# APPENDIX G-4

Final peer review report.

# Scientific Peer Review Panel Review of "Proposed Minimum Flows for the Lower Peace River and Lower Shell Creek" – Final Report

Prepared for:

Southwest Florida Water Management District

Prepared by:

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## Introduction

The Southwest Florida Water Management District (District) contracted with a Peer Review Panel (Panel) comprised of Laura Bedinger, Ph.D., Peter Sheng, Ph.D. and David Tomasko, Ph.D. to provide an independent, scientific peer review of its proposed minimum flows and levels for the Lower Peace River (LPR) and Lower Shell Creek (LSC), as outlined in the report "Proposed Minimum Flows for the Lower Peace River and Lower Shell Creek – Draft Report" dated March 20, 2020 along with six appendices.

The draft MFL report summarizes prior efforts to establish MFL guidance for the Lower Peace River and Lower Shell Creek. For the purposes of the draft MFL report, the LPR is defined as the river segment from the USGS gage location at Arcadia down to Charlotte Harbor, while the LSC is defined as the segment of the creek that extends from the Hendrickson Dam at Shell Creek Reservoir to the confluence of Shell Creek with the Lower Peace River.

The District's prior MFL guidance for the previously developed minimum flows for the LPR and guidance proposed for LSC were summarized in a 2010 District report. This information supported the adoption of the MFL for the Lower Peace River into District Rules as Rule 40D-8.041(8), Florida Administrative Code (FAC) that became effective in August 2010, as shown below:

| Period | Effective Dates | Where Flow on Previous Day Equals: | Minimum Flow Is |
|---|---|---|---|
| **Annually** | January 1 through December 31 | ≤ 130 cfs* | Actual flow (no surface water withdrawals permitted) |
| | | > 130 cfs | Seasonally dependent – see Blocks below<br><br>In addition, the total permitted maximum withdrawals on any day shall not exceed 400 cfs |
| **Block 1** | April 20 through June 25 | ≤ 130 cfs | Actual flow (no surface water withdrawals permitted) |
| | | > 130 cfs | Previous day's flow minus 16% but not less than 130 cfs |
| **Block 2** | October 28 through April 19 | ≤ 130 cfs | Actual flow (no surface water withdrawals permitted) |
| | | > 130 cfs and < 625 cfs | Previous day's flow minus 16% but not less than 130 cfs |
| | | ≥ 625 cfs | Previous day's flow minus 29% |
| **Block 3** | June 26 through October 27 | ≤ 130 cfs | Actual flow (no surface water withdrawals permitted) |
| | | > 130 cfs and < 625 cfs | Previous day's flow minus 16% but not less than 130 cfs |
| | | ≥625 cfs | Previous day's flow minus 38% |

*cfs = cubic feet per second

In 2010, the District developed draft minimum flows guidance for the LSC, and determined that a recovery strategy was needed for the LSC, as existing (at the time) flow rates in the LSC were below the draft MFL guidance developed for the LSC. Based on this finding, and the need to develop a recovery strategy for the LSC, draft MFL guidance for the LSC was not adopted into District rules.

The revised MFL guidance for the LPR, from the draft 2020 MFL report, is listed below:

| Block | If Combined Flow on Previous Day is | Allowable Flow Reduction |
|---|---|---|
| **All** | <130 cfs | 0% |
| **Block 1** | >130 cfs - 149 cfs<br>>149 cfs - 297 cfs | Flow - 130 cfs<br>13% of flow |
| **Block 2** | >297 cfs - 386 cfs<br>>386 cfs - 622 cfs | 23% of (flow - 297 cfs) plus 13% of remaining flow<br>23% of flow |
| **Block 3** | >622 cfs - 1037 cfs<br>>1,037 cfs | 40% of (flow - 622 cfs) plus 23% of remaining flow<br>40% of flow |
| The total permitted maximum withdrawals on any day shall not exceed 400 cfs | | |

The MFL guidance for the LSC from the draft 2020 MFL report is listed below:

| Block | If Inflow to Reservoir on Previous Day is | Allowable Flow Release |
|---|---|---|
| **Block 1** | <56 cfs | 87% of inflow |
| **Block 2** | 56 cfs - 137 cfs | 77% of inflow |
| **Block 3** | >137 cfs | 60% of inflow |

The most apparent difference between the initial (2010) and draft revised MFL guidance for the LPR (and that proposed for LSC) is the move from a calendar-based regulatory approach to guidance that is based on defined threshold flow levels – which vary over the course of a year. The biggest difference between MFL guidance for LPR and LSC is that there is a maximum diversion quantity value for the LPR, but not for the LSC.

## Peer Review Panel Responsibilities

The District's charge to the Panel was for the members to become familiar with the relevant regulatory background, and to use that information in the development of their report.

Section 373.042 of the Florida Statutes, states that for waterbodies such as the LPR and the LSC, established minimum flows represent the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The legislative guidance further states that MFLs shall be calculated using the best information available, that the Governing Board shall consider and may provide for non-consumptive uses in the establishment of MFL, and when appropriate, MFL may be calculated to reflect seasonal variation.

Additional and more detailed guidance on the development of MFL is provided in Rule 62-40, FAC, which states that MFL should consider the following concerns: 1) recreation, 2) fish and wildlife habitats, 3) estuarine resources, 4) transfer of detrital material, 5) maintenance of freshwater storage and supply, 6) aesthetics, 7) filtration and absorption of pollutants and/or nutrients, 8) sediment loads, 9) water quality, and 10) navigation.

As such, MFL are to cover not only the protection of natural resources, but also navigation, recreation, and – for r the LSC in particular – the maintenance of freshwater storage and supply.

In its broadest sense, the Panel is charged with the following six tasks, as related to their review of the 2020 Draft MFL for the LPR and the LSC:

1) Determine whether District conclusions are supported by analyses/results presented
2) Determine whether data/information were properly collected and used, any data exclusions were justified, and the data were the best available information
3) Determine whether technical assumptions are clearly stated, reasonable and consistent with the best available information, and if better analyses could be used
4) Determine whether procedures and analyses were appropriate and reasonable, based on the best available data, correctly applied, limitations were handled appropriately, and conclusions are supported by the data
5) For methods judged to be not scientifically reasonable, describe scientific deficiencies, identify remedies, if any, or alternative methods

6) As appropriate, identify and characterize effort involved for preferred alternative methods that could be used in lieu of scientifically reasonable methods that were used

**Format of the Panel's Final Report**

After discussion in publicly-accessible teleconferences, the Panel decided to produce an interim MFL review report using the following format: 1) Panel comments by all panelists would be compiled, based on the sequencing of the Draft MFL, 2) Panel comments would first be summarized in tabular form, by report section, in terms of the concern – briefly described – and the relevant Panel charge for which the concern was raised, and 3) additional text would provide additional background for the concern.

