | 27.66629 | 27.11 | 16.40 |
| | 175 | -82.405 | 27.6663 | 38.98 | 16.50 |
| | 176 | -82.4045 | 27.66592 | 52.41 | 16.58 |
| | 177 | -82.4039 | 27.66554 | 62.45 | 16.60 |
| | 178 | -82.4032 | 27.66484 | 66.02 | 16.70 |
| | 179 | -82.4025 | 27.66466 | 67.22 | 16.80 |
| | 180 | -82.4019 | 27.6645 | 61.48 | 16.90 |
| | 181 | -82.4013 | 27.66444 | 65.64 | 16.95 |
| | 182 | -82.4006 | 27.6644 | 68.03 | 17.00 |
| | 183 | -82.3999 | 27.66436 | 70.64 | 17.10 |
| | 184 | -82.3992 | 27.66428 | 72.05 | 17.20 |
| | 185 | -82.3985 | 27.66414 | 70.06 | 17.23 |
| | 186 | -82.3978 | 27.66398 | 63.92 | 17.30 |
| | 187 | -82.3972 | 27.66387 | 59.35 | 17.40 |
| | 188 | -82.3966 | 27.6639 | 57.25 | 17.43 |
| | 189 | -82.396 | 27.66406 | 61.74 | 17.50 |
| | 190 | -82.3955 | 27.66433 | 68.62 | 17.60 |
| | 191 | -82.3948 | 27.66461 | 71.62 | 17.70 |
| | 192 | -82.3941 | 27.66483 | 71.36 | 17.73 |
| | 193 | -82.3935 | 27.665 | 68.48 | 17.80 |
| | 194 | -82.3928 | 27.66516 | 66.66 | 17.90 |
| | 195 | -82.3922 | 27.66532 | 63.65 | 17.93 |
| | 196 | -82.3916 | 27.66551 | 59.21 | 18.00 |
| | 197 | -82.3891 | 27.66576 | 55.15 | 18.30 |

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|--|------------|----------|----------|-------|-------|
| | 198 | -82.3891 | 27.6661 | 55.72 | 18.40 |
| | 199 | -82.3891 | 27.66652 | 56.15 | 18.42 |
| | 200 | -82.3891 | 27.66702 | 58.03 | 18.50 |
| | 201 | -82.3902 | 27.66757 | 65.6 | 18.70 |
| | 202 | -82.3901 | 27.66818 | 71.34 | 18.90 |
| | 203 | -82.3901 | 27.66882 | 71.68 | 19.00 |
| | 204 | -82.3899 | 27.66945 | 73.84 | 19.02 |
| | 205 | -82.3896 | 27.67009 | 81.38 | 19.10 |
| | 206 | -82.389 | 27.67057 | 73.65 | 19.20 |
| | 207 | -82.3885 | 27.67086 | 58.58 | 19.30 |
| | 208 | -82.388 | 27.67116 | 51.33 | 19.37 |
| | 209 | -82.3878 | 27.67159 | 56.32 | 19.40 |
| | 210 | -82.3877 | 27.67214 | 68.54 | 19.50 |
| | 211 | -82.3875 | 27.67267 | 54.72 | 19.55 |
| | 212 | -82.3873 | 27.67311 | 52.84 | 19.60 |
| | 213 | -82.3869 | 27.67348 | 58.68 | 19.70 |
| | 214 | -82.3865 | 27.67372 | 48.36 | 19.80 |
| | 215 | -82.3861 | 27.67386 | 41.77 | 19.90 |
| | 216 | -82.3857 | 27.67398 | 40.38 | 19.95 |
| | 217 | -82.3853 | 27.67411 | 38.95 | 19.97 |
| | 218 | -82.3849 | 27.67425 | 37.41 | 20.00 |
| | 219 | -82.3846 | 27.67441 | 36.32 | 20.05 |
| | 220 | -82.3843 | 27.6746 | 35.78 | 20.10 |
| | 221 | -82.384 | 27.67483 | 35.33 | 20.13 |
| | 222 | -82.3838 | 27.67508 | 36.18 | 20.17 |
| | 223 | -82.3836 | 27.67536 | 37.34 | 20.20 |
| | 224 | -82.3835 | 27.67569 | 40.78 | 20.23 |
| | 225 | -82.3833 | 27.67605 | 45.9 | 20.30 |
| | 226 | -82.383 | 27.67641 | 51.99 | 20.33 |
| | 227 | -82.3826 | 27.67668 | 48.56 | 20.50 |
| | 228 | -82.3822 | 27.67681 | 44.99 | 20.52 |
| | 229 | -82.3817 | 27.67687 | 43.12 | 20.57 |
| | 230 | -82.3813 | 27.6769 | 40.51 | 20.60 |
| | 231 | -82.3809 | 27.67694 | 41.17 | 20.65 |
| | 232 | -82.3805 | 27.67698 | 41.59 | 20.70 |
| | 233 | -82.3802 | 27.67699 | 25.33 | 20.78 |
| | 234 | -82.3799 | 27.67718 | 27.58 | 20.90 |
| | 235 | -82.3796 | 27.67738 | 27.09 | 20.92 |
| | 236 | -82.3793 | 27.67769 | 27.58 | 20.95 |
| | 237 | -82.3791 | 27.67772 | 27.59 | 20.98 |
| | 238 | -82.3788 | 27.6778 | 27.58 | 21.01 |
| | 239 | -82.3785 | 27.6778 | 27.57 | 21.03 |
| | 240 | -82.3782 | 27.67782 | 28.55 | 21.06 |
| | 241 | -82.3779 | 27.67761 | 28.07 | 21.09 |
| | 242 | -82.3776 | 27.67739 | 28.64 | 21.12 |
| | 243 | -82.3773 | 27.67716 | 29.72 | 21.15 |
| | 244 | -82.377 | 27.67691 | 31.35 | 21.18 |
| | 245 | -82.3767 | 27.67681 | 32.09 | 21.21 |
| | 246 | -82.3765 | 27.67665 | 31.82 | 21.24 |
| | 247 | -82.3762 | 27.67647 | 30.7 | 21.27 |
| | 248 | -82.376 | 27.67628 | 28.96 | 21.30 |
| | 249 | -82.3758 | 27.67609 | 26.1 | 21.33 |

| | | | | | |
|--|------------|----------|----------|-------|-------|
| | 250 | -82.3757 | 27.67591 | 25.21 | 21.35 |
| | 251 | -82.3755 | 27.67576 | 24.49 | 21.38 |
| | 252 | -82.3753 | 27.67562 | 23.86 | 21.40 |
| | 253 | -82.3751 | 27.67552 | 23.21 | 21.43 |
| | 254 | -82.3749 | 27.67544 | 24.72 | 21.45 |
| | 255 | -82.3746 | 27.6754 | 26.19 | 21.48 |
| | 256 | -82.3743 | 27.67538 | 27.22 | 21.50 |
| | 257 | -82.3737 | 27.67541 | 99.92 | 21.60 |
| | 258 | -82.373 | 27.67557 | 49.01 | 21.65 |
| | 259 | -82.3725 | 27.67575 | 57 | 21.71 |
| | 260 | -82.372 | 27.67572 | 53.01 | 21.76 |
| | 261 | -82.3715 | 27.67553 | 46.97 | 21.81 |
| | 262 | -82.3711 | 27.67529 | 45.18 | 21.86 |
| | 263 | -82.3708 | 27.67505 | 42.84 | 21.90 |
| | 264 | -82.3704 | 27.67482 | 41.07 | 21.94 |
| | 265 | -82.3701 | 27.67462 | 42.64 | 21.98 |
| | 266 | -82.3697 | 27.67442 | 49.18 | 22.03 |
| | 267 | -82.3693 | 27.67414 | 52.76 | 22.08 |
| | 268 | -82.3689 | 27.67381 | 45.94 | 22.13 |
| | 269 | -82.3687 | 27.67348 | 43.68 | 22.17 |
| | 270 | -82.3684 | 27.67318 | 41.49 | 22.21 |
| | 271 | -82.3681 | 27.67292 | 37.67 | 22.25 |
| | 272 | -82.3679 | 27.67271 | 35.1 | 22.29 |
| | 273 | -82.3675 | 27.67262 | 34.04 | 22.32 |
| | 274 | -82.3672 | 27.67265 | 37.31 | 22.36 |
| | 275 | -82.3668 | 27.67278 | 43.24 | 22.40 |
| | 276 | -82.3663 | 27.6739 | 53.46 | 22.46 |
| | 277 | -82.3658 | 27.67388 | 54.96 | 22.51 |
| | 278 | -82.3653 | 27.6732 | 49.34 | 22.56 |
| | 279 | -82.3649 | 27.67246 | 46.56 | 22.61 |
| | 280 | -82.3646 | 27.67219 | 45.34 | 22.65 |
| | 281 | -82.3642 | 27.67192 | 44.24 | 22.70 |
| | 282 | -82.3639 | 27.67165 | 44.65 | 22.74 |
| | 283 | -82.3636 | 27.67137 | 42.82 | 22.78 |
| | 284 | -82.3633 | 27.67112 | 40.55 | 22.82 |
| | 285 | -82.3629 | 27.6709 | 37.63 | 22.86 |
| | 286 | -82.3626 | 27.67076 | 35.18 | 22.90 |
| | 287 | -82.3623 | 27.6707 | 34.46 | 22.93 |
| | 288 | -82.3619 | 27.67074 | 37.31 | 22.97 |
| | 289 | -82.3616 | 27.67086 | 40.52 | 23.01 |
| | 290 | -82.3612 | 27.67102 | 44.12 | 23.05 |
| | 291 | -82.3607 | 27.67118 | 45.72 | 23.10 |
| | 292 | -82.3603 | 27.67132 | 45.81 | 23.14 |
| | 293 | -82.3599 | 27.67142 | 45.43 | 23.19 |
| | 294 | -82.3594 | 27.67151 | 44.24 | 23.23 |
| | 295 | -82.359 | 27.67159 | 42.91 | 23.28 |
| | 296 | -82.3586 | 27.67168 | 42.69 | 23.32 |
| | 297 | -82.3581 | 27.67178 | 43.6 | 23.36 |
| | 298 | -82.3577 | 27.67189 | 43.29 | 23.41 |
| | 299 | -82.3573 | 27.67201 | 42.52 | 23.45 |
| | 300 | -82.3569 | 27.67213 | 43.34 | 23.49 |
| | 301 | -82.3565 | 27.67227 | 43.27 | 23.54 |

| | | | | | |
|--|------------|----------|----------|-------|-------|
| | 302 | -82.3561 | 27.67241 | 42.56 | 23.58 |
| | 303 | -82.3557 | 27.67257 | 42.12 | 23.62 |
| | 304 | -82.3553 | 27.67275 | 45.83 | 23.67 |
| | 305 | -82.3548 | 27.67291 | 50.54 | 23.72 |
| | 306 | -82.3543 | 27.67298 | 54.68 | 23.77 |
| | 307 | -82.3538 | 27.67289 | 53.2 | 23.83 |
| | 308 | -82.3533 | 27.6727 | 44.27 | 23.87 |
| | 309 | -82.3529 | 27.67242 | 55.62 | 23.93 |
| | 310 | -82.3526 | 27.67207 | 47.73 | 23.97 |
| | 311 | -82.3523 | 27.67173 | 48.28 | 24.02 |

note: 1 * Lon and Lat are the longitude and latitude of the c
Elevations are NGVD 1929
2 l is the segment numbering along the river central
3 l numbers connected to bayous are marked

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| |
| er listed below |
| |
| |

| A=Area | | V=Volume | | | | | | | |
|-------------|----------|-------------|----------|------------|----------|--------------|----------|------------|--------|
| Z<-0.0 feet | | Z<-1.5 feet | | Z<- 3 feet | | Z<- 4.5 feet | | Z<- 6 feet | |
| A (m^2)* | V(m^3)* | A(m^2)* | V(m^3)* | A(m^2) | V(m^3) | A(m^2) | V(m^3) | A(m^2) | V(m^3) |
| 46471.2 | 70658.53 | 46386.27 | 49512.04 | 46301.35 | 28365.54 | 26654.56 | 11380.17 | 16711.48 | |
| 43527.74 | 61061.72 | 43447.89 | 41266.73 | 34614.44 | 21953.2 | 17584.19 | 12048.26 | 17544.63 | |
| 41445.56 | 62309.75 | 41369.23 | 43464.12 | 32959.99 | 25993.42 | 16738.75 | 15144.89 | 16700.93 | |
| 40192.42 | 63121.16 | 40118.19 | 44862.25 | 31971.57 | 26724.41 | 23107.36 | 14559.96 | 16222.26 | |
| 39613.17 | 53004.92 | 39539.75 | 35004.37 | 30794.8 | 17741.48 | 8554.65 | 9711.67 | 8518.24 | |
| 50361.76 | 43584.99 | 50286.41 | 20614.25 | 16925 | 2912.38 | 0 | 0 | 0 | |
| 51265.94 | 50797.46 | 51188.97 | 27428.02 | 42890.65 | 5826.16 | 0 | 0 | 0 | |
| 52153.75 | 52737.65 | 52073.33 | 28957.6 | 35280.61 | 7913.95 | 0 | 0 | 0 | |
| 53480.41 | 53637.28 | 53397.51 | 29231.29 | 37482.17 | 7726.94 | 9741.52 | 267.89 | 0 | |
| 64307.19 | 65191.71 | 64222.58 | 35831.32 | 27822.01 | 15682.37 | 18925.56 | 6801.57 | 0 | |
| 46347.9 | 48452.39 | 46261.79 | 27324.87 | 37457.74 | 8076.05 | 9151.56 | 1624.4 | 0 | |
| 46353.5 | 52062.38 | 46267.21 | 30937.19 | 46180.93 | 9812 | 7848.34 | 58.86 | 0 | |
| 46280.87 | 52364.46 | 46194.68 | 31303.12 | 46108.5 | 10241.78 | 8837.23 | 1829.65 | 0 | |
| 45294.72 | 52005.31 | 45210.26 | 31398.94 | 45125.8 | 10792.56 | 8725.07 | 3193.89 | 0 | |
| 35442.72 | 43774.51 | 35360.23 | 27682.77 | 35277.74 | 11591.03 | 8590.78 | 4591.2 | 8549.06 | |
| 33792.31 | 41199.41 | 33713.52 | 25858.21 | 33634.73 | 10517.01 | 8269.71 | 5154.82 | 8229.72 | |
| 32228.12 | 31345.57 | 32152.71 | 16690.44 | 16284.68 | 4235.16 | 0 | 0 | 0 | |
| 39728.02 | 38385.09 | 39655.4 | 20297.17 | 24502.32 | 6358.4 | 0 | 0 | 0 | |
| 54010.68 | 52995.45 | 53941.93 | 28373.14 | 38970.48 | 5451.72 | 6262.27 | 234.73 | 0 | |
| 52153.02 | 48066.29 | 52086.33 | 24264.44 | 19218.09 | 7667.56 | 7092.84 | 2393.83 | 0 | |
| 39386.46 | 46033.85 | 39322.44 | 28067.65 | 18398.77 | 13414.06 | 12825.88 | 7406.94 | 12825.88 | |
| 32369.03 | 37745.74 | 32307.41 | 22988.37 | 24349.72 | 9535.78 | 12327.68 | 2434.72 | 0 | |
| 31850.79 | 32547.36 | 31790.01 | 18030.4 | 23878.52 | 4731.98 | 6235.94 | 296.21 | 0 | |
| 30676.68 | 37904.3 | 30617.97 | 23931.56 | 24218.19 | 10244.16 | 5424.23 | 4868.25 | 5424.23 | |
| 29152.47 | 39007.59 | 29096.52 | 25744.66 | 29040.57 | 12481.73 | 18539.06 | 2754.26 | 0 | |
| 28749.39 | 35057.99 | 28693.93 | 21973.95 | 28638.46 | 8889.91 | 0 | 0 | 0 | |
| 30031.04 | 64159.65 | 29972.96 | 50538.99 | 29914.88 | 36918.34 | 19339.44 | 25959.33 | 19308.13 | |
| 50249.07 | 82685.17 | 50186.75 | 59823.84 | 43960.79 | 37178.23 | 25414.48 | 24335.17 | 25380.54 | |
| 56158.32 | 66142.35 | 56091.64 | 40550.51 | 30215.64 | 17505.09 | 9038.06 | 7786.92 | 5469.23 | |
| 19465.09 | 35991.26 | 19385.83 | 27226.82 | 19306.57 | 18462.38 | 19227.31 | 9697.94 | 9898.91 | |
| 20195.3 | 39118.11 | 20116.68 | 30027.02 | 20038.06 | 20935.93 | 19959.44 | 11844.83 | 15880.42 | |
| 18382.46 | 31132.06 | 18306.86 | 22835.57 | 18231.26 | 14539.09 | 14493.58 | 6325.33 | 0 | |
| 16069.41 | 23180.73 | 16001.44 | 15913.65 | 15933.48 | 8646.57 | 4980.33 | 2925.94 | 4980.33 | |
| 15691.76 | 19172.75 | 15624.58 | 12077.07 | 8061.32 | 5468.94 | 8026.85 | 1804.85 | 0 | |
| 15975.94 | 23672.52 | 15906.93 | 16478.57 | 15837.91 | 9284.62 | 15768.89 | 2090.67 | 3195.9 | |
| 16723.34 | 24885.75 | 16650.29 | 17380.42 | 8648.63 | 9914.73 | 8611.13 | 6036.91 | 3425.93 | |
| 18098.08 | 19553.54 | 18017.3 | 11389.44 | 9331.19 | 4733.91 | 3688.73 | 2599.99 | 3647.25 | |
| 15432.77 | 25030.78 | 15353.07 | 18107.11 | 10018.03 | 11578.07 | 6572.22 | 7614.94 | 6531.35 | |
| 12696.01 | 18305.38 | 12629.57 | 12621.65 | 5458.7 | 7684.66 | 5424.63 | 5254.6 | 5390.55 | |
| 7384.92 | 11256.66 | 7324.7 | 7974.38 | 7264.49 | 4692.11 | 4757.32 | 2405.22 | 2085.1 | |

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| 11287.61 | 18555.53 | 11214.88 | 13529.35 | 11142.15 | 8503.18 | 5022.21 | 3492.12 | 2550.49 |
| 14721.38 | 23085.63 | 14624.49 | 16529.72 | 14527.59 | 9973.81 | 6555.5 | 4937.72 | 3332.72 |
| 18609.85 | 38956.41 | 18506.88 | 30634.07 | 18403.91 | 22311.74 | 18300.94 | 13989.41 | 14764.63 |
| 17542.92 | 46274.67 | 17443.63 | 38519.85 | 17344.34 | 30765.03 | 17245.05 | 23010.21 | 17145.76 |
| 18788.47 | 50695.38 | 18697.51 | 42352.53 | 18606.55 | 34009.67 | 18515.59 | 25666.82 | 18424.63 |
| 25932.28 | 61960.26 | 25831.27 | 50342.71 | 25730.25 | 38725.16 | 25629.24 | 27107.61 | 25528.23 |
| 38810.1 | 58842.73 | 38705.21 | 41247.6 | 38600.31 | 23652.47 | 38495.42 | 6057.34 | 0 |
| 28740.14 | 41764.3 | 28637.73 | 28766.22 | 28535.32 | 15768.15 | 28432.91 | 2770.08 | 0 |
| 25210.75 | 31204.56 | 25120.31 | 19783.69 | 25029.87 | 8362.82 | 0 | 0 | 0 |
| 24418.64 | 20606.4 | 24324.01 | 9515.31 | 0 | 0 | 0 | 0 | 0 |
| 22056.53 | 15558.64 | 21964.41 | 5533.18 | 0 | 0 | 0 | 0 | 0 |
| 18428.27 | 12621.71 | 18338.14 | 4252.97 | 0 | 0 | 0 | 0 | 0 |
| 16086.46 | 14331.28 | 16003.7 | 7046.21 | 0 | 0 | 0 | 0 | 0 |
| 14151.47 | 17133.15 | 14068.87 | 10760.45 | 13986.26 | 4387.76 | 0 | 0 | 0 |
| 12142.31 | 14332.55 | 12066.63 | 8868.27 | 11990.94 | 3403.98 | 0 | 0 | 0 |
| 11208.4 | 15477.38 | 11133.27 | 10455.46 | 11058.15 | 5433.55 | 10983.02 | 411.63 | 0 |
| 10560.87 | 12455.36 | 10491.71 | 7706.75 | 10422.55 | 2958.15 | 0 | 0 | 0 |
| 10915.51 | 10978.93 | 10847.4 | 6054.56 | 10779.29 | 1130.18 | 0 | 0 | 0 |
| 10853.64 | 9967.44 | 10786.75 | 5064.1 | 10719.87 | 160.77 | 0 | 0 | 0 |
| 11595.96 | 5759.78 | 11526.05 | 489.58 | 0 | 0 | 0 | 0 | 0 |
| 12376.61 | 8345.7 | 12306.96 | 2730.76 | 0 | 0 | 0 | 0 | 0 |
| 12872.67 | 6397.25 | 12801.15 | 543.77 | 0 | 0 | 0 | 0 | 0 |
| 12707.24 | 7320.89 | 12640.18 | 1546.22 | 0 | 0 | 0 | 0 | 0 |
| 14425.41 | 9313.39 | 14357.06 | 2758.2 | 0 | 0 | 0 | 0 | 0 |
| 13721.04 | 11163.1 | 13661.06 | 4934.91 | 0 | 0 | 0 | 0 | 0 |
| 16213.34 | 15952.07 | 16093.8 | 8654 | 15974.27 | 1355.93 | 0 | 0 | 0 |
| 16068 | 19058.56 | 15997.14 | 11792.49 | 15926.28 | 4526.41 | 0 | 0 | 0 |
| 16064.24 | 21096.28 | 15994.62 | 13839.48 | 15925.01 | 6582.67 | 0 | 0 | 0 |
| 15767.46 | 22672.1 | 15692.68 | 15567.66 | 15617.91 | 8463.21 | 15543.14 | 1358.77 | 0 |
| 15362.65 | 22974.52 | 15288.06 | 16059.49 | 15213.46 | 9144.46 | 15138.87 | 2229.44 | 0 |
| 18125.17 | 25223.9 | 18048.63 | 17039.55 | 17972.1 | 8855.2 | 17895.56 | 670.85 | 0 |
| 17897.16 | 21585.69 | 17820.67 | 13491.06 | 17744.18 | 5396.42 | 0 | 0 | 0 |
| 18027.98 | 19634.18 | 17953.65 | 11468.15 | 17879.31 | 3302.11 | 0 | 0 | 0 |
| 17948.15 | 21129.75 | 17874.31 | 13006.34 | 17800.48 | 4882.93 | 0 | 0 | 0 |
| 22802.59 | 27989.34 | 22728.13 | 17651.72 | 22653.67 | 7314.1 | 0 | 0 | 0 |
| 17695.24 | 22189.79 | 17614.92 | 14196.22 | 17534.6 | 6202.66 | 0 | 0 | 0 |
| 16296.97 | 20581.79 | 16219.25 | 13225.41 | 16141.53 | 5869.02 | 0 | 0 | 0 |
| 15593.23 | 20427.83 | 15512.75 | 13400.96 | 15432.27 | 6374.1 | 0 | 0 | 0 |
| 14875.58 | 18893.44 | 14794.19 | 12192.86 | 14712.79 | 5492.28 | 0 | 0 | 0 |
| 14006.82 | 20067.03 | 13924.63 | 13778.91 | 13842.45 | 7490.78 | 13760.26 | 1202.65 | 0 |
| 14094.67 | 21692.52 | 14013.72 | 15371.29 | 13932.78 | 9050.06 | 13851.83 | 2728.84 | 0 |
| 13947.37 | 20648.61 | 13864.72 | 14392.49 | 13782.07 | 8136.37 | 13699.41 | 1880.25 | 0 |
| 14618.33 | 21507.68 | 14532.96 | 14947.84 | 14447.6 | 8388 | 14362.24 | 1828.15 | 0 |
| 15574.1 | 21313.76 | 15494.96 | 14298.62 | 15415.81 | 7283.48 | 15336.67 | 268.34 | 0 |
| 17132.74 | 24126.18 | 17049.15 | 16407.49 | 16965.55 | 8688.8 | 16881.96 | 970.11 | 0 |
| 18032.84 | 23818.53 | 17944.82 | 15686.46 | 17856.79 | 7554.39 | 0 | 0 | 0 |
| 17510.07 | 24155.16 | 17426.29 | 16261.6 | 17342.51 | 8368.04 | 17258.73 | 474.48 | 0 |
| 16613.84 | 24514.5 | 16531.23 | 17037.58 | 16448.63 | 9560.65 | 16366.02 | 2083.73 | 0 |
| 14895.88 | 25364.71 | 14812.14 | 18695.54 | 14728.41 | 12026.37 | 14644.68 | 5357.2 | 0 |
| 13574.74 | 23483.61 | 13495.35 | 17413.69 | 13415.95 | 11343.78 | 13336.56 | 5273.86 | 0 |
| 14314.31 | 27507.97 | 14232.83 | 21119.7 | 14151.34 | 14731.42 | 14069.86 | 8343.15 | 13988.37 |
| 14809.63 | 21665.98 | 14727.13 | 15013.5 | 14644.62 | 8361.03 | 14562.11 | 1708.56 | 0 |

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| 16170.01 | 18967.52 | 16081.23 | 11675.38 | 15992.45 | 4383.25 | 0 | 0 | 0 |
| 17021.2 | 19488.91 | 16934.27 | 11802.55 | 16847.34 | 4116.19 | 0 | 0 | 0 |
| 17298.15 | 18790.57 | 17208.39 | 10975.4 | 17118.63 | 3160.23 | 0 | 0 | 0 |
| 48459.6 | 57863.71 | 48368.16 | 35803.17 | 48276.72 | 13742.63 | 0 | 0 | 0 |
| 16264.64 | 25031.51 | 16171.1 | 17737.3 | 16077.56 | 10443.08 | 15984.02 | 3148.87 | 0 |
| 17807.62 | 37965.94 | 17709.1 | 30034.7 | 17610.59 | 22103.46 | 17512.08 | 14172.22 | 17413.56 |
| 20903.59 | 43294.4 | 20799.64 | 33951.38 | 20695.69 | 24608.37 | 20591.73 | 15265.36 | 20487.78 |
| 24141 | 39669.79 | 24035.08 | 28802.17 | 23929.16 | 17934.55 | 23823.24 | 7066.92 | 0 |
| 22773.29 | 28791.03 | 22673.1 | 18500.49 | 22572.92 | 8209.94 | 0 | 0 | 0 |
| 22659.06 | 24902.91 | 22566.74 | 14638.87 | 22474.41 | 4374.84 | 0 | 0 | 0 |
| 21562.52 | 23487.13 | 21474.94 | 13718.62 | 21387.36 | 3950.11 | 0 | 0 | 0 |
| 21378.17 | 21814.67 | 21289.83 | 12125.15 | 21201.5 | 2435.62 | 0 | 0 | 0 |
| 20469.28 | 18474.04 | 20384.75 | 9186.27 | 0 | 0 | 0 | 0 | 0 |
| 18137.26 | 16888.79 | 18054.29 | 8668.98 | 17971.33 | 449.17 | 0 | 0 | 0 |
| 17351.88 | 17347.95 | 17272.3 | 9489.85 | 17192.72 | 1631.74 | 0 | 0 | 0 |
| 16378.77 | 18117.09 | 16295.93 | 10716.58 | 16213.09 | 3316.07 | 0 | 0 | 0 |
| 14806.02 | 19097.85 | 14726.56 | 12428.18 | 14647.11 | 5758.51 | 0 | 0 | 0 |
| 13888.73 | 22863.85 | 13812.67 | 16637.53 | 13736.61 | 10411.22 | 13660.56 | 4184.9 | 0 |
| 13468.11 | 32532.95 | 13384.86 | 26579.42 | 13301.6 | 20625.89 | 13218.35 | 14672.36 | 13135.1 |
| 10792.99 | 33710.12 | 10721.09 | 29008.18 | 10649.18 | 24306.23 | 10577.28 | 19604.29 | 10505.37 |
| 10432.78 | 15265.12 | 10354.69 | 10609.26 | 10276.6 | 5953.4 | 10198.51 | 1297.54 | 0 |
| 9264.86 | 14326.15 | 9191.57 | 10204 | 9118.28 | 6081.85 | 9045 | 1959.71 | 0 |
| 9230.35 | 12886.04 | 9160.24 | 8763.41 | 9090.13 | 4640.78 | 9020.02 | 518.14 | 0 |
| 8171.13 | 12698.18 | 8104 | 9067.29 | 8036.87 | 5436.41 | 7969.74 | 1805.52 | 0 |
| 9692.81 | 20892.87 | 9618.13 | 16625.68 | 9543.45 | 12358.5 | 9468.77 | 8091.32 | 9394.1 |
| 9928.81 | 19229.78 | 9857 | 14830.97 | 9785.19 | 10432.16 | 9713.38 | 6033.34 | 9641.57 |
| 10174.52 | 16185.45 | 10105.81 | 11642.6 | 10037.1 | 7099.75 | 9968.39 | 2556.9 | 0 |
| 10397.25 | 20095.88 | 10328.55 | 15475.84 | 10259.85 | 10855.81 | 10191.15 | 6235.78 | 10122.46 |
| 8732.14 | 14322.7 | 8662.52 | 10445.4 | 8592.9 | 6568.1 | 8523.28 | 2690.8 | 0 |
| 9869.85 | 18778.64 | 9791.46 | 14417.61 | 9713.07 | 10056.58 | 9634.68 | 5695.55 | 9556.29 |
| 12447.33 | 28231.82 | 12353.37 | 22758.92 | 12259.41 | 17286.01 | 12165.45 | 11813.1 | 12071.49 |
| 14598.7 | 40679.42 | 14494.14 | 34305.85 | 14389.57 | 27932.27 | 14285 | 21558.7 | 14180.44 |
| 15018.28 | 39673.49 | 14911.56 | 33097.18 | 14804.84 | 26520.86 | 14698.11 | 19944.55 | 14591.39 |
| 13539.87 | 37521.38 | 13444.98 | 31602.06 | 13350.1 | 25682.74 | 13255.21 | 19763.42 | 13160.33 |
| 12904.27 | 33352.37 | 12803.46 | 27721.85 | 12702.66 | 22091.33 | 12601.85 | 16460.81 | 12501.05 |
| 19555.21 | 48014.37 | 19450.83 | 39331.93 | 19346.46 | 30649.49 | 19242.08 | 21967.05 | 19137.71 |
| 17466.12 | 37408.98 | 17370.04 | 29629.61 | 17273.96 | 21850.24 | 17177.87 | 14070.88 | 17081.79 |
| 17613.42 | 33564.5 | 17519.38 | 25689.75 | 17425.33 | 17815 | 17331.28 | 9940.26 | 17237.23 |
| 17763.98 | 35979.49 | 17643.82 | 28103.59 | 17523.67 | 20227.7 | 17403.51 | 12351.81 | 17283.35 |
| 14002.97 | 31231.42 | 13918.62 | 25019.08 | 13834.26 | 18806.75 | 13749.9 | 12594.41 | 13665.54 |
| 4986.6 | 10434.09 | 4949.02 | 8234.28 | 4911.44 | 6034.46 | 4873.85 | 3834.65 | 4836.27 |
| 8608.83 | 17491.26 | 8531.97 | 13709.19 | 8455.11 | 9927.12 | 6681.29 | 6217.32 | 4907.51 |
| 10879.78 | 14505.42 | 10802.4 | 9645.68 | 10725.03 | 4785.94 | 5146.76 | 1764.52 | 1424.99 |
| 12261.63 | 14753.09 | 12198.59 | 9234.68 | 10636.52 | 3738.76 | 1281.61 | 325.49 | 0 |
| 21916.66 | 29680.81 | 21852.32 | 19759.53 | 21787.99 | 9838.25 | 8565.89 | 1253.05 | 0 |
| 17060.97 | 27348.33 | 16992.51 | 19672.89 | 16924.05 | 11997.44 | 14809.61 | 4593.09 | 2782.74 |
| 22802.9 | 34727.89 | 22747.78 | 24407.13 | 22692.66 | 14086.38 | 17162.03 | 4853 | 2697.01 |
| 24739 | 39564.8 | 24671.22 | 28390.06 | 24603.43 | 17215.33 | 16030.37 | 7207.81 | 3768.13 |
| 19226.1 | 31078.26 | 19167.05 | 22397.55 | 19108 | 13716.83 | 11500.06 | 5455.78 | 7306.24 |
| 22209.23 | 29976.33 | 22144.86 | 19906.72 | 22080.5 | 9837.1 | 8559.1 | 958.86 | 0 |
| 22761.79 | 29508.04 | 22689.13 | 19186.3 | 22616.46 | 8864.56 | 7638.84 | 2587.07 | 0 |
| 30649.3 | 45099.87 | 30579.03 | 31185.68 | 30508.76 | 17271.49 | 15818.42 | 3937.71 | 1642.61 |

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| 16364.11 | 29786.65 | 16300.56 | 22423 | 16237.01 | 15059.35 | 16173.46 | 7695.71 | 8451.79 |
| 17773.86 | 41165.34 | 17708.01 | 33169.22 | 17642.16 | 25173.11 | 17576.3 | 17176.99 | 11246.38 |
| 28883.33 | 77213.44 | 28824.6 | 64103 | 28765.86 | 50992.56 | 21939.89 | 38817.8 | 19894.28 |
| 19009.64 | 31032.54 | 18957.3 | 22411.96 | 18904.96 | 13791.39 | 8903.66 | 6142.68 | 3967.57 |
| 41125.8 | 84368.13 | 41066.55 | 65637.4 | 41007.29 | 46906.67 | 18423.57 | 31034.03 | 14493.95 |
| 31401.69 | 50426.35 | 31345.05 | 36160.48 | 31288.42 | 21894.6 | 9963.41 | 13410.46 | 7661.9 |
| 31956.22 | 54875.31 | 31904.11 | 40386.18 | 31852.01 | 25897.05 | 18108.32 | 15095.04 | 13194.52 |
| 15841.39 | 25313.24 | 15804.13 | 18129.8 | 15766.86 | 10946.35 | 9878.26 | 5213.72 | 5344.59 |
| 15344.38 | 24012.59 | 15306.6 | 17053.78 | 15268.83 | 10094.98 | 9884.74 | 4329.48 | 4291.15 |
| 19956.44 | 24592.23 | 19909.12 | 15527.11 | 19861.8 | 6462 | 4050.63 | 790.91 | 0 |
| 28879.07 | 36227.46 | 28822.37 | 23091.49 | 24231.54 | 10235.12 | 12193.28 | 1638.51 | 0 |
| 97647.73 | 147601.88 | 97572.27 | 103040.4 | 97496.82 | 58478.99 | 85589.56 | 15461.29 | 8635.9 |
| 13042.5 | 23880.68 | 12991.67 | 18006.77 | 12940.85 | 12132.86 | 12890.02 | 6258.95 | 9365.07 |
| 12032.94 | 19671.25 | 11978.85 | 14260.02 | 11924.76 | 8848.79 | 11870.68 | 3437.56 | 0 |
| 16554.27 | 24422.08 | 16494.12 | 16948.49 | 16433.96 | 9474.9 | 11680.28 | 3216.1 | 2324.41 |
| 21635.38 | 32808.16 | 21573.21 | 23024.58 | 19079.34 | 13447.69 | 14857.1 | 5347.15 | 3518.25 |
| 20285.48 | 33009.06 | 20219.65 | 23844.82 | 20153.82 | 14680.58 | 18033.71 | 5891.25 | 5618.49 |
| 20568.08 | 35648.15 | 20499.48 | 26344.73 | 20430.88 | 17041.32 | 20362.29 | 7737.9 | 2219.9 |
| 18755.05 | 32619.63 | 18697.72 | 24130.92 | 18640.38 | 15642.22 | 16766.79 | 7357.85 | 5046.16 |
| 12264.65 | 21453.19 | 12228.86 | 15922 | 12193.07 | 10390.82 | 9138.66 | 5319.61 | 5834.01 |
| 9922.07 | 15943.52 | 9888.63 | 11471.76 | 8589.75 | 7272.06 | 6864.76 | 3772.52 | 5447.08 |
| 12634.08 | 20771.82 | 12601.13 | 15056.36 | 10068.89 | 9758.17 | 10035.93 | 5186.14 | 5043.41 |
| 9877.32 | 13670.46 | 9845.73 | 9210.16 | 7427.34 | 5336.92 | 4585.47 | 2361.72 | 3395.37 |
| 11277.83 | 12584.09 | 11246.88 | 7476.81 | 5627.31 | 3523.84 | 4490.71 | 1473.66 | 0 |
| 12311.25 | 11476.99 | 12280.15 | 5883.98 | 3325.89 | 2063.3 | 3307.87 | 552.96 | 0 |
| 11684.22 | 11568.76 | 11652.41 | 6262.14 | 6922.54 | 1803.81 | 3272.71 | 57.26 | 0 |
| 11138.64 | 10490.05 | 11107.35 | 5422.42 | 5941.84 | 1102.35 | 0 | 0 | 0 |
| 9637.34 | 8559.18 | 9610.01 | 4179.29 | 6007.27 | 372.33 | 0 | 0 | 0 |
| 7096.25 | 6169.11 | 7069.07 | 2954.25 | 936.98 | 647.21 | 924.68 | 227.21 | 0 |
| 9787.45 | 10372.87 | 9749.57 | 5950.23 | 6251.71 | 2428.87 | 4409.34 | 243.29 | 0 |
| 10305.22 | 8624.63 | 10257.5 | 3938.87 | 4732.57 | 966.78 | 0 | 0 | 0 |
| 16529.23 | 15137.62 | 16475.53 | 7614.26 | 9358.81 | 1685.93 | 0 | 0 | 0 |
| 13722.33 | 8668.27 | 13659.48 | 2430.43 | 0 | 0 | 0 | 0 | 0 |
| 17135.3 | 12399.09 | 17063.24 | 4612.9 | 0 | 0 | 0 | 0 | 0 |
| 13712.25 | 10849.61 | 13655.09 | 4624.14 | 4733.65 | 307.43 | 0 | 0 | 0 |
| 17609.08 | 13855.18 | 17536.21 | 5859.64 | 5074.3 | 532.08 | 0 | 0 | 0 |
| 19248.61 | 15923.24 | 19167.49 | 7189.04 | 5242.05 | 1436.42 | 0 | 0 | 0 |
| 18433.76 | 15978.22 | 18357.04 | 7616.58 | 5710.89 | 1961.85 | 0 | 0 | 0 |
| 19433.3 | 14646.73 | 19354.19 | 5817.64 | 0 | 0 | 0 | 0 | 0 |
| 18710.73 | 15983.63 | 18635.38 | 7493.52 | 5565.92 | 1801.52 | 0 | 0 | 0 |
| 18003.88 | 16346.17 | 17929.51 | 8185.43 | 4745.74 | 2847.78 | 4716.5 | 694.29 | 0 |
| 4504.07 | 4171.74 | 4449.77 | 2162.72 | 4395.46 | 153.7 | 0 | 0 | 0 |
| 4887.43 | 6297.75 | 4835.05 | 4131.42 | 4782.67 | 1965.09 | 0 | 0 | 0 |
| 6045.58 | 10201.61 | 5989.09 | 7534.62 | 5932.6 | 4867.62 | 5876.1 | 2200.63 | 0 |
| 7365.67 | 11848.83 | 7302.88 | 8583.27 | 7240.1 | 5317.7 | 7177.31 | 2052.13 | 0 |
| 7515.09 | 9884.31 | 7449.55 | 6534.63 | 7384.02 | 3184.94 | 0 | 0 | 0 |
| 6709.98 | 12541.77 | 6644.69 | 9599.28 | 6579.39 | 6656.79 | 6514.1 | 3714.29 | 6448.8 |
| 5851.62 | 10035.56 | 5788.96 | 7470.6 | 5726.3 | 4905.65 | 5663.64 | 2340.7 | 0 |
| 6024.06 | 9520.89 | 5963.07 | 6864.91 | 5902.08 | 4208.93 | 5841.08 | 1552.95 | 0 |
| 6758.99 | 13258.58 | 6700.75 | 10285.14 | 6642.51 | 7311.71 | 6584.27 | 4338.28 | 6526.03 |
| 6889.68 | 12791.63 | 6835.5 | 9743.63 | 6781.32 | 6695.62 | 6727.14 | 3647.61 | 6672.97 |
| 6311.37 | 11652.32 | 6260.9 | 8861.26 | 6210.44 | 6070.19 | 6159.98 | 3279.12 | 6109.52 |

| | | | | | | | | |
|---------|----------|---------|---------|---------|---------|---------|---------|---------|
| 5870.66 | 10697.47 | 5819.68 | 8108 | 5768.69 | 5518.54 | 5717.71 | 2929.07 | 5666.72 |
| 5426.34 | 10154.33 | 5374.96 | 7771.97 | 5323.58 | 5389.61 | 5272.2 | 3007.25 | 5220.83 |
| 5484.83 | 9669.34 | 5366.77 | 7389.07 | 5248.71 | 5108.8 | 5130.65 | 2828.53 | 5012.58 |
| 5596.99 | 10516.9 | 5536.97 | 8074.52 | 5476.94 | 5632.15 | 5416.92 | 3189.77 | 5356.9 |
| 5801.37 | 11968.91 | 5736.09 | 9457.09 | 5670.82 | 6945.26 | 5605.54 | 4433.44 | 5540.26 |
| 5292.13 | 8100.41 | 5226.55 | 5784.2 | 5160.96 | 3467.99 | 5095.37 | 1151.78 | 0 |
| 5033.67 | 6896.16 | 4966.11 | 4689.87 | 4898.55 | 2483.58 | 4830.98 | 277.29 | 0 |
| 5467.92 | 5817.77 | 5393.46 | 3398.11 | 5319 | 978.44 | 0 | 0 | 0 |
| 5365.4 | 6676.25 | 5298.01 | 4308.51 | 5230.62 | 1940.77 | 0 | 0 | 0 |
| 4985.16 | 6048.39 | 4931.56 | 3834.68 | 4877.96 | 1620.97 | 0 | 0 | 0 |
| 4921.01 | 7242.75 | 4874.04 | 5062.77 | 4827.07 | 2882.8 | 4780.11 | 702.83 | 0 |
| 5110.48 | 6741.91 | 5058.94 | 4473.95 | 5007.41 | 2205.99 | 0 | 0 | 0 |
| 5770.38 | 7540.19 | 5707.67 | 4984.9 | 5644.95 | 2429.62 | 0 | 0 | 0 |
| 4565.84 | 9105.63 | 4515.77 | 7121.9 | 4465.7 | 5138.18 | 4415.63 | 3154.45 | 4365.56 |
| 4407.91 | 6128.26 | 4359.56 | 4181.26 | 4311.22 | 2234.26 | 4262.87 | 287.26 | 0 |
| 5425.55 | 6547.23 | 5371.86 | 4131.62 | 5318.17 | 1716.01 | 0 | 0 | 0 |
| 4777.97 | 6949.33 | 4733.72 | 4829.79 | 4689.47 | 2710.24 | 4645.22 | 590.69 | 0 |
| 4166.14 | 4918.72 | 4127.92 | 3058.95 | 4089.7 | 1199.19 | 0 | 0 | 0 |
| 4059 | 5294.04 | 4022.05 | 3486.56 | 3985.1 | 1679.08 | 0 | 0 | 0 |
| 3860.72 | 6158.11 | 3825.08 | 4450.64 | 3789.45 | 2743.16 | 3753.81 | 1035.68 | 0 |
| 3622.78 | 6379.13 | 3588.55 | 4784.35 | 3554.32 | 3189.57 | 3520.09 | 1594.78 | 3485.86 |
| 3436.6 | 5886.99 | 3403.37 | 4373.9 | 3370.13 | 2860.81 | 3336.9 | 1347.72 | 0 |
| 3295.7 | 5517.86 | 3262.96 | 4067.04 | 3230.22 | 2616.22 | 3197.48 | 1165.41 | 0 |
| 3057.1 | 4936.51 | 3024.78 | 3592.19 | 2992.45 | 2247.87 | 2960.12 | 903.56 | 0 |
| 2900.91 | 4215.39 | 2867.81 | 2938.21 | 2834.7 | 1661.03 | 2801.6 | 383.85 | 0 |
| 2737.4 | 3761.76 | 2703.23 | 2558.26 | 2669.06 | 1354.76 | 2634.9 | 151.26 | 0 |
| 2694.33 | 3290.26 | 2657.02 | 2104.99 | 2619.71 | 919.72 | 0 | 0 | 0 |
| 3129.39 | 3374.49 | 3016.48 | 2077.15 | 2903.57 | 779.82 | 0 | 0 | 0 |
| 3272.25 | 3534.49 | 3224.68 | 2090.71 | 3177.11 | 646.94 | 0 | 0 | 0 |
| 2479.96 | 2925.82 | 2435.53 | 1846.33 | 2391.09 | 766.85 | 0 | 0 | 0 |
| 1806.35 | 1958.3 | 1765.18 | 1179.24 | 1724.02 | 400.17 | 0 | 0 | 0 |
| 1751.97 | 1649.92 | 1712.51 | 887.46 | 1673.06 | 124.99 | 0 | 0 | 0 |
| 1709.93 | 1690.69 | 1672.86 | 946.95 | 1635.79 | 203.21 | 0 | 0 | 0 |
| 1818.48 | 1917.06 | 1780.81 | 1126.92 | 1743.14 | 336.78 | 0 | 0 | 0 |
| 1905.65 | 1874.58 | 1867.6 | 1041.94 | 1829.54 | 209.3 | 0 | 0 | 0 |
| 1156.31 | 1126.73 | 1133.14 | 621.36 | 1109.96 | 115.99 | 0 | 0 | 0 |
| 1210.21 | 1198.96 | 1184.97 | 671.53 | 1159.74 | 144.11 | 0 | 0 | 0 |
| 1098.5 | 1113.36 | 1073.71 | 637.32 | 1048.92 | 161.28 | 0 | 0 | 0 |
| 1118.09 | 1153.19 | 1092.86 | 669.17 | 1067.62 | 185.14 | 0 | 0 | 0 |
| 1163.47 | 1181.74 | 1138.23 | 676.46 | 1112.98 | 171.19 | 0 | 0 | 0 |
| 1114.23 | 1079.13 | 1089 | 595.11 | 1063.76 | 111.09 | 0 | 0 | 0 |
| 1061.72 | 920.5 | 1036.49 | 457.72 | 0 | 0 | 0 | 0 | 0 |
| 1096.03 | 890.37 | 1069.91 | 411.14 | 0 | 0 | 0 | 0 | 0 |
| 1123.64 | 873.32 | 1097.96 | 380.05 | 0 | 0 | 0 | 0 | 0 |
| 1192.86 | 873.49 | 1166.65 | 347.67 | 0 | 0 | 0 | 0 | 0 |
| 1247.65 | 855.86 | 1220.45 | 304.37 | 0 | 0 | 0 | 0 | 0 |
| 1466.24 | 926.56 | 1437.55 | 274.41 | 0 | 0 | 0 | 0 | 0 |
| 1862.18 | 933.02 | 1832.82 | 96.05 | 0 | 0 | 0 | 0 | 0 |
| 2284.36 | 2091.06 | 2255.24 | 1073.34 | 2226.13 | 55.61 | 0 | 0 | 0 |
| 2546.87 | 2388.41 | 2518.78 | 1250.18 | 2490.69 | 111.96 | 0 | 0 | 0 |
| 2554.56 | 2399 | 2528.06 | 1255.73 | 2501.56 | 112.45 | 0 | 0 | 0 |
| 2244.86 | 2128.4 | 2220.98 | 1124.54 | 2197.1 | 120.68 | 0 | 0 | 0 |

| | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 2005.96 | 1936.48 | 1982.89 | 1041.59 | 1959.83 | 146.7 | 0 | 0 | 0 |
| 1630.54 | 1535.54 | 1608.14 | 811.3 | 1585.73 | 87.07 | 0 | 0 | 0 |
| 1181.55 | 1079.4 | 1159.72 | 559.59 | 1137.88 | 39.77 | 0 | 0 | 0 |
| 873.86 | 788.27 | 852.62 | 408.66 | 831.38 | 29.04 | 0 | 0 | 0 |
| 788.32 | 773.23 | 765.7 | 436.32 | 743.08 | 99.42 | 0 | 0 | 0 |
| 772.34 | 851.38 | 748.38 | 526.79 | 724.42 | 202.2 | 0 | 0 | 0 |
| 821.77 | 681 | 796.87 | 326.96 | 0 | 0 | 0 | 0 | 0 |
| 4747.2 | 4198.28 | 4655.77 | 2110.55 | 4564.35 | 22.82 | 0 | 0 | 0 |
| 3102.82 | 2917.51 | 3057.98 | 1541.47 | 3013.13 | 165.43 | 0 | 0 | 0 |
| 3284.34 | 2925.1 | 3232.19 | 1470.5 | 3180.03 | 15.9 | 0 | 0 | 0 |
| 2593.78 | 2463.93 | 2545.28 | 1325.3 | 2496.77 | 186.66 | 0 | 0 | 0 |
| 2291.2 | 2218.28 | 2248.22 | 1213.47 | 2205.24 | 208.65 | 0 | 0 | 0 |
| 2547.7 | 2693.13 | 2506.36 | 1573.04 | 2465.02 | 452.94 | 0 | 0 | 0 |
| 2798.74 | 3053.17 | 2759.54 | 1817.04 | 2720.34 | 580.91 | 0 | 0 | 0 |
| 2964.84 | 3989.79 | 2927.26 | 2685.98 | 2889.69 | 1382.18 | 2852.11 | 78.37 | 0 |
| 3405.66 | 5791.87 | 3366.64 | 4303.23 | 3327.63 | 2814.59 | 3288.61 | 1325.95 | 0 |
| 4206.37 | 4507.99 | 4161.37 | 2633.07 | 4116.37 | 758.16 | 0 | 0 | 0 |
| 4558.99 | 6261 | 4510.72 | 4243.81 | 4462.44 | 2226.62 | 4414.17 | 209.43 | 0 |
| 3778.56 | 6641.49 | 3736.53 | 4990.14 | 3694.49 | 3338.79 | 3652.46 | 1687.44 | 3610.42 |
| 3368.6 | 6387.76 | 3328.63 | 4926.56 | 3288.67 | 3465.36 | 3248.7 | 2004.16 | 3208.73 |
| 2970.27 | 5687.69 | 2932.31 | 4405.86 | 2894.34 | 3124.03 | 2856.38 | 1842.2 | 2818.42 |
| 2514.47 | 4749.71 | 2480 | 3668.62 | 2445.54 | 2587.53 | 2411.07 | 1506.44 | 2376.6 |
| 2148.12 | 4015.44 | 2116 | 3096.91 | 2083.89 | 2178.38 | 2051.77 | 1259.84 | 2019.65 |
| 1892.62 | 3512.93 | 1861.48 | 2709.35 | 1830.33 | 1905.76 | 1799.18 | 1102.18 | 1768.04 |
| 1922.58 | 3546.69 | 1888.45 | 2735.38 | 1854.31 | 1924.08 | 1820.17 | 1112.77 | 1786.03 |
| 2135.19 | 3924.46 | 2095.63 | 3026.74 | 2056.06 | 2129.02 | 2016.5 | 1231.3 | 1976.93 |
| 2954.2 | 5480.72 | 2905.28 | 4227 | 2856.37 | 2973.29 | 2807.45 | 1719.58 | 2758.54 |
| 3674.24 | 6324.8 | 3557.15 | 4878 | 3440.07 | 3431.2 | 3322.99 | 1984.4 | 3205.9 |
| 3108.91 | 5823.11 | 3063.77 | 4491.07 | 3018.62 | 3159.04 | 2973.48 | 1827 | 2928.33 |
| 3027.33 | 5682.18 | 2984.73 | 4382.38 | 2942.13 | 3082.58 | 2899.52 | 1782.78 | 2856.92 |
| 3055.01 | 5747.3 | 3013.52 | 4432.6 | 2972.04 | 3117.91 | 2930.55 | 1803.21 | 2889.06 |
| 3025.13 | 5696.34 | 2984.65 | 4393.3 | 2944.17 | 3090.27 | 2903.69 | 1787.23 | 2863.21 |
| 3099.16 | 5841.11 | 3058.3 | 4504.96 | 3017.45 | 3168.8 | 2976.59 | 1832.65 | 2935.74 |
| 2929.32 | 5516.07 | 2890.14 | 4254.27 | 2850.96 | 2992.47 | 2811.78 | 1730.67 | 2772.59 |
| 2705.9 | 5087.4 | 2668.8 | 3923.66 | 2631.69 | 2759.92 | 2594.59 | 1596.17 | 2557.49 |
| 2572.76 | 4844.49 | 2538.33 | 3736.31 | 2503.9 | 2628.13 | 2469.47 | 1519.96 | 2435.04 |
| 2487.58 | 4693.72 | 2455.39 | 3620.03 | 2423.2 | 2546.34 | 2391.01 | 1472.65 | 2358.82 |
| 2459.07 | 4642.45 | 2427.53 | 3580.49 | 2396 | 2518.53 | 2364.47 | 1456.57 | 2332.94 |
| 2583.34 | 4868.21 | 2549.21 | 3754.61 | 2515.07 | 2641 | 2480.93 | 1527.4 | 2446.79 |
| 2630.96 | 4937.77 | 2593.89 | 3808.25 | 2556.81 | 2678.74 | 2519.74 | 1549.22 | 2482.66 |
| 2751.76 | 5150.57 | 2711.39 | 3972.38 | 2671.02 | 2794.18 | 2630.65 | 1615.99 | 2590.29 |
| 2730.4 | 5095.04 | 2688.56 | 3929.55 | 2646.73 | 2764.06 | 2604.9 | 1598.57 | 2563.06 |
| 2741.27 | 5116.06 | 2699.35 | 3945.76 | 2657.44 | 2775.46 | 2615.52 | 1605.16 | 2573.61 |
| 2843.92 | 5324.4 | 2802.35 | 4106.44 | 2760.78 | 2888.48 | 2719.21 | 1670.53 | 2677.64 |
| 2912.76 | 5471.6 | 2872.28 | 4219.97 | 2831.8 | 2968.34 | 2791.32 | 1716.72 | 2750.84 |
| 3048.76 | 5754.23 | 3009.49 | 4437.95 | 2970.23 | 3121.67 | 2930.97 | 1805.39 | 2891.7 |
| 3048.92 | 5756.32 | 3009.86 | 4439.56 | 2970.8 | 3122.8 | 2931.74 | 1806.05 | 2892.67 |
| 3062.46 | 5776.13 | 3022.57 | 4454.84 | 2982.68 | 3133.55 | 2942.78 | 1812.26 | 2902.89 |
| 2990.47 | 5634.63 | 2950.86 | 4345.71 | 2911.25 | 3056.78 | 2871.64 | 1767.86 | 2832.03 |
| 2870.1 | 5400.04 | 2831.19 | 4164.78 | 2792.29 | 2929.52 | 2753.38 | 1694.26 | 2714.48 |
| 2947.55 | 5548.39 | 2907.9 | 4279.19 | 2868.24 | 3010 | 2828.59 | 1740.81 | 2788.93 |
| 2964.86 | 5583.56 | 2925.27 | 4306.32 | 2885.68 | 3029.08 | 2846.08 | 1751.84 | 2806.49 |

| | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 2849.82 | 5334.05 | 2810.88 | 4107.76 | 2771.93 | 2881.46 | 2732.99 | 1655.16 | 2694.05 |
| 2715.48 | 5022.56 | 2676.94 | 3856.15 | 2638.4 | 2689.75 | 2599.86 | 1523.34 | 2561.32 |
| 2783.71 | 5031.14 | 2741.78 | 3838.53 | 2699.85 | 2645.91 | 2657.91 | 1453.3 | 2615.98 |
| 3096.59 | 5599.9 | 3050.34 | 4272.46 | 3004.1 | 2945.02 | 2957.85 | 1617.59 | 2911.61 |
| 3811.2 | 6914.35 | 3761.16 | 5266.79 | 3711.13 | 3619.23 | 3661.1 | 1971.67 | 3611.07 |
| 3990.53 | 7341.19 | 3941.85 | 5609.95 | 3893.18 | 3878.72 | 3844.5 | 2147.49 | 3795.82 |
| 3550.45 | 6490.48 | 3509.95 | 4943.92 | 3469.44 | 3397.36 | 3428.93 | 1850.8 | 3388.43 |
| 4450.16 | 8214.64 | 4399.26 | 6277.42 | 4348.37 | 4340.21 | 4297.48 | 2402.99 | 4246.59 |
| 3673.3 | 6832.95 | 3629.63 | 5238.01 | 3585.95 | 3643.08 | 3542.28 | 2048.14 | 3498.61 |
| 3876.88 | 7052.59 | 3832.71 | 5363.29 | 3788.53 | 3673.99 | 3744.36 | 1984.69 | 3700.18 |

grids center along the center line A and V are the area and volum of water under certain depth in that crc
line

| t | Z<- 7.5 feet | | Z<- 9 feet | | Z<- 10.5 feet | | Z<- 12 feet | |
|----------|--------------|---------|------------|---------|---------------|--------|-------------|--------|
| V(m^3) | A(m^2) | V(m^3) | A(m^2) | V(m^3) | A(m^2) | V(m^3) | A(m^2) | V(m^3) |
| 2170.91 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4030.69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7509.51 | 7837.88 | 2684.47 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6628.14 | 8588.25 | 879.45 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5839.7 | 8481.84 | 1967.72 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 683.34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1396.53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1539.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2386.66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17154.98 | 19276.82 | 8350.63 | 13923.96 | 1275.79 | 0 | 0 | 0 | 0 |
| 12757.85 | 13231.46 | 4961.46 | 5175.87 | 491.04 | 0 | 0 | 0 | 0 |
| 3773.77 | 5469.23 | 1271.59 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3994.91 | 6000.18 | 435.01 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4163.52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 647.44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 287 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3960.79 | 3388.43 | 2438.05 | 3350.93 | 915.31 | 0 | 0 | 0 | 0 |
| 942.16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4656.27 | 6490.49 | 1697.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2824.54 | 2371.63 | 1401.87 | 2337.55 | 337.38 | 0 | 0 | 0 | 0 |
| 782.69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[illegible]

| | | | | | | | | |
|----------|----------|---------|----------|---------|----------|-------|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6240.98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5922.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8718.83 | 13051.85 | 2765.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14902.34 | 10433.47 | 10200.4 | 10361.56 | 5498.45 | 10289.66 | 796.5 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3824.14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1634.53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1615.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1334.52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6340.2 | 11977.53 | 867.29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15185.13 | 14075.87 | 8811.55 | 13971.31 | 2437.98 | 0 | 0 | 0 | 0 |
| 13368.24 | 14484.67 | 6791.93 | 14377.95 | 215.62 | 0 | 0 | 0 | 0 |
| 13844.1 | 13065.44 | 7924.77 | 12970.55 | 2005.45 | 0 | 0 | 0 | 0 |
| 10830.29 | 12400.24 | 5199.77 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284.61 | 19033.34 | 4602.17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6291.51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2065.51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4475.92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6382.07 | 13581.18 | 169.74 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1634.83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3282.67 | 3036.99 | 1104.69 | 1339.6 | 6.7 | 0 | 0 | 0 | 0 |
| 309.43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 773.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1516.54 | 2667.79 | 299.32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2415.25 | 3731.28 | 715.29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1228.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 361.37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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| | | | | | | | |
|--------|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 542.96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 560.36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 425.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 341.31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 298.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 301.47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 333.58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 537.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 494.96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 482.99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 488.52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 484.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 496.49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 468.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 432.43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 411.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 398.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 394.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 413.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 419.71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 437.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 433.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 434.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 452.57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 489.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 489.29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 490.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 478.94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 459 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 471.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 474.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|
| 428.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 356.93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 260.68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 290.15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 324.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 416.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 304.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 453.21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 295.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

ross section

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

| | A=Area | V=Volumn | | | Centerline Distance |
|-------------------------------|--------|----------|----------|--------|---------------------|
| Connect to Bayous | I* | Lon* | Lat* | Dx (m) | (Kilometer) |
| | 2 | -82.4817 | 27.7165 | 93.21 | 0.60 |
| | 3 | -82.4808 | 27.71627 | 87.65 | 0.70 |
| | 4 | -82.4799 | 27.71604 | 83.79 | 0.80 |
| | 5 | -82.4791 | 27.71583 | 81.49 | 0.90 |
| | 6 | -82.4783 | 27.71562 | 80.61 | 1.00 |
| | 7 | -82.4776 | 27.71541 | 82.01 | 1.10 |
| | 8 | -82.4767 | 27.71521 | 83.84 | 1.10 |
| | 9 | -82.4759 | 27.71499 | 87.64 | 1.20 |
| | 10 | -82.475 | 27.71477 | 90.45 | 1.30 |
| | 11 | -82.4741 | 27.71455 | 92.66 | 1.40 |
| | 12 | -82.4732 | 27.71431 | 94.21 | 1.50 |
| | 13 | -82.4723 | 27.71409 | 94.44 | 1.60 |
| | 14 | -82.4711 | 27.71464 | 94.53 | 1.70 |
| | 15 | -82.47 | 27.71516 | 93.05 | 1.80 |
| | 16 | -82.4691 | 27.71493 | 91.19 | 1.90 |
| | 17 | -82.4682 | 27.71471 | 87.42 | 2.00 |
| | 18 | -82.4674 | 27.71449 | 83.99 | 2.10 |
| | 19 | -82.4666 | 27.71427 | 80.73 | 2.20 |
| | 20 | -82.4658 | 27.71406 | 76.76 | 2.20 |
| | 21 | -82.4651 | 27.71385 | 74.63 | 2.30 |
| | 22 | -82.4644 | 27.71364 | 72.25 | 2.40 |
| | 23 | -82.4637 | 27.71342 | 69.5 | 2.50 |
| | 24 | -82.463 | 27.71321 | 68.74 | 2.50 |
| | 25 | -82.4624 | 27.71299 | 66.58 | 2.60 |
| | 26 | -82.4618 | 27.71278 | 63.62 | 2.70 |
| | 27 | -82.4612 | 27.71255 | 63.23 | 2.80 |
| | 28 | -82.4606 | 27.71232 | 66.4 | 2.90 |
| | 29 | -82.4595 | 27.7129 | 72.04 | 3.00 |
| | 30 | -82.4584 | 27.71332 | 78.83 | 3.20 |
| | 31 | -82.4577 | 27.71297 | 87.06 | 3.30 |
| | 32 | -82.4569 | 27.71257 | 91.22 | 3.40 |
| connect to Ruskin Inlet Bayou | 33 | -82.4561 | 27.71215 | 84.24 | 3.50 |
| | 34 | -82.4554 | 27.71176 | 74.69 | 3.60 |
| | 35 | -82.4548 | 27.71138 | 73.84 | 3.63 |
| | 36 | -82.4542 | 27.71097 | 75.87 | 3.70 |
| | 37 | -82.4536 | 27.71054 | 80.32 | 3.80 |
| | 38 | -82.4529 | 27.71005 | 88.82 | 3.90 |
| | 39 | -82.4519 | 27.70986 | 86.64 | 4.00 |
| | 40 | -82.451 | 27.70961 | 73.41 | 4.05 |
| | 41 | -82.4506 | 27.70915 | 65.86 | 4.10 |
| | 42 | -82.4501 | 27.70867 | 79.04 | 4.20 |
| | 43 | -82.4495 | 27.70803 | 105.33 | 4.30 |
| | 44 | -82.4485 | 27.70743 | 112.82 | 4.40 |
| | 45 | -82.4482 | 27.70656 | 105.8 | 4.50 |
| | 46 | -82.4481 | 27.70565 | 100.31 | 4.60 |
| | 47 | -82.4481 | 27.70473 | 105.87 | 4.70 |
| connect to Mills Bayou | 48 | -82.4484 | 27.70375 | 121.68 | 4.80 |
| | 49 | -82.4489 | 27.70285 | 104.22 | 4.90 |
| | 50 | -82.4496 | 27.7021 | 103.96 | 5.00 |

| | | | | | |
|------------------------|-----|----------|----------|--------|------|
| | 51 | -82.4503 | 27.70145 | 99.56 | 5.10 |
| | 52 | -82.4511 | 27.70085 | 103.21 | 5.20 |
| | 53 | -82.4519 | 27.70035 | 94.79 | 5.30 |
| | 54 | -82.4527 | 27.69995 | 94.79 | 5.40 |
| | 55 | -82.4536 | 27.6996 | 85.53 | 5.50 |
| | 56 | -82.4544 | 27.69928 | 87.99 | 5.60 |
| | 57 | -82.4551 | 27.6989 | 77.98 | 5.70 |
| | 58 | -82.4557 | 27.6985 | 73.94 | 5.80 |
| | 59 | -82.4563 | 27.69803 | 78.58 | 5.85 |
| | 60 | -82.4567 | 27.69745 | 75.21 | 5.90 |
| | 61 | -82.457 | 27.69683 | 74.92 | 6.00 |
| | 62 | -82.4571 | 27.69615 | 78.45 | 6.10 |
| | 63 | -82.4572 | 27.69545 | 77.83 | 6.20 |
| | 64 | -82.4571 | 27.69478 | 72.63 | 6.30 |
| | 65 | -82.457 | 27.69415 | 69.56 | 6.33 |
| | 66 | -82.4568 | 27.69357 | 67.95 | 6.40 |
| | 67 | -82.4564 | 27.69303 | 75.52 | 6.50 |
| | 68 | -82.4559 | 27.69253 | 70.3 | 6.60 |
| | 69 | -82.4553 | 27.69207 | 81.24 | 6.65 |
| | 70 | -82.4547 | 27.69165 | 82.02 | 6.70 |
| | 71 | -82.454 | 27.6913 | 76.56 | 6.80 |
| | 72 | -82.4532 | 27.69095 | 90.45 | 6.90 |
| | 73 | -82.4524 | 27.6906 | 81.05 | 7.00 |
| | 74 | -82.4517 | 27.69033 | 79.2 | 7.10 |
| | 75 | -82.4509 | 27.6901 | 77.13 | 7.14 |
| connect to Hayes Bayou | 76 | -82.4501 | 27.68993 | 90.33 | 7.20 |
| | 77 | -82.4493 | 27.68978 | 80.69 | 7.30 |
| | 78 | -82.4484 | 27.68965 | 89.3 | 7.40 |
| | 79 | -82.4475 | 27.68953 | 85.57 | 7.50 |
| | 80 | -82.4467 | 27.6894 | 89.3 | 7.60 |
| | 81 | -82.4458 | 27.6893 | 89.3 | 7.70 |
| | 82 | -82.4449 | 27.68917 | 90.33 | 7.74 |
| | 83 | -82.444 | 27.68903 | 85.57 | 7.80 |
| | 84 | -82.4431 | 27.68885 | 91.36 | 7.90 |
| | 85 | -82.4422 | 27.68865 | 91.36 | 8.00 |
| | 86 | -82.4413 | 27.68845 | 91.36 | 8.10 |
| | 87 | -82.4404 | 27.68825 | 91.36 | 8.20 |
| | 88 | -82.4395 | 27.688 | 94.68 | 8.30 |
| | 89 | -82.4386 | 27.68765 | 94.8 | 8.40 |
| | 90 | -82.4378 | 27.6873 | 85.54 | 8.50 |
| | 91 | -82.437 | 27.68698 | 88 | 8.65 |
| | 92 | -82.4362 | 27.68662 | 92.34 | 8.60 |
| | 93 | -82.4354 | 27.6863 | 85.54 | 8.70 |
| | 94 | -82.4345 | 27.68595 | 94.8 | 8.80 |
| | 95 | -82.4337 | 27.6855 | 96.41 | 8.90 |
| | 96 | -82.4329 | 27.68498 | 99.82 | 9.00 |
| | 97 | -82.4322 | 27.68437 | 99.94 | 9.10 |
| | 98 | -82.4315 | 27.68368 | 102.25 | 9.30 |
| | 99 | -82.431 | 27.68285 | 109.44 | 9.40 |
| | 100 | -82.4307 | 27.6819 | 112.27 | 9.50 |
| | 101 | -82.4307 | 27.68088 | 118.4 | 9.60 |
| | 102 | -82.431 | 27.67992 | 104.4 | 9.70 |

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|--|------------|----------|----------|--------|-------|
| | 103 | -82.4315 | 27.6791 | 104.23 | 9.80 |
| | 104 | -82.4321 | 27.67837 | 96.54 | 9.90 |
| | 105 | -82.4328 | 27.67772 | 93.41 | 10.00 |
| | 106 | -82.4334 | 27.6771 | 95.92 | 10.10 |
| | 107 | -82.4341 | 27.67653 | 85.12 | 10.20 |
| | 108 | -82.4347 | 27.67598 | 92.24 | 10.30 |
| | 109 | -82.4354 | 27.67543 | 88.53 | 10.40 |
| | 110 | -82.436 | 27.67488 | 85.12 | 10.50 |
| | 111 | -82.4367 | 27.67435 | 88.55 | 10.50 |
| | 112 | -82.4373 | 27.6738 | 89.11 | 10.60 |
| | 113 | -82.4379 | 27.67323 | 78.59 | 10.70 |
| | 114 | -82.4384 | 27.67265 | 82.91 | 10.80 |
| | 115 | -82.4388 | 27.67205 | 72.96 | 10.90 |
| | 116 | -82.4391 | 27.6714 | 83.25 | 11.00 |
| | 117 | -82.4393 | 27.67072 | 72.94 | 11.10 |
| | 118 | -82.4393 | 27.67005 | 78.45 | 11.13 |
| | 119 | -82.4391 | 27.66938 | 74.92 | 11.20 |
| | 120 | -82.4388 | 27.66872 | 80.36 | 11.30 |
| | 121 | -82.4384 | 27.66813 | 75.87 | 11.40 |
| | 122 | -82.4379 | 27.66763 | 77.54 | 11.50 |
| | 123 | -82.4373 | 27.66715 | 88.56 | 11.53 |
| | 124 | -82.4364 | 27.6667 | 103.61 | 11.60 |
| | 125 | -82.4354 | 27.66635 | 118.07 | 11.70 |
| | 126 | -82.4342 | 27.66613 | 119.47 | 11.90 |
| | 127 | -82.4331 | 27.6661 | 108.89 | 12.00 |
| | 128 | -82.432 | 27.66625 | 110.58 | 12.10 |
| | 129 | -82.4309 | 27.6665 | 113.38 | 12.20 |
| | 130 | -82.4299 | 27.66688 | 101.89 | 12.30 |
| | 131 | -82.429 | 27.66735 | 104.62 | 12.40 |
| | 132 | -82.428 | 27.66778 | 101.38 | 12.50 |
| | 133 | -82.4271 | 27.66797 | 84.09 | 12.60 |
| | 134 | -82.4265 | 27.66793 | 40.55 | 12.70 |
| | 135 | -82.4259 | 27.66788 | 84.4 | 12.72 |
| | 136 | -82.4251 | 27.66815 | 85.24 | 12.80 |
| | 137 | -82.4243 | 27.66842 | 69.81 | 12.90 |
| | 138 | -82.4237 | 27.66893 | 72.29 | 12.95 |
| | 139 | -82.4238 | 27.66935 | 77.55 | 13.00 |
| | 140 | -82.4232 | 27.66996 | 63.09 | 13.10 |
| | 141 | -82.4227 | 27.67042 | 78.41 | 13.15 |
| | 142 | -82.4221 | 27.67095 | 69.13 | 13.20 |
| | 143 | -82.4216 | 27.67154 | 75.77 | 13.30 |
| | 144 | -82.4209 | 27.67171 | 85.74 | 13.40 |
| | 145 | -82.4201 | 27.67187 | 83.57 | 13.45 |
| | 146 | -82.4193 | 27.672 | 77.14 | 13.50 |
| | 147 | -82.4177 | 27.67211 | 79.31 | 13.70 |
| | 148 | -82.4169 | 27.67213 | 69.67 | 13.80 |
| | 149 | -82.4162 | 27.67165 | 59.58 | 13.90 |
| | 150 | -82.4156 | 27.6694 | 65.53 | 14.20 |
| | 151 | -82.415 | 27.66904 | 59.4 | 14.22 |
| | 152 | -82.4144 | 27.66901 | 54.31 | 14.30 |
| | 153 | -82.4139 | 27.66899 | 39.27 | 14.35 |
| | 154 | -82.4135 | 27.66898 | 39.96 | 14.40 |

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|--|------------|----------|----------|-------|-------|
| | 155 | -82.4131 | 27.66895 | 50.62 | 14.45 |
| | 156 | -82.4125 | 27.66893 | 60.77 | 14.50 |
| | 157 | -82.4119 | 27.66925 | 55.07 | 14.60 |
| | 158 | -82.4114 | 27.66923 | 41.29 | 14.64 |
| | 159 | -82.411 | 27.66921 | 44.73 | 14.70 |
| | 160 | -82.4105 | 27.66883 | 57.85 | 14.80 |
| | 161 | -82.4099 | 27.66845 | 60.62 | 14.83 |
| | 162 | -82.4093 | 27.66842 | 52.62 | 14.90 |
| | 163 | -82.4088 | 27.66841 | 44.41 | 14.95 |
| | 164 | -82.4084 | 27.66875 | 38.6 | 14.97 |
| | 165 | -82.408 | 27.66873 | 34.99 | 15.00 |
| | 166 | -82.4077 | 27.66872 | 32.44 | 15.10 |
| | 167 | -82.4074 | 27.66872 | 30.3 | 15.13 |
| | 168 | -82.4071 | 27.66871 | 28.84 | 15.16 |
| | 169 | -82.4068 | 27.66835 | 28.35 | 15.20 |
| | 170 | -82.4065 | 27.66799 | 28.76 | 15.30 |
| | 171 | -82.4061 | 27.6643 | 34.01 | 16.10 |
| | 172 | -82.4058 | 27.66465 | 32.35 | 16.20 |
| | 173 | -82.4056 | 27.66547 | 27.53 | 16.30 |
| | 174 | -82.4053 | 27.66629 | 27.11 | 16.40 |
| | 175 | -82.405 | 27.6663 | 38.98 | 16.50 |
| | 176 | -82.4045 | 27.66592 | 52.41 | 16.58 |
| | 177 | -82.4039 | 27.66554 | 62.45 | 16.60 |
| | 178 | -82.4032 | 27.66484 | 66.02 | 16.70 |
| | 179 | -82.4025 | 27.66466 | 67.22 | 16.80 |
| | 180 | -82.4019 | 27.6645 | 61.48 | 16.90 |
| | 181 | -82.4013 | 27.66444 | 65.64 | 16.95 |
| | 182 | -82.4006 | 27.6644 | 68.03 | 17.00 |
| | 183 | -82.3999 | 27.66436 | 70.64 | 17.10 |
| | 184 | -82.3992 | 27.66428 | 72.05 | 17.20 |
| | 185 | -82.3985 | 27.66414 | 70.06 | 17.23 |
| | 186 | -82.3978 | 27.66398 | 63.92 | 17.30 |
| | 187 | -82.3972 | 27.66387 | 59.35 | 17.40 |
| | 188 | -82.3966 | 27.6639 | 57.25 | 17.43 |
| | 189 | -82.396 | 27.66406 | 61.74 | 17.50 |
| | 190 | -82.3955 | 27.66433 | 68.62 | 17.60 |
| | 191 | -82.3948 | 27.66461 | 71.62 | 17.70 |
| | 192 | -82.3941 | 27.66483 | 71.36 | 17.73 |
| | 193 | -82.3935 | 27.665 | 68.48 | 17.80 |
| | 194 | -82.3928 | 27.66516 | 66.66 | 17.90 |
| | 195 | -82.3922 | 27.66532 | 63.65 | 17.93 |
| | 196 | -82.3916 | 27.66551 | 59.21 | 18.00 |
| | 197 | -82.3891 | 27.66576 | 55.15 | 18.30 |
| | 198 | -82.3891 | 27.6661 | 55.72 | 18.40 |
| | 199 | -82.3891 | 27.66652 | 56.15 | 18.42 |
| | 200 | -82.3891 | 27.66702 | 58.03 | 18.50 |
| | 201 | -82.3902 | 27.66757 | 65.6 | 18.70 |
| | 202 | -82.3901 | 27.66818 | 71.34 | 18.90 |
| | 203 | -82.3901 | 27.66882 | 71.68 | 19.00 |
| | 204 | -82.3899 | 27.66945 | 73.84 | 19.02 |
| | 205 | -82.3896 | 27.67009 | 81.38 | 19.10 |
| | 206 | -82.389 | 27.67057 | 73.65 | 19.20 |

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|--|------------|----------|----------|-------|-------|
| | 207 | -82.3885 | 27.67086 | 58.58 | 19.30 |
| | 208 | -82.388 | 27.67116 | 51.33 | 19.37 |
| | 209 | -82.3878 | 27.67159 | 56.32 | 19.40 |
| | 210 | -82.3877 | 27.67214 | 68.54 | 19.50 |
| | 211 | -82.3875 | 27.67267 | 54.72 | 19.55 |
| | 212 | -82.3873 | 27.67311 | 52.84 | 19.60 |
| | 213 | -82.3869 | 27.67348 | 58.68 | 19.70 |
| | 214 | -82.3865 | 27.67372 | 48.36 | 19.80 |
| | 215 | -82.3861 | 27.67386 | 41.77 | 19.90 |
| | 216 | -82.3857 | 27.67398 | 40.38 | 19.95 |
| | 217 | -82.3853 | 27.67411 | 38.95 | 19.97 |
| | 218 | -82.3849 | 27.67425 | 37.41 | 20.00 |
| | 219 | -82.3846 | 27.67441 | 36.32 | 20.05 |
| | 220 | -82.3843 | 27.6746 | 35.78 | 20.10 |
| | 221 | -82.384 | 27.67483 | 35.33 | 20.13 |
| | 222 | -82.3838 | 27.67508 | 36.18 | 20.17 |
| | 223 | -82.3836 | 27.67536 | 37.34 | 20.20 |
| | 224 | -82.3835 | 27.67569 | 40.78 | 20.23 |
| | 225 | -82.3833 | 27.67605 | 45.9 | 20.30 |
| | 226 | -82.383 | 27.67641 | 51.99 | 20.33 |
| | 227 | -82.3826 | 27.67668 | 48.56 | 20.50 |
| | 228 | -82.3822 | 27.67681 | 44.99 | 20.52 |
| | 229 | -82.3817 | 27.67687 | 43.12 | 20.57 |
| | 230 | -82.3813 | 27.6769 | 40.51 | 20.60 |
| | 231 | -82.3809 | 27.67694 | 41.17 | 20.65 |
| | 232 | -82.3805 | 27.67698 | 41.59 | 20.70 |
| | 233 | -82.3802 | 27.67699 | 25.33 | 20.78 |
| | 234 | -82.3799 | 27.67718 | 27.58 | 20.90 |
| | 235 | -82.3796 | 27.67738 | 27.09 | 20.92 |
| | 236 | -82.3793 | 27.67769 | 27.58 | 20.95 |
| | 237 | -82.3791 | 27.67772 | 27.59 | 20.98 |
| | 238 | -82.3788 | 27.6778 | 27.58 | 21.01 |
| | 239 | -82.3785 | 27.6778 | 27.57 | 21.03 |
| | 240 | -82.3782 | 27.67782 | 28.55 | 21.06 |
| | 241 | -82.3779 | 27.67761 | 28.07 | 21.09 |
| | 242 | -82.3776 | 27.67739 | 28.64 | 21.12 |
| | 243 | -82.3773 | 27.67716 | 29.72 | 21.15 |
| | 244 | -82.377 | 27.67691 | 31.35 | 21.18 |
| | 245 | -82.3767 | 27.67681 | 32.09 | 21.21 |
| | 246 | -82.3765 | 27.67665 | 31.82 | 21.24 |
| | 247 | -82.3762 | 27.67647 | 30.7 | 21.27 |
| | 248 | -82.376 | 27.67628 | 28.96 | 21.30 |
| | 249 | -82.3758 | 27.67609 | 26.1 | 21.33 |
| | 250 | -82.3757 | 27.67591 | 25.21 | 21.35 |
| | 251 | -82.3755 | 27.67576 | 24.49 | 21.38 |
| | 252 | -82.3753 | 27.67562 | 23.86 | 21.40 |
| | 253 | -82.3751 | 27.67552 | 23.21 | 21.43 |
| | 254 | -82.3749 | 27.67544 | 24.72 | 21.45 |
| | 255 | -82.3746 | 27.6754 | 26.19 | 21.48 |
| | 256 | -82.3743 | 27.67538 | 27.22 | 21.50 |
| | 257 | -82.3737 | 27.67541 | 99.92 | 21.60 |
| | 258 | -82.373 | 27.67557 | 49.01 | 21.65 |

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|--|------------|----------|----------|-------|-------|
| | 259 | -82.3725 | 27.67575 | 57 | 21.71 |
| | 260 | -82.372 | 27.67572 | 53.01 | 21.76 |
| | 261 | -82.3715 | 27.67553 | 46.97 | 21.81 |
| | 262 | -82.3711 | 27.67529 | 45.18 | 21.86 |
| | 263 | -82.3708 | 27.67505 | 42.84 | 21.90 |
| | 264 | -82.3704 | 27.67482 | 41.07 | 21.94 |
| | 265 | -82.3701 | 27.67462 | 42.64 | 21.98 |
| | 266 | -82.3697 | 27.67442 | 49.18 | 22.03 |
| | 267 | -82.3693 | 27.67414 | 52.76 | 22.08 |
| | 268 | -82.3689 | 27.67381 | 45.94 | 22.13 |
| | 269 | -82.3687 | 27.67348 | 43.68 | 22.17 |
| | 270 | -82.3684 | 27.67318 | 41.49 | 22.21 |
| | 271 | -82.3681 | 27.67292 | 37.67 | 22.25 |
| | 272 | -82.3679 | 27.67271 | 35.1 | 22.29 |
| | 273 | -82.3675 | 27.67262 | 34.04 | 22.32 |
| | 274 | -82.3672 | 27.67265 | 37.31 | 22.36 |
| | 275 | -82.3668 | 27.67278 | 43.24 | 22.40 |
| | 276 | -82.3663 | 27.6739 | 53.46 | 22.46 |
| | 277 | -82.3658 | 27.67388 | 54.96 | 22.51 |
| | 278 | -82.3653 | 27.6732 | 49.34 | 22.56 |
| | 279 | -82.3649 | 27.67246 | 46.56 | 22.61 |
| | 280 | -82.3646 | 27.67219 | 45.34 | 22.65 |
| | 281 | -82.3642 | 27.67192 | 44.24 | 22.70 |
| | 282 | -82.3639 | 27.67165 | 44.65 | 22.74 |
| | 283 | -82.3636 | 27.67137 | 42.82 | 22.78 |
| | 284 | -82.3633 | 27.67112 | 40.55 | 22.82 |
| | 285 | -82.3629 | 27.6709 | 37.63 | 22.86 |
| | 286 | -82.3626 | 27.67076 | 35.18 | 22.90 |
| | 287 | -82.3623 | 27.6707 | 34.46 | 22.93 |
| | 288 | -82.3619 | 27.67074 | 37.31 | 22.97 |
| | 289 | -82.3616 | 27.67086 | 40.52 | 23.01 |
| | 290 | -82.3612 | 27.67102 | 44.12 | 23.05 |
| | 291 | -82.3607 | 27.67118 | 45.72 | 23.10 |
| | 292 | -82.3603 | 27.67132 | 45.81 | 23.14 |
| | 293 | -82.3599 | 27.67142 | 45.43 | 23.19 |
| | 294 | -82.3594 | 27.67151 | 44.24 | 23.23 |
| | 295 | -82.359 | 27.67159 | 42.91 | 23.28 |
| | 296 | -82.3586 | 27.67168 | 42.69 | 23.32 |
| | 297 | -82.3581 | 27.67178 | 43.6 | 23.36 |
| | 298 | -82.3577 | 27.67189 | 43.29 | 23.41 |
| | 299 | -82.3573 | 27.67201 | 42.52 | 23.45 |
| | 300 | -82.3569 | 27.67213 | 43.34 | 23.49 |
| | 301 | -82.3565 | 27.67227 | 43.27 | 23.54 |
| | 302 | -82.3561 | 27.67241 | 42.56 | 23.58 |
| | 303 | -82.3557 | 27.67257 | 42.12 | 23.62 |
| | 304 | -82.3553 | 27.67275 | 45.83 | 23.67 |
| | 305 | -82.3548 | 27.67291 | 50.54 | 23.72 |
| | 306 | -82.3543 | 27.67298 | 54.68 | 23.77 |
| | 307 | -82.3538 | 27.67289 | 53.2 | 23.83 |
| | 308 | -82.3533 | 27.6727 | 44.27 | 23.87 |
| | 309 | -82.3529 | 27.67242 | 55.62 | 23.93 |
| | 310 | -82.3526 | 27.67207 | 47.73 | 23.97 |

| | | | | | |
|--|-----|----------|----------|-------|-------|
| | 311 | -82.3523 | 27.67173 | 48.28 | 24.02 |
|--|-----|----------|----------|-------|-------|

note:

- 1 * Lon and Lat are the longitude and latitude of the grids cent
Z=0 is mean sea level,**
- 2 I is the segment numbering along the river central line**
- 3 I numbers connected to bayous are marked**

| Z<-0.0 feet | | Z<-1.5 feet | | Z<- 3 feet | | Z<- 4.5 feet | | Z<- 6 feet |
|-------------|----------|-------------|----------|------------|----------|--------------|----------|------------|
| A (m^2)* | V(m^3)* | A(m^2)* | V(m^3)* | A(m^2) | V(m^3) | A(m^2) | V(m^3) | A(m^2) |
| 46471.2 | 70658.53 | 46386.27 | 49512.04 | 46301.35 | 28365.54 | 26654.56 | 11380.17 | 16711.48 |
| 43527.74 | 61061.72 | 43447.89 | 41266.73 | 34614.44 | 21953.2 | 17584.19 | 12048.26 | 17544.63 |
| 41445.56 | 62309.75 | 41369.23 | 43464.12 | 32959.99 | 25993.42 | 16738.75 | 15144.89 | 16700.93 |
| 40192.42 | 63121.16 | 40118.19 | 44862.25 | 31971.57 | 26724.41 | 23107.36 | 14559.96 | 16222.26 |
| 39613.17 | 53004.92 | 39539.75 | 35004.37 | 30794.8 | 17741.48 | 8554.65 | 9711.67 | 8518.24 |
| 50361.76 | 43584.99 | 50286.41 | 20614.25 | 16925 | 2912.38 | 0 | 0 | 0 |
| 51265.94 | 50797.46 | 51188.97 | 27428.02 | 42890.65 | 5826.16 | 0 | 0 | 0 |
| 52153.75 | 52737.65 | 52073.33 | 28957.6 | 35280.61 | 7913.95 | 0 | 0 | 0 |
| 53480.41 | 53637.28 | 53397.51 | 29231.29 | 37482.17 | 7726.94 | 9741.52 | 267.89 | 0 |
| 64307.19 | 65191.71 | 64222.58 | 35831.32 | 27822.01 | 15682.37 | 18925.56 | 6801.57 | 0 |
| 46347.9 | 48452.39 | 46261.79 | 27324.87 | 37457.74 | 8076.05 | 9151.56 | 1624.4 | 0 |
| 46353.5 | 52062.38 | 46267.21 | 30937.19 | 46180.93 | 9812 | 7848.34 | 58.86 | 0 |
| 46280.87 | 52364.46 | 46194.68 | 31303.12 | 46108.5 | 10241.78 | 8837.23 | 1829.65 | 0 |
| 45294.72 | 52005.31 | 45210.26 | 31398.94 | 45125.8 | 10792.56 | 8725.07 | 3193.89 | 0 |
| 35442.72 | 43774.51 | 35360.23 | 27682.77 | 35277.74 | 11591.03 | 8590.78 | 4591.2 | 8549.06 |
| 33792.31 | 41199.41 | 33713.52 | 25858.21 | 33634.73 | 10517.01 | 8269.71 | 5154.82 | 8229.72 |
| 32228.12 | 31345.57 | 32152.71 | 16690.44 | 16284.68 | 4235.16 | 0 | 0 | 0 |
| 39728.02 | 38385.09 | 39655.4 | 20297.17 | 24502.32 | 6358.4 | 0 | 0 | 0 |
| 54010.68 | 52995.45 | 53941.93 | 28373.14 | 38970.48 | 5451.72 | 6262.27 | 234.73 | 0 |
| 52153.02 | 48066.29 | 52086.33 | 24264.44 | 19218.09 | 7667.56 | 7092.84 | 2393.83 | 0 |
| 39386.46 | 46033.85 | 39322.44 | 28067.65 | 18398.77 | 13414.06 | 12825.88 | 7406.94 | 12825.88 |
| 32369.03 | 37745.74 | 32307.41 | 22988.37 | 24349.72 | 9535.78 | 12327.68 | 2434.72 | 0 |
| 31850.79 | 32547.36 | 31790.01 | 18030.4 | 23878.52 | 4731.98 | 6235.94 | 296.21 | 0 |
| 30676.68 | 37904.3 | 30617.97 | 23931.56 | 24218.19 | 10244.16 | 5424.23 | 4868.25 | 5424.23 |
| 29152.47 | 39007.59 | 29096.52 | 25744.66 | 29040.57 | 12481.73 | 18539.06 | 2754.26 | 0 |
| 28749.39 | 35057.99 | 28693.93 | 21973.95 | 28638.46 | 8889.91 | 0 | 0 | 0 |
| 30031.04 | 64159.65 | 29972.96 | 50538.99 | 29914.88 | 36918.34 | 19339.44 | 25959.33 | 19308.13 |
| 50249.07 | 82685.17 | 50186.75 | 59823.84 | 43960.79 | 37178.23 | 25414.48 | 24335.17 | 25380.54 |
| 56158.32 | 66142.35 | 56091.64 | 40550.51 | 30215.64 | 17505.09 | 9038.06 | 7786.92 | 5469.23 |
| 19465.09 | 35991.26 | 19385.83 | 27226.82 | 19306.57 | 18462.38 | 19227.31 | 9697.94 | 9898.91 |
| 20195.3 | 39118.11 | 20116.68 | 30027.02 | 20038.06 | 20935.93 | 19959.44 | 11844.83 | 15880.42 |
| 18382.46 | 31132.06 | 18306.86 | 22835.57 | 18231.26 | 14539.09 | 14493.58 | 6325.33 | 0 |
| 16069.41 | 23180.73 | 16001.44 | 15913.65 | 15933.48 | 8646.57 | 4980.33 | 2925.94 | 4980.33 |
| 15691.76 | 19172.75 | 15624.58 | 12077.07 | 8061.32 | 5468.94 | 8026.85 | 1804.85 | 0 |
| 15975.94 | 23672.52 | 15906.93 | 16478.57 | 15837.91 | 9284.62 | 15768.89 | 2090.67 | 3195.9 |
| 16723.34 | 24885.75 | 16650.29 | 17380.42 | 8648.63 | 9914.73 | 8611.13 | 6036.91 | 3425.93 |
| 18098.08 | 19553.54 | 18017.3 | 11389.44 | 9331.19 | 4733.91 | 3688.73 | 2599.99 | 3647.25 |
| 15432.77 | 25030.78 | 15353.07 | 18107.11 | 10018.03 | 11578.07 | 6572.22 | 7614.94 | 6531.35 |
| 12696.01 | 18305.38 | 12629.57 | 12621.65 | 5458.7 | 7684.66 | 5424.63 | 5254.6 | 5390.55 |
| 7384.92 | 11256.66 | 7324.7 | 7974.38 | 7264.49 | 4692.11 | 4757.32 | 2405.22 | 2085.1 |
| 11287.61 | 18555.53 | 11214.88 | 13529.35 | 11142.15 | 8503.18 | 5022.21 | 3492.12 | 2550.49 |
| 14721.38 | 23085.63 | 14624.49 | 16529.72 | 14527.59 | 9973.81 | 6555.5 | 4937.72 | 3332.72 |
| 18609.85 | 38956.41 | 18506.88 | 30634.07 | 18403.91 | 22311.74 | 18300.94 | 13989.41 | 14764.63 |
| 17542.92 | 46274.67 | 17443.63 | 38519.85 | 17344.34 | 30765.03 | 17245.05 | 23010.21 | 17145.76 |
| 18788.47 | 50695.38 | 18697.51 | 42352.53 | 18606.55 | 34009.67 | 18515.59 | 25666.82 | 18424.63 |
| 25932.28 | 61960.26 | 25831.27 | 50342.71 | 25730.25 | 38725.16 | 25629.24 | 27107.61 | 25528.23 |
| 38810.1 | 58842.73 | 38705.21 | 41247.6 | 38600.31 | 23652.47 | 38495.42 | 6057.34 | 0 |
| 28740.14 | 41764.3 | 28637.73 | 28766.22 | 28535.32 | 15768.15 | 28432.91 | 2770.08 | 0 |
| 25210.75 | 31204.56 | 25120.31 | 19783.69 | 25029.87 | 8362.82 | 0 | 0 | 0 |

| | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 24418.64 | 20606.4 | 24324.01 | 9515.31 | 0 | 0 | 0 | 0 | 0 |
| 22056.53 | 15558.64 | 21964.41 | 5533.18 | 0 | 0 | 0 | 0 | 0 |
| 18428.27 | 12621.71 | 18338.14 | 4252.97 | 0 | 0 | 0 | 0 | 0 |
| 16086.46 | 14331.28 | 16003.7 | 7046.21 | 0 | 0 | 0 | 0 | 0 |
| 14151.47 | 17133.15 | 14068.87 | 10760.45 | 13986.26 | 4387.76 | 0 | 0 | 0 |
| 12142.31 | 14332.55 | 12066.63 | 8868.27 | 11990.94 | 3403.98 | 0 | 0 | 0 |
| 11208.4 | 15477.38 | 11133.27 | 10455.46 | 11058.15 | 5433.55 | 10983.02 | 411.63 | 0 |
| 10560.87 | 12455.36 | 10491.71 | 7706.75 | 10422.55 | 2958.15 | 0 | 0 | 0 |
| 10915.51 | 10978.93 | 10847.4 | 6054.56 | 10779.29 | 1130.18 | 0 | 0 | 0 |
| 10853.64 | 9967.44 | 10786.75 | 5064.1 | 10719.87 | 160.77 | 0 | 0 | 0 |
| 11595.96 | 5759.78 | 11526.05 | 489.58 | 0 | 0 | 0 | 0 | 0 |
| 12376.61 | 8345.7 | 12306.96 | 2730.76 | 0 | 0 | 0 | 0 | 0 |
| 12872.67 | 6397.25 | 12801.15 | 543.77 | 0 | 0 | 0 | 0 | 0 |
| 12707.24 | 7320.89 | 12640.18 | 1546.22 | 0 | 0 | 0 | 0 | 0 |
| 14425.41 | 9313.39 | 14357.06 | 2758.2 | 0 | 0 | 0 | 0 | 0 |
| 13721.04 | 11163.1 | 13661.06 | 4934.91 | 0 | 0 | 0 | 0 | 0 |
| 16213.34 | 15952.07 | 16093.8 | 8654 | 15974.27 | 1355.93 | 0 | 0 | 0 |
| 16068 | 19058.56 | 15997.14 | 11792.49 | 15926.28 | 4526.41 | 0 | 0 | 0 |
| 16064.24 | 21096.28 | 15994.62 | 13839.48 | 15925.01 | 6582.67 | 0 | 0 | 0 |
| 15767.46 | 22672.1 | 15692.68 | 15567.66 | 15617.91 | 8463.21 | 15543.14 | 1358.77 | 0 |
| 15362.65 | 22974.52 | 15288.06 | 16059.49 | 15213.46 | 9144.46 | 15138.87 | 2229.44 | 0 |
| 18125.17 | 25223.9 | 18048.63 | 17039.55 | 17972.1 | 8855.2 | 17895.56 | 670.85 | 0 |
| 17897.16 | 21585.69 | 17820.67 | 13491.06 | 17744.18 | 5396.42 | 0 | 0 | 0 |
| 18027.98 | 19634.18 | 17953.65 | 11468.15 | 17879.31 | 3302.11 | 0 | 0 | 0 |
| 17948.15 | 21129.75 | 17874.31 | 13006.34 | 17800.48 | 4882.93 | 0 | 0 | 0 |
| 22802.59 | 27989.34 | 22728.13 | 17651.72 | 22653.67 | 7314.1 | 0 | 0 | 0 |
| 17695.24 | 22189.79 | 17614.92 | 14196.22 | 17534.6 | 6202.66 | 0 | 0 | 0 |
| 16296.97 | 20581.79 | 16219.25 | 13225.41 | 16141.53 | 5869.02 | 0 | 0 | 0 |
| 15593.23 | 20427.83 | 15512.75 | 13400.96 | 15432.27 | 6374.1 | 0 | 0 | 0 |
| 14875.58 | 18893.44 | 14794.19 | 12192.86 | 14712.79 | 5492.28 | 0 | 0 | 0 |
| 14006.82 | 20067.03 | 13924.63 | 13778.91 | 13842.45 | 7490.78 | 13760.26 | 1202.65 | 0 |
| 14094.67 | 21692.52 | 14013.72 | 15371.29 | 13932.78 | 9050.06 | 13851.83 | 2728.84 | 0 |
| 13947.37 | 20648.61 | 13864.72 | 14392.49 | 13782.07 | 8136.37 | 13699.41 | 1880.25 | 0 |
| 14618.33 | 21507.68 | 14532.96 | 14947.84 | 14447.6 | 8388 | 14362.24 | 1828.15 | 0 |
| 15574.1 | 21313.76 | 15494.96 | 14298.62 | 15415.81 | 7283.48 | 15336.67 | 268.34 | 0 |
| 17132.74 | 24126.18 | 17049.15 | 16407.49 | 16965.55 | 8688.8 | 16881.96 | 970.11 | 0 |
| 18032.84 | 23818.53 | 17944.82 | 15686.46 | 17856.79 | 7554.39 | 0 | 0 | 0 |
| 17510.07 | 24155.16 | 17426.29 | 16261.6 | 17342.51 | 8368.04 | 17258.73 | 474.48 | 0 |
| 16613.84 | 24514.5 | 16531.23 | 17037.58 | 16448.63 | 9560.65 | 16366.02 | 2083.73 | 0 |
| 14895.88 | 25364.71 | 14812.14 | 18695.54 | 14728.41 | 12026.37 | 14644.68 | 5357.2 | 0 |
| 13574.74 | 23483.61 | 13495.35 | 17413.69 | 13415.95 | 11343.78 | 13336.56 | 5273.86 | 0 |
| 14314.31 | 27507.97 | 14232.83 | 21119.7 | 14151.34 | 14731.42 | 14069.86 | 8343.15 | 13988.37 |
| 14809.63 | 21665.98 | 14727.13 | 15013.5 | 14644.62 | 8361.03 | 14562.11 | 1708.56 | 0 |
| 16170.01 | 18967.52 | 16081.23 | 11675.38 | 15992.45 | 4383.25 | 0 | 0 | 0 |
| 17021.2 | 19488.91 | 16934.27 | 11802.55 | 16847.34 | 4116.19 | 0 | 0 | 0 |
| 17298.15 | 18790.57 | 17208.39 | 10975.4 | 17118.63 | 3160.23 | 0 | 0 | 0 |
| 48459.6 | 57863.71 | 48368.16 | 35803.17 | 48276.72 | 13742.63 | 0 | 0 | 0 |
| 16264.64 | 25031.51 | 16171.1 | 17737.3 | 16077.56 | 10443.08 | 15984.02 | 3148.87 | 0 |
| 17807.62 | 37965.94 | 17709.1 | 30034.7 | 17610.59 | 22103.46 | 17512.08 | 14172.22 | 17413.56 |
| 20903.59 | 43294.4 | 20799.64 | 33951.38 | 20695.69 | 24608.37 | 20591.73 | 15265.36 | 20487.78 |
| 24141 | 39669.79 | 24035.08 | 28802.17 | 23929.16 | 17934.55 | 23823.24 | 7066.92 | 0 |
| 22773.29 | 28791.03 | 22673.1 | 18500.49 | 22572.92 | 8209.94 | 0 | 0 | 0 |