The Initial Panel report format was selected to allow for a more efficient District review process, as shared concerns were characterized in one location, rather than the more traditional approach, where concerns from other Panels might be listed in multiple locations in different sections of their Peer Review report. The Initial Report was constructed from the comments from individual Panel members, with their individual comments included as Appendices to the main body of the Initial Report.

After receiving the Interim Report, District staff reviewed the Panel's concerns, and responded to the comments in writing. For some of the Panel concerns, sufficient time existed to modify the draft MFL report, if the District agreed with the suggested modifications. On those occasions, the Panel members could review not only the District response to their concerns, but the modifications to the draft MFL report. Not all comments could be addressed in a revised draft MFL report. For example, the Panel members pointed out concerns with the water quality parameter list being collected and analyzed for the Hydrobiological Monitoring Program (HBMP). While the concerns about HBMP water quality parameters remain, changes to the monitoring program can only occur moving forward in time.

This Final Report should be viewed in context with the Initial Report. The Panel's Initial Report provided detailed information on a number of concerns or general comments related to the draft MFL for the Lower Peace River and Lower Shell Creek. Those comments were then responded to by District staff, and in some cases, the draft MFL was revised in response to those comments. This Final Report summarizes the Panel's subsequent response to the District's response to the Initial Report, including any modifications to the draft MFL report that could be completed prior to the development of this Final Report.

This Final Report has the following format: 1) a brief summary of the comments on the draft MFL, by individual MFL sections, and 2) a tabular summary of the Panel's review of District responses to the Panel concerns. The tabular summary includes four columns: 1) a summary of the Panel concerns, 2) a summary of District Responses, 3) whether the Panel was satisfied with the District response, and 4) whether any provided modifications of the draft MFL were satisfactory.

**Overall Panel Comments on the Draft MFL**

The Panel felt that the draft and revised MFL reports represented an impressive effort by the District and its consultants. The variety, quantity and quality of data that was compiled, collected, analyzed and interpreted, as well as the hydrodynamic and hydrologic modelling efforts were viewed as impressive, and obviously indicative of the MFL process being approached in a thorough and professional manner by District staff. The conversion of MFL guidance from a calendar-based system to flow-based criteria was considered to be a valuable improvement over the earlier guidance.

The District's use of a 15% threshold for "significant harm" was one of the primary concerns raised by the Panel. While the Panel concluded that there is nothing inherently "wrong" with the proposed threshold, the Panel believes that the draft MFL report should balance both the existing literature that supports the appropriateness of such guidance, as well as to note that such guidance is not universally accepted as a threefold of acceptable habitat loss for all regulatory programs. The Panel agreed that alternative and locally-derived thresholds were sought after, and that no more protective links could be made for water quality, and that wetland inundation thresholds were actually less protective than the 15% flow-based salinity-habitat metric.

Panel members felt that while the expanded and more detailed hydrodynamic model used in the MFL was a substantial improvement over prior efforts, the issue of baseline conditions and the overall hydrologic output for non-gaged portions of the watershed will continue to have limitations, and additional revisions will be helpful, as data allow.

The Panel was pleased that the District's revised draft MFL report now includes reference to other regulatory guidance documents. For example, the revised draft MFL report now includes reference to the Pollutant Load Reduction Goal developed for Charlotte Harbor. The Panel felt that public agencies should seek to develop regulatory guidance that is as complementary – or at least consistent with – guidance from other local, regional and/or state agencies.

The Panel believes that closer coordination with the South Florida Water Management may be needed, to better quantify potential current and future impacts to the health of portions of Charlotte Harbor associated with the quantity and quality of water discharged from the Caloosahatchee River. This should continue to be a concern to the District, in light of recent adverse impacts to seagrass resources along the eastern wall region of Charlotte Harbor – impacts that could be attributed by some to the Peace River, given its much closer proximity, compared to the Caloosahatchee River.

Related to the issue of accelerating rates of sea level rise (SLR), the Panel felt it would be prudent to consider the potential impact of SLR on the MFL by using the NOAA (2017) projection of SLR for Fort Myers in 2020-2050. The revised draft MFL does include the numbers from the more recent NOAA report. As the field of SLR impacts is adjusting predictions, as needed, based on additional data collection, the newer report from NOAA should be considered the "best available science" as relates to this concern.

The Panel and the District are in sync as to the potential impacts of future SLR on the quantity of low-salinity habitat in the Lower Peace River, as results displayed in the revised draft MFL report suggest that the protective benefits of the MFL might be offset within a few decades by realistic expectations of future SLR.

In consideration of the rapidly changing climate, the Panel recommends that, future evaluations of the MFL, as well as coordination with the regional water supply utilities should be cognizant of these potential impacts, and should work together to determine if modifications to future MFL guidance may be warranted, as actual SLR impacts arise.

A summary of the Panel's review of District responses to overall comments from the Panel is shown in Table 1.

**Table 1 – Review of District Responses – Overall Panel Comments**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *MFL report was comprehensive, well-written and thorough* | We thank the panel for this comment. | No response required | No response required |
| *Basing MFL on specific flows, vs. calendar dates, a good idea* | We thank the panel for this comment. | No response required | No response required |
| *15% threshold value for "significant harm" needs further support, rather than reference that others have found it reasonable* | Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" below for our response to this comment. | This important topic is discussed by the District, and examples given of the reasonableness of the 15% threshold. However, the point remains that while examples can be found that support its application, it is not universally agreed as an acceptable level of impact for all activities (e.g., wetland impacts from construction, impacts to seagrass from dredging, etc.) | The reviewers feel that the District has sought to apply the best approach that can be reasonably expected to work in the absence of any potentially more conservative approaches such as inflection points or threshold values. Although citations reference the reasonableness of using a 15% threshold to provide "high to moderate" protection from impacts, those are not universally-accepted as definitive thresholds for "significant harm" and may not necessarily by appropriate in all situations. |
| *Hydrodynamic modeling represents a substantial improvement from prior efforts* | We agree and thank the panel for this comment. | No response required | No response required |
| *Helpful for the MFL report to tie into other relevant regulatory guidance (i.e., FDEP water quality guidance, SWIM Plans, etc.)* | The proposed minimum flows for the Lower Peace River and Lower Shell Creek were developed in accordance with all requirements for minimum flows establishment included in the Florida Statutes and Water Resource Implementation Rule. The minimum flows established for the river and creek will be implemented in accordance with these and other legislative and regulatory directives through the District's permitting and planning programs and other water management activities.<br><br>With regard to other water management activities, we note, for example, the District's 2000 Charlotte Harbor Surface Water Improvement and Management (SWIM) plan and the 2020 SWIM plan currently under development for the harbor are mentioned and cited in the revised, draft minimum flows report. The SWIM plans are mentioned in the water quality classification Section 3.1, a newly added Section 3.2.2 on the Pollutant Load Reduction Goal for the Lower Peace River and Section 4.1.5, which addresses seagrasses. | Yes | Additional text clearly spells out the linkages between the MFL's need to protect the very highest flows coming into the Harbor, which requires an attention to high flows that is not as evident for rivers that discharge to locations such as Tampa Bay and the Springs Coast. |