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|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 22659.06 | 24902.91 | 22566.74 | 14638.87 | 22474.41 | 4374.84 | 0 | 0 | 0 |
| 21562.52 | 23487.13 | 21474.94 | 13718.62 | 21387.36 | 3950.11 | 0 | 0 | 0 |
| 21378.17 | 21814.67 | 21289.83 | 12125.15 | 21201.5 | 2435.62 | 0 | 0 | 0 |
| 20469.28 | 18474.04 | 20384.75 | 9186.27 | 0 | 0 | 0 | 0 | 0 |
| 18137.26 | 16888.79 | 18054.29 | 8668.98 | 17971.33 | 449.17 | 0 | 0 | 0 |
| 17351.88 | 17347.95 | 17272.3 | 9489.85 | 17192.72 | 1631.74 | 0 | 0 | 0 |
| 16378.77 | 18117.09 | 16295.93 | 10716.58 | 16213.09 | 3316.07 | 0 | 0 | 0 |
| 14806.02 | 19097.85 | 14726.56 | 12428.18 | 14647.11 | 5758.51 | 0 | 0 | 0 |
| 13888.73 | 22863.85 | 13812.67 | 16637.53 | 13736.61 | 10411.22 | 13660.56 | 4184.9 | 0 |
| 13468.11 | 32532.95 | 13384.86 | 26579.42 | 13301.6 | 20625.89 | 13218.35 | 14672.36 | 13135.1 |
| 10792.99 | 33710.12 | 10721.09 | 29008.18 | 10649.18 | 24306.23 | 10577.28 | 19604.29 | 10505.37 |
| 10432.78 | 15265.12 | 10354.69 | 10609.26 | 10276.6 | 5953.4 | 10198.51 | 1297.54 | 0 |
| 9264.86 | 14326.15 | 9191.57 | 10204 | 9118.28 | 6081.85 | 9045 | 1959.71 | 0 |
| 9230.35 | 12886.04 | 9160.24 | 8763.41 | 9090.13 | 4640.78 | 9020.02 | 518.14 | 0 |
| 8171.13 | 12698.18 | 8104 | 9067.29 | 8036.87 | 5436.41 | 7969.74 | 1805.52 | 0 |
| 9692.81 | 20892.87 | 9618.13 | 16625.68 | 9543.45 | 12358.5 | 9468.77 | 8091.32 | 9394.1 |
| 9928.81 | 19229.78 | 9857 | 14830.97 | 9785.19 | 10432.16 | 9713.38 | 6033.34 | 9641.57 |
| 10174.52 | 16185.45 | 10105.81 | 11642.6 | 10037.1 | 7099.75 | 9968.39 | 2556.9 | 0 |
| 10397.25 | 20095.88 | 10328.55 | 15475.84 | 10259.85 | 10855.81 | 10191.15 | 6235.78 | 10122.46 |
| 8732.14 | 14322.7 | 8662.52 | 10445.4 | 8592.9 | 6568.1 | 8523.28 | 2690.8 | 0 |
| 9869.85 | 18778.64 | 9791.46 | 14417.61 | 9713.07 | 10056.58 | 9634.68 | 5695.55 | 9556.29 |
| 12447.33 | 28231.82 | 12353.37 | 22758.92 | 12259.41 | 17286.01 | 12165.45 | 11813.1 | 12071.49 |
| 14598.7 | 40679.42 | 14494.14 | 34305.85 | 14389.57 | 27932.27 | 14285 | 21558.7 | 14180.44 |
| 15018.28 | 39673.49 | 14911.56 | 33097.18 | 14804.84 | 26520.86 | 14698.11 | 19944.55 | 14591.39 |
| 13539.87 | 37521.38 | 13444.98 | 31602.06 | 13350.1 | 25682.74 | 13255.21 | 19763.42 | 13160.33 |
| 12904.27 | 33352.37 | 12803.46 | 27721.85 | 12702.66 | 22091.33 | 12601.85 | 16460.81 | 12501.05 |
| 19555.21 | 48014.37 | 19450.83 | 39331.93 | 19346.46 | 30649.49 | 19242.08 | 21967.05 | 19137.71 |
| 17466.12 | 37408.98 | 17370.04 | 29629.61 | 17273.96 | 21850.24 | 17177.87 | 14070.88 | 17081.79 |
| 17613.42 | 33564.5 | 17519.38 | 25689.75 | 17425.33 | 17815 | 17331.28 | 9940.26 | 17237.23 |
| 17763.98 | 35979.49 | 17643.82 | 28103.59 | 17523.67 | 20227.7 | 17403.51 | 12351.81 | 17283.35 |
| 14002.97 | 31231.42 | 13918.62 | 25019.08 | 13834.26 | 18806.75 | 13749.9 | 12594.41 | 13665.54 |
| 4986.6 | 10434.09 | 4949.02 | 8234.28 | 4911.44 | 6034.46 | 4873.85 | 3834.65 | 4836.27 |
| 8608.83 | 17491.26 | 8531.97 | 13709.19 | 8455.11 | 9927.12 | 6681.29 | 6217.32 | 4907.51 |
| 10879.78 | 14505.42 | 10802.4 | 9645.68 | 10725.03 | 4785.94 | 5146.76 | 1764.52 | 1424.99 |
| 12261.63 | 14753.09 | 12198.59 | 9234.68 | 10636.52 | 3738.76 | 1281.61 | 325.49 | 0 |
| 21916.66 | 29680.81 | 21852.32 | 19759.53 | 21787.99 | 9838.25 | 8565.89 | 1253.05 | 0 |
| 17060.97 | 27348.33 | 16992.51 | 19672.89 | 16924.05 | 11997.44 | 14809.61 | 4593.09 | 2782.74 |
| 22802.9 | 34727.89 | 22747.78 | 24407.13 | 22692.66 | 14086.38 | 17162.03 | 4853 | 2697.01 |
| 24739 | 39564.8 | 24671.22 | 28390.06 | 24603.43 | 17215.33 | 16030.37 | 7207.81 | 3768.13 |
| 19226.1 | 31078.26 | 19167.05 | 22397.55 | 19108 | 13716.83 | 11500.06 | 5455.78 | 7306.24 |
| 22209.23 | 29976.33 | 22144.86 | 19906.72 | 22080.5 | 9837.1 | 8559.1 | 958.86 | 0 |
| 22761.79 | 29508.04 | 22689.13 | 19186.3 | 22616.46 | 8864.56 | 7638.84 | 2587.07 | 0 |
| 30649.3 | 45099.87 | 30579.03 | 31185.68 | 30508.76 | 17271.49 | 15818.42 | 3937.71 | 1642.61 |
| 16364.11 | 29786.65 | 16300.56 | 22423 | 16237.01 | 15059.35 | 16173.46 | 7695.71 | 8451.79 |
| 17773.86 | 41165.34 | 17708.01 | 33169.22 | 17642.16 | 25173.11 | 17576.3 | 17176.99 | 11246.38 |
| 28883.33 | 77213.44 | 28824.6 | 64103 | 28765.86 | 50992.56 | 21939.89 | 38817.8 | 19894.28 |
| 19009.64 | 31032.54 | 18957.3 | 22411.96 | 18904.96 | 13791.39 | 8903.66 | 6142.68 | 3967.57 |
| 41125.8 | 84368.13 | 41066.55 | 65637.4 | 41007.29 | 46906.67 | 18423.57 | 31034.03 | 14493.95 |
| 31401.69 | 50426.35 | 31345.05 | 36160.48 | 31288.42 | 21894.6 | 9963.41 | 13410.46 | 7661.9 |
| 31956.22 | 54875.31 | 31904.11 | 40386.18 | 31852.01 | 25897.05 | 18108.32 | 15095.04 | 13194.52 |
| 15841.39 | 25313.24 | 15804.13 | 18129.8 | 15766.86 | 10946.35 | 9878.26 | 5213.72 | 5344.59 |
| 15344.38 | 24012.59 | 15306.6 | 17053.78 | 15268.83 | 10094.98 | 9884.74 | 4329.48 | 4291.15 |

| | | | | | | | | |
|----------|-----------|----------|----------|----------|----------|----------|----------|---------|
| 19956.44 | 24592.23 | 19909.12 | 15527.11 | 19861.8 | 6462 | 4050.63 | 790.91 | 0 |
| 28879.07 | 36227.46 | 28822.37 | 23091.49 | 24231.54 | 10235.12 | 12193.28 | 1638.51 | 0 |
| 97647.73 | 147601.88 | 97572.27 | 103040.4 | 97496.82 | 58478.99 | 85589.56 | 15461.29 | 8635.9 |
| 13042.5 | 23880.68 | 12991.67 | 18006.77 | 12940.85 | 12132.86 | 12890.02 | 6258.95 | 9365.07 |
| 12032.94 | 19671.25 | 11978.85 | 14260.02 | 11924.76 | 8848.79 | 11870.68 | 3437.56 | 0 |
| 16554.27 | 24422.08 | 16494.12 | 16948.49 | 16433.96 | 9474.9 | 11680.28 | 3216.1 | 2324.41 |
| 21635.38 | 32808.16 | 21573.21 | 23024.58 | 19079.34 | 13447.69 | 14857.1 | 5347.15 | 3518.25 |
| 20285.48 | 33009.06 | 20219.65 | 23844.82 | 20153.82 | 14680.58 | 18033.71 | 5891.25 | 5618.49 |
| 20568.08 | 35648.15 | 20499.48 | 26344.73 | 20430.88 | 17041.32 | 20362.29 | 7737.9 | 2219.9 |
| 18755.05 | 32619.63 | 18697.72 | 24130.92 | 18640.38 | 15642.22 | 16766.79 | 7357.85 | 5046.16 |
| 12264.65 | 21453.19 | 12228.86 | 15922 | 12193.07 | 10390.82 | 9138.66 | 5319.61 | 5834.01 |
| 9922.07 | 15943.52 | 9888.63 | 11471.76 | 8589.75 | 7272.06 | 6864.76 | 3772.52 | 5447.08 |
| 12634.08 | 20771.82 | 12601.13 | 15056.36 | 10068.89 | 9758.17 | 10035.93 | 5186.14 | 5043.41 |
| 9877.32 | 13670.46 | 9845.73 | 9210.16 | 7427.34 | 5336.92 | 4585.47 | 2361.72 | 3395.37 |
| 11277.83 | 12584.09 | 11246.88 | 7476.81 | 5627.31 | 3523.84 | 4490.71 | 1473.66 | 0 |
| 12311.25 | 11476.99 | 12280.15 | 5883.98 | 3325.89 | 2063.3 | 3307.87 | 552.96 | 0 |
| 11684.22 | 11568.76 | 11652.41 | 6262.14 | 6922.54 | 1803.81 | 3272.71 | 57.26 | 0 |
| 11138.64 | 10490.05 | 11107.35 | 5422.42 | 5941.84 | 1102.35 | 0 | 0 | 0 |
| 9637.34 | 8559.18 | 9610.01 | 4179.29 | 6007.27 | 372.33 | 0 | 0 | 0 |
| 7096.25 | 6169.11 | 7069.07 | 2954.25 | 936.98 | 647.21 | 924.68 | 227.21 | 0 |
| 9787.45 | 10372.87 | 9749.57 | 5950.23 | 6251.71 | 2428.87 | 4409.34 | 243.29 | 0 |
| 10305.22 | 8624.63 | 10257.5 | 3938.87 | 4732.57 | 966.78 | 0 | 0 | 0 |
| 16529.23 | 15137.62 | 16475.53 | 7614.26 | 9358.81 | 1685.93 | 0 | 0 | 0 |
| 13722.33 | 8668.27 | 13659.48 | 2430.43 | 0 | 0 | 0 | 0 | 0 |
| 17135.3 | 12399.09 | 17063.24 | 4612.9 | 0 | 0 | 0 | 0 | 0 |
| 13712.25 | 10849.61 | 13655.09 | 4624.14 | 4733.65 | 307.43 | 0 | 0 | 0 |
| 17609.08 | 13855.18 | 17536.21 | 5859.64 | 5074.3 | 532.08 | 0 | 0 | 0 |
| 19248.61 | 15923.24 | 19167.49 | 7189.04 | 5242.05 | 1436.42 | 0 | 0 | 0 |
| 18433.76 | 15978.22 | 18357.04 | 7616.58 | 5710.89 | 1961.85 | 0 | 0 | 0 |
| 19433.3 | 14646.73 | 19354.19 | 5817.64 | 0 | 0 | 0 | 0 | 0 |
| 18710.73 | 15983.63 | 18635.38 | 7493.52 | 5565.92 | 1801.52 | 0 | 0 | 0 |
| 18003.88 | 16346.17 | 17929.51 | 8185.43 | 4745.74 | 2847.78 | 4716.5 | 694.29 | 0 |
| 4504.07 | 4171.74 | 4449.77 | 2162.72 | 4395.46 | 153.7 | 0 | 0 | 0 |
| 4887.43 | 6297.75 | 4835.05 | 4131.42 | 4782.67 | 1965.09 | 0 | 0 | 0 |
| 6045.58 | 10201.61 | 5989.09 | 7534.62 | 5932.6 | 4867.62 | 5876.1 | 2200.63 | 0 |
| 7365.67 | 11848.83 | 7302.88 | 8583.27 | 7240.1 | 5317.7 | 7177.31 | 2052.13 | 0 |
| 7515.09 | 9884.31 | 7449.55 | 6534.63 | 7384.02 | 3184.94 | 0 | 0 | 0 |
| 6709.98 | 12541.77 | 6644.69 | 9599.28 | 6579.39 | 6656.79 | 6514.1 | 3714.29 | 6448.8 |
| 5851.62 | 10035.56 | 5788.96 | 7470.6 | 5726.3 | 4905.65 | 5663.64 | 2340.7 | 0 |
| 6024.06 | 9520.89 | 5963.07 | 6864.91 | 5902.08 | 4208.93 | 5841.08 | 1552.95 | 0 |
| 6758.99 | 13258.58 | 6700.75 | 10285.14 | 6642.51 | 7311.71 | 6584.27 | 4338.28 | 6526.03 |
| 6889.68 | 12791.63 | 6835.5 | 9743.63 | 6781.32 | 6695.62 | 6727.14 | 3647.61 | 6672.97 |
| 6311.37 | 11652.32 | 6260.9 | 8861.26 | 6210.44 | 6070.19 | 6159.98 | 3279.12 | 6109.52 |
| 5870.66 | 10697.47 | 5819.68 | 8108 | 5768.69 | 5518.54 | 5717.71 | 2929.07 | 5666.72 |
| 5426.34 | 10154.33 | 5374.96 | 7771.97 | 5323.58 | 5389.61 | 5272.2 | 3007.25 | 5220.83 |
| 5484.83 | 9669.34 | 5366.77 | 7389.07 | 5248.71 | 5108.8 | 5130.65 | 2828.53 | 5012.58 |
| 5596.99 | 10516.9 | 5536.97 | 8074.52 | 5476.94 | 5632.15 | 5416.92 | 3189.77 | 5356.9 |
| 5801.37 | 11968.91 | 5736.09 | 9457.09 | 5670.82 | 6945.26 | 5605.54 | 4433.44 | 5540.26 |
| 5292.13 | 8100.41 | 5226.55 | 5784.2 | 5160.96 | 3467.99 | 5095.37 | 1151.78 | 0 |
| 5033.67 | 6896.16 | 4966.11 | 4689.87 | 4898.55 | 2483.58 | 4830.98 | 277.29 | 0 |
| 5467.92 | 5817.77 | 5393.46 | 3398.11 | 5319 | 978.44 | 0 | 0 | 0 |
| 5365.4 | 6676.25 | 5298.01 | 4308.51 | 5230.62 | 1940.77 | 0 | 0 | 0 |

| | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 4985.16 | 6048.39 | 4931.56 | 3834.68 | 4877.96 | 1620.97 | 0 | 0 | 0 |
| 4921.01 | 7242.75 | 4874.04 | 5062.77 | 4827.07 | 2882.8 | 4780.11 | 702.83 | 0 |
| 5110.48 | 6741.91 | 5058.94 | 4473.95 | 5007.41 | 2205.99 | 0 | 0 | 0 |
| 5770.38 | 7540.19 | 5707.67 | 4984.9 | 5644.95 | 2429.62 | 0 | 0 | 0 |
| 4565.84 | 9105.63 | 4515.77 | 7121.9 | 4465.7 | 5138.18 | 4415.63 | 3154.45 | 4365.56 |
| 4407.91 | 6128.26 | 4359.56 | 4181.26 | 4311.22 | 2234.26 | 4262.87 | 287.26 | 0 |
| 5425.55 | 6547.23 | 5371.86 | 4131.62 | 5318.17 | 1716.01 | 0 | 0 | 0 |
| 4777.97 | 6949.33 | 4733.72 | 4829.79 | 4689.47 | 2710.24 | 4645.22 | 590.69 | 0 |
| 4166.14 | 4918.72 | 4127.92 | 3058.95 | 4089.7 | 1199.19 | 0 | 0 | 0 |
| 4059 | 5294.04 | 4022.05 | 3486.56 | 3985.1 | 1679.08 | 0 | 0 | 0 |
| 3860.72 | 6158.11 | 3825.08 | 4450.64 | 3789.45 | 2743.16 | 3753.81 | 1035.68 | 0 |
| 3622.78 | 6379.13 | 3588.55 | 4784.35 | 3554.32 | 3189.57 | 3520.09 | 1594.78 | 3485.86 |
| 3436.6 | 5886.99 | 3403.37 | 4373.9 | 3370.13 | 2860.81 | 3336.9 | 1347.72 | 0 |
| 3295.7 | 5517.86 | 3262.96 | 4067.04 | 3230.22 | 2616.22 | 3197.48 | 1165.41 | 0 |
| 3057.1 | 4936.51 | 3024.78 | 3592.19 | 2992.45 | 2247.87 | 2960.12 | 903.56 | 0 |
| 2900.91 | 4215.39 | 2867.81 | 2938.21 | 2834.7 | 1661.03 | 2801.6 | 383.85 | 0 |
| 2737.4 | 3761.76 | 2703.23 | 2558.26 | 2669.06 | 1354.76 | 2634.9 | 151.26 | 0 |
| 2694.33 | 3290.26 | 2657.02 | 2104.99 | 2619.71 | 919.72 | 0 | 0 | 0 |
| 3129.39 | 3374.49 | 3016.48 | 2077.15 | 2903.57 | 779.82 | 0 | 0 | 0 |
| 3272.25 | 3534.49 | 3224.68 | 2090.71 | 3177.11 | 646.94 | 0 | 0 | 0 |
| 2479.96 | 2925.82 | 2435.53 | 1846.33 | 2391.09 | 766.85 | 0 | 0 | 0 |
| 1806.35 | 1958.3 | 1765.18 | 1179.24 | 1724.02 | 400.17 | 0 | 0 | 0 |
| 1751.97 | 1649.92 | 1712.51 | 887.46 | 1673.06 | 124.99 | 0 | 0 | 0 |
| 1709.93 | 1690.69 | 1672.86 | 946.95 | 1635.79 | 203.21 | 0 | 0 | 0 |
| 1818.48 | 1917.06 | 1780.81 | 1126.92 | 1743.14 | 336.78 | 0 | 0 | 0 |
| 1905.65 | 1874.58 | 1867.6 | 1041.94 | 1829.54 | 209.3 | 0 | 0 | 0 |
| 1156.31 | 1126.73 | 1133.14 | 621.36 | 1109.96 | 115.99 | 0 | 0 | 0 |
| 1210.21 | 1198.96 | 1184.97 | 671.53 | 1159.74 | 144.11 | 0 | 0 | 0 |
| 1098.5 | 1113.36 | 1073.71 | 637.32 | 1048.92 | 161.28 | 0 | 0 | 0 |
| 1118.09 | 1153.19 | 1092.86 | 669.17 | 1067.62 | 185.14 | 0 | 0 | 0 |
| 1163.47 | 1181.74 | 1138.23 | 676.46 | 1112.98 | 171.19 | 0 | 0 | 0 |
| 1114.23 | 1079.13 | 1089 | 595.11 | 1063.76 | 111.09 | 0 | 0 | 0 |
| 1061.72 | 920.5 | 1036.49 | 457.72 | 0 | 0 | 0 | 0 | 0 |
| 1096.03 | 890.37 | 1069.91 | 411.14 | 0 | 0 | 0 | 0 | 0 |
| 1123.64 | 873.32 | 1097.96 | 380.05 | 0 | 0 | 0 | 0 | 0 |
| 1192.86 | 873.49 | 1166.65 | 347.67 | 0 | 0 | 0 | 0 | 0 |
| 1247.65 | 855.86 | 1220.45 | 304.37 | 0 | 0 | 0 | 0 | 0 |
| 1466.24 | 926.56 | 1437.55 | 274.41 | 0 | 0 | 0 | 0 | 0 |
| 1862.18 | 933.02 | 1832.82 | 96.05 | 0 | 0 | 0 | 0 | 0 |
| 2284.36 | 2091.06 | 2255.24 | 1073.34 | 2226.13 | 55.61 | 0 | 0 | 0 |
| 2546.87 | 2388.41 | 2518.78 | 1250.18 | 2490.69 | 111.96 | 0 | 0 | 0 |
| 2554.56 | 2399 | 2528.06 | 1255.73 | 2501.56 | 112.45 | 0 | 0 | 0 |
| 2244.86 | 2128.4 | 2220.98 | 1124.54 | 2197.1 | 120.68 | 0 | 0 | 0 |
| 2005.96 | 1936.48 | 1982.89 | 1041.59 | 1959.83 | 146.7 | 0 | 0 | 0 |
| 1630.54 | 1535.54 | 1608.14 | 811.3 | 1585.73 | 87.07 | 0 | 0 | 0 |
| 1181.55 | 1079.4 | 1159.72 | 559.59 | 1137.88 | 39.77 | 0 | 0 | 0 |
| 873.86 | 788.27 | 852.62 | 408.66 | 831.38 | 29.04 | 0 | 0 | 0 |
| 788.32 | 773.23 | 765.7 | 436.32 | 743.08 | 99.42 | 0 | 0 | 0 |
| 772.34 | 851.38 | 748.38 | 526.79 | 724.42 | 202.2 | 0 | 0 | 0 |
| 821.77 | 681 | 796.87 | 326.96 | 0 | 0 | 0 | 0 | 0 |
| 4747.2 | 4198.28 | 4655.77 | 2110.55 | 4564.35 | 22.82 | 0 | 0 | 0 |
| 3102.82 | 2917.51 | 3057.98 | 1541.47 | 3013.13 | 165.43 | 0 | 0 | 0 |

| | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 3284.34 | 2925.1 | 3232.19 | 1470.5 | 3180.03 | 15.9 | 0 | 0 | 0 |
| 2593.78 | 2463.93 | 2545.28 | 1325.3 | 2496.77 | 186.66 | 0 | 0 | 0 |
| 2291.2 | 2218.28 | 2248.22 | 1213.47 | 2205.24 | 208.65 | 0 | 0 | 0 |
| 2547.7 | 2693.13 | 2506.36 | 1573.04 | 2465.02 | 452.94 | 0 | 0 | 0 |
| 2798.74 | 3053.17 | 2759.54 | 1817.04 | 2720.34 | 580.91 | 0 | 0 | 0 |
| 2964.84 | 3989.79 | 2927.26 | 2685.98 | 2889.69 | 1382.18 | 2852.11 | 78.37 | 0 |
| 3405.66 | 5791.87 | 3366.64 | 4303.23 | 3327.63 | 2814.59 | 3288.61 | 1325.95 | 0 |
| 4206.37 | 4507.99 | 4161.37 | 2633.07 | 4116.37 | 758.16 | 0 | 0 | 0 |
| 4558.99 | 6261 | 4510.72 | 4243.81 | 4462.44 | 2226.62 | 4414.17 | 209.43 | 0 |
| 3778.56 | 6641.49 | 3736.53 | 4990.14 | 3694.49 | 3338.79 | 3652.46 | 1687.44 | 3610.42 |
| 3368.6 | 6387.76 | 3328.63 | 4926.56 | 3288.67 | 3465.36 | 3248.7 | 2004.16 | 3208.73 |
| 2970.27 | 5687.69 | 2932.31 | 4405.86 | 2894.34 | 3124.03 | 2856.38 | 1842.2 | 2818.42 |
| 2514.47 | 4749.71 | 2480 | 3668.62 | 2445.54 | 2587.53 | 2411.07 | 1506.44 | 2376.6 |
| 2148.12 | 4015.44 | 2116 | 3096.91 | 2083.89 | 2178.38 | 2051.77 | 1259.84 | 2019.65 |
| 1892.62 | 3512.93 | 1861.48 | 2709.35 | 1830.33 | 1905.76 | 1799.18 | 1102.18 | 1768.04 |
| 1922.58 | 3546.69 | 1888.45 | 2735.38 | 1854.31 | 1924.08 | 1820.17 | 1112.77 | 1786.03 |
| 2135.19 | 3924.46 | 2095.63 | 3026.74 | 2056.06 | 2129.02 | 2016.5 | 1231.3 | 1976.93 |
| 2954.2 | 5480.72 | 2905.28 | 4227 | 2856.37 | 2973.29 | 2807.45 | 1719.58 | 2758.54 |
| 3674.24 | 6324.8 | 3557.15 | 4878 | 3440.07 | 3431.2 | 3322.99 | 1984.4 | 3205.9 |
| 3108.91 | 5823.11 | 3063.77 | 4491.07 | 3018.62 | 3159.04 | 2973.48 | 1827 | 2928.33 |
| 3027.33 | 5682.18 | 2984.73 | 4382.38 | 2942.13 | 3082.58 | 2899.52 | 1782.78 | 2856.92 |
| 3055.01 | 5747.3 | 3013.52 | 4432.6 | 2972.04 | 3117.91 | 2930.55 | 1803.21 | 2889.06 |
| 3025.13 | 5696.34 | 2984.65 | 4393.3 | 2944.17 | 3090.27 | 2903.69 | 1787.23 | 2863.21 |
| 3099.16 | 5841.11 | 3058.3 | 4504.96 | 3017.45 | 3168.8 | 2976.59 | 1832.65 | 2935.74 |
| 2929.32 | 5516.07 | 2890.14 | 4254.27 | 2850.96 | 2992.47 | 2811.78 | 1730.67 | 2772.59 |
| 2705.9 | 5087.4 | 2668.8 | 3923.66 | 2631.69 | 2759.92 | 2594.59 | 1596.17 | 2557.49 |
| 2572.76 | 4844.49 | 2538.33 | 3736.31 | 2503.9 | 2628.13 | 2469.47 | 1519.96 | 2435.04 |
| 2487.58 | 4693.72 | 2455.39 | 3620.03 | 2423.2 | 2546.34 | 2391.01 | 1472.65 | 2358.82 |
| 2459.07 | 4642.45 | 2427.53 | 3580.49 | 2396 | 2518.53 | 2364.47 | 1456.57 | 2332.94 |
| 2583.34 | 4868.21 | 2549.21 | 3754.61 | 2515.07 | 2641 | 2480.93 | 1527.4 | 2446.79 |
| 2630.96 | 4937.77 | 2593.89 | 3808.25 | 2556.81 | 2678.74 | 2519.74 | 1549.22 | 2482.66 |
| 2751.76 | 5150.57 | 2711.39 | 3972.38 | 2671.02 | 2794.18 | 2630.65 | 1615.99 | 2590.29 |
| 2730.4 | 5095.04 | 2688.56 | 3929.55 | 2646.73 | 2764.06 | 2604.9 | 1598.57 | 2563.06 |
| 2741.27 | 5116.06 | 2699.35 | 3945.76 | 2657.44 | 2775.46 | 2615.52 | 1605.16 | 2573.61 |
| 2843.92 | 5324.4 | 2802.35 | 4106.44 | 2760.78 | 2888.48 | 2719.21 | 1670.53 | 2677.64 |
| 2912.76 | 5471.6 | 2872.28 | 4219.97 | 2831.8 | 2968.34 | 2791.32 | 1716.72 | 2750.84 |
| 3048.76 | 5754.23 | 3009.49 | 4437.95 | 2970.23 | 3121.67 | 2930.97 | 1805.39 | 2891.7 |
| 3048.92 | 5756.32 | 3009.86 | 4439.56 | 2970.8 | 3122.8 | 2931.74 | 1806.05 | 2892.67 |
| 3062.46 | 5776.13 | 3022.57 | 4454.84 | 2982.68 | 3133.55 | 2942.78 | 1812.26 | 2902.89 |
| 2990.47 | 5634.63 | 2950.86 | 4345.71 | 2911.25 | 3056.78 | 2871.64 | 1767.86 | 2832.03 |
| 2870.1 | 5400.04 | 2831.19 | 4164.78 | 2792.29 | 2929.52 | 2753.38 | 1694.26 | 2714.48 |
| 2947.55 | 5548.39 | 2907.9 | 4279.19 | 2868.24 | 3010 | 2828.59 | 1740.81 | 2788.93 |
| 2964.86 | 5583.56 | 2925.27 | 4306.32 | 2885.68 | 3029.08 | 2846.08 | 1751.84 | 2806.49 |
| 2849.82 | 5334.05 | 2810.88 | 4107.76 | 2771.93 | 2881.46 | 2732.99 | 1655.16 | 2694.05 |
| 2715.48 | 5022.56 | 2676.94 | 3856.15 | 2638.4 | 2689.75 | 2599.86 | 1523.34 | 2561.32 |
| 2783.71 | 5031.14 | 2741.78 | 3838.53 | 2699.85 | 2645.91 | 2657.91 | 1453.3 | 2615.98 |
| 3096.59 | 5599.9 | 3050.34 | 4272.46 | 3004.1 | 2945.02 | 2957.85 | 1617.59 | 2911.61 |
| 3811.2 | 6914.35 | 3761.16 | 5266.79 | 3711.13 | 3619.23 | 3661.1 | 1971.67 | 3611.07 |
| 3990.53 | 7341.19 | 3941.85 | 5609.95 | 3893.18 | 3878.72 | 3844.5 | 2147.49 | 3795.82 |
| 3550.45 | 6490.48 | 3509.95 | 4943.92 | 3469.44 | 3397.36 | 3428.93 | 1850.8 | 3388.43 |
| 4450.16 | 8214.64 | 4399.26 | 6277.42 | 4348.37 | 4340.21 | 4297.48 | 2402.99 | 4246.59 |
| 3673.3 | 6832.95 | 3629.63 | 5238.01 | 3585.95 | 3643.08 | 3542.28 | 2048.14 | 3498.61 |

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|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 3876.88 | 7052.59 | 3832.71 | 5363.29 | 3788.53 | 3673.99 | 3744.36 | 1984.69 | 3700.18 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|

er along the center line A and V are the area and volum of water under certain depth in that cross sectio

[illegible]

| | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|---------|---------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8718.83 | 13051.85 | 2765.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14902.34 | 10433.47 | 10200.4 | 10361.56 | 5498.45 | 10289.66 | 796.5 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3824.14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1634.53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1615.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1334.52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6340.2 | 11977.53 | 867.29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15185.13 | 14075.87 | 8811.55 | 13971.31 | 2437.98 | 0 | 0 | 0 | 0 |
| 13368.24 | 14484.67 | 6791.93 | 14377.95 | 215.62 | 0 | 0 | 0 | 0 |
| 13844.1 | 13065.44 | 7924.77 | 12970.55 | 2005.45 | 0 | 0 | 0 | 0 |
| 10830.29 | 12400.24 | 5199.77 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13284.61 | 19033.34 | 4602.17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6291.51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2065.51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4475.92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6382.07 | 13581.18 | 169.74 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1634.83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3282.67 | 3036.99 | 1104.69 | 1339.6 | 6.7 | 0 | 0 | 0 | 0 |
| 309.43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 773.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1516.54 | 2667.79 | 299.32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2415.25 | 3731.28 | 715.29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1228.28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 361.37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1600.57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10837.6 | 8948.35 | 6344.69 | 4583.73 | 3280.43 | 2228.97 | 1354.1 | 2228.97 | 334.34 |
| 28828.41 | 13959.34 | 20538.3 | 11738.51 | 14696 | 9599.32 | 10015.52 | 7603.21 | 6522.08 |
| 2745.82 | 2025.63 | 1139.42 | 2025.63 | 212.69 | 0 | 0 | 0 | 0 |
| 23766.01 | 14493.95 | 17135.03 | 12255.27 | 11231.62 | 7906.57 | 6488.69 | 7906.57 | 2871.43 |
| 9794.32 | 7634.23 | 6308.92 | 6040.16 | 3131.27 | 4017.64 | 494.31 | 0 | 0 |
| 8316.14 | 11138.86 | 3231.76 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1851.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 895.37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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|--------|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 542.96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 560.36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 425.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 341.31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 298.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 301.47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 333.58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 537.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 494.96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 482.99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 488.52 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 484.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 496.49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 468.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 432.43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 411.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 398.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 394.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 413.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 419.71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 437.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 433.08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 434.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 452.57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 489.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 489.29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 490.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 478.94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 459 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 471.61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 474.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 428.87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 356.93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 260.68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 290.15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 324.11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 416.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 304.24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 465.78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 453.21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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|-------|---|---|---|---|---|---|---|---|
| 295.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
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| 0 | 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|

From: [Sid Flannery](#)
To: [Xinjian Chen](#)
Cc: [Kym Holzwart](#); [Doug Leeper](#)
Subject: Re: Bathymetry and shoreline stuff
Date: Friday, December 3, 2021 2:30:24 PM
Attachments: [BolsterBayou Area&Volume with totals for Alan.xls](#)
[LMR Area volume file from FSU new.xls](#)
[Little Manatee Area volume final withnotes.xls](#)
[SWFWMD FSU SQW Final revise.doc](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Xinjian,

First things first. For several philosophical reasons, I am so disgusted with the Gators firing their football coach before the year was over. I guess Doug and I did not have our annual Dawgs/Gators lunch bet, or he is being kind and not cashing in.

Back to bidness. Attached is EXCEL file that I am 99% sure that Allan used for the area and volume plots, plus a version with notes. See the folder called *area volume* in my Rivers/LMR folder that was on the D drive. We received the precursor of this from FSU, as one version of the spreadsheet says from FSU (also attached). Note that version does not have data for Bolster Bayou, as the FSU EFDC model does not have that bayou as well. But, there is a sub-folder for Bolster Bayou under LMR which contains area volume results I think the District generated and added to the spreadsheet Allan used.

Also attached is the scope of work for FSU, which calls for the area/volume spreadsheet. However, I wonder if this spreadsheet is more exact than the cells used in their EFDC model. The data for the spreadsheet might have come first, then those same data grouped for the model grid (which might not have the same vertical resolution as the spreadsheet). Do you know what I mean - what do you think?

Have a good weekend,
Sid

On Fri, Dec 3, 2021 at 9:29 AM Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us> wrote:

Thanks Sid!

XinJian

From: Sid Flannery <sidflannery22@gmail.com>
Sent: Friday, December 3, 2021 9:26 AM
To: Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>
Cc: Kym Holzward <Kym.Holzward@swfwmd.state.fl.us>
Subject: Re: Bathymetry and shoreline stuff

[EXTERNAL SENDER] Use caution before opening.

Hi Xinjian,

I have a meeting coming up, but can look this afternoon.

This could be a case of "let's go fishin" and you will have access to the same files I have. It was a long time ago, and I assume I submitted Ping Wang files to Allan.

BUT - there is a general volume/area spreadsheet that was created that Allan may have used. I am pretty sure I can find that after lunch and it may match up with those plots, maybe not.

Sid

On Fri, Dec 3, 2021 at 9:18 AM Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us> wrote:

Good morning Sid,

In your 11/18/2021 email, you attached four files. One of them is called "Little Manatee morphology and vegetation plots.pdf". You mentioned that Allan Willis of Atkins generated those area and volume plots in the file from the bathymetry data. I assume that these were the bathymetry data surveyed by Ping Wang of USF. I am trying to find electric files containing data points for generating these Atkins plots but failed. Do you have these files by any chance? If you have, would you please email them to me?

Thanks,

XinJian

From: Sid Flannery <sidflannery22@gmail.com>
Sent: Thursday, November 18, 2021 2:59 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Mike Wessel (MWessel@janickienviromental.com) <MWessel@janickienviromental.com>
Subject: Bathymetry and shoreline stuff

[EXTERNAL SENDER] Use caution before opening.

Hello all,

I just talked with Doug about EFDC model output files and will reply about that tomorrow morning. In short, I can wait for the revised model runs.

In the meantime, Doug and I were talking about the bathymetry data for the Little Manatee and I brought up the bathymetry report and data sets that Ping Wang of USF did for the District. I am sure that you all, especially Xinjian, are aware of that. This is the bathymetry data from USF that were provided to FSU for construction of the EFDC model. Again, I expect you have those files, and if not, Xinjian can find them in the files I left behind.

I have attached three jpgs from the USF bathymetry work plus the WORD file of the final USF report. It looks like USF did go into the side channels quite a bit.

I have also attached a pdf of some combined graphs taken from the bathymetry data that Allan Willis generated for the District when he was Atkins. I think the area and volume plots could be helpful.

There are also shoreline plots, but I am thinking they must have come

from the vegetation work that FWRI did for the District as the vegetation is classified into different groups. The vegetation plots are more than you need, but it was easier than sorting them out.

As I told Doug, I will submit to the District a document by the Monday after Thanksgiving that lists data and graphics I think would be useful, including some of these graphics.

Sid

SCOPE OF WORK

HYDRODYNAMIC MODELING OF LITTLE MANATEE RIVER

BACKGROUND

Sections 373.042 and 373.0421 of the Florida Statute require Water Management Districts to establish and implement minimum flows and levels (MFLs) for certain priority water bodies within their respective jurisdictional boundaries. The Florida Statute defines an MFL as: *the minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area.*

The Little Manatee River (LMR) is one of the priority water bodies for that MFLs are to be adopted by the Southwest Florida Water Management District. This project is to support the adoption of MFLs for the tidal reach of the LMR. The river extends approximately 40 miles from its mouth on the southeast corner of Tampa Bay near Ruskin to its eastward origin in southeastern Hillsborough County. The drainage area is approximately 225 square miles. Tidal effects are discernable up to 15 miles from Tampa Bay. Key elements for adopting minimum flows for the LMR is a sound understanding of salinity transport processes and how freshwater flows affect salinity distributions and mixing times (e.g., residence times) in the riverine estuary. The present project involves the development of a hydrodynamic model for the LMR to simulate salinity transport processes and residence times in the tidal river. ~~and to quantify the effects of freshwater inflows on these characteristics of the river.~~

TASKS

The UNIVERSITY shall complete the following tasks:

Task I: Project Kick-Off Meeting

The UNIVERSITY shall attend an initial project kick-off meeting with DISTRICT staff to review the overall project objectives, the scope of work, project schedules, and other project-related matters. The UNIVERSITY shall take and submit minutes for the project kick-off meeting.

Task II Processing Data

Sub-Task II.1 Processing Bathymetric Data

The UNIVERSITY shall obtain, from the DISTRICT, bathymetric data measured in the LMR. The UNIVERSITY shall process these data using a GIS (Geophysical Information System) software package and/or an appropriate software package. The UNIVERSITY will report to the DISTRICT on the adequacy of bathymetric data for the study area. Pending UNIVERSITY's findings, the DISTRICT will be responsible for gathering new bathymetric data.

The bathymetric cross-sectional survey points shall be extended to include 1'-, 3'-, and 5'-contours above NGVD 1929 wherever these topographic contour lines are available. Based on measured bathymetric and available topographic data, the UNIVERSITY shall generate a grid system for the LMR hydrodynamic model. It is anticipated that the lengths of the cells along the longitudinal dimension of the estuary will range between 100 and 500 meters. The selection of the final model grid will be submitted to and approved by the DISTRICT. Under the DISTRICT's direction, the UNIVERSITY shall also generate an area-volume spreadsheet using processed bathymetric/topographic information of the grid system.

Sub-Task II.2 Processing USGS Data

The United State Geological Survey (USGS) has several data collection sites along the LMR: two above the tidal reach that measure streamflow and three along the tidal reach that measure water level, specific conductance, and temperature. The most downstream streamflow gauge measures approximately 67% of the entire Little Manatee River watershed. The DISTRICT will provide data from these sites for the period from April 2004 through July 2005 to UNIVERSITY by October 1, 2005. The UNIVERSITY shall graph and access the quality of these data. If some problematic data are identified, the UNIVERSITY shall contact the DISTRICT and/or the USGS to resolve these data issues. The USGS data will be used either for boundary conditions of the model or for model calibrations/verifications.

Sub-Task II.3 Processing Meteorological Data

The UNIVERSITY shall obtain, from the DISTRICT, meteorological data, including rainfall, wind, air temperature, air humidity, and solar radiation. The UNIVERSITY shall graph these data to identify any problems with the data. If problems are found in the data, the UNIVERSITY shall contact the DISTRICT to resolve these problems before they are used in the model.