**Table 1 – continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Uncertainty and accuracy of hydrologic model should be discussed in more detail* | We considered the over-estimation of ungaged flow in our previous, 2010 minimum flows study for the Lower Peace/Shell System. We adjusted flow records to get the best ungaged flow estimate based on the previous hydrodynamic study of the Charlotte Harbor system and the flow estimation from those ungaged sites using a surface water model HSPF (Ross et al. 2005). In addition, a drainage ratio method was used to improve streamflow estimation at ungaged sites based on neighboring gaged sites.<br><br>We acknowledge that there is still uncertainty and inaccuracy in our estimates of ungaged flow, which accounts for about 16% of the entire Peace River watershed drainage. About 84% of the Peace River watershed is gaged by the U.S. Geological Survey and the hydrologic loading to the Lower Peace River from the gaged watershed is reliable.<br><br>For our minimum flow analyses, we used the best available data, in combination of what we learned from the previous hydrodynamic simulation of the system, and a comparison of two other hydrologic studies of the watershed to estimate the ungaged flow to the Lower Peace River.<br><br>We added new text addressing ungaged flow estimation to Section 5.3.1 of the revised, draft minimum flows report. Additional response development associated with incorporation of uncertainty information in the body of the minimum flows report and the hydrodynamic modeling appendix (Chen 2020) was also added.<br><br>Regarding modeling and data uncertainty, we think it is worth emphasizing that as discussed in Section 1.3.7 of the draft minimum flows report, the District uses an adaptive management approach for minimum flows development and implementation, which includes routine status assessments and, as necessary, reevaluation of established minimum flows. When possible, these activities are conducted to attempt to minimize uncertainty in our results and recommendations. | Yes, the level of uncertainty is clearly spelled out in the District response. | The level of uncertainty associated with flow estimates for the ungaged portions of the Peace and Lower Shell Creek are better described in the District response to the Initial Panel Report. However, the revised MFL report titled "revised LPR_Shell Draft Min Flows2020-06-01.pdf" does not yet include the same level of explanation of these uncertainties as the District response laid out in the file "LPR_Shell Peer Rev Staff Resp 2020-06-01".<br><br>As such, while the Peer Review Panel is now more aware of the reasonableness and appropriateness of the District's approach, the public document may not give others the same level of understanding, at least in the revised MFL report from June 1, 2020. |

**Table 1 – continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *In a changing climate, long-term (50-100 year) averaged flow are not necessarily more indicative of the hydrologic conditions in the next 15-20 years. Should more recent data in the past two decades be given more weight in the development of the baseline flow which was based on the average in 1950-2014?* | We think it is best to use hydrologic data (e.g., flow records) for the longest period, within reason, to best capture the climatic variability integrated in the data.<br><br>As part of baseline flow development for Lower Peace River, historic flows for Peace River at Arcadia, Horse Creek, Joshua Creek and Charlie Creek were examined in multi-decadal blocks (roughly 20 years) as shown in Figure 5.3 of the draft minimum flows report.<br><br>Per the request of the peer reviewers, we added short-term (2000-2018) mean annual flows for Peace River at Arcadia, Horse Creek, Joshua Creek and Shell Creek to Section 2.7.1 in the revised, draft minimum flows report. In addition, as noted in response 4f in Table 4 below, we added the short term average flow values to Figures 2-12 through 2-16 within the report section.<br><br>We also note that as part of minimum flow assessment for the Lower Peace River, 5- and 10 -year moving averages were calculated for river flows under baseline, minimum flow and existing flow scenarios (see Table 7.1 in the revised, draft minimum flows report).<br><br>We also think it is worth emphasizing again that the District uses an adaptive management approach for minimum flows development and implementation that includes routine status assessments and, as necessary, reevaluation of established minimum flows. | Yes | Additional text and revised figures include the requested data analysis. However, the District should consider the value of separately displaying data from 2000 to 2018, to compare the recent period with the prior-to-recent period. |
| *Early in the report, give a holistic overview of how hydrodynamics could influence other in-Harbor phenomena. For example, describe the importance of high flows on bottom water hypoxia and other phenomena* | We included additional information on the importance of hydrodynamics in several sections of the revised, draft minimum flows report.<br><br>For example, we added text to the end of Section 1.5 that emphasizes the<br>adopted minimum flows for the Lower Peace River and the proposed minimum flows for the river and Lower Shell Creek were based on potential flow-related changes in salinities assessed with hydrodynamic models. In addition, we added a new section (Section 3.2.2) on the pollutant load reduction goal for the Lower Peace River, emphasizing the environmental effects associated with relatively large, seasonal inflows to Charlotte Harbor. We also emphasized the importance of hydrodynamics in text added to the beginning of Section 3.3.1. | Yes | Additional text links the need to protect the very highest inflows to bottom water hypoxia, and the link between bottom water hypoxia and the Harbor's adopted Pollutant Load Reduction Goal. |

**Table 1 – continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Consider development of a "dynamic" MFL with real-time now-cast/forecast capabilities* | This is an intriguing suggestion, although we do not think development of a dynamic water quality model (for water quality parameters other than salinity and temperature) is necessary for the current development of proposed minimum flows for the Lower Peace River and Lower Shell Creek.<br><br>Minimum flows (and minimum water levels) are typically assumed to correspond with long-term hydrologic and environmental conditions, and in the case of the Lower Peace River and Lower Shell Creek were developed based on central tendencies of environmental responses to changes in flow simulated every 90 seconds (or 75 or 72 seconds during a few short periods when storms occurred) for a 7.7 year simulation period.<br><br>Further, we add that estuarine organisms are adapted to cope with a wide range of salinities and the small changes in salinity, attributable to the currently proposed minimum flows, are unlikely to alter the ecological integrity of the naturally dynamic Lower Peace/Shell System or Charlotte Harbor.<br><br>We note, however, that established minimum flows can be and are used to develop withdrawal-related conditions in water use permits, on both long-term and short-term bases. For example, in the case of the existing and proposed minimum flows for the Lower Peace River, permit conditions that limit withdrawals based on the previous day's average flow have been and are expected to be successfully implemented.<br><br>These types of permit conditions are developed by District staff in coordination with permittees based on identified regulatory constraints, such as established minimum flows, the needs of the permittee and other practical considerations. | Yes | Additional text and revised figures include the information requested. |