Task III Hydrodynamic Modeling

Under the DISTRICT's direction, the UNIVERSITY will develop an LMR hydrodynamic model based on either the DISTRICT LAMFE model or another proper hydrodynamic model. The UNIVERSITY shall obtain approval from the DISTRICT on the simulation domain. The UNIVERSITY shall perform hydrodynamic simulations for a period of at least 15 months beginning in April 2004. The model will be used to evaluate salinity distributions, water temperature, and residence times in segments of the LMR. It is important that the hydrodynamic model is well calibrated and verified.

The DISTRICT will provide estimates of watershed runoff from the un-gauged 33% of the watershed to the UNIVERSITY for the period April 2004 through July

2005. The DISTRICT will provide preliminary estimates of un-gauged flows to the UNIVERSITY by October 1, 2005. Final values of un-gauged flows for the period April 2004 through July 2005 will be provided to the UNIVERSITY by December 20, 2005.

The DISTRICT will recommend that a baseline freshwater inflow scenario first be run, followed by three scenarios with the freshwater inflows reduced by different amounts. The model will be used to calculate salinity distributions and temperature regimes throughout the estuary. ~~and residence times in different segments of the estuary for the series of freshwater inflow scenarios.~~ It may be necessary to run some simulations for a three to five month period outside the calibration period in order to simulate the effects of low freshwater inflows. If such simulations are done, The DISTRICT will provide boundary conditions, streamflow, ungauged runoff, and meteorological data for this other period to the UNIVERSITY.

The output for the model will consist of simulated variables (stage, salinity, temperature, and water velocity) in all cells with a time interval of one hour. The UNIVERSITY will construct databases of model output for the baseline scenario and up to three flow reduction scenarios. The model output for each scenario will be provide to the DISTRICT in a mutually agreed format.

The UNIVERISTY will also required to produce graphic and tabular output for up to six periods in the baseline and three flow reduction scenarios. These outputs may include graphics of salinity distributions in the estuary and tables of volumes of water in different salinity zones.

The UNIVERSITY shall compute residence time as Pulse Residence Time (PRT) for one-kilometer segments and Estuarine Residence Time (ERT) for the entire estuary. Both ERT and PRT will be calculated for up 16 rates of freshwater inflow. The output of this effort will be a spreadsheet of values for PRT in each river segment and ERT for the entire estuary for all rates of flow examined.

Task IV Final Project Report

The UNIVERSITY shall submit a draft project report for the DISTRICT's review. The DISTRICT shall provide written comments on the draft report within two weeks of receipt. The UNIVERSITY shall incorporate the DISTRICT's comments into the final version of the project report that shall include at the minimum the following sections:

1. Executive summary,
2. Introduction,
3. Field Measurements (the location of the measurement, instruments used, plots of measured data, some preliminary analyses, etc.),

4. Hydrodynamic Modeling (brief description of model theory; boundary conditions used to driving the model, etc.),
5. Model Results (graphical and/or tabular output of model results showing comparisons with measured data, results of baseline runs vs. those of flow reductions, salinity distributions at selected time points, residence times for various flow scenarios, discussions, etc.),
6. Conclusions, and
7. References.

Task V General Administration

The UNIVERSITY shall submit a series of brief bi-monthly progress reports to the DISTRICT updating project status.

DELIVERABLES

The UNIVERSITY shall provide the DISTRICT with the following items:

1. Electronic files containing all measured data in the ASCII format,
2. The hydrodynamic model used,
3. Input files for model simulations,
4. Results of model simulations and residence time analyses specified in Task II in either the ASCII format or the MS Excel format,
5. All graphic files for figures included in the final report,
6. The final project report in the **MS WORD and pdf formats**, and
7. Five (5) hard copies of the final project report.

If the hydrodynamic model is not developed on a Microsoft Windows system (95, 98, 2000, or NT), it shall be adapted to a Microsoft Windows system.

SCHEDULE

The contract shall terminate on December 31, 2006. Starting from the date when Notice To Proceed (NTP) is issued, the UNIVERSITY shall complete each task within the time frame specified in the following table:

| Task | From NTP |
|----------------------------|----------|
| I. Kick-Off Meeting | 1 Week |
| II. Processing Data | 1 Months |
| III. Hydrodynamic Modeling | 7 Months |
| IV. Final Project Report | 8 Months |
| V. General Administration | Ongoing |

BUDGET (**Adjust costs as determined by Univeristy, kick off meeting is too much**)

| Task | Budget |
|------|--------|
|------|--------|

| | |
|----------------------------|-----------|
| I. Kick-Off Meeting | \$1,000 |
| II. Processing Data | \$12,000 |
| III. Hydrodynamic Modeling | \$75,000 |
| IV. Final Project Report | \$9,000 |
| V. General Administration | \$3,000 |
| Total | \$100,000 |

| | | | | | |
|---------------|--------|--------|--------|---------|---------|
| DZ(m) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Z_Top | -11.07 | -10.07 | -9.07 | -8.07 | -7.07 |
| Z(m) | | -10.57 | -9.57 | -8.57 | -7.57 |
| Z_Bottom | | -11.07 | -10.07 | -9.07 | -8.07 |
| Volume(Hec-m) | | 1.4704 | 3.8569 | 5.7398 | 6.2988 |
| Cul_Vol | 0 | 1.4704 | 5.3273 | 11.0671 | 17.3659 |

| | DX(km) | X_end | RivKM_XJC | RivKM_PBSJ | | | | | |
|----|--------|--------|-----------|------------|--------|--------|--------|--------|--|
| 1 | 0.100 | 0.100 | 0.050 | -0.018 | 0.0304 | 0.4770 | 0.7266 | 0.8252 | |
| 2 | 0.100 | 0.2000 | 0.150 | 0.083 | 0.0844 | 0.4967 | 0.6978 | 0.8012 | |
| 3 | 0.100 | 0.3000 | 0.250 | 0.182 | 0.1385 | 0.5165 | 0.6691 | 0.7772 | |
| 4 | 0.100 | 0.4000 | 0.350 | 0.282 | 0.2214 | 0.5777 | 0.6860 | 0.7927 | |
| 5 | 0.100 | 0.5000 | 0.450 | 0.383 | 0.4200 | 0.8053 | 0.8852 | 0.9663 | |
| 6 | 0.100 | 0.6000 | 0.550 | 0.492 | 0.5757 | 0.9837 | 1.0413 | 1.1024 | |
| 7 | 0.100 | 0.7000 | 0.650 | 0.593 | 0.0000 | 0.0000 | 1.0338 | 1.0338 | |
| 8 | 0.100 | 0.8000 | 0.750 | 0.693 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 9 | 0.100 | 0.9000 | 0.850 | 0.796 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 10 | 0.100 | 1.0000 | 0.950 | 0.900 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 11 | 0.100 | 1.1000 | 1.050 | 1.001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 12 | 0.100 | 1.2000 | 1.150 | 1.101 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 13 | 0.100 | 1.3000 | 1.250 | 1.202 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 14 | 0.100 | 1.4000 | 1.350 | 1.305 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 15 | 0.100 | 1.5000 | 1.450 | 1.410 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 16 | 0.100 | 1.6000 | 1.550 | 1.512 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 17 | 0.100 | 1.7000 | 1.650 | 1.609 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 18 | 0.100 | 1.8000 | 1.750 | 1.720 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 19 | 0.100 | 1.9000 | 1.850 | 1.872 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 20 | 0.100 | 2.0000 | 1.950 | 2.001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 21 | 0.100 | 2.1000 | 2.050 | 2.124 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 22 | 0.100 | 2.2000 | 2.150 | 2.207 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 23 | 0.100 | 2.3000 | 2.250 | 2.303 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 24 | 0.100 | 2.4000 | 2.350 | 2.401 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 25 | 0.100 | 2.5000 | 2.450 | 2.503 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 26 | 0.100 | 2.6000 | 2.550 | 2.603 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 27 | 0.100 | 2.7000 | 2.650 | 2.703 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 28 | 0.100 | 2.8000 | 2.750 | 2.802 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 29 | 0.100 | 2.9000 | 2.850 | 2.902 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 30 | 0.100 | 3.0000 | 2.950 | 3.003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 31 | 0.100 | 3.1000 | 3.050 | 3.105 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 32 | 0.100 | 3.2000 | 3.150 | 3.205 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 33 | 0.100 | 3.3000 | 3.250 | 3.306 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 34 | 0.100 | 3.4000 | 3.350 | 3.406 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 35 | 0.100 | 3.5000 | 3.450 | 3.506 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 36 | 0.100 | 3.6000 | 3.550 | 3.609 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 37 | 0.100 | 3.7000 | 3.650 | 3.709 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 38 | 0.100 | 3.8000 | 3.750 | 3.808 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 39 | 0.100 | 3.9000 | 3.850 | 3.909 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 40 | 0.100 | 4.0000 | 3.950 | 4.008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 41 | 0.100 | 4.1000 | 4.050 | 4.108 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 42 | 0.100 | 4.2000 | 4.150 | 4.208 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 43 | 0.100 | 4.3000 | 4.250 | 4.307 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |
| 44 | 0.100 | 4.4000 | 4.350 | 4.407 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | |

| | | | | | | | | |
|----|-------|--------|-------|-------|--------|--------|--------|--------|
| 45 | 0.100 | 4.5000 | 4.450 | 4.508 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 46 | 0.100 | 4.6000 | 4.550 | 4.610 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 47 | 0.100 | 4.7000 | 4.650 | 4.709 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 48 | 0.100 | 4.8000 | 4.750 | 4.810 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 49 | 0.100 | 4.9000 | 4.850 | 4.911 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 50 | 0.100 | 5.0000 | 4.950 | 5.011 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 51 | 0.100 | 5.1000 | 5.050 | 5.109 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 52 | 0.100 | 5.2000 | 5.150 | 5.211 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 53 | 0.100 | 5.3000 | 5.250 | 5.313 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 54 | 0.100 | 5.4000 | 5.350 | 5.415 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 55 | 0.100 | 5.5000 | 5.450 | 5.514 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 56 | 0.100 | 5.6000 | 5.550 | 5.614 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 57 | 0.100 | 5.7000 | 5.650 | 5.713 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 58 | 0.100 | 5.8000 | 5.750 | 5.813 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 59 | 0.100 | 5.9000 | 5.850 | 5.913 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 60 | 0.100 | 6.0000 | 5.950 | 6.013 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 61 | 0.100 | 6.1000 | 6.050 | 6.114 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 62 | 0.100 | 6.2000 | 6.150 | 6.215 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 63 | 0.100 | 6.3000 | 6.250 | 6.318 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 64 | 0.100 | 6.4000 | 6.350 | 6.418 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 65 | 0.100 | 6.5000 | 6.450 | 6.519 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 66 | 0.100 | 6.6000 | 6.550 | 6.618 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 67 | 0.100 | 6.7000 | 6.650 | 6.712 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 68 | 0.100 | 6.8000 | 6.750 | 6.809 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 69 | 0.100 | 6.9000 | 6.850 | 6.910 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 70 | 0.100 | 7.0000 | 6.950 | 7.011 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 71 | 0.100 | 7.1000 | 7.050 | 7.110 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 72 | 0.100 | 7.2000 | 7.150 | 7.209 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 73 | 0.100 | 7.3000 | 7.250 | 7.310 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 74 | 0.100 | 7.4000 | 7.350 | 7.410 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 75 | 0.100 | 7.5000 | 7.450 | 7.510 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 76 | 0.100 | 7.6000 | 7.550 | 7.610 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 77 | 0.100 | 7.7000 | 7.650 | 7.711 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 78 | 0.100 | 7.8000 | 7.750 | 7.811 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 79 | 0.100 | 7.9000 | 7.850 | 7.913 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 80 | 0.100 | 8.0000 | 7.950 | 8.011 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 81 | 0.100 | 8.1000 | 8.050 | 8.113 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 82 | 0.100 | 8.2000 | 8.150 | 8.211 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 83 | 0.100 | 8.3000 | 8.250 | 8.312 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 84 | 0.100 | 8.4000 | 8.350 | 8.412 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 85 | 0.100 | 8.5000 | 8.450 | 8.512 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 86 | 0.100 | 8.6000 | 8.550 | 8.612 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 87 | 0.100 | 8.7000 | 8.650 | 8.713 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 88 | 0.100 | 8.8000 | 8.750 | 8.813 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 89 | 0.100 | 8.9000 | 8.850 | 8.915 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 90 | 0.100 | 9.0000 | 8.950 | 9.018 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 91 | 0.100 | 9.1000 | 9.050 | 9.119 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 92 | 0.100 | 9.2000 | 9.150 | 9.219 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 93 | 0.100 | 9.3000 | 9.250 | 9.319 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 94 | 0.100 | 9.4000 | 9.350 | 9.410 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 95 | 0.100 | 9.5000 | 9.450 | 9.508 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 96 | 0.100 | 9.6000 | 9.550 | 9.609 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

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|-----|-------|---------|--------|--------|--------|--------|--------|--------|
| 97 | 0.100 | 9.7000 | 9.650 | 9.707 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 98 | 0.100 | 9.8000 | 9.750 | 9.807 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 99 | 0.100 | 9.9000 | 9.850 | 9.907 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 100 | 0.100 | 10.0000 | 9.950 | 10.003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 101 | 0.100 | 10.1000 | 10.050 | 10.110 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 102 | 0.100 | 10.2000 | 10.150 | 10.207 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 103 | 0.100 | 10.3000 | 10.250 | 10.307 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 104 | 0.100 | 10.4000 | 10.350 | 10.408 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 105 | 0.100 | 10.5000 | 10.450 | 10.505 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 106 | 0.100 | 10.6000 | 10.550 | 10.602 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 107 | 0.100 | 10.7000 | 10.650 | 10.703 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 108 | 0.100 | 10.8000 | 10.750 | 10.804 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 109 | 0.100 | 10.9000 | 10.850 | 10.902 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 110 | 0.100 | 11.0000 | 10.950 | 11.003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 111 | 0.100 | 11.1000 | 11.050 | 11.102 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 112 | 0.100 | 11.2000 | 11.150 | 11.202 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 113 | 0.100 | 11.3000 | 11.250 | 11.302 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 114 | 0.100 | 11.4000 | 11.350 | 11.402 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 115 | 0.100 | 11.5000 | 11.450 | 11.503 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 116 | 0.100 | 11.6000 | 11.550 | 11.603 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 117 | 0.100 | 11.7000 | 11.650 | 11.704 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 118 | 0.100 | 11.8000 | 11.750 | 11.803 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 119 | 0.100 | 11.9000 | 11.850 | 11.904 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 120 | 0.100 | 12.0000 | 11.950 | 12.005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 121 | 0.100 | 12.1000 | 12.050 | 12.106 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 122 | 0.100 | 12.2000 | 12.150 | 12.213 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 123 | 0.100 | 12.3000 | 12.250 | 12.296 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 124 | 0.100 | 12.4000 | 12.350 | 12.400 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 125 | 0.100 | 12.5000 | 12.450 | 12.490 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 126 | 0.100 | 12.6000 | 12.550 | 12.582 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 127 | 0.100 | 12.7000 | 12.650 | 12.683 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 128 | 0.100 | 12.8000 | 12.750 | 12.789 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 129 | 0.100 | 12.9000 | 12.850 | 12.892 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 130 | 0.100 | 13.0000 | 12.950 | 12.992 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 131 | 0.100 | 13.1000 | 13.050 | 13.091 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 132 | 0.100 | 13.2000 | 13.150 | 13.191 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 133 | 0.100 | 13.3000 | 13.250 | 13.296 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 134 | 0.100 | 13.4000 | 13.350 | 13.426 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 135 | 0.100 | 13.5000 | 13.450 | 13.493 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 136 | 0.100 | 13.6000 | 13.550 | 13.600 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 137 | 0.100 | 13.7000 | 13.650 | 13.700 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 138 | 0.100 | 13.8000 | 13.750 | 13.800 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 139 | 0.100 | 13.9000 | 13.850 | 13.899 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 140 | 0.100 | 14.0000 | 13.950 | 13.996 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 141 | 0.100 | 14.1000 | 14.050 | 14.094 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 142 | 0.100 | 14.2000 | 14.150 | 14.185 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 143 | 0.100 | 14.3000 | 14.250 | 14.285 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 144 | 0.100 | 14.4000 | 14.350 | 14.391 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 145 | 0.100 | 14.5000 | 14.450 | 14.495 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 146 | 0.100 | 14.6000 | 14.550 | 14.591 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 147 | 0.100 | 14.7000 | 14.650 | 14.689 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 148 | 0.100 | 14.8000 | 14.750 | 14.781 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

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|-----|-------|---------|--------|--------|--------|--------|--------|--------|
| 149 | 0.100 | 14.9000 | 14.850 | 14.879 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 150 | 0.100 | 15.0000 | 14.950 | 14.977 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 151 | 0.100 | 15.1000 | 15.050 | 15.074 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 152 | 0.100 | 15.2000 | 15.150 | 15.171 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 153 | 0.100 | 15.3000 | 15.250 | 15.269 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 154 | 0.100 | 15.4000 | 15.350 | 15.366 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 155 | 0.100 | 15.5000 | 15.450 | 15.465 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 156 | 0.100 | 15.6000 | 15.550 | 15.565 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 157 | 0.100 | 15.7000 | 15.650 | 15.662 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 158 | 0.100 | 15.8000 | 15.750 | 15.762 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 159 | 0.100 | 15.9000 | 15.850 | 15.855 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 160 | 0.100 | 16.0000 | 15.950 | 15.941 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 161 | 0.100 | 16.1000 | 16.050 | 16.041 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 162 | 0.100 | 16.2000 | 16.150 | 16.151 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 163 | 0.100 | 16.3000 | 16.250 | 16.250 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 164 | 0.100 | 16.4000 | 16.350 | 16.348 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 165 | 0.100 | 16.5000 | 16.450 | 16.448 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 166 | 0.100 | 16.6000 | 16.550 | 16.548 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 167 | 0.100 | 16.7000 | 16.650 | 16.646 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 168 | 0.100 | 16.8000 | 16.750 | 16.747 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 169 | 0.100 | 16.9000 | 16.850 | 16.843 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 170 | 0.100 | 17.0000 | 16.950 | 16.946 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 171 | 0.100 | 17.1000 | 17.050 | 17.046 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 172 | 0.100 | 17.2000 | 17.150 | 17.143 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 173 | 0.100 | 17.3000 | 17.250 | 17.241 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 174 | 0.100 | 17.4000 | 17.350 | 17.334 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 175 | 0.100 | 17.5000 | 17.450 | 17.433 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 176 | 0.100 | 17.6000 | 17.550 | 17.528 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 177 | 0.100 | 17.7000 | 17.650 | 17.629 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 178 | 0.069 | 17.7690 | 17.735 | 17.705 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

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|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| 1.60 | 1.00 | 0.60 | 0.50 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| -5.47 | -4.47 | -3.87 | -3.37 | -2.97 | -2.57 | -2.17 | -1.77 | -1.37 |
| -6.27 | -4.97 | -4.17 | -3.62 | -3.17 | -2.77 | -2.37 | -1.97 | -1.57 |
| -7.07 | -5.47 | -4.47 | -3.87 | -3.37 | -2.97 | -2.57 | -2.17 | -1.77 |
| 12.1888 | 8.8133 | 5.9104 | 5.7450 | 6.3565 | 10.7449 | 16.1985 | 24.3509 | 38.8004 |
| 29.5547 | 38.3680 | 44.2784 | 50.0233 | 56.3798 | 67.1248 | 83.3233 | 107.6742 | 146.4746 |

[illegible]

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|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0846 | 0.2253 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2190 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2142 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0434 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1318 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2180 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1325 | 0.2822 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1325 | 0.2794 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0460 | 0.1230 | 0.2289 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0427 | 0.0665 | 0.1271 | 0.2502 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0427 | 0.0826 | 0.1373 | 0.2598 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0427 | 0.0897 | 0.1595 | 0.2464 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0908 | 0.1504 | 0.2504 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1385 | 0.2344 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1374 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0588 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0692 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0796 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0846 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0840 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2429 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.3193 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1124 | 0.2925 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1252 | 0.2646 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0815 | 0.1495 | 0.2356 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0492 | 0.1536 | 0.2190 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0263 | 0.1506 | 0.2060 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0635 | 0.1337 | 0.1988 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0403 | 0.0941 | 0.1521 | 0.2082 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0403 | 0.0856 | 0.1603 | 0.2120 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0550 | 0.1557 | 0.2276 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1430 | 0.3277 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1335 | 0.3202 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1258 | 0.2545 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1169 | 0.2148 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1053 | 0.2300 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0992 | 0.1155 | 0.2140 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0468 | 0.0979 | 0.1389 | 0.1807 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0348 | 0.0868 | 0.1439 | 0.1866 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0228 | 0.0756 | 0.1488 | 0.1926 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1488 | 0.2348 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0975 | 0.2602 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0343 | 0.0534 | 0.0975 | 0.2446 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0164 | 0.0407 | 0.0724 | 0.1089 | 0.2128 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0297 | 0.0534 | 0.1098 | 0.1313 | 0.1654 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0534 | 0.0858 | 0.1319 | 0.1823 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0813 | 0.1364 | 0.1958 |

| | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0938 | 0.1444 | 0.2060 |
| 0.0000 | 0.0000 | 0.0405 | 0.0589 | 0.0630 | 0.0778 | 0.0997 | 0.1271 | 0.1530 |
| 0.0000 | 0.0000 | 0.0000 | 0.0520 | 0.0416 | 0.0416 | 0.1082 | 0.1555 | 0.1928 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1162 | 0.1791 | 0.2333 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0894 | 0.0894 | 0.1455 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0728 | 0.0890 | 0.1378 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0086 | 0.0728 | 0.1267 | 0.1644 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0562 | 0.0562 | 0.0926 | 0.1306 | 0.1540 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0817 | 0.0817 | 0.0988 | 0.1282 | 0.1465 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0540 | 0.0664 | 0.0890 | 0.1331 | 0.1547 |
| 0.0000 | 0.0000 | 0.0000 | 0.0232 | 0.0540 | 0.0929 | 0.1081 | 0.1314 | 0.1420 |
| 0.0000 | 0.0000 | 0.0000 | 0.0232 | 0.0521 | 0.0759 | 0.1021 | 0.1155 | 0.1236 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0507 | 0.0640 | 0.0974 | 0.1073 | 0.1183 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0656 | 0.0963 | 0.1194 | 0.1476 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0600 | 0.0870 | 0.1131 | 0.1467 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0186 | 0.0433 | 0.0652 | 0.0826 | 0.1032 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0296 | 0.0554 | 0.1265 | 0.1456 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0175 | 0.0458 | 0.1632 | 0.1820 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0175 | 0.0372 | 0.1459 | 0.1753 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0287 | 0.1286 | 0.1686 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0202 | 0.1112 | 0.1619 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0117 | 0.0940 | 0.1552 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0738 | 0.0764 | 0.1050 | 0.1247 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0655 | 0.0930 | 0.1141 | 0.1242 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0536 | 0.0886 | 0.1223 | 0.1368 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0536 | 0.0598 | 0.0942 | 0.1368 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0310 | 0.0662 | 0.1368 |
| 0.0000 | 0.0000 | 0.0000 | 0.0924 | 0.0739 | 0.0739 | 0.0739 | 0.0956 | 0.1304 |
| 0.0000 | 0.0448 | 0.0895 | 0.1066 | 0.0885 | 0.0966 | 0.1054 | 0.1195 | 0.1253 |
| 0.0000 | 0.0000 | 0.0685 | 0.0571 | 0.0457 | 0.0559 | 0.0707 | 0.1088 | 0.1272 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 0.0152 | 0.0360 | 0.0980 | 0.1291 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0106 | 0.0236 | 0.0395 | 0.0793 | 0.1042 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0178 | 0.0313 | 0.0432 | 0.0638 | 0.0838 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0178 | 0.0301 | 0.0472 | 0.0718 | 0.0976 |
| 0.0000 | 0.0000 | 0.0959 | 0.0800 | 0.0640 | 0.0640 | 0.0803 | 0.1024 | 0.1222 |
| 0.1027 | 0.1361 | 0.1264 | 0.1358 | 0.1296 | 0.1296 | 0.1400 | 0.1534 | 0.1566 |
| 0.0000 | 0.1361 | 0.1264 | 0.1060 | 0.0848 | 0.0848 | 0.1100 | 0.1247 | 0.1302 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0298 | 0.0708 | 0.0876 | 0.0976 |
| 0.0000 | 0.0000 | 0.0000 | 0.0697 | 0.0647 | 0.0647 | 0.0942 | 0.1036 | 0.1091 |
| 0.0000 | 0.0000 | 0.0195 | 0.0697 | 0.0953 | 0.0996 | 0.1177 | 0.1198 | 0.1206 |
| 0.0000 | 0.0000 | 0.0000 | 0.0361 | 0.0784 | 0.0960 | 0.1072 | 0.1101 | 0.1109 |
| 0.0000 | 0.0000 | 0.0000 | 0.0129 | 0.0607 | 0.0846 | 0.0953 | 0.1002 | 0.1020 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0425 | 0.0602 | 0.0833 | 0.0918 | 0.0961 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0372 | 0.0448 | 0.0791 | 0.0880 | 0.0928 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0330 | 0.0780 | 0.0862 | 0.0906 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0506 | 0.0506 | 0.0823 | 0.0882 | 0.0919 |
| 0.0000 | 0.0000 | 0.0000 | 0.0931 | 0.0792 | 0.0792 | 0.0888 | 0.0916 | 0.0945 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0843 | 0.0844 | 0.0844 | 0.0989 | 0.1044 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0668 | 0.0767 | 0.1016 | 0.1095 |
| 0.0000 | 0.0000 | 0.0000 | 0.0513 | 0.0565 | 0.0668 | 0.0754 | 0.0870 | 0.0913 |
| 0.0000 | 0.0000 | 0.0469 | 0.0402 | 0.0560 | 0.0654 | 0.0727 | 0.0781 | 0.0820 |
| 0.0000 | 0.0000 | 0.0000 | 0.0160 | 0.0551 | 0.0623 | 0.0683 | 0.0762 | 0.0830 |

[illegible]

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|----------|----------|----------|----------|----------|----------|----------|
| 0.40 | 0.40 | 0.30 | 0.30 | 0.30 | 0.40 | 0.50 |
| -0.97 | -0.57 | -0.27 | 0.03 | 0.33 | 0.73 | 1.23 |
| -1.17 | -0.77 | -0.42 | -0.12 | 0.18 | 0.53 | 0.98 |
| -1.37 | -0.97 | -0.57 | -0.27 | 0.03 | 0.33 | 0.73 |
| 63.0381 | 81.3678 | 70.1384 | 71.5331 | 71.7200 | 95.8908 | 120.2495 |
| 209.5127 | 290.8805 | 361.0189 | 432.5520 | 504.2721 | 600.1629 | 720.4124 |

| | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 0.5089 | 0.5580 | 0.4823 | 0.4832 | 0.4840 | 0.6466 | 0.8107 |
| 0.5046 | 0.5428 | 0.4538 | 0.4545 | 0.4553 | 0.6084 | 0.7626 |
| 0.5003 | 0.5277 | 0.4253 | 0.4259 | 0.4267 | 0.5702 | 0.7145 |
| 0.5108 | 0.5289 | 0.4137 | 0.4141 | 0.4149 | 0.5545 | 0.6945 |
| 0.5809 | 0.5956 | 0.4694 | 0.4697 | 0.4705 | 0.6284 | 0.7871 |
| 0.6474 | 0.6634 | 0.5284 | 0.5286 | 0.5294 | 0.7070 | 0.8854 |
| 0.7013 | 0.7351 | 0.5994 | 0.5998 | 0.6006 | 0.8020 | 1.0042 |
| 0.7551 | 0.8068 | 0.6704 | 0.6710 | 0.6718 | 0.8971 | 1.1229 |
| 0.8090 | 0.8786 | 0.7415 | 0.7422 | 0.7430 | 0.9922 | 1.2417 |
| 0.8628 | 0.9503 | 0.8126 | 0.8134 | 0.8142 | 1.0872 | 1.3604 |
| 0.8199 | 0.9496 | 0.8494 | 0.8554 | 0.8563 | 1.1434 | 1.4310 |
| 0.7540 | 0.9317 | 0.8780 | 0.8906 | 0.8915 | 1.1904 | 1.4900 |
| 0.6881 | 0.9138 | 0.9067 | 0.9257 | 0.9267 | 1.2374 | 1.5491 |
| 0.6996 | 0.9133 | 0.8460 | 0.8600 | 0.8610 | 1.1497 | 1.4391 |
| 0.7117 | 0.9130 | 0.7846 | 0.7934 | 0.7944 | 1.0608 | 1.3276 |
| 0.7238 | 0.9126 | 0.7231 | 0.7268 | 0.7278 | 0.9718 | 1.2161 |
| 0.9623 | 1.3717 | 1.0431 | 1.0446 | 1.0453 | 1.3954 | 1.7451 |
| 1.3280 | 2.0891 | 1.5777 | 1.5787 | 1.5789 | 2.1073 | 2.6344 |
| 1.2871 | 2.2294 | 1.7114 | 1.7243 | 1.7246 | 2.3018 | 2.8779 |
| 1.0496 | 2.0904 | 1.6513 | 1.6820 | 1.6829 | 2.2461 | 2.8091 |
| 0.8121 | 1.9514 | 1.5911 | 1.6398 | 1.6411 | 2.1904 | 2.7402 |
| 0.7118 | 1.7681 | 1.5227 | 1.5795 | 1.5810 | 2.1101 | 2.6403 |
| 0.7784 | 1.5308 | 1.4443 | 1.4974 | 1.4986 | 2.0001 | 2.5027 |
| 0.8450 | 1.2934 | 1.3658 | 1.4152 | 1.4162 | 1.8901 | 2.3650 |
| 0.9116 | 1.0561 | 1.2873 | 1.3330 | 1.3337 | 1.7801 | 2.2274 |
| 0.9181 | 0.9934 | 1.1692 | 1.2093 | 1.2100 | 1.6151 | 2.0212 |
| 0.9061 | 0.9843 | 1.0389 | 1.0727 | 1.0735 | 1.4332 | 1.7939 |
| 0.8940 | 0.9753 | 0.9086 | 0.9362 | 0.9369 | 1.2512 | 1.5666 |
| 0.8820 | 0.9662 | 0.7783 | 0.7997 | 0.8004 | 1.0693 | 1.3393 |
| 0.8869 | 1.0129 | 0.8495 | 0.8778 | 0.8791 | 1.1741 | 1.4701 |
| 0.8948 | 1.0698 | 0.9576 | 0.9953 | 0.9972 | 1.3314 | 1.6666 |
| 0.9028 | 1.1267 | 1.0657 | 1.1128 | 1.1153 | 1.4888 | 1.8631 |
| 0.8963 | 1.1484 | 1.1154 | 1.1662 | 1.1691 | 1.5604 | 1.9526 |
| 0.8606 | 1.0990 | 1.0470 | 1.0903 | 1.0929 | 1.4588 | 1.8256 |
| 0.8248 | 1.0496 | 0.9787 | 1.0143 | 1.0166 | 1.3572 | 1.6986 |
| 0.7890 | 1.0003 | 0.9104 | 0.9384 | 0.9404 | 1.2556 | 1.5717 |
| 0.7533 | 0.9509 | 0.8420 | 0.8624 | 0.8642 | 1.1540 | 1.4447 |
| 0.7175 | 0.9015 | 0.7737 | 0.7865 | 0.7879 | 1.0524 | 1.3177 |
| 0.6818 | 0.8521 | 0.7054 | 0.7106 | 0.7117 | 0.9507 | 1.1907 |
| 0.6442 | 0.8180 | 0.6599 | 0.6643 | 0.6653 | 0.8888 | 1.1134 |
| 0.6058 | 0.7911 | 0.6251 | 0.6319 | 0.6329 | 0.8453 | 1.0591 |
| 0.5675 | 0.7584 | 0.6216 | 0.6309 | 0.6320 | 0.8440 | 1.0575 |
| 0.5296 | 0.6948 | 0.7889 | 0.8008 | 0.8037 | 1.0729 | 1.3438 |
| 0.4917 | 0.6312 | 0.9561 | 0.9707 | 0.9753 | 1.3018 | 1.6301 |

| | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 0.4584 | 0.5716 | 1.0966 | 1.1137 | 1.1198 | 1.4946 | 1.8712 |
| 0.5102 | 0.5875 | 0.7501 | 0.7667 | 0.7698 | 1.0278 | 1.2872 |
| 0.5402 | 0.6371 | 0.5031 | 0.5183 | 0.5191 | 0.6934 | 0.8689 |
| 0.4883 | 0.8135 | 0.6302 | 0.6412 | 0.6419 | 0.8572 | 1.0738 |
| 0.4379 | 0.8949 | 0.7151 | 0.7223 | 0.7231 | 0.9655 | 1.2090 |
| 0.3884 | 0.9154 | 0.7728 | 0.7767 | 0.7775 | 1.0382 | 1.2994 |
| 0.3475 | 0.9312 | 0.8187 | 0.8201 | 0.8209 | 1.0962 | 1.3717 |
| 0.3865 | 0.9038 | 0.7547 | 0.7617 | 0.7625 | 1.0184 | 1.2750 |
| 0.4255 | 0.8765 | 0.6906 | 0.7034 | 0.7041 | 0.9407 | 1.1782 |
| 0.5251 | 0.7972 | 0.5988 | 0.5998 | 0.6005 | 0.8022 | 1.0049 |
| 0.5415 | 0.6774 | 0.5090 | 0.5099 | 0.5107 | 0.6823 | 0.8546 |
| 0.5426 | 0.5844 | 0.4392 | 0.4401 | 0.4411 | 0.5892 | 0.7383 |
| 0.4969 | 0.5726 | 0.4307 | 0.4316 | 0.4327 | 0.5781 | 0.7252 |
| 0.3552 | 0.4593 | 0.4482 | 0.4715 | 0.4725 | 0.6316 | 0.7915 |
| 0.3514 | 0.4641 | 0.4292 | 0.4454 | 0.4463 | 0.5966 | 0.7479 |
| 0.3374 | 0.4413 | 0.3906 | 0.4042 | 0.4051 | 0.5416 | 0.6791 |
| 0.3036 | 0.3642 | 0.3132 | 0.3332 | 0.3340 | 0.4468 | 0.5605 |
| 0.3561 | 0.4535 | 0.3803 | 0.3985 | 0.3995 | 0.5343 | 0.6700 |
| 0.4174 | 0.5499 | 0.4559 | 0.4712 | 0.4723 | 0.6314 | 0.7917 |
| 0.4501 | 0.5574 | 0.4626 | 0.4759 | 0.4769 | 0.6375 | 0.7996 |
| 0.4838 | 0.5662 | 0.4672 | 0.4782 | 0.4792 | 0.6405 | 0.8035 |
| 0.5222 | 0.5810 | 0.4619 | 0.4690 | 0.4700 | 0.6283 | 0.7884 |
| 0.5606 | 0.5960 | 0.4567 | 0.4598 | 0.4607 | 0.6161 | 0.7732 |
| 0.5556 | 0.5802 | 0.4366 | 0.4377 | 0.4386 | 0.5866 | 0.7363 |
| 0.5058 | 0.5332 | 0.4013 | 0.4024 | 0.4034 | 0.5394 | 0.6771 |
| 0.4660 | 0.4792 | 0.3608 | 0.3616 | 0.3626 | 0.4853 | 0.6091 |
| 0.4183 | 0.4442 | 0.3346 | 0.3353 | 0.3364 | 0.4503 | 0.5653 |
| 0.3608 | 0.4327 | 0.3259 | 0.3268 | 0.3279 | 0.4388 | 0.5512 |
| 0.3243 | 0.4032 | 0.3036 | 0.3046 | 0.3057 | 0.4090 | 0.5138 |
| 0.3067 | 0.3573 | 0.2691 | 0.2700 | 0.2710 | 0.3624 | 0.4554 |
| 0.2844 | 0.3368 | 0.2537 | 0.2546 | 0.2555 | 0.3417 | 0.4289 |
| 0.2680 | 0.3237 | 0.2439 | 0.2447 | 0.2455 | 0.3283 | 0.4117 |
| 0.2777 | 0.3211 | 0.2420 | 0.2428 | 0.2435 | 0.3257 | 0.4088 |
| 0.2878 | 0.3261 | 0.2457 | 0.2468 | 0.2477 | 0.3315 | 0.4165 |
| 0.2763 | 0.3280 | 0.2551 | 0.2649 | 0.2658 | 0.3558 | 0.4473 |
| 0.2714 | 0.3405 | 0.2757 | 0.2955 | 0.2963 | 0.3965 | 0.4985 |
| 0.3764 | 0.4190 | 0.3332 | 0.3390 | 0.3398 | 0.4546 | 0.5703 |
| 0.3839 | 0.4523 | 0.3632 | 0.3661 | 0.3670 | 0.4909 | 0.6157 |
| 0.3386 | 0.4611 | 0.3783 | 0.3844 | 0.3855 | 0.5154 | 0.6467 |
| 0.3173 | 0.4577 | 0.3809 | 0.3878 | 0.3889 | 0.5199 | 0.6525 |
| 0.3466 | 0.4284 | 0.3569 | 0.3596 | 0.3605 | 0.4821 | 0.6051 |
| 0.3056 | 0.3848 | 0.3207 | 0.3285 | 0.3294 | 0.4406 | 0.5533 |
| 0.2243 | 0.3318 | 0.2766 | 0.2941 | 0.2950 | 0.3947 | 0.4962 |
| 0.2220 | 0.2873 | 0.2402 | 0.2493 | 0.2502 | 0.3349 | 0.4209 |
| 0.2198 | 0.2429 | 0.2039 | 0.2047 | 0.2055 | 0.2752 | 0.3458 |
| 0.2770 | 0.3118 | 0.2492 | 0.2500 | 0.2508 | 0.3357 | 0.4218 |
| 0.3067 | 0.3442 | 0.2732 | 0.2801 | 0.2809 | 0.3759 | 0.4722 |
| 0.2693 | 0.2872 | 0.2452 | 0.2729 | 0.2738 | 0.3664 | 0.4598 |
| 0.2344 | 0.2698 | 0.2334 | 0.2588 | 0.2598 | 0.3478 | 0.4369 |
| 0.2020 | 0.2904 | 0.2371 | 0.2382 | 0.2391 | 0.3205 | 0.4037 |
| 0.2374 | 0.2869 | 0.2410 | 0.2442 | 0.2453 | 0.3284 | 0.4135 |
| 0.2443 | 0.2682 | 0.2232 | 0.2288 | 0.2297 | 0.3077 | 0.3872 |

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|--------|--------|--------|--------|--------|--------|--------|
| 0.2260 | 0.2365 | 0.1867 | 0.1945 | 0.1954 | 0.2620 | 0.3294 |
| 0.1730 | 0.1921 | 0.1551 | 0.1628 | 0.1637 | 0.2196 | 0.2764 |
| 0.2164 | 0.2335 | 0.1911 | 0.1955 | 0.1964 | 0.2629 | 0.3309 |
| 0.2668 | 0.2850 | 0.2338 | 0.2346 | 0.2354 | 0.3148 | 0.3961 |
| 0.2471 | 0.3108 | 0.2448 | 0.2454 | 0.2460 | 0.3288 | 0.4128 |
| 0.2322 | 0.2950 | 0.2333 | 0.2348 | 0.2354 | 0.3149 | 0.3955 |
| 0.2195 | 0.2613 | 0.2123 | 0.2151 | 0.2158 | 0.2891 | 0.3638 |
| 0.1787 | 0.1988 | 0.1604 | 0.1708 | 0.1715 | 0.2302 | 0.2900 |
| 0.1597 | 0.1698 | 0.1347 | 0.1505 | 0.1514 | 0.2034 | 0.2563 |
| 0.1739 | 0.1888 | 0.1569 | 0.1672 | 0.1681 | 0.2255 | 0.2840 |
| 0.1531 | 0.1635 | 0.1498 | 0.1506 | 0.1514 | 0.2033 | 0.2558 |
| 0.1328 | 0.1426 | 0.1260 | 0.1268 | 0.1275 | 0.1713 | 0.2157 |
| 0.1273 | 0.1365 | 0.1150 | 0.1163 | 0.1170 | 0.1571 | 0.1980 |
| 0.1610 | 0.1696 | 0.1376 | 0.1409 | 0.1417 | 0.1901 | 0.2392 |
| 0.1753 | 0.1862 | 0.1514 | 0.1548 | 0.1556 | 0.2087 | 0.2626 |
| 0.1606 | 0.1782 | 0.1514 | 0.1522 | 0.1529 | 0.2051 | 0.2582 |
| 0.1779 | 0.1933 | 0.1542 | 0.1550 | 0.1557 | 0.2088 | 0.2630 |
| 0.1926 | 0.2061 | 0.1562 | 0.1571 | 0.1578 | 0.2115 | 0.2664 |
| 0.1881 | 0.2016 | 0.1531 | 0.1538 | 0.1545 | 0.2070 | 0.2606 |
| 0.1835 | 0.1971 | 0.1500 | 0.1507 | 0.1513 | 0.2026 | 0.2548 |
| 0.1790 | 0.1926 | 0.1469 | 0.1475 | 0.1480 | 0.1981 | 0.2490 |
| 0.1744 | 0.1881 | 0.1438 | 0.1442 | 0.1447 | 0.1936 | 0.2432 |
| 0.1311 | 0.1357 | 0.1031 | 0.1037 | 0.1044 | 0.1400 | 0.1761 |
| 0.1282 | 0.1302 | 0.0986 | 0.0994 | 0.1002 | 0.1347 | 0.1701 |
| 0.1429 | 0.1454 | 0.1102 | 0.1111 | 0.1120 | 0.1508 | 0.1911 |
| 0.1609 | 0.1632 | 0.1235 | 0.1244 | 0.1253 | 0.1684 | 0.2127 |
| 0.1788 | 0.1811 | 0.1368 | 0.1377 | 0.1386 | 0.1859 | 0.2344 |
| 0.1528 | 0.1564 | 0.1184 | 0.1193 | 0.1203 | 0.1618 | 0.2046 |
| 0.1310 | 0.1358 | 0.1031 | 0.1040 | 0.1050 | 0.1416 | 0.1796 |
| 0.1358 | 0.1413 | 0.1071 | 0.1079 | 0.1088 | 0.1465 | 0.1853 |
| 0.1406 | 0.1468 | 0.1111 | 0.1118 | 0.1126 | 0.1514 | 0.1910 |
| 0.1259 | 0.1333 | 0.1033 | 0.1041 | 0.1049 | 0.1413 | 0.1791 |
| 0.1132 | 0.1216 | 0.0962 | 0.0971 | 0.0979 | 0.1322 | 0.1682 |
| 0.1166 | 0.1238 | 0.0952 | 0.0961 | 0.0969 | 0.1307 | 0.1658 |
| 0.1321 | 0.1370 | 0.1036 | 0.1043 | 0.1051 | 0.1412 | 0.1784 |
| 0.1586 | 0.1599 | 0.1205 | 0.1210 | 0.1215 | 0.1627 | 0.2047 |
| 0.1377 | 0.1454 | 0.1103 | 0.1110 | 0.1118 | 0.1502 | 0.1897 |
| 0.1118 | 0.1261 | 0.0967 | 0.0976 | 0.0986 | 0.1331 | 0.1691 |
| 0.1166 | 0.1242 | 0.0944 | 0.0950 | 0.0958 | 0.1287 | 0.1627 |
| 0.1214 | 0.1222 | 0.0921 | 0.0925 | 0.0929 | 0.1243 | 0.1563 |
| 0.1116 | 0.1124 | 0.0848 | 0.0851 | 0.0856 | 0.1148 | 0.1445 |
| 0.1030 | 0.1038 | 0.0784 | 0.0788 | 0.0793 | 0.1065 | 0.1345 |
| 0.0977 | 0.0985 | 0.0744 | 0.0749 | 0.0754 | 0.1014 | 0.1282 |
| 0.0950 | 0.0959 | 0.0725 | 0.0729 | 0.0734 | 0.0986 | 0.1246 |
| 0.0933 | 0.0944 | 0.0713 | 0.0717 | 0.0722 | 0.0969 | 0.1221 |
| 0.0954 | 0.0976 | 0.0738 | 0.0743 | 0.0748 | 0.1006 | 0.1271 |
| 0.0989 | 0.1027 | 0.0777 | 0.0783 | 0.0789 | 0.1063 | 0.1350 |
| 0.1096 | 0.1144 | 0.0866 | 0.0874 | 0.0881 | 0.1187 | 0.1506 |
| 0.1147 | 0.1194 | 0.0905 | 0.0914 | 0.0922 | 0.1241 | 0.1570 |
| 0.0947 | 0.0976 | 0.0740 | 0.0747 | 0.0754 | 0.1014 | 0.1281 |
| 0.0860 | 0.0884 | 0.0670 | 0.0677 | 0.0683 | 0.0919 | 0.1159 |
| 0.0905 | 0.0942 | 0.0714 | 0.0720 | 0.0727 | 0.0978 | 0.1234 |

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|--------|--------|--------|--------|--------|--------|--------|
| 0.0961 | 0.0986 | 0.0746 | 0.0752 | 0.0758 | 0.1019 | 0.1286 |
| 0.1006 | 0.1018 | 0.0770 | 0.0775 | 0.0780 | 0.1048 | 0.1324 |
| 0.0775 | 0.0855 | 0.0649 | 0.0656 | 0.0662 | 0.0894 | 0.1137 |
| 0.0736 | 0.0820 | 0.0626 | 0.0633 | 0.0641 | 0.0866 | 0.1101 |
| 0.0826 | 0.0871 | 0.0668 | 0.0676 | 0.0683 | 0.0922 | 0.1168 |
| 0.0799 | 0.0836 | 0.0636 | 0.0643 | 0.0649 | 0.0875 | 0.1104 |
| 0.0783 | 0.0818 | 0.0621 | 0.0627 | 0.0633 | 0.0853 | 0.1078 |
| 0.0777 | 0.0809 | 0.0615 | 0.0621 | 0.0628 | 0.0847 | 0.1072 |
| 0.0780 | 0.0816 | 0.0620 | 0.0626 | 0.0633 | 0.0855 | 0.1085 |
| 0.0803 | 0.0853 | 0.0648 | 0.0655 | 0.0662 | 0.0894 | 0.1136 |
| 0.0827 | 0.0890 | 0.0676 | 0.0683 | 0.0691 | 0.0933 | 0.1187 |
| 0.0729 | 0.0762 | 0.0579 | 0.0585 | 0.0592 | 0.0800 | 0.1018 |
| 0.0654 | 0.0666 | 0.0507 | 0.0513 | 0.0519 | 0.0702 | 0.0892 |
| 0.0660 | 0.0680 | 0.0520 | 0.0527 | 0.0533 | 0.0720 | 0.0913 |
| 0.0666 | 0.0694 | 0.0533 | 0.0540 | 0.0547 | 0.0739 | 0.0935 |
| 0.0686 | 0.0748 | 0.0573 | 0.0580 | 0.0587 | 0.0793 | 0.1005 |
| 0.0707 | 0.0809 | 0.0617 | 0.0624 | 0.0632 | 0.0853 | 0.1082 |
| 0.0728 | 0.0870 | 0.0662 | 0.0669 | 0.0676 | 0.0912 | 0.1160 |
| 0.0750 | 0.0930 | 0.0706 | 0.0713 | 0.0721 | 0.0972 | 0.1237 |
| 0.0648 | 0.0768 | 0.0619 | 0.0626 | 0.0634 | 0.0857 | 0.1089 |
| 0.0542 | 0.0595 | 0.0525 | 0.0533 | 0.0541 | 0.0733 | 0.0930 |
| 0.0513 | 0.0544 | 0.0464 | 0.0471 | 0.0478 | 0.0648 | 0.0824 |
| 0.0497 | 0.0514 | 0.0408 | 0.0414 | 0.0420 | 0.0570 | 0.0726 |
| 0.0477 | 0.0487 | 0.0372 | 0.0378 | 0.0383 | 0.0520 | 0.0665 |
| 0.0454 | 0.0465 | 0.0355 | 0.0361 | 0.0367 | 0.0499 | 0.0640 |
| 0.0367 | 0.0429 | 0.0362 | 0.0396 | 0.0413 | 0.0571 | 0.0749 |
| 0.0246 | 0.0386 | 0.0383 | 0.0459 | 0.0492 | 0.0695 | 0.0932 |
| 0.0162 | 0.0282 | 0.0293 | 0.0362 | 0.0411 | 0.0613 | 0.0871 |
| 0.0088 | 0.0162 | 0.0174 | 0.0224 | 0.0288 | 0.0477 | 0.0745 |
| 0.0018 | 0.0042 | 0.0051 | 0.0074 | 0.0127 | 0.0250 | 0.0441 |

Volume for each individual layer - cell combination.