**Table 1 – continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Discuss potential influence of inflows to the Harbor from other far-field sources, e.g., Caloosahatchee* | Although flow from the Caloosahatchee River was not directly used as boundary conditions near the mouth of the Caloosahatchee River, its effects are included in the hydrodynamic model, as the Caloosahatchee River flow was included in the USF WFCOM model.<br><br>We also think it is valuable to comment on the complexity of inflows that can impact environmental conditions in Charlotte Harbor. For example, proliferation of drift algae and apparent loss of seagrass has been observed along the east wall region of the harbor and may be related to the Red Tide event of 2017-2018. This question provides a good opportunity to emphasize that the sharing of information concerning minimum flows and other resource management issues among the state water management districts and other agencies/organizations charged with water resource management is an important component of water resource management in Florida. | Yes, the issues related to red tide, potential impacts from the Caloosahatchee River and the potential for adverse impacts to the Harbor from sources other than the Peace and Myakka is realized by the District, and included in the response to the Panel's Initial Report. | The District's response to the Panel's comment displays an understanding of the issue of impacts to the Harbor from influences outside the control of the District itself. However, the revised MFL report titled "revised LPR_Shell Draft Min Flows2020-06-01.pdf" does not yet include the same level of discussion as the District response laid out in the file "LPR_Shell Peer Rev Staff Resp 2020-06-01".<br><br>While the Caloosahatchee River is listed as a model element, the revised MFL report does not include the words "red tide" or references to the sort of impacts described in the District's response to the Panel.<br><br>As such, while the Peer Review Panel is now more aware of District's awareness of this issue, the public document may not give other reviewers the same level of understanding, at least in the revised MFL report from June 1, 2020. |
| *Analyze the potential impact of sea level rise on the MFL, using best available SLR data for 2020-2050* | We did not develop the proposed minimum flows based on future sea level conditions. However, we evaluated the proposed minimum flows under three SLR scenarios to help determine when a future re-evaluation of the minimum flows may be necessary.<br><br>Although we used U.S. Army Corps of Engineer (USACE) SLR estimates, which are generally lower than those of the National Oceanic and Atmospheric Administration (NOAA), our results supported the need for consideration of a future reevaluation for the Lower Peace River and Lower Shell Creek minimum flows. Future reevaluations will be based on actual sea level conditions and other factors.<br><br>Following the review panel's suggestion, we have conducted new model runs using NOAA et al. (2017) SLR estimates and are in the process of revising the draft minimum flows report based on an analysis of the new model results. | Yes | Additional text and revised figures include the information requested. However, the differing baseline conditions and rates of anticipated sea level rise displayed in the two tables could be better explained.<br><br>It should also be noted that the 2017 SLR estimates from NOAA should be considered not just another example of SLR estimates to be compared to the earlier USACE values, but the most up-to-date estimates, and thus the "best available science". |

## Comments on Executive Summary

The draft MFL report was revised to incorporate language that the Panel recommended to better define the terms “significant harm” and “best available information” in the Executive Summary.

Concerns were raised by the Panel related to the absence of a maximum flow value for the LSC, compared to a proposed value of 400 cfs for the Lower Peace River. This seems to be a function of the District determining that the area of interest for MFL development for the LSC ends at its downstream boundary with the LPR, even though the area of concern for the LPR extends out into Charlotte Harbor. Since flows from the LSC average (on an annual time step) perhaps 20 to 30% of the annual average flows of the LPR, if flows from the LPR are important to the Harbor such that a maximum withdrawal value of 400 cfs is included in the draft MFL, it would appear that a similar maximum diversion criterion could also be derived for the LSC. The revised MFL report does not include a proposed maximum flow value for the LSC, and while the Panel understands the District’s points for not including such guidance, the Panel suggests that such guidance ought to be considered.

The Panel and the District are in agreement that the impact of SLR will need to be carefully monitored in the near future, as the impacts of SLR could offset the protections laid out as the basis for the protective nature of the MFL guidance.

A summary of the Panel’s review of District responses to Panel comments on the Executive Summary is shown in Table 2.

**Table 2 – Review of District Responses – Executive Summary**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Definition of "significant harm"* | Significant harm and significantly harmful are not defined by the State Legislature. For minimum flows and levels development, each water management district of the state or the Florida Department of Environmental Protection identify specific thresholds or criteria that can be associated with significant harm.<br><br>We incorporated additional information concerning significant harm into the first paragraph of the Executive Summary in the revised, draft minimum flows report. | Yes | Modified text in the Executive Summary better explains the logic behind the District's interpretation of how "significant harm" is quantified, as well as the background information used to support their approach to quantifying such. |
| *Definition of "best available information"* | In accordance with direction provided by the Florida Legislature, District staff use the best available information when determining minimum flows. Determinations regarding the best available information are made by District staff based on professional judgment, with consideration of input from all stakeholders.<br><br>The best available information includes information that exists at the initiation of the minimum flows development process and information that is acquired specifically to fill data requirements deemed necessary for establishment of the best, defensible minimum flows.<br><br>We do not think a definition for "best available information" is needed in the Executive Summary of the minimum flows report. However, we added the characterization of "best available information" above to the first paragraph of Section 1.5 in the revised, draft minimum flows report. | Yes | Modified text in both the Executive Summary and Section 1.5 better explains the modifier of "best available" when used to construct the MFL using existing data sources |

**Table 2 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Could MFL be set for more than 3 flow blocks?* | In theory, any number of flow blocks could be identified and used for minimum flows development and implementation. For practical purposes, use of three flow blocks for the District's development and implementation of minimum flows for water use permitting, planning and water resource protection has proven to be successful.<br><br>One reason for this success in the management of runoff driven lotic systems is that the flow blocks associated with established minimum flows have been developed with consideration of low, medium and high flow conditions that are known to be important for the physical, chemical and biological functions and structure of riverine systems.<br><br>We have not conducted analyses associated with development of proposed minimum flows for the Lower Peace River and Lower Shell Creek with varying numbers of flow-based blocks. | Yes | Issue did not need to be included in revised MFL report – was raised for consideration, rather than a requested modification to the draft report. |
| *Concern over LSC low flow conditions* | Please refer to response 2i in this table. | Yes – District response is quite clear that the proposed minimum flow guidance is not being met, but that adherence to the guidance contained within the MFL would enhance ecosystem function, compared to existing condition. | The revised MFL report clearly states that the proposed minimum flow guidance for the Lower Shell Creek is not being met, and requires a recovery strategy. Table 7-2 lays out the steps involved in the recovery strategy for the Lower Shell Creek. |
| *Helpful for the MFL report to tie into other relevant regulatory guidance (i.e., FDEP water quality guidance, SWIM Plans, etc.)* | Please refer to response 1e in Table 1 for our response to this comment. | Yes | Additional text clearly spells out the linkages between the MFL's role in protecting the health of the Lower Peace River, Lower Shell Creek and Charlotte Harbor, in light of concurrent efforts to monitor, protect and/or restore ecological health in those same systems. |
| *Water quality data analyzed in the report are inconsistent with water quality criteria included in FDEP's Numeric Nutrient Concentration (NNC) criteria* | We analyzed water quality data to explore potential linkages between flow and water quality parameters as is required by the Water Resource Implementation Rule, not to validate or to infer compliance with the Numeric Nutrient Criteria adopted by FDEP | Yes – but the issues associated with incomplete analytical techniques for phosphorus (i.e., reporting only orthophosphate) and chlorophyll-a (i.e., reporting values not corrected for phaeophytin) are problematic. | The HBMP's parameter list should collect all forms of phosphorus, not just orthophosphate, and values for chlorophyll-a should be corrected for phaeophytin. While these points cannot be "corrected" in the MFL report, this issue should be resolved prior to the production of the next MFL update. |

**Table 2 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| Explain the need for MFL to be protective of high inflow requirements needed for Charlotte Harbor | We agree with the preliminary comments below that are included in the appendices to the Panel's initial peer review report:<br><br>*"It appears improbable that even maximum water withdrawals would reduce flows sufficient to prevent bottom water hypoxia, which requires an average flow of 10,000 CFS at Arcadia (Stoker et al, 1989 – U.S. Geological Survey Publication XXXXX) – roughly equivalent to total gaged PR flow of about 20,000 cfs."*<br><br>"*Proposed max withdrawal of 400 cfs represents ca. 2% of the minimum flow from PR watershed required to initiate stratification of 10 ppt in Harbor. Consequently, maximum withdrawal appears to be protective of the "reset button" of bottom water hypoxia."*<br><br>We have therefore included text in a new Section (3.2.2) and at the beginning of Section 3.3.1 in the revised, draft minimum flows report to emphasize the importance of hydrodynamics and high inflows to Charlotte Harbor. | Yes | Additional text links the need to protect the very highest inflows to bottom water hypoxia, and the link between bottom water hypoxia and the Harbor's adopted Pollutant Load Reduction Goal. |
| *15% threshold value for "significant harm" needs further support, rather than reference that others have found it reasonable* | Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" section above for our response to this comment. | This important topic is discussed by the District, and examples given of the reasonableness of the 15% threshold. However, the point remains that while examples can be found that support its application, it is not universally agreed as an acceptable level of impact for all activities (e.g., wetland impacts from construction, impacts to seagrass from dredging, etc.) | The reviewers feel that the District has sought to apply the best approach that can be reasonably expected to work in the absence of any <u>potentially</u> more conservative approaches such as inflection points or threshold values.<br><br>Although citations reference the reasonableness of using a 15% threshold to provide "high to moderate" protection from impacts, those are not universally-accepted as definitive thresholds for "significant harm" and may not necessarily by appropriate in all situations. |

**Table 2 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Lack of maximum flow diversion quantity for LSC, while the LPR has a 400 cfs maximum diversion criterion to protect downstream ecological health* | The proposed minimum flows for Lower Shell Creek are to be implemented based on discharge of a percentage of the inflow to Shell Creek Reservoir. For example, the allowable flow reduction of 23% for Block 2 flows, means that quantity of water equal to 77% of the inflows to the reservoir must be discharged downstream of Hendrickson Dam.<br><br>This minimum flow is required, irrespective of withdrawals from the reservoir. By associating the minimum flows with rates of inflow to the reservoir, we believe the ecology of Lower Shell Creek is protected from significant harm associated with water withdrawals. Thus, a maximum flow diversion quantity is not required for the Lower Shell Creek.<br><br>For minimum flows development purposes, Shell Creek is partitioned into the Upper Shell Creek and Lower Shell Creek, separated by Hendrickson Dam. The only significant, permitted withdrawal directly from Shell Creek is associated with the permit issued by the District to the City of Punta Gorda for withdrawals from Shell Creek Reservoir, the portion of the upper creek impounded by the dam.<br><br>Because the proposed minimum flows for Lower Shell Creek are based on maintaining block-specific percentages of inflow to Shell Creek Reservoir from Upper Shell Creek (and Prairie Creek) and the City's withdrawals are from the multi-year storage in the reservoir storage, a maximum withdrawal limit (i.e., a maximum flow reduction) is not needed for the Lower Shell Creek minimum flows. Also, of note, the permit issued to the City for withdrawals from Shell Creek Reservoir includes monthly and annual average maximum withdrawal limits.<br><br>We further note that preliminary comments prepared by the panel and used to support development of their initial peer review report, indicated it is "*[n]ot likely that max withdrawals (if set) for LSC would affect threshold values for stratification, but should be mentioned/ acknowledged*<br><br>We agree with this assertion, and note that for a recent period from 1996 through 2016, mean annual flow in the Lower Peace River, based on flows in the River at Arcadia and flows from Joshua and Horse creeks was 1,279 cfs, while flows to Lower Shell Creek from the same | Not entirely. The District's response is very detailed, and lays out the logic of them not including a maximum flow diversion quantity for Lower Shell Creek. However, the Panel's concerns about the lack of incorporation of a maximum diversion quantity remain.<br><br>The District's logic for including a maximum diversion quantity of 400 cfs for the Lower Peace River are that diversions above and beyond that amount might be problematic for regions beyond the boundaries of the Lower Peace River – areas out into the Harbor itself. The lack of similar maximum diversion guidance for the Lower Shell Creek does not follow the same logic. While it is true that such quantities are not likely to be reached – not "requiring" such guidance does not diminish the value of developing such guidance. | The District's reluctance to include a maximum diversion quantity for the Lower Shell Creek seems at odds with the inclusion of such guidance for the Lower Peace River. The logic for not including a maximum diversion quantity for Lower Shell Creek seems to rest on the statement (Section 6.2) that withdrawals are "…from Shell Creek Reservoir upstream of Hendrickson Dam, not directly from the lower portion of Shell Creek." This may be an important distinction for regulatory reasons, but it is not an important distinction as far as protecting the health of the Harbor is concerned.<br><br>Since it is acknowledged by the District (in their response) that it is unlikely that a potential maximum diversion quantity for the Lower Shell Creek MFL would be problematic for existing users, it is not entirely clear to the Panel why the District does not more fully consider the benefits of establishing similar maximum diversion guidance for the Lower Shell Creek as was included for the Lower Peace River. |