Total volume for each cell is in column AA. Total volume of river is in 10\

| | | | | |
|-----------------|--------|--------|--------|---------|
| DZ(m) | | 1.00 | 1.00 | 1.00 |
| Z_Top | -11.07 | -10.07 | -9.07 | -8.07 |
| Z(m) | | -10.57 | -9.57 | -8.57 |
| Z_Bottom | | -11.07 | -10.07 | -9.07 |
| Volume(Hec-m) | | 1.4704 | 3.8569 | 5.7398 |
| Cul_Vol (Hec-m) | 0 | 1.4704 | 5.3273 | 11.0671 |

| cell # | cell length km | cell end km | km-mid cell | km mid -HBMP | | | |
|--------|----------------|-------------|-------------|--------------|--------|--------|--------|
| 1 | 0.100 | 0.100 | 0.050 | -0.018 | 0.0304 | 0.4770 | 0.7266 |
| 2 | 0.100 | 0.2000 | 0.150 | 0.083 | 0.0844 | 0.4967 | 0.6978 |
| 3 | 0.100 | 0.3000 | 0.250 | 0.182 | 0.1385 | 0.5165 | 0.6691 |
| 4 | 0.100 | 0.4000 | 0.350 | 0.282 | 0.2214 | 0.5777 | 0.6860 |
| 5 | 0.100 | 0.5000 | 0.450 | 0.383 | 0.4200 | 0.8053 | 0.8852 |
| 6 | 0.100 | 0.6000 | 0.550 | 0.492 | 0.5757 | 0.9837 | 1.0413 |
| 7 | 0.100 | 0.7000 | 0.650 | 0.593 | 0.0000 | 0.0000 | 1.0338 |
| 8 | 0.100 | 0.8000 | 0.750 | 0.693 | 0.0000 | 0.0000 | 0.0000 |
| 9 | 0.100 | 0.9000 | 0.850 | 0.796 | 0.0000 | 0.0000 | 0.0000 |
| 10 | 0.100 | 1.0000 | 0.950 | 0.900 | 0.0000 | 0.0000 | 0.0000 |
| 11 | 0.100 | 1.1000 | 1.050 | 1.001 | 0.0000 | 0.0000 | 0.0000 |
| 12 | 0.100 | 1.2000 | 1.150 | 1.101 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 0.100 | 1.3000 | 1.250 | 1.202 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.100 | 1.4000 | 1.350 | 1.305 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.100 | 1.5000 | 1.450 | 1.410 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.100 | 1.6000 | 1.550 | 1.512 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.100 | 1.7000 | 1.650 | 1.609 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.100 | 1.8000 | 1.750 | 1.720 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.100 | 1.9000 | 1.850 | 1.872 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.100 | 2.0000 | 1.950 | 2.001 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.100 | 2.1000 | 2.050 | 2.124 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.100 | 2.2000 | 2.150 | 2.207 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.100 | 2.3000 | 2.250 | 2.303 | 0.0000 | 0.0000 | 0.0000 |
| 24 | 0.100 | 2.4000 | 2.350 | 2.401 | 0.0000 | 0.0000 | 0.0000 |
| 25 | 0.100 | 2.5000 | 2.450 | 2.503 | 0.0000 | 0.0000 | 0.0000 |
| 26 | 0.100 | 2.6000 | 2.550 | 2.603 | 0.0000 | 0.0000 | 0.0000 |
| 27 | 0.100 | 2.7000 | 2.650 | 2.703 | 0.0000 | 0.0000 | 0.0000 |
| 28 | 0.100 | 2.8000 | 2.750 | 2.802 | 0.0000 | 0.0000 | 0.0000 |
| 29 | 0.100 | 2.9000 | 2.850 | 2.902 | 0.0000 | 0.0000 | 0.0000 |
| 30 | 0.100 | 3.0000 | 2.950 | 3.003 | 0.0000 | 0.0000 | 0.0000 |
| 31 | 0.100 | 3.1000 | 3.050 | 3.105 | 0.0000 | 0.0000 | 0.0000 |
| 32 | 0.100 | 3.2000 | 3.150 | 3.205 | 0.0000 | 0.0000 | 0.0000 |
| 33 | 0.100 | 3.3000 | 3.250 | 3.306 | 0.0000 | 0.0000 | 0.0000 |
| 34 | 0.100 | 3.4000 | 3.350 | 3.406 | 0.0000 | 0.0000 | 0.0000 |
| 35 | 0.100 | 3.5000 | 3.450 | 3.506 | 0.0000 | 0.0000 | 0.0000 |
| 36 | 0.100 | 3.6000 | 3.550 | 3.609 | 0.0000 | 0.0000 | 0.0000 |
| 37 | 0.100 | 3.7000 | 3.650 | 3.709 | 0.0000 | 0.0000 | 0.0000 |
| 38 | 0.100 | 3.8000 | 3.750 | 3.808 | 0.0000 | 0.0000 | 0.0000 |
| 39 | 0.100 | 3.9000 | 3.850 | 3.909 | 0.0000 | 0.0000 | 0.0000 |

| | | | | | | | |
|----|-------|--------|-------|-------|--------|--------|--------|
| 40 | 0.100 | 4.0000 | 3.950 | 4.008 | 0.0000 | 0.0000 | 0.0000 |
| 41 | 0.100 | 4.1000 | 4.050 | 4.108 | 0.0000 | 0.0000 | 0.0000 |
| 42 | 0.100 | 4.2000 | 4.150 | 4.208 | 0.0000 | 0.0000 | 0.0000 |
| 43 | 0.100 | 4.3000 | 4.250 | 4.307 | 0.0000 | 0.0000 | 0.0000 |
| 44 | 0.100 | 4.4000 | 4.350 | 4.407 | 0.0000 | 0.0000 | 0.0000 |
| 45 | 0.100 | 4.5000 | 4.450 | 4.508 | 0.0000 | 0.0000 | 0.0000 |
| 46 | 0.100 | 4.6000 | 4.550 | 4.610 | 0.0000 | 0.0000 | 0.0000 |
| 47 | 0.100 | 4.7000 | 4.650 | 4.709 | 0.0000 | 0.0000 | 0.0000 |
| 48 | 0.100 | 4.8000 | 4.750 | 4.810 | 0.0000 | 0.0000 | 0.0000 |
| 49 | 0.100 | 4.9000 | 4.850 | 4.911 | 0.0000 | 0.0000 | 0.0000 |
| 50 | 0.100 | 5.0000 | 4.950 | 5.011 | 0.0000 | 0.0000 | 0.0000 |
| 51 | 0.100 | 5.1000 | 5.050 | 5.109 | 0.0000 | 0.0000 | 0.0000 |
| 52 | 0.100 | 5.2000 | 5.150 | 5.211 | 0.0000 | 0.0000 | 0.0000 |
| 53 | 0.100 | 5.3000 | 5.250 | 5.313 | 0.0000 | 0.0000 | 0.0000 |
| 54 | 0.100 | 5.4000 | 5.350 | 5.415 | 0.0000 | 0.0000 | 0.0000 |
| 55 | 0.100 | 5.5000 | 5.450 | 5.514 | 0.0000 | 0.0000 | 0.0000 |
| 56 | 0.100 | 5.6000 | 5.550 | 5.614 | 0.0000 | 0.0000 | 0.0000 |
| 57 | 0.100 | 5.7000 | 5.650 | 5.713 | 0.0000 | 0.0000 | 0.0000 |
| 58 | 0.100 | 5.8000 | 5.750 | 5.813 | 0.0000 | 0.0000 | 0.0000 |
| 59 | 0.100 | 5.9000 | 5.850 | 5.913 | 0.0000 | 0.0000 | 0.0000 |
| 60 | 0.100 | 6.0000 | 5.950 | 6.013 | 0.0000 | 0.0000 | 0.0000 |
| 61 | 0.100 | 6.1000 | 6.050 | 6.114 | 0.0000 | 0.0000 | 0.0000 |
| 62 | 0.100 | 6.2000 | 6.150 | 6.215 | 0.0000 | 0.0000 | 0.0000 |
| 63 | 0.100 | 6.3000 | 6.250 | 6.318 | 0.0000 | 0.0000 | 0.0000 |
| 64 | 0.100 | 6.4000 | 6.350 | 6.418 | 0.0000 | 0.0000 | 0.0000 |
| 65 | 0.100 | 6.5000 | 6.450 | 6.519 | 0.0000 | 0.0000 | 0.0000 |
| 66 | 0.100 | 6.6000 | 6.550 | 6.618 | 0.0000 | 0.0000 | 0.0000 |
| 67 | 0.100 | 6.7000 | 6.650 | 6.712 | 0.0000 | 0.0000 | 0.0000 |
| 68 | 0.100 | 6.8000 | 6.750 | 6.809 | 0.0000 | 0.0000 | 0.0000 |
| 69 | 0.100 | 6.9000 | 6.850 | 6.910 | 0.0000 | 0.0000 | 0.0000 |
| 70 | 0.100 | 7.0000 | 6.950 | 7.011 | 0.0000 | 0.0000 | 0.0000 |
| 71 | 0.100 | 7.1000 | 7.050 | 7.110 | 0.0000 | 0.0000 | 0.0000 |
| 72 | 0.100 | 7.2000 | 7.150 | 7.209 | 0.0000 | 0.0000 | 0.0000 |
| 73 | 0.100 | 7.3000 | 7.250 | 7.310 | 0.0000 | 0.0000 | 0.0000 |
| 74 | 0.100 | 7.4000 | 7.350 | 7.410 | 0.0000 | 0.0000 | 0.0000 |
| 75 | 0.100 | 7.5000 | 7.450 | 7.510 | 0.0000 | 0.0000 | 0.0000 |
| 76 | 0.100 | 7.6000 | 7.550 | 7.610 | 0.0000 | 0.0000 | 0.0000 |
| 77 | 0.100 | 7.7000 | 7.650 | 7.711 | 0.0000 | 0.0000 | 0.0000 |
| 78 | 0.100 | 7.8000 | 7.750 | 7.811 | 0.0000 | 0.0000 | 0.0000 |
| 79 | 0.100 | 7.9000 | 7.850 | 7.913 | 0.0000 | 0.0000 | 0.0000 |
| 80 | 0.100 | 8.0000 | 7.950 | 8.011 | 0.0000 | 0.0000 | 0.0000 |
| 81 | 0.100 | 8.1000 | 8.050 | 8.113 | 0.0000 | 0.0000 | 0.0000 |
| 82 | 0.100 | 8.2000 | 8.150 | 8.211 | 0.0000 | 0.0000 | 0.0000 |
| 83 | 0.100 | 8.3000 | 8.250 | 8.312 | 0.0000 | 0.0000 | 0.0000 |
| 84 | 0.100 | 8.4000 | 8.350 | 8.412 | 0.0000 | 0.0000 | 0.0000 |
| 85 | 0.100 | 8.5000 | 8.450 | 8.512 | 0.0000 | 0.0000 | 0.0000 |
| 86 | 0.100 | 8.6000 | 8.550 | 8.612 | 0.0000 | 0.0000 | 0.0000 |
| 87 | 0.100 | 8.7000 | 8.650 | 8.713 | 0.0000 | 0.0000 | 0.0000 |
| 88 | 0.100 | 8.8000 | 8.750 | 8.813 | 0.0000 | 0.0000 | 0.0000 |
| 89 | 0.100 | 8.9000 | 8.850 | 8.915 | 0.0000 | 0.0000 | 0.0000 |
| 90 | 0.100 | 9.0000 | 8.950 | 9.018 | 0.0000 | 0.0000 | 0.0000 |
| 91 | 0.100 | 9.1000 | 9.050 | 9.119 | 0.0000 | 0.0000 | 0.0000 |

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|-----|-------|---------|--------|--------|--------|--------|--------|
| 92 | 0.100 | 9.2000 | 9.150 | 9.219 | 0.0000 | 0.0000 | 0.0000 |
| 93 | 0.100 | 9.3000 | 9.250 | 9.319 | 0.0000 | 0.0000 | 0.0000 |
| 94 | 0.100 | 9.4000 | 9.350 | 9.410 | 0.0000 | 0.0000 | 0.0000 |
| 95 | 0.100 | 9.5000 | 9.450 | 9.508 | 0.0000 | 0.0000 | 0.0000 |
| 96 | 0.100 | 9.6000 | 9.550 | 9.609 | 0.0000 | 0.0000 | 0.0000 |
| 97 | 0.100 | 9.7000 | 9.650 | 9.707 | 0.0000 | 0.0000 | 0.0000 |
| 98 | 0.100 | 9.8000 | 9.750 | 9.807 | 0.0000 | 0.0000 | 0.0000 |
| 99 | 0.100 | 9.9000 | 9.850 | 9.907 | 0.0000 | 0.0000 | 0.0000 |
| 100 | 0.100 | 10.0000 | 9.950 | 10.003 | 0.0000 | 0.0000 | 0.0000 |
| 101 | 0.100 | 10.1000 | 10.050 | 10.110 | 0.0000 | 0.0000 | 0.0000 |
| 102 | 0.100 | 10.2000 | 10.150 | 10.207 | 0.0000 | 0.0000 | 0.0000 |
| 103 | 0.100 | 10.3000 | 10.250 | 10.307 | 0.0000 | 0.0000 | 0.0000 |
| 104 | 0.100 | 10.4000 | 10.350 | 10.408 | 0.0000 | 0.0000 | 0.0000 |
| 105 | 0.100 | 10.5000 | 10.450 | 10.505 | 0.0000 | 0.0000 | 0.0000 |
| 106 | 0.100 | 10.6000 | 10.550 | 10.602 | 0.0000 | 0.0000 | 0.0000 |
| 107 | 0.100 | 10.7000 | 10.650 | 10.703 | 0.0000 | 0.0000 | 0.0000 |
| 108 | 0.100 | 10.8000 | 10.750 | 10.804 | 0.0000 | 0.0000 | 0.0000 |
| 109 | 0.100 | 10.9000 | 10.850 | 10.902 | 0.0000 | 0.0000 | 0.0000 |
| 110 | 0.100 | 11.0000 | 10.950 | 11.003 | 0.0000 | 0.0000 | 0.0000 |
| 111 | 0.100 | 11.1000 | 11.050 | 11.102 | 0.0000 | 0.0000 | 0.0000 |
| 112 | 0.100 | 11.2000 | 11.150 | 11.202 | 0.0000 | 0.0000 | 0.0000 |
| 113 | 0.100 | 11.3000 | 11.250 | 11.302 | 0.0000 | 0.0000 | 0.0000 |
| 114 | 0.100 | 11.4000 | 11.350 | 11.402 | 0.0000 | 0.0000 | 0.0000 |
| 115 | 0.100 | 11.5000 | 11.450 | 11.503 | 0.0000 | 0.0000 | 0.0000 |
| 116 | 0.100 | 11.6000 | 11.550 | 11.603 | 0.0000 | 0.0000 | 0.0000 |
| 117 | 0.100 | 11.7000 | 11.650 | 11.704 | 0.0000 | 0.0000 | 0.0000 |
| 118 | 0.100 | 11.8000 | 11.750 | 11.803 | 0.0000 | 0.0000 | 0.0000 |
| 119 | 0.100 | 11.9000 | 11.850 | 11.904 | 0.0000 | 0.0000 | 0.0000 |
| 120 | 0.100 | 12.0000 | 11.950 | 12.005 | 0.0000 | 0.0000 | 0.0000 |
| 121 | 0.100 | 12.1000 | 12.050 | 12.106 | 0.0000 | 0.0000 | 0.0000 |
| 122 | 0.100 | 12.2000 | 12.150 | 12.213 | 0.0000 | 0.0000 | 0.0000 |
| 123 | 0.100 | 12.3000 | 12.250 | 12.296 | 0.0000 | 0.0000 | 0.0000 |
| 124 | 0.100 | 12.4000 | 12.350 | 12.400 | 0.0000 | 0.0000 | 0.0000 |
| 125 | 0.100 | 12.5000 | 12.450 | 12.490 | 0.0000 | 0.0000 | 0.0000 |
| 126 | 0.100 | 12.6000 | 12.550 | 12.582 | 0.0000 | 0.0000 | 0.0000 |
| 127 | 0.100 | 12.7000 | 12.650 | 12.683 | 0.0000 | 0.0000 | 0.0000 |
| 128 | 0.100 | 12.8000 | 12.750 | 12.789 | 0.0000 | 0.0000 | 0.0000 |
| 129 | 0.100 | 12.9000 | 12.850 | 12.892 | 0.0000 | 0.0000 | 0.0000 |
| 130 | 0.100 | 13.0000 | 12.950 | 12.992 | 0.0000 | 0.0000 | 0.0000 |
| 131 | 0.100 | 13.1000 | 13.050 | 13.091 | 0.0000 | 0.0000 | 0.0000 |
| 132 | 0.100 | 13.2000 | 13.150 | 13.191 | 0.0000 | 0.0000 | 0.0000 |
| 133 | 0.100 | 13.3000 | 13.250 | 13.296 | 0.0000 | 0.0000 | 0.0000 |
| 134 | 0.100 | 13.4000 | 13.350 | 13.426 | 0.0000 | 0.0000 | 0.0000 |
| 135 | 0.100 | 13.5000 | 13.450 | 13.493 | 0.0000 | 0.0000 | 0.0000 |
| 136 | 0.100 | 13.6000 | 13.550 | 13.600 | 0.0000 | 0.0000 | 0.0000 |
| 137 | 0.100 | 13.7000 | 13.650 | 13.700 | 0.0000 | 0.0000 | 0.0000 |
| 138 | 0.100 | 13.8000 | 13.750 | 13.800 | 0.0000 | 0.0000 | 0.0000 |
| 139 | 0.100 | 13.9000 | 13.850 | 13.899 | 0.0000 | 0.0000 | 0.0000 |
| 140 | 0.100 | 14.0000 | 13.950 | 13.996 | 0.0000 | 0.0000 | 0.0000 |
| 141 | 0.100 | 14.1000 | 14.050 | 14.094 | 0.0000 | 0.0000 | 0.0000 |
| 142 | 0.100 | 14.2000 | 14.150 | 14.185 | 0.0000 | 0.0000 | 0.0000 |
| 143 | 0.100 | 14.3000 | 14.250 | 14.285 | 0.0000 | 0.0000 | 0.0000 |

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|-----|-------|---------|--------|--------|--------|--------|--------|
| 144 | 0.100 | 14.4000 | 14.350 | 14.391 | 0.0000 | 0.0000 | 0.0000 |
| 145 | 0.100 | 14.5000 | 14.450 | 14.495 | 0.0000 | 0.0000 | 0.0000 |
| 146 | 0.100 | 14.6000 | 14.550 | 14.591 | 0.0000 | 0.0000 | 0.0000 |
| 147 | 0.100 | 14.7000 | 14.650 | 14.689 | 0.0000 | 0.0000 | 0.0000 |
| 148 | 0.100 | 14.8000 | 14.750 | 14.781 | 0.0000 | 0.0000 | 0.0000 |
| 149 | 0.100 | 14.9000 | 14.850 | 14.879 | 0.0000 | 0.0000 | 0.0000 |
| 150 | 0.100 | 15.0000 | 14.950 | 14.977 | 0.0000 | 0.0000 | 0.0000 |
| 151 | 0.100 | 15.1000 | 15.050 | 15.074 | 0.0000 | 0.0000 | 0.0000 |
| 152 | 0.100 | 15.2000 | 15.150 | 15.171 | 0.0000 | 0.0000 | 0.0000 |
| 153 | 0.100 | 15.3000 | 15.250 | 15.269 | 0.0000 | 0.0000 | 0.0000 |
| 154 | 0.100 | 15.4000 | 15.350 | 15.366 | 0.0000 | 0.0000 | 0.0000 |
| 155 | 0.100 | 15.5000 | 15.450 | 15.465 | 0.0000 | 0.0000 | 0.0000 |
| 156 | 0.100 | 15.6000 | 15.550 | 15.565 | 0.0000 | 0.0000 | 0.0000 |
| 157 | 0.100 | 15.7000 | 15.650 | 15.662 | 0.0000 | 0.0000 | 0.0000 |
| 158 | 0.100 | 15.8000 | 15.750 | 15.762 | 0.0000 | 0.0000 | 0.0000 |
| 159 | 0.100 | 15.9000 | 15.850 | 15.855 | 0.0000 | 0.0000 | 0.0000 |
| 160 | 0.100 | 16.0000 | 15.950 | 15.941 | 0.0000 | 0.0000 | 0.0000 |
| 161 | 0.100 | 16.1000 | 16.050 | 16.041 | 0.0000 | 0.0000 | 0.0000 |
| 162 | 0.100 | 16.2000 | 16.150 | 16.151 | 0.0000 | 0.0000 | 0.0000 |
| 163 | 0.100 | 16.3000 | 16.250 | 16.250 | 0.0000 | 0.0000 | 0.0000 |
| 164 | 0.100 | 16.4000 | 16.350 | 16.348 | 0.0000 | 0.0000 | 0.0000 |
| 165 | 0.100 | 16.5000 | 16.450 | 16.448 | 0.0000 | 0.0000 | 0.0000 |
| 166 | 0.100 | 16.6000 | 16.550 | 16.548 | 0.0000 | 0.0000 | 0.0000 |
| 167 | 0.100 | 16.7000 | 16.650 | 16.646 | 0.0000 | 0.0000 | 0.0000 |
| 168 | 0.100 | 16.8000 | 16.750 | 16.747 | 0.0000 | 0.0000 | 0.0000 |
| 169 | 0.100 | 16.9000 | 16.850 | 16.843 | 0.0000 | 0.0000 | 0.0000 |
| 170 | 0.100 | 17.0000 | 16.950 | 16.946 | 0.0000 | 0.0000 | 0.0000 |
| 171 | 0.100 | 17.1000 | 17.050 | 17.046 | 0.0000 | 0.0000 | 0.0000 |
| 172 | 0.100 | 17.2000 | 17.150 | 17.143 | 0.0000 | 0.0000 | 0.0000 |
| 173 | 0.100 | 17.3000 | 17.250 | 17.241 | 0.0000 | 0.0000 | 0.0000 |
| 174 | 0.100 | 17.4000 | 17.350 | 17.334 | 0.0000 | 0.0000 | 0.0000 |
| 175 | 0.100 | 17.5000 | 17.450 | 17.433 | 0.0000 | 0.0000 | 0.0000 |
| 176 | 0.100 | 17.6000 | 17.550 | 17.528 | 0.0000 | 0.0000 | 0.0000 |
| 177 | 0.100 | 17.7000 | 17.650 | 17.629 | 0.0000 | 0.0000 | 0.0000 |
| 178 | 0.069 | 17.7690 | 17.735 | 17.705 | 0.0000 | 0.0000 | 0.0000 |

| | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| 1.00 | 1.60 | 1.00 | 0.60 | 0.50 | 0.40 | 0.40 | 0.40 | 0.40 |
| -7.07 | -5.47 | -4.47 | -3.87 | -3.37 | -2.97 | -2.57 | -2.17 | -1.77 |
| -7.57 | -6.27 | -4.97 | -4.17 | -3.62 | -3.17 | -2.77 | -2.37 | -1.97 |
| -8.07 | -7.07 | -5.47 | -4.47 | -3.87 | -3.37 | -2.97 | -2.57 | -2.17 |
| 6.2988 | 12.1888 | 8.8133 | 5.9104 | 5.7450 | 6.3565 | 10.7449 | 16.1985 | 24.3509 |
| 17.3659 | 29.5547 | 38.3680 | 44.2784 | 50.0233 | 56.3798 | 67.1248 | 83.3233 | 107.6742 |

[illegible]

[illegible]

| | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0343 | 0.0534 | 0.0975 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0164 | 0.0407 | 0.0724 | 0.1089 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0297 | 0.0534 | 0.1098 | 0.1313 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0534 | 0.0858 | 0.1319 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0813 | 0.1364 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0938 | 0.1444 |
| 0.0000 | 0.0000 | 0.0000 | 0.0405 | 0.0589 | 0.0630 | 0.0778 | 0.0997 | 0.1271 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0520 | 0.0416 | 0.0416 | 0.1082 | 0.1555 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1162 | 0.1791 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0894 | 0.0894 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0728 | 0.0890 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0086 | 0.0728 | 0.1267 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0562 | 0.0562 | 0.0926 | 0.1306 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0817 | 0.0817 | 0.0988 | 0.1282 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0540 | 0.0664 | 0.0890 | 0.1331 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0232 | 0.0540 | 0.0929 | 0.1081 | 0.1314 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0232 | 0.0521 | 0.0759 | 0.1021 | 0.1155 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0507 | 0.0640 | 0.0974 | 0.1073 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0656 | 0.0963 | 0.1194 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0600 | 0.0870 | 0.1131 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0186 | 0.0433 | 0.0652 | 0.0826 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0296 | 0.0554 | 0.1265 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0175 | 0.0458 | 0.1632 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0175 | 0.0372 | 0.1459 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0287 | 0.1286 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0202 | 0.1112 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0117 | 0.0940 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0738 | 0.0764 | 0.1050 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0655 | 0.0930 | 0.1141 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0278 | 0.0536 | 0.0886 | 0.1223 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0536 | 0.0598 | 0.0942 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0310 | 0.0662 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0924 | 0.0739 | 0.0739 | 0.0739 | 0.0956 |
| 0.0000 | 0.0000 | 0.0448 | 0.0895 | 0.1066 | 0.0885 | 0.0966 | 0.1054 | 0.1195 |
| 0.0000 | 0.0000 | 0.0000 | 0.0685 | 0.0571 | 0.0457 | 0.0559 | 0.0707 | 0.1088 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 0.0152 | 0.0360 | 0.0980 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0106 | 0.0236 | 0.0395 | 0.0793 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0178 | 0.0313 | 0.0432 | 0.0638 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0178 | 0.0301 | 0.0472 | 0.0718 |
| 0.0000 | 0.0000 | 0.0000 | 0.0959 | 0.0800 | 0.0640 | 0.0640 | 0.0803 | 0.1024 |
| 0.0000 | 0.1027 | 0.1361 | 0.1264 | 0.1358 | 0.1296 | 0.1296 | 0.1400 | 0.1534 |
| 0.0000 | 0.0000 | 0.1361 | 0.1264 | 0.1060 | 0.0848 | 0.0848 | 0.1100 | 0.1247 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0298 | 0.0708 | 0.0876 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0697 | 0.0647 | 0.0647 | 0.0942 | 0.1036 |
| 0.0000 | 0.0000 | 0.0000 | 0.0195 | 0.0697 | 0.0953 | 0.0996 | 0.1177 | 0.1198 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0361 | 0.0784 | 0.0960 | 0.1072 | 0.1101 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0129 | 0.0607 | 0.0846 | 0.0953 | 0.1002 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0425 | 0.0602 | 0.0833 | 0.0918 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0372 | 0.0448 | 0.0791 | 0.0880 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0330 | 0.0780 | 0.0862 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0506 | 0.0506 | 0.0823 | 0.0882 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0931 | 0.0792 | 0.0792 | 0.0888 | 0.0916 |

[illegible]

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|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 0.40 | 0.40 | 0.40 | 0.30 | 0.30 | 0.30 | 0.40 | 0.50 |
| -1.37 | -0.97 | -0.57 | -0.27 | 0.03 | 0.33 | 0.73 | 1.23 |
| -1.57 | -1.17 | -0.77 | -0.42 | -0.12 | 0.18 | 0.53 | 0.98 |
| -1.77 | -1.37 | -0.97 | -0.57 | -0.27 | 0.03 | 0.33 | 0.73 |
| 38.8004 | 63.0381 | 81.3678 | 70.1384 | 71.5331 | 71.7200 | 95.8908 | 120.2495 |
| 146.4746 | 209.5127 | 290.8805 | 361.0189 | 432.5520 | 504.2721 | 600.1629 | 720.4124 |

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.4846 | 0.5089 | 0.5580 | 0.4823 | 0.4832 | 0.4840 | 0.6466 | 0.8107 |
| 0.4819 | 0.5046 | 0.5428 | 0.4538 | 0.4545 | 0.4553 | 0.6084 | 0.7626 |
| 0.4792 | 0.5003 | 0.5277 | 0.4253 | 0.4259 | 0.4267 | 0.5702 | 0.7145 |
| 0.4917 | 0.5108 | 0.5289 | 0.4137 | 0.4141 | 0.4149 | 0.5545 | 0.6945 |
| 0.5652 | 0.5809 | 0.5956 | 0.4694 | 0.4697 | 0.4705 | 0.6284 | 0.7871 |
| 0.6292 | 0.6474 | 0.6634 | 0.5284 | 0.5286 | 0.5294 | 0.7070 | 0.8854 |
| 0.6594 | 0.7013 | 0.7351 | 0.5994 | 0.5998 | 0.6006 | 0.8020 | 1.0042 |
| 0.6896 | 0.7551 | 0.8068 | 0.6704 | 0.6710 | 0.6718 | 0.8971 | 1.1229 |
| 0.7197 | 0.8090 | 0.8786 | 0.7415 | 0.7422 | 0.7430 | 0.9922 | 1.2417 |
| 0.7498 | 0.8628 | 0.9503 | 0.8126 | 0.8134 | 0.8142 | 1.0872 | 1.3604 |
| 0.7003 | 0.8199 | 0.9496 | 0.8494 | 0.8554 | 0.8563 | 1.1434 | 1.4310 |
| 0.6318 | 0.7540 | 0.9317 | 0.8780 | 0.8906 | 0.8915 | 1.1904 | 1.4900 |
| 0.5633 | 0.6881 | 0.9138 | 0.9067 | 0.9257 | 0.9267 | 1.2374 | 1.5491 |
| 0.5930 | 0.6996 | 0.9133 | 0.8460 | 0.8600 | 0.8610 | 1.1497 | 1.4391 |
| 0.6235 | 0.7117 | 0.9130 | 0.7846 | 0.7934 | 0.7944 | 1.0608 | 1.3276 |
| 0.6540 | 0.7238 | 0.9126 | 0.7231 | 0.7268 | 0.7278 | 0.9718 | 1.2161 |
| 0.6772 | 0.9623 | 1.3717 | 1.0431 | 1.0446 | 1.0453 | 1.3954 | 1.7451 |
| 0.6963 | 1.3280 | 2.0891 | 1.5777 | 1.5787 | 1.5789 | 2.1073 | 2.6344 |
| 0.6497 | 1.2871 | 2.2294 | 1.7114 | 1.7243 | 1.7246 | 2.3018 | 2.8779 |
| 0.5714 | 1.0496 | 2.0904 | 1.6513 | 1.6820 | 1.6829 | 2.2461 | 2.8091 |
| 0.4931 | 0.8121 | 1.9514 | 1.5911 | 1.6398 | 1.6411 | 2.1904 | 2.7402 |
| 0.4694 | 0.7118 | 1.7681 | 1.5227 | 1.5795 | 1.5810 | 2.1101 | 2.6403 |
| 0.5122 | 0.7784 | 1.5308 | 1.4443 | 1.4974 | 1.4986 | 2.0001 | 2.5027 |
| 0.5551 | 0.8450 | 1.2934 | 1.3658 | 1.4152 | 1.4162 | 1.8901 | 2.3650 |
| 0.5979 | 0.9116 | 1.0561 | 1.2873 | 1.3330 | 1.3337 | 1.7801 | 2.2274 |
| 0.5615 | 0.9181 | 0.9934 | 1.1692 | 1.2093 | 1.2100 | 1.6151 | 2.0212 |
| 0.5008 | 0.9061 | 0.9843 | 1.0389 | 1.0727 | 1.0735 | 1.4332 | 1.7939 |
| 0.4401 | 0.8940 | 0.9753 | 0.9086 | 0.9362 | 0.9369 | 1.2512 | 1.5666 |
| 0.3794 | 0.8820 | 0.9662 | 0.7783 | 0.7997 | 0.8004 | 1.0693 | 1.3393 |
| 0.3347 | 0.8869 | 1.0129 | 0.8495 | 0.8778 | 0.8791 | 1.1741 | 1.4701 |
| 0.2929 | 0.8948 | 1.0698 | 0.9576 | 0.9953 | 0.9972 | 1.3314 | 1.6666 |
| 0.2510 | 0.9028 | 1.1267 | 1.0657 | 1.1128 | 1.1153 | 1.4888 | 1.8631 |
| 0.2243 | 0.8963 | 1.1484 | 1.1154 | 1.1662 | 1.1691 | 1.5604 | 1.9526 |
| 0.2280 | 0.8606 | 1.0990 | 1.0470 | 1.0903 | 1.0929 | 1.4588 | 1.8256 |
| 0.2318 | 0.8248 | 1.0496 | 0.9787 | 1.0143 | 1.0166 | 1.3572 | 1.6986 |
| 0.2356 | 0.7890 | 1.0003 | 0.9104 | 0.9384 | 0.9404 | 1.2556 | 1.5717 |
| 0.2394 | 0.7533 | 0.9509 | 0.8420 | 0.8624 | 0.8642 | 1.1540 | 1.4447 |
| 0.2431 | 0.7175 | 0.9015 | 0.7737 | 0.7865 | 0.7879 | 1.0524 | 1.3177 |
| 0.2469 | 0.6818 | 0.8521 | 0.7054 | 0.7106 | 0.7117 | 0.9507 | 1.1907 |

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.2483 | 0.6442 | 0.8180 | 0.6599 | 0.6643 | 0.6653 | 0.8888 | 1.1134 |
| 0.2486 | 0.6058 | 0.7911 | 0.6251 | 0.6319 | 0.6329 | 0.8453 | 1.0591 |
| 0.2478 | 0.5675 | 0.7584 | 0.6216 | 0.6309 | 0.6320 | 0.8440 | 1.0575 |
| 0.2402 | 0.5296 | 0.6948 | 0.7889 | 0.8008 | 0.8037 | 1.0729 | 1.3438 |
| 0.2327 | 0.4917 | 0.6312 | 0.9561 | 0.9707 | 0.9753 | 1.3018 | 1.6301 |
| 0.2253 | 0.4584 | 0.5716 | 1.0966 | 1.1137 | 1.1198 | 1.4946 | 1.8712 |
| 0.2190 | 0.5102 | 0.5875 | 0.7501 | 0.7667 | 0.7698 | 1.0278 | 1.2872 |
| 0.2142 | 0.5402 | 0.6371 | 0.5031 | 0.5183 | 0.5191 | 0.6934 | 0.8689 |
| 0.0000 | 0.4883 | 0.8135 | 0.6302 | 0.6412 | 0.6419 | 0.8572 | 1.0738 |
| 0.0000 | 0.4379 | 0.8949 | 0.7151 | 0.7223 | 0.7231 | 0.9655 | 1.2090 |
| 0.0000 | 0.3884 | 0.9154 | 0.7728 | 0.7767 | 0.7775 | 1.0382 | 1.2994 |
| 0.0000 | 0.3475 | 0.9312 | 0.8187 | 0.8201 | 0.8209 | 1.0962 | 1.3717 |
| 0.0000 | 0.3865 | 0.9038 | 0.7547 | 0.7617 | 0.7625 | 1.0184 | 1.2750 |
| 0.0434 | 0.4255 | 0.8765 | 0.6906 | 0.7034 | 0.7041 | 0.9407 | 1.1782 |
| 0.1318 | 0.5251 | 0.7972 | 0.5988 | 0.5998 | 0.6005 | 0.8022 | 1.0049 |
| 0.2180 | 0.5415 | 0.6774 | 0.5090 | 0.5099 | 0.5107 | 0.6823 | 0.8546 |
| 0.2822 | 0.5426 | 0.5844 | 0.4392 | 0.4401 | 0.4411 | 0.5892 | 0.7383 |
| 0.2794 | 0.4969 | 0.5726 | 0.4307 | 0.4316 | 0.4327 | 0.5781 | 0.7252 |
| 0.2289 | 0.3552 | 0.4593 | 0.4482 | 0.4715 | 0.4725 | 0.6316 | 0.7915 |
| 0.2502 | 0.3514 | 0.4641 | 0.4292 | 0.4454 | 0.4463 | 0.5966 | 0.7479 |
| 0.2598 | 0.3374 | 0.4413 | 0.3906 | 0.4042 | 0.4051 | 0.5416 | 0.6791 |
| 0.2464 | 0.3036 | 0.3642 | 0.3132 | 0.3332 | 0.3340 | 0.4468 | 0.5605 |
| 0.2504 | 0.3561 | 0.4535 | 0.3803 | 0.3985 | 0.3995 | 0.5343 | 0.6700 |
| 0.2344 | 0.4174 | 0.5499 | 0.4559 | 0.4712 | 0.4723 | 0.6314 | 0.7917 |
| 0.1374 | 0.4501 | 0.5574 | 0.4626 | 0.4759 | 0.4769 | 0.6375 | 0.7996 |
| 0.0588 | 0.4838 | 0.5662 | 0.4672 | 0.4782 | 0.4792 | 0.6405 | 0.8035 |
| 0.0692 | 0.5222 | 0.5810 | 0.4619 | 0.4690 | 0.4700 | 0.6283 | 0.7884 |
| 0.0796 | 0.5606 | 0.5960 | 0.4567 | 0.4598 | 0.4607 | 0.6161 | 0.7732 |
| 0.0846 | 0.5556 | 0.5802 | 0.4366 | 0.4377 | 0.4386 | 0.5866 | 0.7363 |
| 0.0840 | 0.5058 | 0.5332 | 0.4013 | 0.4024 | 0.4034 | 0.5394 | 0.6771 |
| 0.2429 | 0.4660 | 0.4792 | 0.3608 | 0.3616 | 0.3626 | 0.4853 | 0.6091 |
| 0.3193 | 0.4183 | 0.4442 | 0.3346 | 0.3353 | 0.3364 | 0.4503 | 0.5653 |
| 0.2925 | 0.3608 | 0.4327 | 0.3259 | 0.3268 | 0.3279 | 0.4388 | 0.5512 |
| 0.2646 | 0.3243 | 0.4032 | 0.3036 | 0.3046 | 0.3057 | 0.4090 | 0.5138 |
| 0.2356 | 0.3067 | 0.3573 | 0.2691 | 0.2700 | 0.2710 | 0.3624 | 0.4554 |
| 0.2190 | 0.2844 | 0.3368 | 0.2537 | 0.2546 | 0.2555 | 0.3417 | 0.4289 |
| 0.2060 | 0.2680 | 0.3237 | 0.2439 | 0.2447 | 0.2455 | 0.3283 | 0.4117 |
| 0.1988 | 0.2777 | 0.3211 | 0.2420 | 0.2428 | 0.2435 | 0.3257 | 0.4088 |
| 0.2082 | 0.2878 | 0.3261 | 0.2457 | 0.2468 | 0.2477 | 0.3315 | 0.4165 |
| 0.2120 | 0.2763 | 0.3280 | 0.2551 | 0.2649 | 0.2658 | 0.3558 | 0.4473 |
| 0.2276 | 0.2714 | 0.3405 | 0.2757 | 0.2955 | 0.2963 | 0.3965 | 0.4985 |
| 0.3277 | 0.3764 | 0.4190 | 0.3332 | 0.3390 | 0.3398 | 0.4546 | 0.5703 |
| 0.3202 | 0.3839 | 0.4523 | 0.3632 | 0.3661 | 0.3670 | 0.4909 | 0.6157 |
| 0.2545 | 0.3386 | 0.4611 | 0.3783 | 0.3844 | 0.3855 | 0.5154 | 0.6467 |
| 0.2148 | 0.3173 | 0.4577 | 0.3809 | 0.3878 | 0.3889 | 0.5199 | 0.6525 |
| 0.2300 | 0.3466 | 0.4284 | 0.3569 | 0.3596 | 0.3605 | 0.4821 | 0.6051 |
| 0.2140 | 0.3056 | 0.3848 | 0.3207 | 0.3285 | 0.3294 | 0.4406 | 0.5533 |
| 0.1807 | 0.2243 | 0.3318 | 0.2766 | 0.2941 | 0.2950 | 0.3947 | 0.4962 |
| 0.1866 | 0.2220 | 0.2873 | 0.2402 | 0.2493 | 0.2502 | 0.3349 | 0.4209 |
| 0.1926 | 0.2198 | 0.2429 | 0.2039 | 0.2047 | 0.2055 | 0.2752 | 0.3458 |
| 0.2348 | 0.2770 | 0.3118 | 0.2492 | 0.2500 | 0.2508 | 0.3357 | 0.4218 |
| 0.2602 | 0.3067 | 0.3442 | 0.2732 | 0.2801 | 0.2809 | 0.3759 | 0.4722 |

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.2446 | 0.2693 | 0.2872 | 0.2452 | 0.2729 | 0.2738 | 0.3664 | 0.4598 |
| 0.2128 | 0.2344 | 0.2698 | 0.2334 | 0.2588 | 0.2598 | 0.3478 | 0.4369 |
| 0.1654 | 0.2020 | 0.2904 | 0.2371 | 0.2382 | 0.2391 | 0.3205 | 0.4037 |
| 0.1823 | 0.2374 | 0.2869 | 0.2410 | 0.2442 | 0.2453 | 0.3284 | 0.4135 |
| 0.1958 | 0.2443 | 0.2682 | 0.2232 | 0.2288 | 0.2297 | 0.3077 | 0.3872 |
| 0.2060 | 0.2260 | 0.2365 | 0.1867 | 0.1945 | 0.1954 | 0.2620 | 0.3294 |
| 0.1530 | 0.1730 | 0.1921 | 0.1551 | 0.1628 | 0.1637 | 0.2196 | 0.2764 |
| 0.1928 | 0.2164 | 0.2335 | 0.1911 | 0.1955 | 0.1964 | 0.2629 | 0.3309 |
| 0.2333 | 0.2668 | 0.2850 | 0.2338 | 0.2346 | 0.2354 | 0.3148 | 0.3961 |
| 0.1455 | 0.2471 | 0.3108 | 0.2448 | 0.2454 | 0.2460 | 0.3288 | 0.4128 |
| 0.1378 | 0.2322 | 0.2950 | 0.2333 | 0.2348 | 0.2354 | 0.3149 | 0.3955 |
| 0.1644 | 0.2195 | 0.2613 | 0.2123 | 0.2151 | 0.2158 | 0.2891 | 0.3638 |
| 0.1540 | 0.1787 | 0.1988 | 0.1604 | 0.1708 | 0.1715 | 0.2302 | 0.2900 |
| 0.1465 | 0.1597 | 0.1698 | 0.1347 | 0.1505 | 0.1514 | 0.2034 | 0.2563 |
| 0.1547 | 0.1739 | 0.1888 | 0.1569 | 0.1672 | 0.1681 | 0.2255 | 0.2840 |
| 0.1420 | 0.1531 | 0.1635 | 0.1498 | 0.1506 | 0.1514 | 0.2033 | 0.2558 |
| 0.1236 | 0.1328 | 0.1426 | 0.1260 | 0.1268 | 0.1275 | 0.1713 | 0.2157 |
| 0.1183 | 0.1273 | 0.1365 | 0.1150 | 0.1163 | 0.1170 | 0.1571 | 0.1980 |
| 0.1476 | 0.1610 | 0.1696 | 0.1376 | 0.1409 | 0.1417 | 0.1901 | 0.2392 |
| 0.1467 | 0.1753 | 0.1862 | 0.1514 | 0.1548 | 0.1556 | 0.2087 | 0.2626 |
| 0.1032 | 0.1606 | 0.1782 | 0.1514 | 0.1522 | 0.1529 | 0.2051 | 0.2582 |
| 0.1456 | 0.1779 | 0.1933 | 0.1542 | 0.1550 | 0.1557 | 0.2088 | 0.2630 |
| 0.1820 | 0.1926 | 0.2061 | 0.1562 | 0.1571 | 0.1578 | 0.2115 | 0.2664 |
| 0.1753 | 0.1881 | 0.2016 | 0.1531 | 0.1538 | 0.1545 | 0.2070 | 0.2606 |
| 0.1686 | 0.1835 | 0.1971 | 0.1500 | 0.1507 | 0.1513 | 0.2026 | 0.2548 |
| 0.1619 | 0.1790 | 0.1926 | 0.1469 | 0.1475 | 0.1480 | 0.1981 | 0.2490 |
| 0.1552 | 0.1744 | 0.1881 | 0.1438 | 0.1442 | 0.1447 | 0.1936 | 0.2432 |
| 0.1247 | 0.1311 | 0.1357 | 0.1031 | 0.1037 | 0.1044 | 0.1400 | 0.1761 |
| 0.1242 | 0.1282 | 0.1302 | 0.0986 | 0.0994 | 0.1002 | 0.1347 | 0.1701 |
| 0.1368 | 0.1429 | 0.1454 | 0.1102 | 0.1111 | 0.1120 | 0.1508 | 0.1911 |
| 0.1368 | 0.1609 | 0.1632 | 0.1235 | 0.1244 | 0.1253 | 0.1684 | 0.2127 |
| 0.1368 | 0.1788 | 0.1811 | 0.1368 | 0.1377 | 0.1386 | 0.1859 | 0.2344 |
| 0.1304 | 0.1528 | 0.1564 | 0.1184 | 0.1193 | 0.1203 | 0.1618 | 0.2046 |
| 0.1253 | 0.1310 | 0.1358 | 0.1031 | 0.1040 | 0.1050 | 0.1416 | 0.1796 |
| 0.1272 | 0.1358 | 0.1413 | 0.1071 | 0.1079 | 0.1088 | 0.1465 | 0.1853 |
| 0.1291 | 0.1406 | 0.1468 | 0.1111 | 0.1118 | 0.1126 | 0.1514 | 0.1910 |
| 0.1042 | 0.1259 | 0.1333 | 0.1033 | 0.1041 | 0.1049 | 0.1413 | 0.1791 |
| 0.0838 | 0.1132 | 0.1216 | 0.0962 | 0.0971 | 0.0979 | 0.1322 | 0.1682 |
| 0.0976 | 0.1166 | 0.1238 | 0.0952 | 0.0961 | 0.0969 | 0.1307 | 0.1658 |
| 0.1222 | 0.1321 | 0.1370 | 0.1036 | 0.1043 | 0.1051 | 0.1412 | 0.1784 |
| 0.1566 | 0.1586 | 0.1599 | 0.1205 | 0.1210 | 0.1215 | 0.1627 | 0.2047 |
| 0.1302 | 0.1377 | 0.1454 | 0.1103 | 0.1110 | 0.1118 | 0.1502 | 0.1897 |
| 0.0976 | 0.1118 | 0.1261 | 0.0967 | 0.0976 | 0.0986 | 0.1331 | 0.1691 |
| 0.1091 | 0.1166 | 0.1242 | 0.0944 | 0.0950 | 0.0958 | 0.1287 | 0.1627 |
| 0.1206 | 0.1214 | 0.1222 | 0.0921 | 0.0925 | 0.0929 | 0.1243 | 0.1563 |
| 0.1109 | 0.1116 | 0.1124 | 0.0848 | 0.0851 | 0.0856 | 0.1148 | 0.1445 |
| 0.1020 | 0.1030 | 0.1038 | 0.0784 | 0.0788 | 0.0793 | 0.1065 | 0.1345 |
| 0.0961 | 0.0977 | 0.0985 | 0.0744 | 0.0749 | 0.0754 | 0.1014 | 0.1282 |
| 0.0928 | 0.0950 | 0.0959 | 0.0725 | 0.0729 | 0.0734 | 0.0986 | 0.1246 |
| 0.0906 | 0.0933 | 0.0944 | 0.0713 | 0.0717 | 0.0722 | 0.0969 | 0.1221 |
| 0.0919 | 0.0954 | 0.0976 | 0.0738 | 0.0743 | 0.0748 | 0.1006 | 0.1271 |
| 0.0945 | 0.0989 | 0.1027 | 0.0777 | 0.0783 | 0.0789 | 0.1063 | 0.1350 |