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| | period were 388 cfs. This information, which has been included in Section 2.7.1 of the revised, draft minimum flows report, indicates the Shell Creek watershed accounts for only about 25% of the combined flows from the Peace River and Shell Creek watersheds.<br><br>Based on the information provided here, we do not currently intend to recommend inclusion of a maximum withdrawal cap or limit as part of the proposed minimum flows for Lower Shell Creek. We will, however, continue to assess and, as necessary, consider this recommendation of the panel for potential, future reevaluations of minimum flows established for the creek. | | |
| *Say something about potential impact of SLR on the MFL* | Sea level rise effects on salinity habitats were assessed in the District's draft minimum flows report to help evaluate the potential need for future reevaluation of the proposed minimum flows.<br><br>As noted in response 1l in Table 1, analyses based on modeled scenarios associated with SLR predictions from the U.S. Army Corps of Engineers indicated the need for reevaluation of minimum flows established for the Lower Peace River and Lower Shell Creek.<br><br>We acknowledge the SLR estimates used in our initial analyses are conservative. We have run the hydrodynamic model using the most recent SLR estimates by the National Oceanic and Atmospheric Administration (NOAA et al. 2017), and plan to update the revised, draft minimum flows report based on results of these SLR simulations. | Yes | Additional text and revised figures include the some of the additional information and discussion requested.<br><br>The results displayed in the revised Draft MFL report suggest that anticipated rates of SLR are likely to impact the available low salinity habitat to a degree that be above and beyond the levels of impact meant to be protected through the implementation of this MFL. The implications of anticipated SLR on low salinity habitats needs to be assessed at regular intervals. |

## Comments on Chapter 1 – Introduction

The Panel felt that the draft MFL report's Introduction was well developed, and gave the Panel a thorough introduction to the LPR and LSC, as well as the District's responsibilities. As is noted in other parts of this report, the Panel concluded that the definition of significant harm requires a careful discussion, not just of literature that supports proposed guidance criteria, but the diversity of opinions about the topic.

A summary of the Panel's review of District responses to Panel comments on Chapter 1 – Introduction is shown in Table 3.

**Table 3 – Review of District Responses – Chapter 1 – Introduction**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Formatting of Table 1-1 Improve within cell formatting so text in final column matches up with that in preceding columns* | Table 1-1 was reformatted in the revised, draft minimum flows report to align information contained in the final column with that in the preceding column. | Yes | Modified table now formatted correctly |
| *1.2.1 Remove 's from Florida in title* | We changed "Florida's" to "Florida" in the Section 1.2.1 title in the revised, draft minimum flows report. | Yes | Modified text now correct |

## Comments on Chapter 2 – Physical and Hydrologic Description

As noted in the Panel's Initial Report, there were a number of modifications to text, figure legends and other fairly routine edits that were appropriate. The District's responses were favorable, and those portions of the draft MFL report that could be revised in time for the Panel's review were appreciated.

As important as the hydrologic and hydrodynamic models are, the Panel felt that they could have been described in greater detail earlier in the draft report, and the Panel viewed the revisions as being responsive to these concerns. The assumptions and data limitations associated with quantifying the water budget from both ungauged and gauged sources are more clearly discussed in the revised draft MFL report.

A summary of the Panel's review of District responses to Panel comments on Chapter 2 – Physical and Hydrologic Description is shown in Table 4.

**Table 4 – Review of District Responses – Chapter 2 Physical and Hydrologic Description**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Issues related to clarity of maps and figures, for example, enhancing Figure 2-2 so it is better related/connected to a Google street map for the same area. In addition, river scales are discussed or displayed in both miles and km. Perhaps use both metrics each time.* | Figures 2.2 and 2.3 have been updated in the revised, draft minimum flows report. In addition, an inset map was included in Figure 2.2, and we clarified the purpose of the inset maps in both Figure 2.2 and Figure 2.3.<br><br>We acknowledge that differing metrics are used to depict distances in maps included in the draft report. Some of the maps are reproductions from other sources and for this reason, we have continued to present maps using both the U.S. Customary and Standard International metrics. | Yes | Map clarity issue has been addressed. Issues of station locations and listings in both km and miles (as well as station names alone) can be dealt with through expanded text of legend for those figures where other entities have produced the graphics. |
| *Question related to LiDAR sources, for example, is 2017 LiDAR data for the region available from the state?* | The LiDAR photogrammetric data collection (Aerial Cartographic of America, Inc. 2015) was conducted primarily to support development of the District's hydrodynamic model for minimum flows development. These data were the best available information of this type in 2016, when the hydrodynamic model was calibrated and validated.<br><br>State-wide 2019 LiDAR data are currently under review. These and other available data will be considered for use in future evaluations of minimum flows for the Lower Peace/Shell System. | Yes | Yes |
| *Use of NGVD29 vs. NAVD88 for elevation and bathymetry data* | Most elevation data and references to elevations in the draft minimum flows report are presented relative to the North American Vertical Datum of 1988 (NAVD88). However, we note that in the descriptive information included in Section 2.1 on page 16 of the draft minimum flows report a reference is made to the Peace River originating in an area of Polk County at an elevation of about 100 feet above the National Geodetic Vertical Datum of 1929.<br><br>We also note that a water surface elevation of 5.0 feet is included in the description of Shell Creek Reservoir in Section 5.5.3 on page 91 of the draft minimum flows report.<br><br>For development of the hydrodynamic model for Charlotte Harbor, all the variables associated with elevation are referenced to NAVD88. | Yes | Yes |

**Table 4 – continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Question about the order of MFL development vs. water supply planning efforts* | The development or reevaluation of minimum flows is a relatively lengthy process involving compilation of relevant data, development or refinement of analytical methods and approaches, and coordination with local governments and other affected stakeholders. In addition, the District is typically engaged in the concurrent development of minimum flows for several priority water bodies.<br><br>For these reasons, there are practical limitations concerning minimum flows development and reevaluation schedules. It is worth noting, however, that minimum flow status assessments are conducted annually, on a five-year basis in conjunction with regional water supply planning, and on an as-needed basis associated with reviews for water use permit applications and renewals. Results from these assessments are part of the District's adaptive management approach to minimum flows development and implementation and can be used to inform decisions regarding the need for minimum flow reevaluation. | Yes | Yes |
| *Definition of flow lag* | For the water quality analyses included in the draft minimum flows report, lagged-flows refers to average flows for periods ranging from 2 to 60 days prior to the date of water quality sampling event.<br><br>Text in Section 3.2.2 in the revised, draft minimum flows report was amended with a parenthetic phrase to clarify what is meant by lagged-flows. | Yes | Yes |
| *Consider adding a most recent 10 or 20 year average bar to Figures 2-12 to 2-16 in addition to the one that is the long-term average for POR* | Short term average (2000-2018) flows were added to Figures 2-12 to 2-16 in the revised, draft minimum flows report. Please refer to our response 1g in Table 1 for additional information. | Yes | Additional average value now included in Figures 2-12 to 2-16. The District should consider adding a third line that excludes recent data to show average values calculated solely from historical data, so that the period of record minus the recent past and recent-past values can be directly compared. |
| *Discuss the importance of hydrodynamics and hydrodynamic modeling* | The standard format for the District's minimum flow reports involves identification of ecological criteria followed by descriptions of tools used to model or assess the criteria. The hydrodynamic model is identified in the introductory (Chapter 1), where we discuss the substantial data enhancements that were undertaken to improve upon the model that was previously used for development of the existing Lower Peace River minimum flows. To better emphasize the primacy of the hydrodynamic model for our current minimum flows assessments | Yes | Yes |