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.1044 | 0.1096 | 0.1144 | 0.0866 | 0.0874 | 0.0881 | 0.1187 | 0.1506 |
| 0.1095 | 0.1147 | 0.1194 | 0.0905 | 0.0914 | 0.0922 | 0.1241 | 0.1570 |
| 0.0913 | 0.0947 | 0.0976 | 0.0740 | 0.0747 | 0.0754 | 0.1014 | 0.1281 |
| 0.0820 | 0.0860 | 0.0884 | 0.0670 | 0.0677 | 0.0683 | 0.0919 | 0.1159 |
| 0.0830 | 0.0905 | 0.0942 | 0.0714 | 0.0720 | 0.0727 | 0.0978 | 0.1234 |
| 0.0909 | 0.0961 | 0.0986 | 0.0746 | 0.0752 | 0.0758 | 0.1019 | 0.1286 |
| 0.0982 | 0.1006 | 0.1018 | 0.0770 | 0.0775 | 0.0780 | 0.1048 | 0.1324 |
| 0.0744 | 0.0775 | 0.0855 | 0.0649 | 0.0656 | 0.0662 | 0.0894 | 0.1137 |
| 0.0698 | 0.0736 | 0.0820 | 0.0626 | 0.0633 | 0.0641 | 0.0866 | 0.1101 |
| 0.0780 | 0.0826 | 0.0871 | 0.0668 | 0.0676 | 0.0683 | 0.0922 | 0.1168 |
| 0.0733 | 0.0799 | 0.0836 | 0.0636 | 0.0643 | 0.0649 | 0.0875 | 0.1104 |
| 0.0705 | 0.0783 | 0.0818 | 0.0621 | 0.0627 | 0.0633 | 0.0853 | 0.1078 |
| 0.0690 | 0.0777 | 0.0809 | 0.0615 | 0.0621 | 0.0628 | 0.0847 | 0.1072 |
| 0.0684 | 0.0780 | 0.0816 | 0.0620 | 0.0626 | 0.0633 | 0.0855 | 0.1085 |
| 0.0700 | 0.0803 | 0.0853 | 0.0648 | 0.0655 | 0.0662 | 0.0894 | 0.1136 |
| 0.0717 | 0.0827 | 0.0890 | 0.0676 | 0.0683 | 0.0691 | 0.0933 | 0.1187 |
| 0.0665 | 0.0729 | 0.0762 | 0.0579 | 0.0585 | 0.0592 | 0.0800 | 0.1018 |
| 0.0626 | 0.0654 | 0.0666 | 0.0507 | 0.0513 | 0.0519 | 0.0702 | 0.0892 |
| 0.0631 | 0.0660 | 0.0680 | 0.0520 | 0.0527 | 0.0533 | 0.0720 | 0.0913 |
| 0.0636 | 0.0666 | 0.0694 | 0.0533 | 0.0540 | 0.0547 | 0.0739 | 0.0935 |
| 0.0629 | 0.0686 | 0.0748 | 0.0573 | 0.0580 | 0.0587 | 0.0793 | 0.1005 |
| 0.0621 | 0.0707 | 0.0809 | 0.0617 | 0.0624 | 0.0632 | 0.0853 | 0.1082 |
| 0.0612 | 0.0728 | 0.0870 | 0.0662 | 0.0669 | 0.0676 | 0.0912 | 0.1160 |
| 0.0604 | 0.0750 | 0.0930 | 0.0706 | 0.0713 | 0.0721 | 0.0972 | 0.1237 |
| 0.0542 | 0.0648 | 0.0768 | 0.0619 | 0.0626 | 0.0634 | 0.0857 | 0.1089 |
| 0.0478 | 0.0542 | 0.0595 | 0.0525 | 0.0533 | 0.0541 | 0.0733 | 0.0930 |
| 0.0460 | 0.0513 | 0.0544 | 0.0464 | 0.0471 | 0.0478 | 0.0648 | 0.0824 |
| 0.0450 | 0.0497 | 0.0514 | 0.0408 | 0.0414 | 0.0420 | 0.0570 | 0.0726 |
| 0.0352 | 0.0477 | 0.0487 | 0.0372 | 0.0378 | 0.0383 | 0.0520 | 0.0665 |
| 0.0172 | 0.0454 | 0.0465 | 0.0355 | 0.0361 | 0.0367 | 0.0499 | 0.0640 |
| 0.0081 | 0.0367 | 0.0429 | 0.0362 | 0.0396 | 0.0413 | 0.0571 | 0.0749 |
| 0.0040 | 0.0246 | 0.0386 | 0.0383 | 0.0459 | 0.0492 | 0.0695 | 0.0932 |
| 0.0000 | 0.0162 | 0.0282 | 0.0293 | 0.0362 | 0.0411 | 0.0613 | 0.0871 |
| 0.0000 | 0.0088 | 0.0162 | 0.0174 | 0.0224 | 0.0288 | 0.0477 | 0.0745 |
| 0.0000 | 0.0018 | 0.0042 | 0.0051 | 0.0074 | 0.0127 | 0.0250 | 0.0441 |

**Volume for all depths
in each cell (Hec-m)**

11.77619
11.59822
11.42049
11.72417
13.95511
15.75824
13.61915
10.75677
9.2794
8.7727
8.7799
8.76111
8.76832
8.57843
8.26791
7.96972
10.59038
14.87902
15.67269
14.72547
13.82855
13.04369
12.27402
11.62571
10.74353
9.8757
8.94059
8.00531
7.07013
7.55149
8.2927
9.0739
9.39423
8.86368
8.29322
7.76285
7.23228
6.58028
6.04978

5.70231
5.51408
5.43448
6.35276
7.27102
8.03587
5.91828
4.49417
5.14612
5.66781
5.96825
6.20614
5.86253
5.56239
5.06019
4.50341
4.18949
4.07958
4.02759
3.96743
3.72149
3.19383
3.68382
4.16259
3.99735
3.97728
3.98995
4.00264
3.85617
3.54653
3.36743
3.20356
3.16898
2.95399
2.75851
2.57743
2.44868
2.45762
2.59684
2.69152
2.81265
3.30283
3.4927
3.49033
3.43658
3.27455
3.09151
2.77701
2.45696
2.13766
2.47978
2.69082

2.60441
2.49221
2.42041
2.45013
2.30261
2.07471
1.96282
2.21825
2.49501
2.36007
2.24086
2.14928
1.89009
1.76269
1.86156
1.77904
1.5348
1.40476
1.60884
1.70134
1.57148
1.66488
1.75626
1.69474
1.61587
1.55438
1.49272
1.30162
1.28607
1.3925
1.42288
1.42733
1.57373
1.67628
1.46663
1.24641
1.14905
1.06622
1.08966
1.51034
2.25899
1.85905
1.11858
1.32329
1.44391
1.27739
1.14006
1.02442
0.97488
0.90942
1.00701
1.20412

1.21194
1.144
1.07401
1.02638
0.98303
0.97893
0.96766
0.85178
0.83378
0.87429
0.80327
0.76418
0.71111
0.69489
0.7077
0.72062
0.66944
0.62734
0.63705
0.65052
0.66324
0.68012
0.69703
0.71385
0.61697
0.50761
0.45844
0.39972
0.36344
0.33232
0.33667
0.36304
0.29932
0.21587
0.100229

From: [Sid Flannery](#)
To: [Xinjian Chen](#)
Cc: [Kym Holzwart](#); [Doug Leeper](#)
Subject: Re: Bathymetry and shoreline stuff
Date: Monday, December 6, 2021 7:30:10 AM
Attachments: [Alafia Area Volume.xls](#)
[Alafia Area Volume Xsectional final.xls](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Xinjian,

With regard to the files I sent you on Friday, I have a few follow-up questions/observations, but first things first for Doug's benefit. Too bad about the UGA Dawgs losing to Alabama yet again. The good news is the Dawgs made it to the playoffs, but the bad news is they might have to play Bama again. I am not a football nut, but like to see teams that are long overdue have some success. In that regard, I would like to see Michigan do well.

As I asked on Friday, do you think that FSU developed the area-volume spreadsheet that I sent you directly from the bathymetric data that USF generated, then FSU generated the model grid separately? That seems to be the case, but I could be wrong. Below are some questions about models and bathymetry based on my experience using data from your models (the gold standard) and the EFDC model for the Little Manatee. Can you elaborate on below. I am just trying to understand this stuff better.

On page 16, the FSU report for the Little Manatee EFDC model says "In the river main stem, multiple grids were employed to account for the variations of river bathymetry. In the vertical direction, three sigma layers were adopted to resolve vertical mixing in this shallow water system." Does this mean that three vertical layers were used throughout the entire lower river? If so, did the depths or thicknesses of these layers stay consistent or did they vary from one river segment to another. Also, does the thickness of the layers vary with tide or water level?

Whatever the answers are, it seems to me like FSU generated the area-volume spreadsheet based on the bathymetry data that USF generated, as it had much more than three layers. Then, FSU used the USF data to independently generate the layers for the EFDC model. Is that your understanding or did they do something else? I am thinking the raw USF information is in the Bathymetry sub-folder in the LMR folder I left on the D drive.

I was always amazed with the models you created in that output values could be segregated out on really fine distance and depth scales. That

was in part because your models have vertical layers in fairly small increments that seemed to reflect fairly well the bathymetry of the river. Attached are two versions of the area-volume spreadsheet you created for the Alafia, one is which I grouped the data a bit. I am wondering, did you create the area-volume spreadsheet for the Alafia from your model grids, which seems fine as your model grids were of fairly good resolution. Or, did you do what I suggested for FSU and generated the area-volume spreadsheet from the raw bathymetry data, which I seem to recall that Mote Marine generated.

None of this Alafia stuff matters now, but I am just wondering how area-volume spreadsheets are generated. I don't know much about hydrodynamic models, but always thought your models had some advantages over the EFDC model and am wondering how bathymetry is handled.

Go Wolverines!
Sid

On Fri, Dec 3, 2021 at 2:28 PM Sid Flannery <sidflannery22@gmail.com> wrote:

Hello Xinjian,

First things first. For several philosophical reasons, I am so disgusted with the Gators firing their football coach before the year was over. I guess Doug and I did not have our annual Dawgs/Gators lunch bet, or he is being kind and not cashing in.

Back to bidness. Attached is EXCEL file that I am 99% sure that Allan used for the area and volume plots, plus a version with notes. See the folder called *area volume* in my Rivers/LMR folder that was on the D drive. We received the precursor of this from FSU, as one version of the spreadsheet says from FSU (also attached). Note that version does not have data for Bolster Bayou, as the FSU EFDC model does not have that bayou as well. But, there is a sub-folder for Bolster Bayou under LMR which contains area volume results I think the District generated and added to the spreadsheet Allan used.

Also attached is the scope of work for FSU, which calls for the area/volume spreadsheet. However, I wonder if this spreadsheet is more exact than the cells used in their EFDC model. The data for the spreadsheet might have come first, then those same data grouped for the model grid (which might not have the same vertical resolution as the spreadsheet). Do you know what I mean - what do you think?

Have a good weekend,
Sid

On Fri, Dec 3, 2021 at 9:29 AM Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us> wrote:

Thanks Sid!

XinJian

From: Sid Flannery <sidflannery22@gmail.com>
Sent: Friday, December 3, 2021 9:26 AM
To: Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>
Cc: Kym Holzward <Kym.Holzward@swfwmd.state.fl.us>
Subject: Re: Bathymetry and shoreline stuff

[EXTERNAL SENDER] Use caution before opening.

Hi Xinjian,

I have a meeting coming up, but can look this afternoon.

This could be a case of "let's go fishin" and you will have access to the same files I have. It was a long time ago, and I assume I submitted Ping Wang files to Allan.

BUT - there is a general volume/area spreadsheet that was created that Allan may have used. I am pretty sure I can find that after lunch and it may match up with those plots, maybe not.

Sid

On Fri, Dec 3, 2021 at 9:18 AM Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us> wrote:

Good morning Sid,

In your 11/18/2021 email, you attached four files. One of them is called "Little Manatee morphology and vegetation plots.pdf". You mentioned that Allan Willis of Atkins generated those area and volume plots in the file from the bathymetry data. I assume that these were the bathymetry data surveyed by Ping Wang of USF. I am trying to find electric files containing data points for generating these Atkins plots but failed. Do you have these files by any chance? If you have, would you please email them to me?

Thanks,

XinJian

From: Sid Flannery <sidflannery22@gmail.com>
Sent: Thursday, November 18, 2021 2:59 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Mike Wessel (MWessel@janickienviromental.com) <MWessel@janickienviromental.com>
Subject: Bathymetry and shoreline stuff

[EXTERNAL SENDER] Use caution before opening.

Hello all,

I just talked with Doug about EFDC model output files and will reply about that tomorrow morning. In short, I can wait for the revised model runs.

In the meantime, Doug and I were talking about the bathymetry data for the Little Manatee and I brought up the bathymetry report and data sets that Ping Wang of USF did for the District. I am sure that you all, especially Xinjian, are aware of that. This is the bathymetry data from USF that were provided to FSU for construction of the EFDC model. Again, I expect you have those files, and if not, Xinjian can find them in the files I left behind.

I have attached three jpgs from the USF bathymetry work plus the

WORD file of the final USF report. It looks like USF did go into the side channels quite a bit.

I have also attached a pdf of some combined graphs taken from the bathymetry data that Allan Willis generated for the District when he was Atkins. I think the area and volume plots could be helpful.

There are also shoreline plots, but I am thinking they must have come from the vegetation work that FWRI did for the District as the vegetation is classified into different groups. The vegetation plots are more than you need, but it was easier than sorting them out.

As I told Doug, I will submit to the District a document by the Monday after Thanksgiving that lists data and graphics I think would be useful, including some of these graphics.

Sid

December 13, 2021

Request and questions about Little Manatee River EFF modeling

Hello Kym and Doug,

I have request for a report, selected model output, and have a few questions about the Environmental Favorability Function (EFF) modeling results presented in the minimum flows report for the Little Manatee River. If the District could address these requests when it is convenient, it would be greatly appreciated.

The references for report I am asking for is below, taken from page 186 in the minimum flows report.

Wessel, M. 2011. Defining the Fish-Flow Relationship in Support of Establishing Minimum Flows and Levels for Southwest Florida Tidal Rivers: Building on the Toolbox of Analytical Techniques. Report prepared by Janicki Environmental Inc. for the Southwest Florida Management District

I would also like to receive output from the Environmental Favorability Function modeling that was done for fish species in the lower river. In particular, I am requesting daily output for the amount of favorable habitat for the fish species listed on pages 146 to 149 of the minimum flows report, except for Sheepshead, for the baseline and the 15, 20, 25 and 30% flow reduction scenarios. If it saves time, my request could be limited to the Sailfin Molly, Naked and Clown Gobies, Eastern Mosquitofish, Rainwater Killifish, small gobies and Common Snook. I would also like to receive the flows at the USGS streamflow gage near Wimauma for these flow scenarios for the years 2015 to 2019, the results for which are presented on pages 146 to 149.

The questions I have are about the EFF analyses are listed below.

1. Figure 6-11 on page 147 in the minimum flow report shows average percent reductions in favorable habitat for 10 species. How were the average percent change values calculated for each flow reduction scenario. Were simple arithmetic averages of favorable habitat calculated from all days for the baseline scenario and each flow reduction scenario, then the average for the flow reduction scenario divided by the baseline average value, or was some other method used?

Similarly, in Tables 6-5 to 6-7, were the percent reduction in favorable habitat values calculated as averages for each flow reduction scenario as described above, within flow blocks, or was some other method used to calculate the percent reduction values?

2. The report about nekton in the river collected by the FFWCC that was prepared for the District (MacDonald et al., 2007) divided the stages of many species into size classes for certain analyses. For the species that were assessed for the EFF modeling, were all size classes combined for the modeling of flow reduction effects?

The following questions pertain to the habitat factor that is included in the logistic regression equation that is shown on page 129 of the minimum flows report with the intercept adjustment on page 130. Information on the EFF model is also presented in the report included as Appendix E the minimum flows report, which is draft minimum flows analysis submitted by Janicki Environmental (JEI) in June 2018. The questions below pertain to Appendix E. If these factors are no longer applicable or have been updated, please let me know.

3. On page 4-21, Appendix E says that for the refined model, the habitat levels were collapsed to the following categories: mangroves, emergent (marshes), structure and freshwater habitats, with tree,

terrestrial grasses, and bare sand group as a single category. Are these the categories that remained in the final EFF model used to determine the minimum flows?

Also, this page shows a map of the dominant shore types assigned by FFWCC as part of their seine collections. Were the shoreline classifications assigned by FFWCC categories used as the source data to create the collapsed shore habitat types used in the EFF modeling, or was some other source used to determine the shore habitat types?

The map of page 4-21 of Appendix E shows the distribution of dominant shore types identified FFWCC as part of their sampling. It is interesting to note that the map shows 'freshwater' shore types that are located fairly far downstream, sometimes in the mesohaline reach of the river. I wonder what the FFWCC was using to classify the shore type. Were they looking at the vegetation on the upland next to the shoreline? For fish sampling, I would suggest that the shore type should be classified based on habitats and vegetation within the inter-tidal range of the river, but I don't really know what FFWCC used to classify shore types. Does the District or JEI have any information on that?

Also, the FFWCC sampling generally did not extend upstream of approximately kilometer 14. Again, what source data was used to assign habitat types, was something other than data for FFWCC data used? What was applied upstream of kilometer 14?

In general, how was favorable shore habitat determined and applied in the EFF model? I am assuming that shore type was what used to determine shore habitat. Is that correct? Was a separate analysis conducted on the frequency of occurrence of fish species in various shore habitats conducted to determine favorable shore habitats, then the quantity of those shore habitats in various river reaches applied in the EFF modeling? Or, did the EFF modeling itself derive what the favorable shore habitats were for each species? More explanation of how favorable shore habitats were determined and applied in the model would be helpful.

For example, could a species have more than one favorable shore habitat? From looking at the map on page 4-21, I would think that combined emergent marsh and freshwater would make sense.

The figure on page 4-25 for favorable habitat predictions for the striped mojarra (*Eugerre plumieiri*) using the EFDC and the LOESS model is interesting. Does it incorporate both the salinity predictions and favorable habitat factors or is it just based on salinity? On this date (December 6, 2003), it appears that salinity distribution had much to do with favorable habitat being upstream of approximately kilometer 10, as the flow at the gage on that date was 53 cfs.

I would assume on a day with higher flow, the favorable habitat would extend farther downstream. If that were the case, does the EFF analysis also incorporate data from within the bayous and Ruskin Inlet? Page 169 in MacDonald et al. (2007) shows that the striped mojarra had higher geometric mean abundance values in the bayous than in the river channel during that period of data collection (1996-2006).

Thanks for whatever information you can provide to these questions. I expect you are very busy with the holidays approaching, so whenever you can address these if fine, with after Christmas or sometime thereafter being fine.

Thanks again and Happy Holidays!

Sid

From: [Sid Flannery](#)
To: [Doug Leeper](#); [Kym Holzwart](#); [Gabe I. Herrick](#); [Lei Yang](#); [Xinjian Chen](#); [Jordan D. Miller](#); [Chris Zajac](#); [Randy Smith](#); [Kristina Deak](#)
Subject: Request for material pertaining to EFF modeling in the Little Manatee River
Date: Monday, December 13, 2021 12:27:10 PM
Attachments: [Requests and questions related to Little Manatee River EFF modeling.docx](#)

[EXTERNAL SENDER] Use caution before opening.

Hello Kym, Doug, and other District staff,

Attached is a WORD document that includes requests I have for a report and selected model output related to the Environmental Favorability Function modeling results that were presented in the minimum flows report for the Little Manatee River. I also have a few questions related to the EFF modeling.

As the document says, whenever the District can accommodate these requests and questions will be fine.

Thanks very much for what you can do and have a fine holiday season.

Go Dawgs!
Sid

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | | | |
|-----------------|---------------------------------------------|--------------------|------------------------------------------------------------------|---------|------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 | | |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL | REPORT: | Monthly |
| | | FACILITY TYPE: | IW | GROUP: | Industrial |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | MONITORING GROUP: | D-001 | | |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | DESCRIPTION: | OUTFALL 001 - DISCHARGE TO ALDERMAN CREEK, LITTLE MANATTEE RIVER | | |
| COUNTY: | MANATEE | | | | |
| | | MONITORING PERIOD: | From: 05/01/2021 To: 05/31/2021 | | |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | NOD | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 50050 1 Mon. Site: EFF-001 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-001 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| PARM Code 00400 1 Mon. Site: EFF-001 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly) | (Grab) |
| Turbidity PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Maximum) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-001 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-001 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-001 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-001 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-001 | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| | Permit Requirement | | | | 38.0 (Daily Mn) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-001 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 1 Mon. Site: EFF-001 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-001 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-001 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 06/18/2021 |

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | | | |
|-----------------|---------------------------------------------|--------------------|-----------------------------------------------------|---------|------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 | | |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL | REPORT: | Monthly |
| | | FACILITY TYPE: | IW | GROUP: | Industrial |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | MONITORING GROUP: | D-002 | | |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | DESCRIPTION: | OUTFALL 002 - DISCHARGE TO PAYNE CREEK, PEACE RIVER | | |
| COUNTY: | MANATEE | MONITORING PERIOD: | From: 05/01/2021 To: 05/31/2021 | | |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | NOD | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 50050 1 Mon. Site: EFF-002 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-002 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-002 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| PARM Code 00400 1 Mon. Site: EFF-002 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Grab) |
| Turbidity PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-002 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-002 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-002 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-002 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-002 | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| | Permit Requirement | | | | 38.0 (Dlyavmin) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-002 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-002 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 1 Mon. Site: EFF-002 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-002 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-002 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-002 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 06/18/2021 |

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | |
|----------------------------------------------------|---------------------------------------------|-------------------|-----------------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL REPORT: Monthly |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | FACILITY TYPE: | IW GROUP: Industrial |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | MONITORING GROUP: | D-003 |
| COUNTY: | MANATEE | DESCRIPTION: | Outfall D-003 |
| MONITORING PERIOD: From: 05/01/2021 To: 05/31/2021 | | | |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | NOD | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 50050 1 Mon. Site: EFF-003 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| PARM Code 00400 1 Mon. Site: EFF-003 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | NOD | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly) | (Grab) |
| Turbidity PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Grab) |
| Turbidity PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-003 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-003 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-003 | Sample Measurement | | | | | NOD | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-003 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | 0.0 (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-003 | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| | Permit Requirement | | | | 38.0 (Dlyavmin) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | NOD | | | | 0 | NOD | NOD |
| PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | | | | | Report (Daily Av) | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 1 Mon. Site: EFF-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | NOD | | 0 | NOD | NOD |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-003 | Sample Measurement | | NOD | | | | | | 0 | NOD | NOD |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 06/18/2021 |

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | | | |
|----------------------------------------------------|---------------------------------------------|-------------------|------------------------------------------------------------------|---------|------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 | | |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL | REPORT: | Monthly |
| | | FACILITY TYPE: | IW | GROUP: | Industrial |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | MONITORING GROUP: | D-001 | | |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | DESCRIPTION: | OUTFALL 001 - DISCHARGE TO ALDERMAN CREEK, LITTLE MANATTEE RIVER | | |
| COUNTY: | MANATEE | | | | |
| MONITORING PERIOD: From: 08/01/2021 To: 08/31/2021 | | | | | |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | 77.33 | 39.78 | | | | | | 0 | 1 Continuous | Meter |
| PARM Code 50050 1 Mon. Site: EFF-001 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | 16.80 | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | 58.20 | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-001 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | 7.12 | | 7.40 | | 0 | 1 Weekly | Grab |
| PARM Code 00400 1 Mon. Site: EFF-001 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH | Sample Measurement | | | | 7.03 | | 7.22 | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH | Sample Measurement | | | | 7.15 | | 7.43 | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-001 | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| Turbidity | Sample Measurement | | | | | | 8.27 | | 0 | 1 Weekly | Grab |
| PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-001 | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly) | (Grab) |
| Turbidity | Sample Measurement | | | | | | 6.01 | | 0 | 1 Weekly, when discharging | Grab |
| PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-001 | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity | Sample Measurement | | | | | | 35.01 | | 0 | 1 Weekly | Calculated |
| PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-001 | Permit Requirement | | | | | | Report (Maximum) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | -26.74 | | 0 | 1 Weekly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Maximum) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | 7.45 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-001 | Sample Measurement | | | | | 7.20 | 5.95 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | 4.2 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | 9.2 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-001 | Sample Measurement | | | | | 5.7 | 4.1 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-001 | Sample Measurement | | | | | 0.43 | 0.38 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | 0.7 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-001 | Sample Measurement | | 215.54 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-001 | Sample Measurement | | | | | | 445 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | 241 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | 1275 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-001 | Sample Measurement | | | | | | -830 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | 426 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-001 | Sample Measurement | | | | 39.9 | | | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | 38.0 (Daily Mn) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|--------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | 80 | | | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | 84.5 | | | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water PARM Code 00010 1 Mon. Site: EFF-001 | Sample Measurement | | | | | | 31.3 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | 27.5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-001 | Sample Measurement | | | | | | 29.5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-001 | Sample Measurement | | | | | | 1.0 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-001 | Sample Measurement | | | | | | 1.2 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-001 | Sample Measurement | | 508.91 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 09/22/2021 |

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | | | |
|-----------------|---------------------------------------------|--------------------|-----------------------------------------------------|---------|------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 | | |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL | REPORT: | Monthly |
| | | FACILITY TYPE: | IW | GROUP: | Industrial |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | MONITORING GROUP: | D-002 | | |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | DESCRIPTION: | OUTFALL 002 - DISCHARGE TO PAYNE CREEK, PEACE RIVER | | |
| COUNTY: | MANATEE | MONITORING PERIOD: | From: 08/01/2021 To: 08/31/2021 | | |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | 26.51 | 16.13 | | | | | | 0 | 1 Continuous | Meter |
| PARM Code 50050 1 Mon. Site: EFF-002 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | OTH | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-002 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | 43.50 | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-002 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | 7.17 | | 7.8 | | 0 | 1 Weekly | Grab |
| PARM Code 00400 1 Mon. Site: EFF-002 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | 6.97 | | 6.97 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | 7.18 | | 7.18 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-002 | Sample Measurement | | | | | | 6.6 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Grab) |
| Turbidity PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 8.8 | | 0 | 1 Weekly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | 37.8 | | 0 | 1 Weekly | Calculated |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | -31.2 | | 0 | 1 Weekly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | 3.5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-002 | Sample Measurement | | | | | 6.1 | 5.3 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | 5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-002 | Sample Measurement | | | | | 4.0 | 3.0 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-002 | Sample Measurement | | | | | 0.7 | 0.6 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 0.7 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-002 | Sample Measurement | | 139.77 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-002 | Sample Measurement | | | | | | 534 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 195 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | 1275 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-002 | Sample Measurement | | | | | | -741 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | 410 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-002 | Sample Measurement | | | | 86.5 | | | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | 38.0 (Dlyavmin) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|--------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | 27.1 | | | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | 42.0 | | | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water PARM Code 00010 1 Mon. Site: EFF-002 | Sample Measurement | | | | | | 31.9 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 28.3 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-002 | Sample Measurement | | | | | | 30.5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-002 | Sample Measurement | | | | | | 0.9 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-002 | Sample Measurement | | | | | | 1.5 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-002 | Sample Measurement | | 196.53 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 09/22/2021 |

| Parameter | Monitoring Site | Comments for Monitoring Group - D-002 |
|-----------|-----------------|---------------------------------------------------------------------------------|
| 00060 5 | SWB-002 | The maximum flow for SWB-002 was out of banks and unable to be safely measured. |

DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT - PART A

| | | | |
|-----------------|---------------------------------------------|--------------------|---------------------------------|
| PERMITTEE NAME: | Mosaic Fertilizer, L.L.C. | PERMIT NUMBER: | FL0036412 |
| ADDRESS: | 13830 Circa Crossing Dr Lithia, FL 33547 | LIMIT: | FINAL REPORT: Monthly |
| FACILITY: | Mosaic Fertilizer, LLC - Four Corners Mine | FACILITY TYPE: | IW GROUP: Industrial |
| LOCATION: | 11200 SR 37 S Bradley, FL 33835 | MONITORING GROUP: | D-003 |
| COUNTY: | MANATEE | DESCRIPTION: | Outfall D-003 |
| | | MONITORING PERIOD: | From: 08/01/2021 To: 08/31/2021 |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|-------------------|-------|--------------------------|--|----------------|-------|---------|-----------------------|--------------|
| Flow | Sample Measurement | 19.99 | 17.93 | | | | | | 0 | 1 Continuous | Meter |
| PARM Code 50050 1 Mon. Site: EFF-003 | Permit Requirement | Report (Daily Mx) | Report (Mo Avg) | MGD | | | | | | (1 Continuous) | (Meter) |
| Stream Flow | Sample Measurement | | 5.82 | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| Stream Flow | Sample Measurement | | OTH | | | | | | 0 | 1 Monthly | Calculated |
| PARM Code 00060 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | Report (Daily Mx) | MGD | | | | | | (1 Monthly) | (Calculated) |
| pH | Sample Measurement | | | | 7.30 | | 7.79 | | 0 | 1 Weekly | Grab |
| PARM Code 00400 1 Mon. Site: EFF-003 | Permit Requirement | | | | 6.0 (Daily Mn) | | 8.5 (Daily Mx) | s.u. | | (1 Weekly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|-------|---------|-------------------------------|--------------|
| pH PARM Code 00400 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | 6.75 | | 6.75 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly, when discharging) | (Grab) |
| pH PARM Code 00400 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | 7.19 | | 7.49 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | Report (Daily Mn) | | Report (Daily Mx) | s.u. | | (1 Monthly) | (Grab) |
| Turbidity PARM Code 00070 1 Add. Desc: effluent Mon. Site: EFF-003 | Sample Measurement | | | | | | 9.9 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Grab) |
| Turbidity PARM Code 00070 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | 9.8 | | 0 | 1 Weekly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly, when discharging) | (Grab) |
| Turbidity PARM Code 00070 P Add. Desc: calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | 38.8 | | 0 | 1 Weekly | Calculated |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--------------------|----------------------|-------|---------|----------------------------------|--------------|
| Turbidity PARM Code 00070 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | -28.9 | | 0 | 1 Weekly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Daily Mx) | NTU | | (1 Weekly) | (Calculated) |
| Turbidity PARM Code 00070 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | 2.6 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | NTU | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 1 Mon. Site: EFF-003 | Sample Measurement | | | | | 6.4 | 4.6 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 60.0 (Daily Mx) | 30.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Solids, Total Suspended PARM Code 00530 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | 1.6 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Solids, Total Suspended PARM Code 00530 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | 1.6 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|----------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|--------|--------------------------|--------------------|----------------------|----------|---------|-------------------------------|--------------|
| Solids, Fixed Suspended PARM Code 00540 1 Mon. Site: EFF-003 | Sample Measurement | | | | | 4.2 | 2.4 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 25.0 (Daily Mx) | 12.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 1 Mon. Site: EFF-003 | Sample Measurement | | | | | 0.5 | 0.3 | | 0 | 1 Weekly | Grab |
| | Permit Requirement | | | | | 5.0 (Daily Mx) | 3.0 (30Da Avg) | mg/L | | (1 Weekly) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | 0.2 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Phosphorus, Total (as P) PARM Code 00665 P Mon. Site: EFF-003 | Sample Measurement | | 75.74 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 1 Add. Desc: effluent Mon. Site: EFF-003 | Sample Measurement | | | | | | 533 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|----------|---------|-------------------------------|--------------|
| Specific Conductance PARM Code 00095 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | 251 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Specific Conductance PARM Code 00095 P Add. Desc: calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | 1275 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | Report (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 Q Add. Desc: effluent minus calculated limit Mon. Site: SWB-003 | Sample Measurement | | | | | | -742 | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | | | | | 0.0 (Maximum) | umhos/cm | | (1 Monthly) | (Calculated) |
| Specific Conductance PARM Code 00095 6 Add. Desc: downstream Mon. Site: SWD-003 | Sample Measurement | | | | | | 522 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | umhos/cm | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation PARM Code 00301 1 Mon. Site: EFF-003 | Sample Measurement | | | | 41.2 | | | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | 38.0 (Dlyavmin) | | | percent | | (1 Monthly) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|------------------------------------------------------------------|--------------------|---------------------|--|-------|--------------------------|--|-------------------|---------|---------|-------------------------------|-------------|
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | 76.1 | | | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00301 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | | | Report (Dlyavmin) | | | percent | | (1 Monthly, when discharging) | (Grab) |
| Oxygen, Dissolved Percent Saturation | Sample Measurement | | | | | | 31.8 | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00301 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | | | | | Report (Daily Av) | percent | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | 29.9 | | 0 | 1 Monthly | Grab |
| PARM Code 00010 1 Mon. Site: EFF-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | 28.1 | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00010 5 Add. Desc: background Mon. Site: SWB-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |
| Temperature (C), Water | Sample Measurement | | | | | | 30.4 | | 0 | 1 Monthly, when discharging | Grab |
| PARM Code 00010 6 Add. Desc: downstream Mon. Site: SWD-003 | Permit Requirement | | | | | | Report (Daily Mx) | Deg C | | (1 Monthly, when discharging) | (Grab) |

| Parameter | | Quantity or Loading | | Units | Quality or Concentration | | | Units | No. Ex. | Frequency of Analysis | Sample Type |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--------|--------------------------|--|-------------------------------------------------------------------------------------------|-------|---------|---------------------------------|--------------------------------|
| Nitrogen, Total PARM Code 00600 1 Mon. Site: EFF-003 | Sample Measurement | | | | | | 1.3 | | 0 | 1 Monthly | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly) | (Grab) |
| Nitrogen, Total PARM Code 00600 5 Add. Desc: background Mon. Site: SWB-003 | Sample Measurement | | | | | | 1.1 | | 0 | 1 Monthly, when discharging | Grab |
| | Permit Requirement | | | | | | Report (Daily Mx) | mg/L | | (1 Monthly, when discharging) | (Grab) |
| Nitrogen, Total PARM Code 00600 P Mon. Site: EFF-003 | Sample Measurement | | 215.2 | | | | | | 0 | 1 Monthly | Calculated |
| | Permit Requirement | | Report (Daily Mx) | lb/day | | | | | | (1 Monthly) | (Calculated) |
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Bethany Niec | I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS. | | | | | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT Electronically Signed | | | TELEPHONE (863) 661-0315 | SUBMITTED ON 09/22/2021 |

| Parameter | Monitoring Site | Comments for Monitoring Group - D-003 |
|-----------|-----------------|---------------------------------------------------------------------------------|
| 00060 6 | SWD-003 | The maximum flow for SWD-003 was out of banks and unable to be safely measured. |

for 01-01-2009 to 12-31-2020
Report Generated from DOPPLER -
FLDEP on 11/15/2021

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Florida Department of Environmental Protection
Wastewater Facility Regulation - Discharge Monitoring Re
Monitoring Data Download Report
Facility Id: FL0036412
Monitoring Group: D-001

| County | Monitoring Group | Date | Monitoring Location | PCS Code | NODI | Parameter |
|---------|------------------|------------|---------------------|----------|------|-----------|
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | Q | | P 00061 |

| | | | | | | |
|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2020 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2020 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2020 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00095 |

| | | | | | | |
|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | R | | P 00095 |

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| MANATEE | D-001 | 10/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00301 |

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| MANATEE | D-001 | 9/30/2020 | EFF-001 | Q | | P 00600 |
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| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 00951 |
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| MANATEE | D-001 | 9/30/2020 | EFF-001 | 1 | | P 11503 |
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| MANATEE | D-001 | 9/30/2020 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2020 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00665 |

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| MANATEE | D-001 | 8/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2020 | SWD-001 | R | | P 00010 |
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| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 7/31/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | Q | | P 00665 |

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| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00095 |

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| MANATEE | D-001 | 6/30/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | R | | P 00301 |
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| MANATEE | D-001 | 6/30/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2020 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2020 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2020 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 50050 |
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| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00070 |
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| MANATEE | D-001 | 5/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00540 |

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| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 5/31/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00665 |

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| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | Q | | P 00665 |

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| MANATEE | D-001 | 3/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00095 |
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| MANATEE | D-001 | 3/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | S | | P 00600 |
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| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2020 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2020 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2020 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 50050 |
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| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | S | | P 00070 |

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| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/29/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/29/2020 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/29/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 1/31/2020 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00530 |

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| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00665 |
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| MANATEE | D-001 | 1/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2020 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2020 | SWB-001 | Q | | P 00301 |
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| MANATEE | D-001 | 1/31/2020 | SWB-001 | R | | P 00600 |
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| MANATEE | D-001 | 1/31/2020 | SWD-001 | R | | P 00400 |
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| MANATEE | D-001 | 1/31/2020 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2020 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2020 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2020 | SWD-001 | R | | P 00301 |
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| MANATEE | D-001 | 1/31/2020 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 12/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00540 |

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| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2019 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2019 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2019 | EFF-001 | Q | | P TRP6C |

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| MANATEE | D-001 | 12/31/2019 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00095 |
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| MANATEE | D-001 | 11/30/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 50050 |

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| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 50050 |
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| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 10/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00095 |
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| MANATEE | D-001 | 10/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 9/30/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2019 | EFF-001 | 1 | | P 11503 |

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| MANATEE | D-001 | 9/30/2019 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2019 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | R | | P 00070 |
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| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00530 |
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| MANATEE | D-001 | 8/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2019 | SWD-001 | R | | P 00301 |

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| MANATEE | D-001 | 8/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2019 | SWD-001 | S | | P 00600 |

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| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 32230 |

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| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2019 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2019 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2019 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | R | | P 00530 |

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| MANATEE | D-001 | 5/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 5/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | T | | P 00095 |

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| MANATEE | D-001 | 4/30/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 00010 |

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| MANATEE | D-001 | 3/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2019 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2019 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2019 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/28/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/28/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | Q | | P 00061 |

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| MANATEE | D-001 | 2/28/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/28/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2019 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 1/31/2019 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | T | | P 00070 |

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| MANATEE | D-001 | 1/31/2019 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 1/31/2019 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | S | | P 00665 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 12/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2018 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2018 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2018 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00301 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2018 | EFF-001 | 1 | | P 00600 |

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| MANATEE | D-001 | 10/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | 5 | | P 00061 |

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| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2018 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 9/30/2018 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2018 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00095 |

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|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 8/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 8/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | S | | P 00095 |

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| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00010 |

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| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2018 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2018 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2018 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | Q | | P 00665 |

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| MANATEE | D-001 | 5/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 5/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00095 |

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| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | R | | P 00095 |

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| MANATEE | D-001 | 3/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2018 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2018 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2018 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00540 |

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| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/28/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/28/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/28/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00665 |

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| MANATEE | D-001 | 1/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2018 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 1/31/2018 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 1/31/2018 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | Q | | P 00665 |

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| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2017 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2017 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2017 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2017 | SWD-001 | S | | P 00600 |
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| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 50050 |
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| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00070 |

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| MANATEE | D-001 | 9/30/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2017 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 9/30/2017 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2017 | SWD-001 | R | | P 00951 |

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| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 8/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 50050 |

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| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 7/31/2017 | EFF-001 | Q | | P 00665 |
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| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00301 |
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| MANATEE | D-001 | 7/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | S | | P 00061 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2017 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 32230 |

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| MANATEE | D-001 | 6/30/2017 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2017 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 5/31/2017 | EFF-001 | R | | P 00070 |
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| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 5/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | S | | P 00095 |
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| MANATEE | D-001 | 5/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2017 | SWD-001 | R | | P 00010 |

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| MANATEE | D-001 | 5/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 50050 |

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| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | S | | P 00095 |
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| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 00951 |

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| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2017 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2017 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2017 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/28/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/28/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | S | | P 00665 |

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| MANATEE | D-001 | 2/28/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/28/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00665 |
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| MANATEE | D-001 | 1/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2017 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 1/31/2017 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2017 | SWD-001 | R | | P 00301 |

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| MANATEE | D-001 | 1/31/2017 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | S | | P 00600 |

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| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2016 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2016 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2016 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | 5 | | P 00061 |

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| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2016 | EFF-001 | 1 | | P 00010 |
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| MANATEE | D-001 | 10/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2016 | SWB-001 | Q | | P 00530 |

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| MANATEE | D-001 | 10/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00301 |

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| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2016 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 9/30/2016 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2016 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00530 |
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| MANATEE | D-001 | 8/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00010 |

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| MANATEE | D-001 | 8/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 8/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2016 | EFF-001 | Q | | P 00600 |

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| MANATEE | D-001 | 7/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | S | | P 00095 |
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| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00400 |

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|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2016 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2016 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2016 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | R | | P 00095 |

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| MANATEE | D-001 | 5/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 5/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00301 |

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| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00600 |

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|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 3/31/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2016 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2016 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2016 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | Q | | P 00665 |

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|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/29/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/29/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/29/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00095 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 1/31/2016 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2016 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 1/31/2016 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 1/31/2016 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | S | | P 00095 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2015 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2015 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2015 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00070 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | R | | P 00070 |

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| MANATEE | D-001 | 10/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00530 |

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| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2015 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 9/30/2015 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2015 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | R | | P 00400 |
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| MANATEE | D-001 | 8/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 8/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00070 |

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| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00400 |
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| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00070 |
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| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00070 |

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| MANATEE | D-001 | 6/30/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2015 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2015 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2015 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 50050 |

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| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 5/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | S | | P 00061 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 5/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 5/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 4/30/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00400 |

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| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 3/31/2015 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 3/31/2015 | SWB-001 | Q | | P 00951 |

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| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 3/31/2015 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 2/28/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 2/28/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 2/28/2015 | SWD-001 | S | | P 00600 |

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| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 1/31/2015 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 1/31/2015 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 1/31/2015 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 50050 |

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| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00540 |
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| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 80045 |

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| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2014 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2014 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2014 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00301 |

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| MANATEE | D-001 | 11/30/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 11/30/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 11/30/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 10/31/2014 | SWB-001 | R | | P 00600 |

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| MANATEE | D-001 | 10/31/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 10/31/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 00400 |

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| MANATEE | D-001 | 9/30/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2014 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 9/30/2014 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 9/30/2014 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00400 |

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| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 8/31/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 8/31/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | R | | P 00665 |

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| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 7/31/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 7/31/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00010 |

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| MANATEE | D-001 | 6/30/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 6/30/2014 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 6/30/2014 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 6/30/2014 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 4/30/2014 | EFF-001 | 1 | | P 00600 |

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| MANATEE | D-001 | 4/30/2014 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00400 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 4/30/2014 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 4/30/2014 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00095 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00301 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | 5 | | P 00061 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00400 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00530 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | R | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00301 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00010 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | R | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | Q | | P 00061 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 00400 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | T | | P 00070 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 00530 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | S | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | T | | P 00095 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 00301 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 00010 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | S | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 32230 |
| MANATEE | D-001 | 12/31/2013 | SWB-001 | Q | | P 00951 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 32230 |
| MANATEE | D-001 | 12/31/2013 | SWD-001 | R | | P 00951 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 12/31/2013 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | S | | P 00070 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 11/30/2013 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00095 |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 10/31/2013 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P TRP3B |

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|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 9/30/2013 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00945 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 32230 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 00951 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 80045 |
| MANATEE | D-001 | 9/30/2013 | EFF-001 | 1 | | P 11503 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 8/31/2013 | EFF-001 | R | | P TRP6C |

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|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 12/31/2012 | EFF-001 | Y | | P 00665 |
| MANATEE | D-001 | 12/31/2012 | EFF-001 | Y | | P 00600 |
| MANATEE | D-001 | 12/31/2012 | EFF-001 | P | | P 00600 |
| MANATEE | D-001 | 12/31/2012 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 50050 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 11/30/2012 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00400 |

| | | | | | | |
|---------|-------|------------|---------|---|--|---------|
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 10/31/2012 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 10/31/2012 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 9/30/2012 | EFF-001 | R | | P TRP6C |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 8/31/2012 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00540 |

| | | | | | | |
|---------|-------|-----------|---------|---|--|---------|
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 8/31/2012 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00056 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00400 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00070 |
| MANATEE | D-001 | 7/31/2012 | SWB-001 | Q | | P 00070 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | R | | P 00070 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | S | | P 00070 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00530 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00540 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00665 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P 00665 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00095 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P 00095 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | R | | P 00095 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | S | | P 00095 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00300 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00010 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | 1 | | P 00600 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P 00600 |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | P | | P TRP3B |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P TRP3B |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | R | | P TRP3B |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | P | | P TRP6C |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | Q | | P TRP6C |
| MANATEE | D-001 | 7/31/2012 | EFF-001 | R | | P TRP6C |

| | | | | | | |
|---------|-------|------------|--|---|--|---------|
| MANATEE | D-001 | 12/31/2009 | | P | | P 34210 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34215 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34030 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32101 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32104 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 38677 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32102 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34301 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34311 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34576 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32106 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34418 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32105 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34668 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34496 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 32103 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34501 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34546 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34541 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34561 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34699 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34371 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34423 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34516 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 78389 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34506 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34511 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 78391 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34488 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 34010 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 39175 |
| MANATEE | D-001 | 12/31/2009 | | P | | P 77651 |

ports

| Description | Result Qualifier | Result | Limit | Units |
|--------------------------------------|---------------------|--------|--------|----------|
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|---|----------|--------|----------|
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | 28291.09 | Report | lb/yr |
| Nitrogen, Total | | 28830.43 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 59.72 | Report | MGD |
| Flow | | 40.32 | Report | MGD |
| pH | | 7.1 | Report | s.u. |
| pH | | 7 | 6.0 | s.u. |
| pH | | 7.2 | 8.5 | s.u. |
| Turbidity | | 8.4 | Report | NTU |
| Turbidity | | 6.6 | Report | NTU |
| Turbidity | | 2.8 | Report | NTU |
| Turbidity | | 31.8 | Report | NTU |
| Turbidity | | -23.4 | 0.0 | NTU |
| Solids, Total Suspended | | 5.8 | 30.0 | mg/L |
| Solids, Total Suspended | | 7.8 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 3.4 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 5.9 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 103.73 | Report | lb/day |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Phosphorus, Total (as P) | | 66.55 | Report | lb/day |
| Specific Conductance | | 520 | Report | umhos/cm |
| Specific Conductance | | 263 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -755 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 71.2 | 38.0 | percent |
| Temperature (C), Water | | 26.6 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 301.35 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.65 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | | 1 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 86 | Report | percent |
| Temperature (C), Water | | 17.7 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Stream Flow, Instantaneous | | 48.5 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 6 | Report | NTU |
| Solids, Total Suspended | | 3 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.1 | Report | mg/L |
| Specific Conductance | | 512 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 93.6 | Report | percent |
| Temperature (C), Water | | 18.4 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Sulfate, Total | | 124 | Report | mg/L |
| Chlorophyll a | | 0.61 | Report | ug/L |
| Fluoride, Total (as F) | | 1.9 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 12.2 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 2.5 | Report | ug/L |
| Fluoride, Total (as F) | | 0.9 | Report | mg/L |
| Chlorophyll a | | 0.8 | Report | ug/L |
| Fluoride, Total (as F) | | 1.7 | Report | mg/L |
| Flow | | 50.83 | Report | MGD |
| Flow | | 59.78 | Report | MGD |
| pH | | 6.5 | 6.0 | s.u. |
| pH | | 7.8 | 8.5 | s.u. |
| pH | | 7.3 | Report | s.u. |
| Turbidity | | 8.5 | Report | NTU |
| Turbidity | | 7.8 | Report | NTU |
| Turbidity | | 2.2 | Report | NTU |
| Turbidity | | 31.2 | Report | NTU |
| Turbidity | | -23.1 | 0.0 | NTU |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Solids, Total Suspended | | 7.7 | 30.0 | mg/L |
| Solids, Total Suspended | | 10.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 8.6 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 5.3 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 126.62 | Report | lb/day |
| Phosphorus, Total (as P) | | 111.24 | Report | lb/day |
| Specific Conductance | | 523 | Report | umhos/cm |
| Specific Conductance | | 297 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -752 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 78.3 | 38.0 | percent |
| Temperature (C), Water | | 22.3 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Nitrogen, Total | | 402.9 | Report | lb/day |
| Stream Flow, Instantaneous | | 2.59 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 80.9 | Report | percent |
| Temperature (C), Water | | 20.4 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Stream Flow, Instantaneous | | 60.6 | Report | MGD |
| pH | | 7.1 | Report | s.u. |
| Turbidity | | 3 | Report | NTU |
| Solids, Total Suspended | | 1.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.1 | Report | mg/L |
| Specific Conductance | | 522 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 90 | Report | percent |
| Temperature (C), Water | | 20.6 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Flow | | 64.7 | Report | MGD |
| Flow | | 54.01 | Report | MGD |
| pH | | 8.05 | 8.5 | s.u. |
| pH | | 7.45 | Report | s.u. |
| pH | | 7.01 | 6.0 | s.u. |
| Turbidity | | 10.5 | Report | NTU |
| Turbidity | | 8.6 | Report | NTU |
| Turbidity | | 1.9 | Report | NTU |
| Turbidity | | 30.9 | Report | NTU |
| Turbidity | | -20.4 | 0.0 | NTU |
| Solids, Total Suspended | | 8.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 10.1 | 60.0 | mg/L |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Solids, Fixed Suspended | | 6.5 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 9.7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 119.62 | Report | lb/day |
| Phosphorus, Total (as P) | | 162.23 | Report | lb/day |
| Specific Conductance | | 532 | Report | umhos/cm |
| Specific Conductance | | 328 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -743 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 74.2 | 38.0 | percent |
| Temperature (C), Water | | 20.9 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 354.5 | Report | lb/day |
| Stream Flow, Instantaneous | | 2.91 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Solids, Total Suspended | | 4.1 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 98.6 | Report | percent |
| Temperature (C), Water | | 14.2 | Report | Deg C |
| Nitrogen, Total | | 0.89 | Report | mg/L |
| Stream Flow, Instantaneous | | 38.8 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 4 | Report | NTU |
| Solids, Total Suspended | | 9.3 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.13 | Report | mg/L |
| Specific Conductance | | 573 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 92.1 | Report | percent |
| Temperature (C), Water | | 17.3 | Report | Deg C |
| Nitrogen, Total | | 0.65 | Report | mg/L |
| Flow | | 38.84 | Report | MGD |
| Flow | | 71.68 | Report | MGD |
| pH | | 7.5 | 6.0 | s.u. |
| pH | | 7.7 | Report | s.u. |
| pH | | 7.9 | 8.5 | s.u. |
| Turbidity | | 6.8 | Report | NTU |
| Turbidity | | 9.6 | Report | NTU |
| Turbidity | | 3.64 | Report | NTU |
| Turbidity | | 32.6 | Report | NTU |
| Turbidity | | -23.9 | 0.0 | NTU |
| Solids, Total Suspended | | 9.6 | 60.0 | mg/L |
| Solids, Total Suspended | | 5.7 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 4.2 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 7.5 | 25.0 | mg/L |

| | | | | |
|--------------------------------------|---|----------|--------|----------|
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 181.77 | Report | lb/day |
| Phosphorus, Total (as P) | | 77.46 | Report | lb/day |
| Specific Conductance | | 506 | Report | umhos/cm |
| Specific Conductance | | 252 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -769 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 71.7 | 38.0 | percent |
| Temperature (C), Water | | 21.3 | Report | Deg C |
| Nitrogen, Total | | 0.5 | Report | mg/L |
| Nitrogen, Total | | 271.6 | Report | lb/day |
| Stream Flow, Instantaneous | | 1.9 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Solids, Total Suspended | | 2.1 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 79.8 | Report | percent |
| Temperature (C), Water | | 19.7 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Stream Flow, Instantaneous | | 38.8 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| Turbidity | | 4.9 | Report | NTU |
| Solids, Total Suspended | | 4.9 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.2 | Report | mg/L |
| Specific Conductance | | 495 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 89 | Report | percent |
| Temperature (C), Water | | 20.7 | Report | Deg C |
| Nitrogen, Total | | 0.6 | Report | mg/L |
| Sulfate, Total | | 113 | Report | mg/L |
| Chlorophyll a | | 1.8 | Report | ug/L |
| Fluoride, Total (as F) | | 1.6 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 9.9 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 0.1 | Report | ug/L |
| Fluoride, Total (as F) | | 0.8 | Report | mg/L |
| Chlorophyll a | | 1.1 | Report | ug/L |
| Fluoride, Total (as F) | | 1.5 | Report | mg/L |
| Phosphorus, Total (as P) | | 31182.02 | Report | lb/yr |
| Nitrogen, Total | | 95991.01 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | 47.01 | Report | MGD |
| Flow | | 56.67 | Report | MGD |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 8.9 | Report | NTU |
| Turbidity | | 7.7 | Report | NTU |
| Turbidity | | 4.6 | Report | NTU |
| Turbidity | | 33.6 | Report | NTU |
| Turbidity | | -25.3 | 0.0 | NTU |
| Solids, Total Suspended | | 12 | 60.0 | mg/L |
| Solids, Total Suspended | | 7 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.8 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 10.6 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 111.41 | Report | lb/day |
| Phosphorus, Total (as P) | | 166.17 | Report | lb/day |
| Specific Conductance | | 502 | Report | umhos/cm |
| Specific Conductance | | 247 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -773 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 61.2 | 38.0 | percent |
| Temperature (C), Water | | 25.1 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 287.38 | Report | lb/day |
| Stream Flow, Instantaneous | | 2.59 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Solids, Total Suspended | | 2.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 82.4 | Report | percent |
| Temperature (C), Water | | 22.8 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Stream Flow, Instantaneous | | 40.4 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 8 | Report | NTU |
| Solids, Total Suspended | | 4.9 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 487 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87.6 | Report | percent |
| Temperature (C), Water | | 24.4 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Flow | | 63.47 | Report | MGD |

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|--------------------------------------|--|--------|--------|----------|
| Flow | | 36 | Report | MGD |
| pH | | 7.22 | Report | s.u. |
| pH | | 7.47 | 8.5 | s.u. |
| pH | | 6.83 | 6.0 | s.u. |
| Turbidity | | 10.4 | Report | NTU |
| Turbidity | | 13.3 | Report | NTU |
| Turbidity | | 6.2 | Report | NTU |
| Turbidity | | 35.2 | Report | NTU |
| Turbidity | | -22.8 | 0.0 | NTU |
| Solids, Total Suspended | | 6.9 | 30.0 | mg/L |
| Solids, Total Suspended | | 8.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 5.1 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 121.57 | Report | lb/day |
| Phosphorus, Total (as P) | | 226.57 | Report | lb/day |
| Specific Conductance | | 490 | Report | umhos/cm |
| Specific Conductance | | 237 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -785 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 48.2 | 38.0 | percent |
| Temperature (C), Water | | 27.4 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Nitrogen, Total | | 115.36 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.29 | Report | MGD |
| pH | | 6.5 | Report | s.u. |
| Solids, Total Suspended | | 2.9 | Report | mg/L |
| Phosphorus, Total (as P) | | 1 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 44.9 | Report | percent |
| Temperature (C), Water | | 25.4 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 14.5 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 4.7 | Report | NTU |
| Solids, Total Suspended | | 3 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 462 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 91.4 | Report | percent |
| Temperature (C), Water | | 26.3 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Flow | | 78.57 | Report | MGD |
| Flow | | 43.93 | Report | MGD |
| pH | | 7.4 | Report | s.u. |

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|--------------------------------------|--|--------|--------|----------|
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.3 | 6.0 | s.u. |
| Turbidity | | 11.5 | Report | NTU |
| Turbidity | | 9.1 | Report | NTU |
| Turbidity | | 3.1 | Report | NTU |
| Turbidity | | 32.1 | Report | NTU |
| Turbidity | | -24.9 | 0.0 | NTU |
| Solids, Total Suspended | | 10.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 8.3 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8.9 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 137.01 | Report | lb/day |
| Phosphorus, Total (as P) | | 161.41 | Report | lb/day |
| Specific Conductance | | 478 | Report | umhos/cm |
| Specific Conductance | | 229 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -797 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 51.9 | 38.0 | percent |
| Temperature (C), Water | | 30 | Report | Deg C |
| Nitrogen, Total | | 0.6 | Report | mg/L |
| Nitrogen, Total | | 220.16 | Report | lb/day |
| Stream Flow, Instantaneous | | 2.6 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 73.6 | Report | percent |
| Temperature (C), Water | | 27.4 | Report | Deg C |
| Nitrogen, Total | | 1.03 | Report | mg/L |
| Stream Flow, Instantaneous | | 40.4 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 4.2 | Report | NTU |
| Solids, Total Suspended | | 3 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 452 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87.1 | Report | percent |
| Temperature (C), Water | | 28.7 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Sulfate, Total | | 137 | Report | mg/L |
| Chlorophyll a | | 2.5 | Report | ug/L |
| Fluoride, Total (as F) | | 1.4 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 10.4 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |

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| Chlorophyll a | | 5.6 | Report | ug/L |
| Fluoride, Total (as F) | | 0.8 | Report | mg/L |
| Chlorophyll a | | 17.5 | Report | ug/L |
| Fluoride, Total (as F) | | 1.6 | Report | mg/L |
| Flow | | 93.33 | Report | MGD |
| Flow | | 72.14 | Report | MGD |
| pH | | 7.2 | 6.0 | s.u. |
| pH | | 7.3 | Report | s.u. |
| pH | | 7.5 | 8.5 | s.u. |
| Turbidity | | 16.7 | Report | NTU |
| Turbidity | | 13.1 | Report | NTU |
| Turbidity | | 5.3 | Report | NTU |
| Turbidity | | 34.3 | Report | NTU |
| Turbidity | | -17.6 | 0.0 | NTU |
| Solids, Total Suspended | | 12.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 9.4 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8.3 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 257.81 | Report | lb/day |
| Phosphorus, Total (as P) | | 299.72 | Report | lb/day |
| Specific Conductance | | 493 | Report | umhos/cm |
| Specific Conductance | | 129 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -782 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 57.3 | 38.0 | percent |
| Temperature (C), Water | | 29.9 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 399.11 | Report | lb/day |
| Stream Flow, Instantaneous | | 25.8 | Report | MGD |
| pH | | 6.9 | Report | s.u. |
| Solids, Total Suspended | | 6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 63.9 | Report | percent |
| Temperature (C), Water | | 26.3 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | OTH | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 11.6 | Report | NTU |
| Solids, Total Suspended | | 7.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 462 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 81.9 | Report | percent |

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|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | 28.2 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Flow | | 33.44 | Report | MGD |
| Flow | | 70.23 | Report | MGD |
| pH | | 7.1 | Report | s.u. |
| pH | | 7.3 | 8.5 | s.u. |
| pH | | 7.1 | 6.0 | s.u. |
| Turbidity | | 13.3 | Report | NTU |
| Turbidity | | 10.9 | Report | NTU |
| Turbidity | | 7 | Report | NTU |
| Turbidity | | 36 | Report | NTU |
| Turbidity | | -23.4 | 0.0 | NTU |
| Solids, Total Suspended | | 11.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 7.4 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 4.6 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 87.06 | Report | lb/day |
| Phosphorus, Total (as P) | | 131.6 | Report | lb/day |
| Specific Conductance | | 544 | Report | umhos/cm |
| Specific Conductance | | 223 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -731 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 49.3 | 38.0 | percent |
| Temperature (C), Water | | 29.5 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Nitrogen, Total | | 645.57 | Report | lb/day |
| Stream Flow, Instantaneous | | 11 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | | 4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 71.2 | Report | percent |
| Temperature (C), Water | | 26.9 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Stream Flow, Instantaneous | | 60.6 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 10.2 | Report | NTU |
| Solids, Total Suspended | | 6.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 484 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 85.4 | Report | percent |
| Temperature (C), Water | | 28.1 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |

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| Flow | | 67.599 | Report | MGD |
| Flow | | 41.991 | Report | MGD |
| pH | | 7 | 6.0 | s.u. |
| pH | | 7.2 | 8.5 | s.u. |
| pH | | 7.1 | Report | s.u. |
| Turbidity | | 11.25 | Report | NTU |
| Turbidity | | 12.8 | Report | NTU |
| Turbidity | | 8.91 | Report | NTU |
| Turbidity | | 37.91 | Report | NTU |
| Turbidity | | -25.1 | 0.0 | NTU |
| Solids, Total Suspended | | 7.6 | 60.0 | mg/L |
| Solids, Total Suspended | | 7.1 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.5 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 6.5 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 192.75 | Report | lb/day |
| Phosphorus, Total (as P) | | 101.54 | Report | lb/day |
| Specific Conductance | | 510 | Report | umhos/cm |
| Specific Conductance | | 353 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -765 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 51.2 | 38.0 | percent |
| Temperature (C), Water | | 30.8 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Nitrogen, Total | | 210.66 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.08 | Report | MGD |
| pH | | 6 | Report | s.u. |
| Solids, Total Suspended | | 8.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 42.7 | Report | percent |
| Temperature (C), Water | | 27.9 | Report | Deg C |
| Nitrogen, Total | | 0.5 | Report | mg/L |
| Stream Flow, Instantaneous | | 15.5 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 7.48 | Report | NTU |
| Solids, Total Suspended | | 5 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.2 | Report | mg/L |
| Specific Conductance | | 501 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 90.9 | Report | percent |
| Temperature (C), Water | | 29.4 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Sulfate, Total | | 146 | Report | mg/L |
| Chlorophyll a | | 20.8 | Report | ug/L |

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|--------------------------------------|--|--------|--------|----------|
| Fluoride, Total (as F) | | 1.6 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 8.2 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 5.4 | Report | ug/L |
| Fluoride, Total (as F) | | 0.8 | Report | mg/L |
| Chlorophyll a | | 1.4 | Report | ug/L |
| Fluoride, Total (as F) | | 1.6 | Report | mg/L |
| Flow | | 6.284 | Report | MGD |
| Flow | | 35.7 | Report | MGD |
| pH | | 7.1 | 6.0 | s.u. |
| pH | | 7.1 | Report | s.u. |
| pH | | 7.1 | 8.5 | s.u. |
| Turbidity | | 6.45 | Report | NTU |
| Turbidity | | 6.45 | Report | NTU |
| Turbidity | | 11.6 | Report | NTU |
| Turbidity | | 40.6 | Report | NTU |
| Turbidity | | -34.2 | 0.0 | NTU |
| Solids, Total Suspended | | 4.8 | 30.0 | mg/L |
| Solids, Total Suspended | | 4.8 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 3.7 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 3.7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 36.35 | Report | lb/day |
| Phosphorus, Total (as P) | | 10.07 | Report | lb/day |
| Specific Conductance | | 515 | Report | umhos/cm |
| Specific Conductance | | 226 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -760 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 47.6 | 38.0 | percent |
| Temperature (C), Water | | 29 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 130.25 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.12 | Report | MGD |
| pH | | 6.1 | Report | s.u. |
| Solids, Total Suspended | | 10 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 18.9 | Report | percent |
| Temperature (C), Water | | 25.6 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Stream Flow, Instantaneous | | 12.9 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 7.8 | Report | NTU |
| Solids, Total Suspended | | 4.8 | Report | mg/L |

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|--------------------------------------|--|--------|--------|----------|
| Phosphorus, Total (as P) | | 1 | Report | mg/L |
| Specific Conductance | | 515 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 91.8 | Report | percent |
| Temperature (C), Water | | 27 | Report | Deg C |
| Nitrogen, Total | | 3 | Report | mg/L |
| Flow | | 70.6 | Report | MGD |
| Flow | | 23.743 | Report | MGD |
| pH | | 7.2 | 6.0 | s.u. |
| pH | | 7.4 | 8.5 | s.u. |
| pH | | 7.3 | Report | s.u. |
| Turbidity | | 9.83 | Report | NTU |
| Turbidity | | 12.1 | Report | NTU |
| Turbidity | | 6.88 | Report | NTU |
| Turbidity | | 35.88 | Report | NTU |
| Turbidity | | -23.8 | 0.0 | NTU |
| Solids, Total Suspended | | 12 | 60.0 | mg/L |
| Solids, Total Suspended | | 9.5 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 9.7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 148.34 | Report | lb/day |
| Phosphorus, Total (as P) | | 55.74 | Report | lb/day |
| Specific Conductance | | 504 | Report | umhos/cm |
| Specific Conductance | | 201 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -771 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 78.9 | 38.0 | percent |
| Temperature (C), Water | | 25.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Nitrogen, Total | | 761.62 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.19 | Report | MGD |
| pH | | 6.3 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 57.1 | Report | percent |
| Temperature (C), Water | | 19.6 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | 72.7 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 9.3 | Report | NTU |
| Solids, Total Suspended | | 6.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 503 | Report | umhos/cm |

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|--------------------------------------|--|--------|--------|----------|
| Oxygen, Dissolved Percent Saturation | | 90.2 | Report | percent |
| Temperature (C), Water | | 21 | Report | Deg C |
| Nitrogen, Total | | 1.9 | Report | mg/L |
| Flow | | 88.46 | Report | MGD |
| Flow | | 67.563 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| pH | | 7.5 | 6.0 | s.u. |
| pH | | 7.9 | 8.5 | s.u. |
| Turbidity | | 12.6 | Report | NTU |
| Turbidity | | 14.8 | Report | NTU |
| Turbidity | | 3.2 | Report | NTU |
| Turbidity | | 32.2 | Report | NTU |
| Turbidity | | -17.4 | 0.0 | NTU |
| Solids, Total Suspended | | 9.9 | 30.0 | mg/L |
| Solids, Total Suspended | | 12 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 9.2 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 209.74 | Report | lb/day |
| Phosphorus, Total (as P) | | 264.73 | Report | lb/day |
| Specific Conductance | | 512 | Report | umhos/cm |
| Specific Conductance | | 229 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -763 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 74.5 | 38.0 | percent |
| Temperature (C), Water | | 22.5 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Nitrogen, Total | | 447.71 | Report | lb/day |
| Stream Flow, Instantaneous | | 8.1 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 78.8 | Report | percent |
| Temperature (C), Water | | 19.7 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Stream Flow, Instantaneous | | 60.6 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 6.4 | Report | NTU |
| Solids, Total Suspended | | 3.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.2 | Report | mg/L |
| Specific Conductance | | 506 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87 | Report | percent |
| Temperature (C), Water | | 21.3 | Report | Deg C |

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|--------------------------------------|--|--------|--------|----------|
| Nitrogen, Total | | 0.5 | Report | mg/L |
| Sulfate, Total | | 134 | Report | mg/L |
| Chlorophyll a | | 1.8 | Report | ug/L |
| Fluoride, Total (as F) | | 1.4 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 8.3 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 1.7 | Report | ug/L |
| Fluoride, Total (as F) | | 0.7 | Report | mg/L |
| Chlorophyll a | | 2.1 | Report | ug/L |
| Fluoride, Total (as F) | | 1.4 | Report | mg/L |
| Flow | | 67.4 | Report | MGD |
| Flow | | 87.25 | Report | MGD |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.5 | 6.0 | s.u. |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 8.92 | Report | NTU |
| Turbidity | | 11.5 | Report | NTU |
| Turbidity | | 3.31 | Report | NTU |
| Turbidity | | 32.31 | Report | NTU |
| Turbidity | | -20.8 | 0.0 | NTU |
| Solids, Total Suspended | | 8.8 | 60.0 | mg/L |
| Solids, Total Suspended | | 7.3 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 8.4 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 162.13 | Report | lb/day |
| Phosphorus, Total (as P) | | 157.35 | Report | lb/day |
| Specific Conductance | | 502 | Report | umhos/cm |
| Specific Conductance | | 249 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -773 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 85.3 | 38.0 | percent |
| Temperature (C), Water | | 23.1 | Report | Deg C |
| Nitrogen, Total | | 0.4 | Report | mg/L |
| Nitrogen, Total | | 199.66 | Report | lb/day |
| Stream Flow, Instantaneous | | 5.45 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 1.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 85.1 | Report | percent |
| Temperature (C), Water | | 18.6 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Stream Flow, Instantaneous | | 60.6 | Report | MGD |

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|--------------------------------------|--|--------|--------|----------|
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 4.4 | Report | NTU |
| Solids, Total Suspended | | 2.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.1 | Report | mg/L |
| Specific Conductance | | 617 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 92.1 | Report | percent |
| Temperature (C), Water | | 19.2 | Report | Deg C |
| Nitrogen, Total | | 0.4 | Report | mg/L |
| Flow | | 40.002 | Report | MGD |
| Flow | | 74.07 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| pH | | 7.8 | 8.5 | s.u. |
| pH | | 7.3 | 6.0 | s.u. |
| Turbidity | | 15.1 | Report | NTU |
| Turbidity | | 8.71 | Report | NTU |
| Turbidity | | 2.25 | Report | NTU |
| Turbidity | | 31.25 | Report | NTU |
| Turbidity | | -16.2 | 0.0 | NTU |
| Solids, Total Suspended | | 4.8 | 30.0 | mg/L |
| Solids, Total Suspended | | 5.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 3 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 3.1 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 138.45 | Report | lb/day |
| Phosphorus, Total (as P) | | 82.52 | Report | lb/day |
| Specific Conductance | | 494 | Report | umhos/cm |
| Specific Conductance | | 236 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -781 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 79.8 | 38.0 | percent |
| Temperature (C), Water | | 23.2 | Report | Deg C |
| Nitrogen, Total | | 0.5 | Report | mg/L |
| Nitrogen, Total | | 188.07 | Report | lb/day |
| Stream Flow, Instantaneous | | 6.46 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 80.1 | Report | percent |
| Temperature (C), Water | | 18.7 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | 48.5 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 7.81 | Report | NTU |

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|--------------------------------------|--|--------|--------|----------|
| Solids, Total Suspended | | 4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.2 | Report | mg/L |
| Specific Conductance | | 482 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 89.9 | Report | percent |
| Temperature (C), Water | | 19.8 | Report | Deg C |
| Nitrogen, Total | | 0.6 | Report | mg/L |
| Flow | | 15.496 | Report | MGD |
| Flow | | 71.79 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| pH | | 7.8 | 8.5 | s.u. |
| pH | | 7.8 | 6.0 | s.u. |
| Turbidity | | 11.1 | Report | NTU |
| Turbidity | | 11.1 | Report | NTU |
| Turbidity | | 3.99 | Report | NTU |
| Turbidity | | 32.99 | Report | NTU |
| Turbidity | | -21.89 | 0.0 | NTU |
| Solids, Total Suspended | | 8.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 8.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 120.06 | Report | lb/day |
| Phosphorus, Total (as P) | | 36.34 | Report | lb/day |
| Specific Conductance | | 511 | Report | umhos/cm |
| Specific Conductance | | 199 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -764 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 86.6 | 38.0 | percent |
| Temperature (C), Water | | 18.3 | Report | Deg C |
| Nitrogen, Total | | 0.3 | Report | mg/L |
| Nitrogen, Total | | 143.99 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.96 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Solids, Total Suspended | | 3.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.9 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 83.8 | Report | percent |
| Temperature (C), Water | | 15.9 | Report | Deg C |
| Nitrogen, Total | | 0.337 | Report | mg/L |
| Stream Flow, Instantaneous | | 7.75 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 10.9 | Report | NTU |
| Solids, Total Suspended | | 10 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |

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|--------------------------------------|---|----------|--------|----------|
| Specific Conductance | | 496 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 92.4 | Report | percent |
| Temperature (C), Water | | 17.1 | Report | Deg C |
| Nitrogen, Total | | 0.554 | Report | mg/L |
| Sulfate, Total | | 129 | Report | mg/L |
| Chlorophyll a | | 1.71 | Report | ug/L |
| Fluoride, Total (as F) | | 1.45 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 11.8 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 1.39 | Report | ug/L |
| Fluoride, Total (as F) | | 0.66 | Report | mg/L |
| Chlorophyll a | | 0.3 | Report | ug/L |
| Fluoride, Total (as F) | | 1.35 | Report | mg/L |
| Phosphorus, Total (as P) | | 24687.2 | Report | lb/yr |
| Nitrogen, Total | | 57110.77 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |

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|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 40.121 | Report | MGD |
| Flow | | 66.79 | Report | MGD |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.5 | Report | s.u. |
| pH | | 7.5 | 6.0 | s.u. |
| Turbidity | | 11.93 | Report | NTU |
| Turbidity | | 12.5 | Report | NTU |
| Turbidity | | 2.73 | Report | NTU |
| Turbidity | | 31.73 | Report | NTU |
| Turbidity | | -19.2 | 0.0 | NTU |
| Solids, Total Suspended | | 10 | 60.0 | mg/L |
| Solids, Total Suspended | | 7.8 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 6.6 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 8.8 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 157.7 | Report | lb/day |
| Phosphorus, Total (as P) | | 69.64 | Report | lb/day |
| Specific Conductance | | 507 | Report | umhos/cm |
| Specific Conductance | | 209 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -768 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 72.9 | 38.0 | percent |
| Temperature (C), Water | | 28.7 | Report | Deg C |
| Nitrogen, Total | | 0.6 | Report | mg/L |

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|--------------------------------------|--|--------|--------|----------|
| Nitrogen, Total | | 232.44 | Report | lb/day |
| Stream Flow, Instantaneous | | 6.46 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 74.2 | Report | percent |
| Temperature (C), Water | | 27.7 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Stream Flow, Instantaneous | | 48.5 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 7.28 | Report | NTU |
| Solids, Total Suspended | | 6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 489 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 86.6 | Report | percent |
| Temperature (C), Water | | 28.1 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Flow | | 78.3 | Report | MGD |
| Flow | | 55.3 | Report | MGD |
| pH | | 7.5 | 8.5 | s.u. |
| pH | | 7.3 | 6.0 | s.u. |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 15.43 | Report | NTU |
| Turbidity | | 18.1 | Report | NTU |
| Turbidity | | 5.1 | Report | NTU |
| Turbidity | | 34.1 | Report | NTU |
| Turbidity | | -16 | 0.0 | NTU |
| Solids, Total Suspended | | 6.2 | 30.0 | mg/L |
| Solids, Total Suspended | | 7.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 7.5 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 5.4 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.6 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 336.07 | Report | lb/day |
| Phosphorus, Total (as P) | | 232.02 | Report | lb/day |
| Specific Conductance | | 478 | Report | umhos/cm |
| Specific Conductance | | 184 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -797 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 63.2 | 38.0 | percent |
| Temperature (C), Water | | 29.5 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Nitrogen, Total | | 356.89 | Report | lb/day |
| Stream Flow, Instantaneous | | 14.5 | Report | MGD |

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|--------------------------------------|--|--------|--------|----------|
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | | 5.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 70.2 | Report | percent |
| Temperature (C), Water | | 27.4 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | OTH | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 11.3 | Report | NTU |
| Solids, Total Suspended | | 4.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 443 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 79.1 | Report | percent |
| Temperature (C), Water | | 28 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Sulfate, Total | | 133 | Report | mg/L |
| Chlorophyll a | | 4.98 | Report | ug/L |
| Fluoride, Total (as F) | | 1.67 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 13 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 27.2 | Report | ug/L |
| Fluoride, Total (as F) | | 0.78 | Report | mg/L |
| Chlorophyll a | | 1.51 | Report | ug/L |
| Fluoride, Total (as F) | | 1.78 | Report | mg/L |
| Flow | | 75.6 | Report | MGD |
| Flow | | 59.98 | Report | MGD |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 14.33 | Report | NTU |
| Turbidity | | 14.8 | Report | NTU |
| Turbidity | | 5.04 | Report | NTU |
| Turbidity | | 34.04 | Report | NTU |
| Turbidity | | -19.2 | 0.0 | NTU |
| Solids, Total Suspended | | 8.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 12.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 9.2 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.4 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 217.49 | Report | lb/day |
| Phosphorus, Total (as P) | | 269.67 | Report | lb/day |
| Specific Conductance | | 509 | Report | umhos/cm |
| Specific Conductance | | 187 | Report | umhos/cm |

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|--------------------------------------|--|--------|--------|----------|
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -766 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 72.1 | 38.0 | percent |
| Temperature (C), Water | | 30 | Report | Deg C |
| Nitrogen, Total | | 0.6 | Report | mg/L |
| Nitrogen, Total | | 368 | Report | lb/day |
| Stream Flow, Instantaneous | | 6.46 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 2.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 76.5 | Report | percent |
| Temperature (C), Water | | 26.8 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | 113 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 13.8 | Report | NTU |
| Solids, Total Suspended | | 5.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 473 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 81.4 | Report | percent |
| Temperature (C), Water | | 28.1 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Flow | | 97.55 | Report | MGD |
| Flow | | 79.29 | Report | MGD |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 23.4 | Report | NTU |
| Turbidity | | 12.42 | Report | NTU |
| Turbidity | | 3.65 | Report | NTU |
| Turbidity | | 32.65 | Report | NTU |
| Turbidity | | -9.3 | 0.0 | NTU |
| Solids, Total Suspended | | 15.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 8.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 13.2 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 5.6 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 219.95 | Report | lb/day |
| Phosphorus, Total (as P) | | 289.36 | Report | lb/day |
| Specific Conductance | | 543 | Report | umhos/cm |
| Specific Conductance | | 206 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -732 | 0.0 | umhos/cm |

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|--------------------------------------|--|--------|--------|----------|
| Oxygen, Dissolved Percent Saturation | | 50.5 | 38.0 | percent |
| Temperature (C), Water | | 29.8 | Report | Deg C |
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 475.45 | Report | lb/day |
| Stream Flow, Instantaneous | | 14.5 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 67.8 | Report | percent |
| Temperature (C), Water | | 26.8 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 96.9 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 6.78 | Report | NTU |
| Solids, Total Suspended | | 4.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 512 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 79.3 | Report | percent |
| Temperature (C), Water | | 28.6 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Flow | | 73.885 | Report | MGD |
| Flow | | 91.28 | Report | MGD |
| pH | | 7.2 | 6.0 | s.u. |
| pH | | 7.5 | Report | s.u. |
| pH | | 7.8 | 8.5 | s.u. |
| Turbidity | | 10.43 | Report | NTU |
| Turbidity | | 12.4 | Report | NTU |
| Turbidity | | 3.66 | Report | NTU |
| Turbidity | | 32.66 | Report | NTU |
| Turbidity | | -20.3 | 0.0 | NTU |
| Solids, Total Suspended | | 11.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 8.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.2 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 7.9 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 239.08 | Report | lb/day |
| Phosphorus, Total (as P) | | 318.21 | Report | lb/day |
| Specific Conductance | | 544 | Report | umhos/cm |
| Specific Conductance | | 222 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -731 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 45.4 | 38.0 | percent |
| Temperature (C), Water | | 30.7 | Report | Deg C |

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|--------------------------------------|--|--------|--------|----------|
| Nitrogen, Total | | 0.7 | Report | mg/L |
| Nitrogen, Total | | 253.16 | Report | lb/day |
| Stream Flow, Instantaneous | | 10.9 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.2 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 62.7 | Report | percent |
| Temperature (C), Water | | 28.9 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Stream Flow, Instantaneous | | 38.8 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 6.15 | Report | NTU |
| Solids, Total Suspended | | 5.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Specific Conductance | | 511 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 82.4 | Report | percent |
| Temperature (C), Water | | 28.4 | Report | Deg C |
| Nitrogen, Total | | 2 | Report | mg/L |
| Sulfate, Total | | 162 | Report | mg/L |
| Chlorophyll a | | 6.71 | Report | ug/L |
| Fluoride, Total (as F) | | 1.96 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 13 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 5.11 | Report | ug/L |
| Fluoride, Total (as F) | | 0.67 | Report | mg/L |
| Chlorophyll a | | 1.26 | Report | ug/L |
| Fluoride, Total (as F) | | 1.51 | Report | mg/L |
| Flow | | 8.028 | Report | MGD |
| Flow | | 47.94 | Report | MGD |
| pH | | 7.5 | 8.5 | s.u. |
| pH | | 7.5 | 6.0 | s.u. |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 6.68 | Report | NTU |
| Turbidity | | 6.68 | Report | NTU |
| Turbidity | | 3.31 | Report | NTU |
| Turbidity | | 32.31 | Report | NTU |
| Turbidity | | -25.6 | 0.0 | NTU |
| Solids, Total Suspended | | 3.6 | 30.0 | mg/L |
| Solids, Total Suspended | | 3.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 0.6 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 0.6 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.1 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.1 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 9.85 | Report | lb/day |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Phosphorus, Total (as P) | | 54.34 | Report | lb/day |
| Specific Conductance | | 598 | Report | umhos/cm |
| Specific Conductance | | 251 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -677 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 77.9 | 38.0 | percent |
| Temperature (C), Water | | 26.7 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Nitrogen, Total | | 306.79 | Report | lb/day |
| Stream Flow, Instantaneous | | 7.27 | Report | MGD |
| pH | | 7.1 | Report | s.u. |
| Solids, Total Suspended | | 0.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.1 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 56.3 | Report | percent |
| Temperature (C), Water | | 24.9 | Report | Deg C |
| Nitrogen, Total | | 1.8 | Report | mg/L |
| Stream Flow, Instantaneous | | 48.5 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 7.21 | Report | NTU |
| Solids, Total Suspended | | 4.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Specific Conductance | | 494 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 83.2 | Report | percent |
| Temperature (C), Water | | 25.8 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |

| | | | | |
|--------------------------------------|----|-----|--------|----------|
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | pH | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | 20789 | Report | lb/yr |
| Nitrogen, Total | | 12275 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | | OTH | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | OTH | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 34.05 | Report | MGD |
| Flow | | 65.66 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| pH | | 7.7 | 8.5 | s.u. |
| pH | | 7.3 | 6.0 | s.u. |
| Turbidity | | 13.3 | Report | NTU |
| Turbidity | | 8.7 | Report | NTU |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Turbidity | | 7.9 | Report | NTU |
| Turbidity | | 36.9 | Report | NTU |
| Turbidity | | -23.6 | 0.0 | NTU |
| Solids, Total Suspended | | 8.8 | 60.0 | mg/L |
| Solids, Total Suspended | | 5.8 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 3.5 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 2 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 1.1 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 200 | Report | lb/day |
| Phosphorus, Total (as P) | | 624 | Report | lb/day |
| Specific Conductance | | 373 | Report | umhos/cm |
| Specific Conductance | | 157 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -902 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 98.7 | 38.0 | percent |
| Temperature (C), Water | | 29.2 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Nitrogen, Total | | 686 | Report | lb/day |
| Stream Flow, Instantaneous | | 20.7 | Report | MGD |
| pH | | 7 | Report | s.u. |
| Solids, Total Suspended | | 2.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.2 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 40 | Report | percent |
| Temperature (C), Water | | 26.7 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 23.5 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 13.3 | Report | NTU |
| Solids, Total Suspended | | 8.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.1 | Report | mg/L |
| Specific Conductance | | 373 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 98.7 | Report | percent |
| Temperature (C), Water | | 29.2 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Sulfate, Total | | 68.5 | Report | mg/L |
| Chlorophyll a | | 6.2 | Report | ug/L |
| Fluoride, Total (as F) | | 0.99 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 3.6 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 2.5 | Report | ug/L |
| Fluoride, Total (as F) | | 0.5 | Report | mg/L |
| Chlorophyll a | | 3.9 | Report | ug/L |
| Fluoride, Total (as F) | | 1 | Report | mg/L |

| | | | | |
|--------------------------------------|--|------|--------|----------|
| Flow | | 28.4 | Report | MGD |
| Flow | | 42.9 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.3 | 6.0 | s.u. |
| Turbidity | | 69.3 | Report | NTU |
| Turbidity | | 90.8 | Report | NTU |
| Turbidity | | 12.7 | Report | NTU |
| Turbidity | | 41.7 | Report | NTU |
| Turbidity | | 49.1 | 0.0 | NTU |
| Solids, Total Suspended | | OPS | 30.0 | mg/L |
| Solids, Total Suspended | | OPS | 60.0 | mg/L |
| Solids, Fixed Suspended | | OPS | 25.0 | mg/L |
| Solids, Fixed Suspended | | OPS | 12.0 | mg/L |
| Phosphorus, Total (as P) | | OPS | 3.0 | mg/L |
| Phosphorus, Total (as P) | | OPS | 5.0 | mg/L |
| Phosphorus, Total (as P) | | OPS | Report | lb/day |
| Phosphorus, Total (as P) | | OPS | Report | lb/day |
| Specific Conductance | | 407 | Report | umhos/cm |
| Specific Conductance | | 84 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -868 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 47.1 | 38.0 | percent |
| Temperature (C), Water | | 27.9 | Report | Deg C |
| Nitrogen, Total | | OPS | Report | mg/L |
| Nitrogen, Total | | OPS | Report | lb/day |
| Stream Flow, Instantaneous | | 97 | Report | MGD |
| pH | | 6.7 | Report | s.u. |
| Solids, Total Suspended | | OPS | Report | mg/L |
| Phosphorus, Total (as P) | | OPS | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 60 | Report | percent |
| Temperature (C), Water | | 26.5 | Report | Deg C |
| Nitrogen, Total | | OPS | Report | mg/L |
| Stream Flow, Instantaneous | | 72 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Turbidity | | 25.9 | Report | NTU |
| Solids, Total Suspended | | OPS | Report | mg/L |
| Phosphorus, Total (as P) | | OPS | Report | mg/L |
| Specific Conductance | | 284 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 74.3 | Report | percent |
| Temperature (C), Water | | 26.8 | Report | Deg C |
| Nitrogen, Total | | OPS | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | 10.0 | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Alpha, Gross Particle Activity | | NOD | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | NOD | 5.0 | pCi/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Chlorophyll a | | NOD | Report | ug/L |
| Fluoride, Total (as F) | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 13.57 | Report | MGD |
| Flow | | 0.766 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| pH | | 7.6 | 6.0 | s.u. |
| pH | | 7.6 | 8.5 | s.u. |
| Turbidity | | 9.45 | Report | NTU |
| Turbidity | | 9.45 | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | 29 | Report | NTU |
| Turbidity | | -19.6 | 0.0 | NTU |
| Solids, Total Suspended | | 11.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 11.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.7 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 5.7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 1.82 | Report | lb/day |
| Phosphorus, Total (as P) | | 32.16 | Report | lb/day |
| Specific Conductance | | 513 | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -762 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 76.4 | 38.0 | percent |
| Temperature (C), Water | | 21.7 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Nitrogen, Total | | 126.84 | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | 5.81 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 3.82 | Report | NTU |
| Solids, Total Suspended | | 3.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 506 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 85.9 | Report | percent |
| Temperature (C), Water | | 22.2 | Report | Deg C |
| Nitrogen, Total | | 1.7 | Report | mg/L |

| | | | | |
|--------------------------------------|---|----------|--------|----------|
| Sulfate, Total | | 108 | Report | mg/L |
| Chlorophyll a | | 36.8 | Report | ug/L |
| Fluoride, Total (as F) | | 1.34 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 12.5 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 6.89 | Report | ug/L |
| Fluoride, Total (as F) | | 1.18 | Report | mg/L |
| Chlorophyll a | | 0.3 | Report | ug/L |
| Fluoride, Total (as F) | | 0.94 | Report | mg/L |
| Phosphorus, Total (as P) | | 19393.98 | Report | lb/yr |
| Nitrogen, Total | | 95380.62 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | | 51.4 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | 3.98 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | 3.47 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | 2.685 | Report | MGD |
| Flow | | 43.089 | Report | MGD |
| pH | | 7.4 | 8.5 | s.u. |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 12.2 | Report | NTU |
| Turbidity | | 12.2 | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | 29 | Report | NTU |
| Turbidity | | -16.8 | 0.0 | NTU |
| Solids, Total Suspended | | 10.4 | 60.0 | mg/L |
| Solids, Total Suspended | | 10.4 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8.4 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 8.4 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 10.4 | Report | lb/day |
| Phosphorus, Total (as P) | | 45.58 | Report | lb/day |
| Specific Conductance | | 530 | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -745 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 71.9 | 38.0 | percent |
| Temperature (C), Water | | 20.8 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Nitrogen, Total | | 110 | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | 4.7 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 3.81 | Report | NTU |
| Solids, Total Suspended | | 4.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 528 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87 | Report | percent |
| Temperature (C), Water | | 20.4 | Report | Deg C |
| Nitrogen, Total | | 1.55 | Report | mg/L |
| Flow | | 65.659 | Report | MGD |
| Flow | | 25.642 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| pH | | 8 | 8.5 | s.u. |
| pH | | 7.7 | 6.0 | s.u. |
| Turbidity | | 9.51 | Report | NTU |
| Turbidity | | 10.5 | Report | NTU |
| Turbidity | | 7.64 | Report | NTU |
| Turbidity | | 36.64 | Report | NTU |
| Turbidity | | -26.1 | 0.0 | NTU |
| Solids, Total Suspended | | 8.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 9.2 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 5.7 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 7 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 98.11 | Report | lb/day |
| Phosphorus, Total (as P) | | 296.45 | Report | lb/day |
| Specific Conductance | | 512 | Report | umhos/cm |
| Specific Conductance | | 435 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -763 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | OPS | 38.0 | percent |
| Temperature (C), Water | | 27.6 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Nitrogen, Total | | 591.8 | Report | lb/day |
| Stream Flow, Instantaneous | | 74.6 | Report | MGD |
| pH | | 7.9 | Report | s.u. |
| Solids, Total Suspended | | 4.8 | Report | mg/L |

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|--------------------------------------|--|--------|--------|----------|
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 78.5 | Report | percent |
| Temperature (C), Water | | 26.9 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Stream Flow, Instantaneous | | 1.55 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 8.76 | Report | NTU |
| Solids, Total Suspended | | 4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Specific Conductance | | 385 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 82.8 | Report | percent |
| Temperature (C), Water | | 24.5 | Report | Deg C |
| Nitrogen, Total | | 2.5 | Report | mg/L |
| Flow | | 60.834 | Report | MGD |
| Flow | | 65.659 | Report | MGD |
| pH | | 7.5 | 6.0 | s.u. |
| pH | | 7.7 | Report | s.u. |
| pH | | 8.2 | 8.5 | s.u. |
| Turbidity | | 17.4 | Report | NTU |
| Turbidity | | 14.7 | Report | NTU |
| Turbidity | | 8.54 | Report | NTU |
| Turbidity | | 37.54 | Report | NTU |
| Turbidity | | -20.1 | 0.0 | NTU |
| Solids, Total Suspended | | 13.6 | 60.0 | mg/L |
| Solids, Total Suspended | | 12.7 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 10.1 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 11.4 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.8 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 362.1 | Report | lb/day |
| Phosphorus, Total (as P) | | 415.08 | Report | lb/day |
| Specific Conductance | | 456 | Report | umhos/cm |
| Specific Conductance | | 446 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -819 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 71.8 | 38.0 | percent |
| Temperature (C), Water | | 28.9 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Nitrogen, Total | | 486.72 | Report | lb/day |
| Stream Flow, Instantaneous | | 59.5 | Report | MGD |
| pH | | 8.2 | Report | s.u. |
| Solids, Total Suspended | | 4.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 74.9 | Report | percent |

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|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | 28.5 | Report | Deg C |
| Nitrogen, Total | | 2.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 42.6 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 5.34 | Report | NTU |
| Solids, Total Suspended | | 4.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 430 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 79.5 | Report | percent |
| Temperature (C), Water | | 28.3 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Sulfate, Total | | 136 | Report | mg/L |
| Chlorophyll a | | 14.4 | Report | ug/L |
| Fluoride, Total (as F) | | 1.57 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 14.8 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 7.35 | Report | ug/L |
| Fluoride, Total (as F) | | 1.36 | Report | mg/L |
| Chlorophyll a | | 3.32 | Report | ug/L |
| Fluoride, Total (as F) | | 1.28 | Report | mg/L |
| Flow | | 44.03 | Report | MGD |
| Flow | | 64.789 | Report | MGD |
| pH | | 7.6 | 8.5 | s.u. |
| pH | | 7.5 | Report | s.u. |
| pH | | 7.5 | 6.0 | s.u. |
| Turbidity | | 21.4 | Report | NTU |
| Turbidity | | 13.98 | Report | NTU |
| Turbidity | | 8.95 | Report | NTU |
| Turbidity | | 37.95 | Report | NTU |
| Turbidity | | -16.6 | 0.0 | NTU |
| Solids, Total Suspended | | 20.4 | 60.0 | mg/L |
| Solids, Total Suspended | | 12.6 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.4 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.6 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 288.98 | Report | lb/day |
| Phosphorus, Total (as P) | | 211.35 | Report | lb/day |
| Specific Conductance | | 493 | Report | umhos/cm |
| Specific Conductance | | 462 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -782 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 73 | 38.0 | percent |
| Temperature (C), Water | | 30.7 | Report | Deg C |