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| | we split the paragraph following the numbered list of major initiatives and updates within Section 1.5 into two paragraphs in the revised, draft minimum flows report, and amended the first of the two paragraphs to clearly indicate that like the previous minimum flows effort, the current effort was based on salinity modeling conducted through hydrodynamic modeling.<br><br>The hydrodynamic model is also notably mentioned in the system description (Chapter 2), water quality (Chapter 3) and resources of concern/modeling tools (Chapter 5) chapters.<br><br>As noted in our response to comment 5i in Table 5 below, we also amended the brief discussion of the model in the salinity section of Chapter 3 included in the revised draft minimum flows report. We also emphasized the importance of hydrodynamics in a new section (Section 3.2.2) on the pollutant load reduction goal for the Lower Peace River and new text added to the beginning of the descriptive water quality information section (Section 3.3.1).<br><br>Finally, in Chapter 5 of the revised minimum flows report, the development and application of the UnLESS model to the Charlotte Harbor system has been substantially expanded to include more information on model setup, input data, model calibration and verifications and modeling uncertainty. As noted in the draft minimum flows report, detailed information on the model and its use are also discussed in Chen (2020) which is included as Appendix C to the report. | | |
| *Additional and more detailed description of hydrodynamic model elements needed* | Chapter 5 is expanded to include a brief description of the hydrodynamic model for Charlotte Harbor. Please also refer to our response 4g in this table. | Yes | Yes |

## Comments on Chapter 3 – Water Quality

The Panel felt that some of the figures in the draft MFL were confusing, and in need of restructuring. Most of the requested modifications were made in the revised MFL report viewed by the Panel.

The draft MFL report seemed to focus on flows and residence time, as potentially the sole (or at least primary) influences on concentrations of chlorophyll *a*. In addition, several decades of work on the LPR and upper Charlotte Harbor have indicated that the amount of colored dissolved organic matter (CDOM) in the system is likely a key influence, among other factors. The revised draft MFL report has added language that more accurately reflects the multiple factors that can influence phytoplankton populations, above and beyond residence time alone.

The District's responses to Panel comments (as outlined in the Initial Report) supported the Panel's concerns related to the water quality parameters collected by the Hydrobiological Monitoring Program (HBMP) that is used to ensure compliance with relevant water use permits. For example, it appears that the values of "chlorophyll" used in the water quality analyses in the draft MFL report refer to chlorophyll-a, but not chlorophyll-a that has been corrected for phaeophytin. This is problematic, as FDEP and other regulatory agencies do not include chlorophyll-a values for water quality analyses if the values are not corrected for phaeophytin.

The draft MFL report included information on "Ortho-phosphorus" which the District informed the Panel refers to concentrations of orthophosphate, not Total Phosphorus. Orthophosphorus appears to be a bit of technical jargon term for orthophosphate, which is the dissolved inorganic ionic form of phosphorus. While this could represent 90% of the total pool of phosphorus – as suggested by District staff and/or its consultants – that proportion is likely to vary in time and space in the Lower Peace River and Lower Shell Creek. The HBMP monitoring programs' parameter list should be modified to include Total Phosphorus, in addition to orthophosphate. Neither should be referred to as "othophosphorus" as that term is misleading.

The revised MFL now includes the development of empirical relationships between LPR flows and salinity in the LPR that also include flow data from the LSC, as two of the stations involved in the assessments are located below the confluence of the LSC. That is an improvement over the original draft report.

The revised draft MFL report now includes a more comprehensive discussion of the various natural and anthropogenic influences on bottom water hypoxia in the LPR and Charlotte Harbor.

A summary of the Panel's review of District responses to Panel comments on Chapter 3 – Water Quality is shown in Table 5.

**Table 5 – Review of District Responses - Chapter 3 Water Quality**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Salinity data presented in Figure 3-3 not that helpful* | We note that variability in the salinity data presented in Figure 3-3 can be attributed to seasonal, inter-annual variation and other factors. However, as noted in the report text associated with the figure, we think the figure is helpful in portraying longitudinal and seasonal salinity variation in the Lower Peace River as well as salinity differences in the water column at selected sites. | Mostly | Data are inclusive of 1976 to 2016. This does not directly compare pre and post MFL conditions. Also, as flow blocks are no longer date-based, perhaps it is not as important to categorize data into wet vs. dry seasons |
| *Influences of factors other than flow on concentrations of chlorophyll a* | We added additional text in Section 3.3.1.3 of the revised, draft minimum flows report. | Yes | Section 3.3.1.3 gives a more thorough review of factors that can influence chlorophyll-a than in the prior report. Might be good to add something how the data not being corrected for phaeophytin affects interpretation. |
| *Values of phosphorus only shown for "orthophosphorus"* | Total phosphorus measurement for the Hydrobiological Monitoring Program (HBMP) was terminated in 2003. We investigated our use of ortho-phosphorus vs. total phosphorus by conducting scatterplot analyses for data from 5 stations for the period 1996 through 2003. As indicated in the figures below, about 81-88% of total phosphorus is attributed to ortho-phosphorus, suggesting that results expected for total phosphorus may generally be similar to those determined for ortho-phosphorus.<br><br>We included information concerning the current measurement of ortho-phosphorus for the Peace River HBMP and the correlation between orthophosphorus and total phosphorus in Section 3.3.1.5 of the revised, draft minimum flows report. | Yes, but the draft final report does not include the level of detail included in the District's response to the Panel. | The inclusion of only dissolved inorganic forms of phosphorus is problematic. While this is not the District's data collection effort, it is a data collection effort that is conducted for compliance with a water supply permit. The percentage of phosphorus that is orthophosphate may average 80%, but that value likely varies over the length of the river and with different seasons. The final MFL report should replace all text and data legends that contain "orthophosphorus" with "orthophosphate". |
| *Values of nitrogen only shown for Total Kjeldahl Nitrogen (TKN) and nitrate plus nitrite* | We added results for total nitrogen to Section 3.3.1.4. | Yes | Revised results and analysis are in-line with request. |
| *Definition needed for "flow-lag"* | Please see response 4e in Table 4 for our response to this comment. | Yes | Yes |
| *Various figures have legends that appear to be mislabeled* | Numerous figure legends were corrected in the revised, draft minimum flows report. | Mostly | Captions have improved, but the final report should clearly define wet and dry season in figure captions. Format as "NOx". In Table 3-7 add (or replace with) Rkm to station number so readers know the upstream/downstream position. Figure 3-17 shows the stations are not numbered sequentially. Figures 3-19, 3-21, 3-23, 3-25, 3-27 all could have Rkm on x-axis. Remove "shows" 3-27. |