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|--------------------------------------|--|--------|--------|----------|
| Nitrogen, Total | | 1 | Report | mg/L |
| Nitrogen, Total | | 368.27 | Report | lb/day |
| Stream Flow, Instantaneous | | 38.8 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| Solids, Total Suspended | | 7.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 67.8 | Report | percent |
| Temperature (C), Water | | 28.9 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Stream Flow, Instantaneous | | 85.3 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 6.68 | Report | NTU |
| Solids, Total Suspended | | 8.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 412 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 80.1 | Report | percent |
| Temperature (C), Water | | 26.9 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Flow | | 51.189 | Report | MGD |
| Flow | | 36.017 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.8 | 8.5 | s.u. |
| Turbidity | | 16.5 | Report | NTU |
| Turbidity | | 10.41 | Report | NTU |
| Turbidity | | 6.33 | Report | NTU |
| Turbidity | | 35.33 | Report | NTU |
| Turbidity | | -18.8 | 0.0 | NTU |
| Solids, Total Suspended | | 11.1 | 30.0 | mg/L |
| Solids, Total Suspended | | 16.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 5.9 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 9.2 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 145.55 | Report | lb/day |
| Phosphorus, Total (as P) | | 248.34 | Report | lb/day |
| Specific Conductance | | 548 | Report | umhos/cm |
| Specific Conductance | | 497 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -727 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 46.3 | 38.0 | percent |
| Temperature (C), Water | | 32.2 | Report | Deg C |
| Nitrogen, Total | | 2.2 | Report | mg/L |
| Nitrogen, Total | | 469.21 | Report | lb/day |

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| Stream Flow, Instantaneous | | 48.5 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| Solids, Total Suspended | | 6.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 73.6 | Report | percent |
| Temperature (C), Water | | 30.2 | Report | Deg C |
| Nitrogen, Total | | 2.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 29.1 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| Turbidity | | 3.89 | Report | NTU |
| Solids, Total Suspended | | 3.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.2 | Report | mg/L |
| Specific Conductance | | 517 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 89.1 | Report | percent |
| Temperature (C), Water | | 28.2 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Flow | | 51.349 | Report | MGD |
| Flow | | 24.264 | Report | MGD |
| pH | | 7.8 | 6.0 | s.u. |
| pH | | 8.4 | 8.5 | s.u. |
| pH | | 8 | Report | s.u. |
| Turbidity | | 13.9 | Report | NTU |
| Turbidity | | 10.63 | Report | NTU |
| Turbidity | | 6.32 | Report | NTU |
| Turbidity | | 35.32 | Report | NTU |
| Turbidity | | -21.4 | 0.0 | NTU |
| Solids, Total Suspended | | 8.9 | 30.0 | mg/L |
| Solids, Total Suspended | | 11 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 4.1 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 5.5 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 107.86 | Report | lb/day |
| Phosphorus, Total (as P) | | 221.82 | Report | lb/day |
| Specific Conductance | | 547 | Report | umhos/cm |
| Specific Conductance | | 507 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -728 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 107 | 38.0 | percent |
| Temperature (C), Water | | 31.1 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Nitrogen, Total | | 291.12 | Report | lb/day |
| Stream Flow, Instantaneous | | 1.93 | Report | MGD |
| pH | | 7.7 | Report | s.u. |

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|--------------------------------------|--|------|--------|----------|
| Solids, Total Suspended | | 10 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 79.9 | Report | percent |
| Temperature (C), Water | | 28.7 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Stream Flow, Instantaneous | | 25.8 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 5.02 | Report | NTU |
| Solids, Total Suspended | | 4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 535 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 84.6 | Report | percent |
| Temperature (C), Water | | 25.5 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Sulfate, Total | | 145 | Report | mg/L |
| Chlorophyll a | | 46.5 | Report | ug/L |
| Fluoride, Total (as F) | | 1.43 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 11 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 3.63 | Report | ug/L |
| Fluoride, Total (as F) | | 1.35 | Report | mg/L |
| Chlorophyll a | | 0.96 | Report | ug/L |
| Fluoride, Total (as F) | | 1.36 | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |

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|--------------------------------------|--|--------|--------|----------|
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 26.391 | Report | MGD |
| Flow | | 55.869 | Report | MGD |
| pH | | 8 | 8.5 | s.u. |
| pH | | 7.8 | Report | s.u. |
| pH | | 7.7 | 6.0 | s.u. |
| Turbidity | | 13.83 | Report | NTU |
| Turbidity | | 15.1 | Report | NTU |
| Turbidity | | 2.84 | Report | NTU |
| Turbidity | | 31.84 | Report | NTU |
| Turbidity | | -16.7 | 0.0 | NTU |
| Solids, Total Suspended | | 21 | 60.0 | mg/L |
| Solids, Total Suspended | | 13.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8.8 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.4 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 1.2 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 1 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 371.07 | Report | lb/day |
| Phosphorus, Total (as P) | | 229.82 | Report | lb/day |
| Specific Conductance | | 580 | Report | umhos/cm |
| Specific Conductance | | 250 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -695 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87.2 | 38.0 | percent |

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|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | 25.3 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Nitrogen, Total | | 494.76 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.81 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 78.4 | Report | percent |
| Temperature (C), Water | | 20.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Stream Flow, Instantaneous | | 38.8 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Turbidity | | 8.6 | Report | NTU |
| Solids, Total Suspended | | 7.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.9 | Report | mg/L |
| Specific Conductance | | 591 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 85.1 | Report | percent |
| Temperature (C), Water | | 23.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Flow | | 46.279 | Report | MGD |
| Flow | | 8.145 | Report | MGD |
| pH | | 8.2 | 8.5 | s.u. |
| pH | | 8.2 | 6.0 | s.u. |
| pH | | 8.2 | Report | s.u. |
| Turbidity | | 17.1 | Report | NTU |
| Turbidity | | 17.1 | Report | NTU |
| Turbidity | | 2.5 | Report | NTU |
| Turbidity | | 31.5 | Report | NTU |
| Turbidity | | -14.4 | 0.0 | NTU |
| Solids, Total Suspended | | 6 | 60.0 | mg/L |
| Solids, Total Suspended | | 6 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 2.2 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 2.2 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.8 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.8 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 287.04 | Report | lb/day |
| Phosphorus, Total (as P) | | 56.14 | Report | lb/day |
| Specific Conductance | | 569 | Report | umhos/cm |
| Specific Conductance | | 214 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -706 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 114 | 38.0 | percent |
| Temperature (C), Water | | 19.6 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |

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|--------------------------------------|--|--------|--------|----------|
| Nitrogen, Total | | 483.03 | Report | lb/day |
| Stream Flow, Instantaneous | | 1.94 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 90.3 | Report | percent |
| Temperature (C), Water | | 17.9 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 10.5 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 5.92 | Report | NTU |
| Solids, Total Suspended | | 5.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 540 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 91.1 | Report | percent |
| Temperature (C), Water | | 17.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Sulfate, Total | | 105 | Report | mg/L |
| Chlorophyll a | | 23.4 | Report | ug/L |
| Fluoride, Total (as F) | | 0.84 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 11 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 1.19 | Report | ug/L |
| Fluoride, Total (as F) | | 0.57 | Report | mg/L |
| Chlorophyll a | | 16.7 | Report | ug/L |
| Fluoride, Total (as F) | | 0.81 | Report | mg/L |
| Flow | | 65.479 | Report | MGD |
| Flow | | 54.462 | Report | MGD |
| pH | | 7.2 | 6.0 | s.u. |
| pH | | 7.9 | 8.5 | s.u. |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 14.33 | Report | NTU |
| Turbidity | | 15.9 | Report | NTU |
| Turbidity | | 2.49 | Report | NTU |
| Turbidity | | 31.57 | Report | NTU |
| Turbidity | | -15.7 | 0.0 | NTU |
| Solids, Total Suspended | | 17 | 60.0 | mg/L |
| Solids, Total Suspended | | 14 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 8.1 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 1.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 1 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 452.91 | Report | lb/day |
| Phosphorus, Total (as P) | | 688.51 | Report | lb/day |

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| Specific Conductance | | 503 | Report | umhos/cm |
| Specific Conductance | | 250 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -772 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87.4 | 38.0 | percent |
| Temperature (C), Water | | 19.9 | Report | Deg C |
| Nitrogen, Total | | 1.7 | Report | mg/L |
| Nitrogen, Total | | 821.3 | Report | lb/day |
| Stream Flow, Instantaneous | | 4.8 | Report | MGD |
| pH | | 8.2 | Report | s.u. |
| Solids, Total Suspended | | 2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 87.6 | Report | percent |
| Temperature (C), Water | | 21.2 | Report | Deg C |
| Nitrogen, Total | | 1.6 | Report | mg/L |
| Stream Flow, Instantaneous | | 56.9 | Report | MGD |
| pH | | 8 | Report | s.u. |
| Turbidity | | 5.44 | Report | NTU |
| Solids, Total Suspended | | 5.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 527 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 95.5 | Report | percent |
| Temperature (C), Water | | 21.1 | Report | Deg C |
| Nitrogen, Total | | 2.1 | Report | mg/L |
| Flow | | 11.3 | Report | MGD |
| Flow | | 64.4 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| pH | | 7.7 | 8.5 | s.u. |
| pH | | 7.7 | 6.0 | s.u. |
| Turbidity | | 14.1 | Report | NTU |
| Turbidity | | 14.1 | Report | NTU |
| Turbidity | | 2.03 | Report | NTU |
| Turbidity | | 31.03 | Report | NTU |
| Turbidity | | -16.9 | 0.0 | NTU |
| Solids, Total Suspended | | 13 | 60.0 | mg/L |
| Solids, Total Suspended | | 13 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 8.8 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 8.8 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 177.39 | Report | lb/day |
| Phosphorus, Total (as P) | | 48.45 | Report | lb/day |
| Specific Conductance | | 518 | Report | umhos/cm |
| Specific Conductance | | 211 | Report | umhos/cm |

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|--------------------------------------|--|--------|--------|----------|
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -757 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 97.2 | 38.0 | percent |
| Temperature (C), Water | | 17 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Nitrogen, Total | | 314.74 | Report | lb/day |
| Stream Flow, Instantaneous | | 3.88 | Report | MGD |
| pH | | 7.7 | Report | s.u. |
| Solids, Total Suspended | | 1.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 87.3 | Report | percent |
| Temperature (C), Water | | 14.7 | Report | Deg C |
| Nitrogen, Total | | 0.9 | Report | mg/L |
| Stream Flow, Instantaneous | | 51.7 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 20.7 | Report | NTU |
| Solids, Total Suspended | | 24.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Specific Conductance | | 473 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 89.2 | Report | percent |
| Temperature (C), Water | | 15.6 | Report | Deg C |
| Nitrogen, Total | | 1.7 | Report | mg/L |
| Flow | | 24.093 | Report | MGD |
| Flow | | 65.639 | Report | MGD |
| pH | | 7.5 | 8.5 | s.u. |
| pH | | 7.3 | Report | s.u. |
| pH | | 7.2 | 6.0 | s.u. |
| Turbidity | | 13.95 | Report | NTU |
| Turbidity | | 16.8 | Report | NTU |
| Turbidity | | 2.97 | Report | NTU |
| Turbidity | | 31.97 | Report | NTU |
| Turbidity | | -15.2 | 0.0 | NTU |
| Solids, Total Suspended | | 13.2 | 60.0 | mg/L |
| Solids, Total Suspended | | 11.8 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 7.9 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 7.3 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.8 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.9 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 428.01 | Report | lb/day |
| Phosphorus, Total (as P) | | 165.78 | Report | lb/day |
| Specific Conductance | | 570 | Report | umhos/cm |
| Specific Conductance | | 282 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -705 | 0.0 | umhos/cm |

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|--------------------------------------|---|----------|--------|----------|
| Oxygen, Dissolved Percent Saturation | | 64.9 | 38.0 | percent |
| Temperature (C), Water | | 22.4 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Nitrogen, Total | | 501.31 | Report | lb/day |
| Stream Flow, Instantaneous | | 2.7 | Report | MGD |
| pH | | 7.21 | Report | s.u. |
| Solids, Total Suspended | < | 1 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 83.1 | Report | percent |
| Temperature (C), Water | | 21.2 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 64.6 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 7.05 | Report | NTU |
| Solids, Total Suspended | | 3.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 554 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 79.8 | Report | percent |
| Temperature (C), Water | | 21.4 | Report | Deg C |
| Nitrogen, Total | | 0.97 | Report | mg/L |
| Sulfate, Total | | 105 | Report | mg/L |
| Chlorophyll a | | 29.3 | Report | ug/L |
| Fluoride, Total (as F) | | 1.41 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 14 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 1.03 | Report | ug/L |
| Fluoride, Total (as F) | | 0.84 | Report | mg/L |
| Chlorophyll a | | 22.5 | Report | ug/L |
| Fluoride, Total (as F) | | 1.34 | Report | mg/L |
| Phosphorus, Total (as P) | | 9156.42 | Report | lb/yr |
| Nitrogen, Total | | 54059.71 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | 41.089 | Report | MGD |
| Flow | | 16.599 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.4 | 8.5 | s.u. |
| Turbidity | | 16.2 | Report | NTU |
| Turbidity | | 20.5 | Report | NTU |

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|--------------------------------------|--|--------|--------|----------|
| Turbidity | | 5.28 | Report | NTU |
| Turbidity | | 34.28 | Report | NTU |
| Turbidity | | -13.8 | 0.0 | NTU |
| Solids, Total Suspended | | 11.3 | 30.0 | mg/L |
| Solids, Total Suspended | | 14 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 7 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.3 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.8 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 1 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 109.5 | Report | lb/day |
| Phosphorus, Total (as P) | | 243.07 | Report | lb/day |
| Specific Conductance | | 558 | Report | umhos/cm |
| Specific Conductance | | 306 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -717 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 63.8 | 38.0 | percent |
| Temperature (C), Water | | 23.4 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Nitrogen, Total | | 297.03 | Report | lb/day |
| Stream Flow, Instantaneous | | 1.62 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 63.8 | Report | percent |
| Temperature (C), Water | | 22.3 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Stream Flow, Instantaneous | | 38.78 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 11.9 | Report | NTU |
| Solids, Total Suspended | | 6.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 545 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 84.4 | Report | percent |
| Temperature (C), Water | | 22.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |

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|--------------------------------------|--|--------|--------|----------|
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 57.067 | Report | MGD |
| Flow | | 63.619 | Report | MGD |
| pH | | 7.2 | 6.0 | s.u. |
| pH | | 7.3 | Report | s.u. |
| pH | | 7.5 | 8.5 | s.u. |
| Turbidity | | 16.58 | Report | NTU |
| Turbidity | | 22.5 | Report | NTU |
| Turbidity | | 3.97 | Report | NTU |
| Turbidity | | 32.97 | Report | NTU |
| Turbidity | | -10.5 | 0.0 | NTU |
| Solids, Total Suspended | | 10.6 | 30.0 | mg/L |

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|--------------------------------------|--|--------|--------|----------|
| Solids, Total Suspended | | 15.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 6.4 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 342.02 | Report | lb/day |
| Phosphorus, Total (as P) | | 229.93 | Report | lb/day |
| Specific Conductance | | 519 | Report | umhos/cm |
| Specific Conductance | | 176 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -756 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 53 | 38.0 | percent |
| Temperature (C), Water | | 29.6 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Nitrogen, Total | | 598.56 | Report | lb/day |
| Stream Flow, Instantaneous | | 9.69 | Report | MGD |
| pH | | 6.9 | Report | s.u. |
| Solids, Total Suspended | | 1.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 64.5 | Report | percent |
| Temperature (C), Water | | 25.6 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Stream Flow, Instantaneous | | 58.2 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 9.82 | Report | NTU |
| Solids, Total Suspended | | 6.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 460 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 78.6 | Report | percent |
| Temperature (C), Water | | 27.4 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Sulfate, Total | | 107 | Report | mg/L |
| Chlorophyll a | | 39 | Report | ug/L |
| Fluoride, Total (as F) | | 1.81 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 6 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 0.2 | Report | ug/L |
| Fluoride, Total (as F) | | 0.72 | Report | mg/L |
| Chlorophyll a | | 1.47 | Report | ug/L |
| Fluoride, Total (as F) | | 1.18 | Report | mg/L |
| Flow | | 57.649 | Report | MGD |
| Flow | | 42.056 | Report | MGD |
| pH | | 7.3 | Report | s.u. |
| pH | | 7.5 | 8.5 | s.u. |

| | | | | |
|--------------------------------------|---|--------|--------|----------|
| pH | | 7.1 | 6.0 | s.u. |
| Turbidity | | 17.9 | Report | NTU |
| Turbidity | | 13.25 | Report | NTU |
| Turbidity | | 3.08 | Report | NTU |
| Turbidity | | 32.08 | Report | NTU |
| Turbidity | | -14.2 | 0.0 | NTU |
| Solids, Total Suspended | | 11.1 | 30.0 | mg/L |
| Solids, Total Suspended | | 15.2 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 9.2 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 6.1 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 181.19 | Report | lb/day |
| Phosphorus, Total (as P) | | 270.87 | Report | lb/day |
| Specific Conductance | | 546 | Report | umhos/cm |
| Specific Conductance | | 228 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -729 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 84.3 | 38.0 | percent |
| Temperature (C), Water | | 31.7 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Nitrogen, Total | | 449.8 | Report | lb/day |
| Stream Flow, Instantaneous | | 10.2 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | < | 1 | Report | mg/L |
| Phosphorus, Total (as P) | | 1 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 72.4 | Report | percent |
| Temperature (C), Water | | 26.6 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Stream Flow, Instantaneous | | 23.3 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| Turbidity | | 10.3 | Report | NTU |
| Solids, Total Suspended | | 9.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.7 | Report | mg/L |
| Specific Conductance | | 466 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 82.5 | Report | percent |
| Temperature (C), Water | | 28.3 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |

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|--------------------------------------|--|-----|--------|----------|
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |

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|--------------------------------------|--|-------|--------|----------|
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | 144 | Report | mg/L |
| Chlorophyll a | | 49 | Report | ug/L |
| Fluoride, Total (as F) | | 2.05 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 12.8 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 0.51 | Report | ug/L |
| Fluoride, Total (as F) | | 0.446 | Report | mg/L |
| Chlorophyll a | | 0.74 | Report | ug/L |
| Fluoride, Total (as F) | | 1.63 | Report | mg/L |
| Flow | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | 42.979 | Report | MGD |
| Flow | | 5.864 | Report | MGD |
| pH | | 8.4 | 6.0 | s.u. |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| pH | | 8.4 | Report | s.u. |
| pH | | 8.4 | 8.5 | s.u. |
| Turbidity | | 19.9 | Report | NTU |
| Turbidity | | 19.9 | Report | NTU |
| Turbidity | | 8.72 | Report | NTU |
| Turbidity | | 37.72 | Report | NTU |
| Turbidity | | -17.8 | 0.0 | NTU |
| Solids, Total Suspended | | 10.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 10.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 3.1 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 3.1 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 78.36 | Report | lb/day |
| Phosphorus, Total (as P) | | 17.47 | Report | lb/day |
| Specific Conductance | | 606 | Report | umhos/cm |
| Specific Conductance | | 174 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -669 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 81.6 | 38.0 | percent |
| Temperature (C), Water | | 24.6 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Nitrogen, Total | | 311.67 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.36 | Report | MGD |
| pH | | 7.1 | Report | s.u. |
| Solids, Total Suspended | | 1.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.3 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 65.1 | Report | percent |
| Temperature (C), Water | | 20.2 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Stream Flow, Instantaneous | | 27.1 | Report | MGD |
| pH | | 7.8 | Report | s.u. |
| Turbidity | | 7.39 | Report | NTU |
| Solids, Total Suspended | | 4.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 583 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 89.5 | Report | percent |
| Temperature (C), Water | | 22.1 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Flow | | 47.379 | Report | MGD |
| Flow | | 25.417 | Report | MGD |
| pH | | 8.3 | Report | s.u. |
| pH | | 8.4 | 8.5 | s.u. |
| pH | | 8.1 | 6.0 | s.u. |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Turbidity | | 21 | Report | NTU |
| Turbidity | | 17.15 | Report | NTU |
| Turbidity | | 3.19 | Report | NTU |
| Turbidity | | 32.19 | Report | NTU |
| Turbidity | | -11.2 | 0.0 | NTU |
| Solids, Total Suspended | | 19 | 60.0 | mg/L |
| Solids, Total Suspended | | 14.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 7.2 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.6 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 102.03 | Report | lb/day |
| Phosphorus, Total (as P) | | 236.89 | Report | lb/day |
| Specific Conductance | | 608 | Report | umhos/cm |
| Specific Conductance | | 254 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -667 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 90 | 38.0 | percent |
| Temperature (C), Water | | 25.2 | Report | Deg C |
| Nitrogen, Total | | 1.7 | Report | mg/L |
| Nitrogen, Total | | 650.35 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.39 | Report | MGD |
| pH | | 7.2 | Report | s.u. |
| Solids, Total Suspended | | 2.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.1 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 79 | Report | percent |
| Temperature (C), Water | | 22.9 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Stream Flow, Instantaneous | | 39.6 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 11 | Report | NTU |
| Solids, Total Suspended | | 14.4 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 560 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 92.6 | Report | percent |
| Temperature (C), Water | | 24 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Sulfate, Total | | 141 | Report | mg/L |
| Chlorophyll a | | 64 | Report | ug/L |
| Fluoride, Total (as F) | | 1.77 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 13 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 0.57 | Report | ug/L |
| Fluoride, Total (as F) | | 1.06 | Report | mg/L |

| | | | | |
|--------------------------------------|--|------|--------|----------|
| Chlorophyll a | | 26.9 | Report | ug/L |
| Fluoride, Total (as F) | | 1.7 | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |

| | | | | |
|--------------------------------------|--|------|--------|----------|
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | 85.7 | Report | mg/L |
| Chlorophyll a | | 30.3 | Report | ug/L |
| Fluoride, Total (as F) | | 1.48 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 8.4 | 15.0 | pCi/L |

| | | | | |
|--------------------------------------|---|--------|--------|----------|
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 6.91 | Report | ug/L |
| Fluoride, Total (as F) | | 0.623 | Report | mg/L |
| Chlorophyll a | | 6.44 | Report | ug/L |
| Fluoride, Total (as F) | | 1.31 | Report | mg/L |
| Phosphorus, Total (as P) | | 5276 | Report | lb/yr |
| Nitrogen, Total | | 21814 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100.0 | percent |
| Flow | | 45.329 | Report | MGD |
| Flow | | 8.28 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| pH | | 7.6 | 6.0 | s.u. |
| pH | | 7.6 | 8.5 | s.u. |
| Turbidity | | 8.8 | Report | NTU |
| Turbidity | | 8.8 | Report | NTU |
| Turbidity | | 11.5 | Report | NTU |
| Turbidity | | 40.5 | Report | NTU |
| Turbidity | | -31.7 | 0.0 | NTU |
| Solids, Total Suspended | | 8 | 60.0 | mg/L |
| Solids, Total Suspended | | 8 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 2.4 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 2.4 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 170.61 | Report | lb/day |
| Phosphorus, Total (as P) | | 31.16 | Report | lb/day |
| Specific Conductance | | 558 | Report | umhos/cm |
| Specific Conductance | | 260 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -717 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 73 | 38.0 | percent |
| Temperature (C), Water | | 19 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Nitrogen, Total | | 559.88 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.543 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Solids, Total Suspended | | 11.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.6 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 87.9 | Report | percent |

| | | | | |
|--------------------------------------|--|--------|--------|----------|
| Temperature (C), Water | | 16 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Stream Flow, Instantaneous | | 6.98 | Report | MGD |
| pH | | 7.6 | Report | s.u. |
| Turbidity | | 5.99 | Report | NTU |
| Solids, Total Suspended | | 3.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 523 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 90.1 | Report | percent |
| Temperature (C), Water | | 16.7 | Report | Deg C |
| Nitrogen, Total | | 1.2 | Report | mg/L |
| Flow | | 43.789 | Report | MGD |
| Flow | | 57.679 | Report | MGD |
| pH | | 7.5 | Report | s.u. |
| pH | | 7.4 | 6.0 | s.u. |
| pH | | 7.7 | 8.5 | s.u. |
| Turbidity | | 21 | Report | NTU |
| Turbidity | | 13.57 | Report | NTU |
| Turbidity | | 3.74 | Report | NTU |
| Turbidity | | 32.74 | Report | NTU |
| Turbidity | | -11.7 | 0.0 | NTU |
| Solids, Total Suspended | | 16.8 | 60.0 | mg/L |
| Solids, Total Suspended | | 10.4 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.4 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 11 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.7 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 1.1 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 240.67 | Report | lb/day |
| Phosphorus, Total (as P) | | 515.06 | Report | lb/day |
| Specific Conductance | | 480 | Report | umhos/cm |
| Specific Conductance | | 199 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -795 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 74.6 | 38.0 | percent |
| Temperature (C), Water | | 28.8 | Report | Deg C |
| Nitrogen, Total | | 1 | Report | mg/L |
| Nitrogen, Total | | 384.06 | Report | lb/day |
| Stream Flow, Instantaneous | | 5.82 | Report | MGD |
| pH | | 7 | Report | s.u. |
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.9 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 74.2 | Report | percent |
| Temperature (C), Water | | 20.5 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Stream Flow, Instantaneous | | 46.54 | Report | MGD |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 10.2 | Report | NTU |
| Solids, Total Suspended | | 7.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.5 | Report | mg/L |
| Specific Conductance | | 406 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 85.2 | Report | percent |
| Temperature (C), Water | | 22.3 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Flow | | 0.598 | Report | MGD |
| Flow | | 17.94 | Report | MGD |
| pH | | OTH | 6.0 | s.u. |
| pH | | OTH | 8.5 | s.u. |
| pH | | OTH | Report | s.u. |
| Turbidity | | OTH | Report | NTU |
| Turbidity | | OTH | Report | NTU |
| Turbidity | | OTH | Report | NTU |
| Turbidity | | OTH | Report | NTU |
| Turbidity | | OTH | 0.0 | NTU |
| Solids, Total Suspended | | OTH | 60.0 | mg/L |
| Solids, Total Suspended | | OTH | 30.0 | mg/L |
| Solids, Fixed Suspended | | OTH | 25.0 | mg/L |
| Solids, Fixed Suspended | | OTH | 12.0 | mg/L |
| Phosphorus, Total (as P) | | OTH | 3.0 | mg/L |
| Phosphorus, Total (as P) | | OTH | 5.0 | mg/L |
| Phosphorus, Total (as P) | | OTH | Report | lb/day |
| Phosphorus, Total (as P) | | OTH | Report | lb/day |
| Specific Conductance | | OTH | Report | umhos/cm |
| Specific Conductance | | OTH | Report | umhos/cm |
| Specific Conductance | | OTH | Report | umhos/cm |
| Specific Conductance | | OTH | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | OTH | 38.0 | percent |
| Temperature (C), Water | | OTH | Report | Deg C |
| Nitrogen, Total | | OTH | Report | mg/L |
| Nitrogen, Total | | OTH | Report | lb/day |
| Stream Flow, Instantaneous | | OTH | Report | MGD |
| pH | | OTH | Report | s.u. |
| Solids, Total Suspended | | OTH | Report | mg/L |
| Phosphorus, Total (as P) | | OTH | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | OTH | Report | percent |
| Temperature (C), Water | | OTH | Report | Deg C |
| Nitrogen, Total | | OTH | Report | mg/L |
| Stream Flow, Instantaneous | | OTH | Report | MGD |
| pH | | OTH | Report | s.u. |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Turbidity | | OTH | Report | NTU |
| Solids, Total Suspended | | OTH | Report | mg/L |
| Phosphorus, Total (as P) | | OTH | Report | mg/L |
| Specific Conductance | | OTH | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | OTH | Report | percent |
| Temperature (C), Water | | OTH | Report | Deg C |
| Nitrogen, Total | | OTH | Report | mg/L |
| Sulfate, Total | | OTH | Report | mg/L |
| Chlorophyll a | | OTH | Report | ug/L |
| Fluoride, Total (as F) | | OTH | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | OTH | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | OTH | 5.0 | pCi/L |
| Chlorophyll a | | OTH | Report | ug/L |
| Fluoride, Total (as F) | | OTH | Report | mg/L |
| Chlorophyll a | | OTH | Report | ug/L |
| Fluoride, Total (as F) | | OTH | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |

| | | | | |
|--------------------------------------|--|-----|--------|----------|
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Flow | | NOD | Report | MGD |
| Flow | | NOD | Report | MGD |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | 38.0 | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Nitrogen, Total | | NOD | Report | mg/L |
| Stream Flow, Instantaneous | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | Report | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | mg/L |
| Specific Conductance | | NOD | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | NOD | Report | percent |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | Report | mg/L |
| Sulfate, Total | | 117 | Report | mg/L |
| Chlorophyll a | | 19.6 | Report | ug/L |
| Fluoride, Total (as F) | | 1.75 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 13.3 | 15.0 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5.0 | pCi/L |
| Chlorophyll a | | 0.451 | Report | ug/L |
| Fluoride, Total (as F) | | 0.6 | Report | mg/L |
| Chlorophyll a | | 7.04 | Report | ug/L |
| Fluoride, Total (as F) | | 1.6 | Report | mg/L |
| Flow | | 16.5 | Report | MGD |
| Flow | | 42.2 | Report | MGD |
| pH | | 8.46 | 8.5 | s.u. |
| pH | | 7.78 | 6.0 | s.u. |
| pH | | 8.06 | Report | s.u. |
| Turbidity | | 12.4 | Report | NTU |
| Turbidity | | 10.7 | Report | NTU |
| Turbidity | | 4.4 | Report | NTU |
| Turbidity | | 33.4 | Report | NTU |
| Turbidity | | -21 | 0.0 | NTU |
| Solids, Total Suspended | | 10.4 | 60.0 | mg/L |
| Solids, Total Suspended | | 8.4 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 5.3 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 2.3 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.6 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 216.5 | Report | lb/day |
| Phosphorus, Total (as P) | | 71.2 | Report | lb/day |
| Specific Conductance | | 651 | Report | umhos/cm |
| Specific Conductance | | 235 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -624 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 49.3 | 38 | percent |
| Temperature (C), Water | | 25.5 | Report | Deg C |
| Nitrogen, Total | | 1.7 | Report | mg/L |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Nitrogen, Total | | 593.9 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.5 | Report | MGD |
| pH | | 7.43 | Report | s.u. |
| Solids, Total Suspended | | 1.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.8 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 76.9 | Report | percent |
| Temperature (C), Water | | 18.3 | Report | Deg C |
| Nitrogen, Total | | 1.3 | Report | mg/L |
| Stream Flow, Instantaneous | | 34.9 | Report | MGD |
| pH | | 7.97 | Report | s.u. |
| Turbidity | | 10.2 | Report | NTU |
| Solids, Total Suspended | | 7.2 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.4 | Report | mg/L |
| Specific Conductance | | 620 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 87.2 | Report | percent |
| Temperature (C), Water | | 20.2 | Report | Deg C |
| Nitrogen, Total | | 1.5 | Report | mg/L |
| Flow | | 5.5 | Report | MGD |
| Flow | | 52.8 | Report | MGD |
| pH | | 7.42 | 8.5 | s.u. |
| pH | | 7.42 | 6.0 | s.u. |
| pH | | 7.42 | Report | s.u. |
| Turbidity | | 7.5 | Report | NTU |
| Turbidity | | 11 | Report | NTU |
| Turbidity | | 40 | Report | NTU |
| Turbidity | | -32.5 | 0.0 | NTU |
| Solids, Total Suspended | | 2.4 | 30.0 | mg/L |
| Solids, Total Suspended | | 2.4 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 1.1 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 1.1 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 10.6 | Report | lb/day |
| Phosphorus, Total (as P) | | 78.2 | Report | lb/day |
| Specific Conductance | | 568 | Report | umhos/cm |
| Specific Conductance | | 164.7 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -707 | 0.0 | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 76.1 | 38 | percent |
| Temperature (C), Water | | 18.8 | Report | Deg C |
| Nitrogen, Total | | 0.8 | Report | mg/L |
| Nitrogen, Total | | 258 | Report | lb/day |
| Stream Flow, Instantaneous | | 0.2 | Report | MGD |
| pH | | 6.92 | Report | s.u. |

| | | | | |
|--------------------------------------|--|-------|--------|----------|
| Solids, Total Suspended | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 1.3 | Report | mg/L |
| Oxygen, Dissolved Percent Saturation | | 71 | Report | percent |
| Temperature (C), Water | | 19 | Report | Deg C |
| Nitrogen, Total | | 1.4 | Report | mg/L |
| Stream Flow, Instantaneous | | 14.5 | Report | MGD |
| pH | | 7.75 | Report | s.u. |
| Turbidity | | 6.7 | Report | NTU |
| Solids, Total Suspended | | 2.8 | Report | mg/L |
| Phosphorus, Total (as P) | | 0.3 | Report | mg/L |
| Specific Conductance | | 544 | Report | umhos/cm |
| Oxygen, Dissolved Percent Saturation | | 93.9 | Report | percent |
| Temperature (C), Water | | 19.3 | Report | Deg C |
| Nitrogen, Total | | 1.1 | Report | mg/L |
| Sulfate, Total | | 106.6 | Report | mg/L |
| Chlorophyll a | | 21.4 | Report | ug/L |
| Fluoride, Total (as F) | | 0.3 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 6.7 | 15 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5 | pCi/L |
| Chlorophyll a | | 1.31 | Report | ug/L |
| Fluoride, Total (as F) | | 0.7 | Report | mg/L |
| Chlorophyll a | | 2.3 | Report | ug/L |
| Fluoride, Total (as F) | | 1.6 | Report | mg/L |
| Phosphorus, Total (as P) | | 18495 | Report | lb/yr |
| Nitrogen, Total | | 48403 | Report | lb/yr |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Flow | | 47.1 | Report | MGD |
| Flow | | 58.1 | Report | MGD |
| pH | | 7.24 | 6.0 | s.u. |
| pH | | 7.59 | 8.5 | s.u. |
| pH | | 7.4 | Report | s.u. |
| Turbidity | | 10.7 | Report | NTU |
| Turbidity | | 8.7 | Report | NTU |
| Turbidity | | 7.9 | Report | NTU |
| Turbidity | | 7.9 | Report | NTU |
| Turbidity | | 36.9 | Report | NTU |
| Turbidity | | 36.9 | Report | NTU |
| Turbidity | | -26.2 | 0.0 | NTU |
| Turbidity | | -28.3 | Report | NTU |

| | | | | |
|-----------------------------------|--|-------|--------|----------|
| Solids, Total Suspended | | 5 | 30.0 | mg/L |
| Solids, Total Suspended | | 7.6 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 3.5 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 2.3 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 130.7 | Report | lb/day |
| Phosphorus, Total (as P) | | 108.7 | Report | lb/day |
| Specific Conductance | | 536 | Report | umhos/cm |
| Specific Conductance | | 526 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -739 | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | 6.3 | 5.0 | mg/L |
| Temperature (C), Water | | 23.7 | Report | Deg C |
| Nitrogen, Total | | 0.9 | 3.0 | mg/L |
| Nitrogen, Total | | 372.6 | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Flow | | 49.9 | Report | MGD |
| Flow | | 42.2 | Report | MGD |
| pH | | 7.16 | 6.0 | s.u. |
| pH | | 7.53 | 8.5 | s.u. |
| pH | | 7.33 | Report | s.u. |
| Turbidity | | 7.8 | Report | NTU |
| Turbidity | | 11.7 | Report | NTU |
| Turbidity | | 4.3 | Report | NTU |
| Turbidity | | 4.3 | Report | NTU |
| Turbidity | | 33.3 | Report | NTU |
| Turbidity | | 33.3 | Report | NTU |
| Turbidity | | -21.6 | 0.0 | NTU |
| Turbidity | | -25.5 | Report | NTU |
| Solids, Total Suspended | | 3.9 | 30.0 | mg/L |
| Solids, Total Suspended | | 5.2 | 60.0 | mg/L |
| Solids, Fixed Suspended | | 2.6 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 1.7 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 130.8 | Report | lb/day |
| Phosphorus, Total (as P) | | 87 | Report | lb/day |
| Specific Conductance | | 558 | Report | umhos/cm |

| | | | | |
|-----------------------------------|---|-------|--------|----------|
| Specific Conductance | | 243 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -717 | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | 6.9 | 5.0 | mg/L |
| Temperature (C), Water | | 28.9 | Report | Deg C |
| Nitrogen, Total | | 1.5 | 3.0 | mg/L |
| Nitrogen, Total | | 490.8 | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Flow | | 38.8 | Report | MGD |
| Flow | | 56.6 | Report | MGD |
| pH | | 7.14 | 6.0 | s.u. |
| pH | | 7.46 | 8.5 | s.u. |
| pH | | 7.27 | Report | s.u. |
| Turbidity | | 5.8 | Report | NTU |
| Turbidity | | 7.3 | Report | NTU |
| Turbidity | | 3 | Report | NTU |
| Turbidity | | 3 | Report | NTU |
| Turbidity | | 32 | Report | NTU |
| Turbidity | | 32 | Report | NTU |
| Turbidity | | -26.1 | Report | NTU |
| Turbidity | | -24.7 | 0.0 | NTU |
| Solids, Total Suspended | | 5.6 | 60.0 | mg/L |
| Solids, Total Suspended | | 3.2 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 1.3 | 25.0 | mg/L |
| Solids, Fixed Suspended | | 1.2 | 12.0 | mg/L |
| Phosphorus, Total (as P) | | 0.3 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 0.2 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 58.9 | Report | lb/day |
| Phosphorus, Total (as P) | | 109.6 | Report | lb/day |
| Specific Conductance | | 573 | Report | umhos/cm |
| Specific Conductance | | 295 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -702 | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | 5.1 | 5.0 | mg/L |
| Temperature (C), Water | | 29.8 | Report | Deg C |
| Nitrogen, Total | | 1.2 | 3.0 | mg/L |
| Nitrogen, Total | | 316.5 | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100 | percent |

| | | | | |
|-----------------------------------|---|-------|--------|----------|
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Sulfate, Total | | 125.6 | Report | mg/L |
| Chlorophyll a | | 15.8 | Report | ug/L |
| Fluoride, Total (as F) | | 2.6 | 10.0 | mg/L |
| Alpha, Gross Particle Activity | | 13 | 15 | pCi/L |
| Radium 226 + Radium 228, Total | | MNR | 5 | pCi/L |
| Flow | | 29.7 | Report | MGD |
| Flow | | 49.9 | Report | MGD |
| pH | | 7.38 | Report | s.u. |
| pH | | 7.17 | 6.0 | s.u. |
| pH | | 7.75 | 8.5 | s.u. |
| Turbidity | | 27.5 | Report | NTU |
| Turbidity | | 16.1 | Report | NTU |
| Turbidity | | 5.5 | Report | NTU |
| Turbidity | | 5.5 | Report | NTU |
| Turbidity | | 34.5 | Report | NTU |
| Turbidity | | 34.5 | Report | NTU |
| Turbidity | | -18.4 | Report | NTU |
| Turbidity | | -7 | 0.0 | NTU |
| Solids, Total Suspended | | 8.8 | 60.0 | mg/L |
| Solids, Total Suspended | | 6.1 | 30.0 | mg/L |
| Solids, Fixed Suspended | | 1.9 | 12.0 | mg/L |
| Solids, Fixed Suspended | | 3.5 | 25.0 | mg/L |
| Phosphorus, Total (as P) | | 0.4 | 3.0 | mg/L |
| Phosphorus, Total (as P) | | 0.5 | 5.0 | mg/L |
| Phosphorus, Total (as P) | | 93.4 | Report | lb/day |
| Phosphorus, Total (as P) | | 189.4 | Report | lb/day |
| Specific Conductance | | 583 | Report | umhos/cm |
| Specific Conductance | | 274 | Report | umhos/cm |
| Specific Conductance | | 1275 | Report | umhos/cm |
| Specific Conductance | | -692 | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | 6.7 | 5.0 | mg/L |
| Temperature (C), Water | | 31.6 | Report | Deg C |
| Nitrogen, Total | | 1.3 | 3.0 | mg/L |
| Nitrogen, Total | | 347.5 | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | > | 100 | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | > | 100 | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |

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|-----------------------------------|--|-------|--------|----------|
| Phosphorus, Total (as P) | | 24427 | Report | lb/yr |
| Nitrogen, Total | | 22594 | Report | lb/yr |
| Nitrogen, Total | | MNR | 29.3 | ton/yr |
| Nitrogen, Total | | 11.3 | 69.04 | ton/yr |
| Flow | | DNP | Report | MGD |
| Flow | | DNP | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | MNR | Report | NTU |
| Turbidity | | MNR | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Turbidity | | NOD | Report | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | MNR | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | NOD | 5.0 | mg/L |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | 3.0 | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | NOD | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | NOD | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Flow Rate | | NOD | Report | MGD |
| Flow Rate | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | 8.5 | s.u. |

| | | | | |
|-----------------------------------|--|-----|--------|----------|
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | MNR | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | MNR | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | NOD | 5.0 | mg/L |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | 3.0 | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | NOD | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | NOD | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | NOD | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | NOD | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| Flow Rate | | NOD | Report | MGD |
| Flow Rate | | NOD | Report | MGD |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| pH | | NOD | Report | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | MNR | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |

| | | | | |
|-----------------------------------|--|-----|--------|----------|
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | MNR | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | NOD | 5.0 | mg/L |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | 3.0 | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| Flow Rate | | NOD | Report | MGD |
| Flow Rate | | NOD | Report | MGD |
| pH | | NOD | Report | s.u. |
| pH | | NOD | 8.5 | s.u. |
| pH | | NOD | 6.0 | s.u. |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | MNR | Report | NTU |
| Turbidity | | NOD | Report | NTU |
| Turbidity | | NOD | 0.0 | NTU |
| Solids, Total Suspended | | NOD | 60.0 | mg/L |
| Solids, Total Suspended | | NOD | 30.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 12.0 | mg/L |
| Solids, Fixed Suspended | | NOD | 25.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 5.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | 3.0 | mg/L |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Phosphorus, Total (as P) | | NOD | Report | lb/day |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | MNR | Report | umhos/cm |
| Specific Conductance | | NOD | Report | umhos/cm |
| Specific Conductance | | NOD | 0.0 | umhos/cm |
| Oxygen, Dissolved (DO) | | NOD | 5.0 | mg/L |
| Temperature (C), Water | | NOD | Report | Deg C |
| Nitrogen, Total | | NOD | 3.0 | mg/L |
| Nitrogen, Total | | NOD | Report | lb/day |
| IC25 Statre 7day Chr Ceriodaphnia | | NOD | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7day Chr Ceriodaphnia | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | NOD | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |
| IC25 Statre 7Day Chr Pimephales | | MNR | 100 | percent |

| | | | | |
|----------------------------------------|--|-------|--|------|
| Acrolein | | NODIB | | UG/L |
| Acrylonitrile | | NODIB | | UG/L |
| Benzene | | NODIB | | UG/L |
| Dichlorobromomethane | | NODIB | | UG/L |
| Bromoform | | NODIB | | UG/L |
| Bromomethane | | NODIB | | UG/L |
| Carbon tetrachloride | | NODIB | | UG/L |
| Chlorobenzene | | NODIB | | UG/L |
| Chloroethane, Total Weight | | NODIB | | UG/L |
| 2-chloroethyl vinyl ether (mixed) | | NODIB | | UG/L |
| Chloroform | | NODIB | | UG/L |
| Methyl chloride | | NODIB | | UG/L |
| Dibromochloromethane | | NODIB | | UG/L |
| Dichlorodifluoromethane | | NODIB | | UG/L |
| 1,1-dichloroethane | | NODIB | | UG/L |
| 1,2-dichloroethane | | NODIB | | UG/L |
| 1,1-dichloroethylene | | NODIB | | UG/L |
| 1,2-trans-dichloroethylene | | NODIB | | UG/L |
| 1,2-dichloropropane | | NODIB | | UG/L |
| 1,3-Dichloropropene, Total Weight | | NODIB | | UG/L |
| Trans-1,3-Dichloropropene | | NODIB | | UG/L |
| Ethylbenzene | | 1 | | UG/L |
| Methylene chloride | | NODIB | | UG/L |
| 1,1,2,2-tetrachloroethane | | NODIB | | UG/L |
| Tetrachloroethene | | NODIB | | UG/L |
| 1,1,1-trichloroethane | | NODIB | | UG/L |
| 1,1,2-trichloroethane | | NODIB | | UG/L |
| Trichloroethene | | NODIB | | UG/L |
| Trichlorofluoromethane | | NODIB | | UG/L |
| Toluene | | 2 | | UG/L |
| Vinyl chloride | | NODIB | | UG/L |
| Ethylene dibromide (1,2-dibromoethane) | | NODIB | | UG/L |

| Statistical Base | Exceedance |
|----------------------------|------------|
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |

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|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |

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|----------------------------|--|
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
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| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |

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|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
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| MK - Monthly Average | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| MK - Monthly Average | |
| MB - Maximum | |
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| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |

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| MK - Monthly Average | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |

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| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
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| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
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| DD - Daily Maximum | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
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| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DC - Daily Minimum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |

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|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |

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| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
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| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
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| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |

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| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
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| MB - Maximum | |
| DD - Daily Maximum | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
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| MB - Maximum | |

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| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
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| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
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| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
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| MK - Monthly Average | |
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| DD - Daily Maximum | |

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| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DC - Daily Minimum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

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| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
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| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
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| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |

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| | |
|----------------------------|---|
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | E |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |

| | |
|----------------------------|--|
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | E |
| ME - Minimum | E |
| ME - Minimum | E |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |

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|----------------------------|--|
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |

| | |
|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |

| | |
|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |

| | |
|----------------------------|--|
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |

| | |
|----------------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |

| | |
|----------------------------|--|
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |

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| | |
|----------------------------|--|
| DC - Daily Minimum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| MB - Maximum | |

| | |
|----------------------------|--|
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |

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| | |
|----------------------------|--|
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |

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|----------------------------|--|
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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| | |
|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |

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|----------------------------|--|
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |

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| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DE - Daily Average Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

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|----------------------|--|
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| 5Y - 5 Year Average | |
| AD - Annual Total | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |

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|----------------------|--|
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |

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|----------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| ME - Minimum | |
| ME - Minimum | |

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| | |
|----------------------|--|
| AB - Annual Average | |
| AB - Annual Average | |
| AB - Annual Average | |
| AC - Annual Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |

| | |
|----------------------|--|
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| DC - Daily Minimum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| ME - Minimum | |
| ME - Minimum | |
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| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| ME - Minimum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |
| DC - Daily Minimum | |
| MK - Monthly Average | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MB - Maximum | |
| MK - Monthly Average | |
| DD - Daily Maximum | |
| DD - Daily Maximum | |

[illegible]

[illegible]