**Table 5 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Mislabeling of y-axis on Figure 3.23* | The y-axis label for Figure 3-23 was changed from "Salinity (PSU)" to "Chlorophyll" in the revised, draft minimum flows report. | Yes | Label changed as requested |
| *Importance of hydrodynamic model description* | We agree that description of the hydrodynamic model and its primacy for the analyses presented in our draft minimum flows report should be emphasized. As noted in response 4g in Table 4, we modified text in Section 1.5 of revised minimum flows report to emphasize our prior and current use of hydrodynamic modeling to support minimum flows development for the Lower Peace River and Lower Shell Creek. In addition, we substantially expanded the presentation of model information included in Chapter 5. We also think it is appropriate to discuss the development and use of a hydrodynamic model for assessing flow-related changes in salinity in the Lower Peace/Shell System in Section 3.3.2.1 of the draft minimum flows report, which addresses system salinity. Our mention of the hydrodynamic model in the water quality chapter (Chapter 3) in the original draft report, and additional related text added to the revised draft report serve as another useful preview of the more detailed discussion of the model in Chapter 5 and the referenced model report, Chen (2020), included in the report appendices. We also note that within Section 2.3.2.1 of the revised, draft minimum flows report, we substantially modified the text to emphasize our efforts to develop and use the best available information, in this case the hydrodynamic model, for minimum flows development. | Yes | Yes. Additional text and explanation in the revised report are satisfactory. |
| *Additional and more detailed description of hydrodynamic model elements needed* | In addition to modifications to the text in Section 3.2.2.1 of the draft, revised minimum flows report noted in our previous response 5i in this table, we also amended text associated with the model in Chapter 5 and in the model report (Chen 2020) included as Appendix C to the report. | Yes | Yes |
| *More refined explanation needed for isohaline location trend analyses* | Please refer to response 5o in this table. | Mostly | Test could be expanded slightly, although the table footnote does help. |
| *Better description of results shown Figures 3-12 to 3-16* | To improve presentation of the correlation analyses results presented in Figures 3-12 through 3-16, we amended the figure captions within Sections 3.3.2.2 through 3.3.2.5 of the revised, draft minimum flows report.<br><br>We also modified the statistical methods description included in Section 3.3.2 to better describe the lagged-flows used in the analysis and to summarize our interpretation of the correlation statistics derived from the analyses and presented in Figure 3-12 through 3-16. | Yes | Description more detailed and labels now accurate for the displayed data |

**Table 5 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Value of developing dynamic water quality model, vs. empirical approaches* | As noted in response 1j in Table 1 we understand the potential value of a dynamic water quality model for the Lower Peace/Shell System, but do not think development of such a model (for water quality parameters other than salinity and temperature) is necessary for the current development of proposed minimum flows for the Lower Peace River and Lower Shell Creek.<br><br>See response 1j for additional information concerning our response. | Yes | Yes |
| *Flow-salinity relationships in Figure 3-11 include stations at or below the confluence of the LSC, but flows from the LSC are not included* | Lower Shell Creek and Lower Peace River flows were combined for depiction of the flow-salinity relationships for Stations 6.6 and 15.5 in Figure 3-11 in the revised, draft minimum flows report. In addition, the figure caption and associated text within Section 3.3.2.1 of the revised, draft minimum flows report were updated. | Partially | The salinity data now are plotted against the totality of inflows – from both the Lower Peace River and Shell Creek. However, the graphic does not display equations, statistical significance, etc. The text says that "…salinity was more responsive to freshwater inflow…" at upstream stations without defining what that means. Consider replacing that text with "…variation in flow explained a greater amount of the variability in salinity at upstream stations, but was statistically significant at all stations examined here." |
| *Table 3-1 – improve explanation of location of isohaline location trends* | We note that the text on page 47 preceding and which refers to Table 3-1 indicates the trend analysis identified an upstream movement of the 0 psu and 20 psu isohalines for period from 1984 through 2016.<br><br>To improve understanding of the information presented in the table, we added a footnote to Table 3-1 in the revised draft minimum flows report to characterize our interpretation of the presented, significant statistics, i.e., that positive, significant statistics indicate upstream isohaline movement.<br><br>While revising Table 3-1, we determined that changes to clarify the presented statistical results and better indicate that the results pertain to the Lower Peace River (and in some cases Charlotte Harbor near the mouth of the river) were needed for several other tables and figure within Chapter 3. So, we revised captions and/or footnotes for several additional tables and figures in the revised draft minimum flows report, including Tables, 3-2, 3-3, 3-4 3-5, 3-6 and 3-7, and Figures 3-3, 3-4, 3-5,3-6, 3-7, 3-8, 3-9 and 3-10. | Partially | Table 3-1 and preceding text explains that the trend test was for detecting an upstream movement of the location of the 0 and 20 psu isohalines.<br><br>However, the text regarding Table 3-1 is incorrect, as there was only a trend for 0 and 20 psu isohalines, while t the text suggests there was a trend for all four isohaline locations. |

**Table 5 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Table 3-2 ,3, 4 to 3-7 and 3-12 to 3-16 – improve explanation of summertime hypoxia development and other data presentations* | The text in Section 3.3.1.2 preceding Table 3-2 notes the trend analysis indicated dissolved oxygen concentrations in surface waters associated with the 0 psu isohaline increased for period from 1984 through 2016. We do not think the information presented in the table can be used to assert there is no hypoxia in surface waters of the Lower Peace River during the wet, summer season.<br><br>However, as noted in responses 5i and 5o in this table, we amended the captions, column headers, and/or footnotes for Tables 3-2, 3-3, 3-4 through 3-7 and Figures 3-12 through 3-16 within the revised, draft minimum flows report.<br><br>We also updated the statistical methods description included in Section 3.3.2 within the revised, draft minimum flows report to enhance presentation of the results. | Yes | Figures 3-3 and 3-4 seem to be portraying different versions of the same phenomena – salinity is apt to be higher in the bottom waters, and dissolved oxygen lower, particularly in the wet season. The Panel has concluded that fixed geographic locations and the salinity-based stations serve different purposes and both are important to keep. |

## Comments on Chapter 4 – Ecological Resources

The Panel was concerned about the reasonableness of analyses related to plant communities that were last quantified in 1998, and the District's revised draft MFL report was modified to include the newer information requested. In response to Panel comments related to the value of continuing to collect biotic variables such as fish abundance, macroinvertebrates, and/or macroalgae, the District's responses were mostly in line with Panel expectations: biological data are not as easy to "model" for scenario development as physical and chemical parameters such as dissolved oxygen and salinity. A more detailed description of the relationship between the Hydro-biological Monitoring Program (HBMP), guidance from the HBMP review committee, and the data set used to develop the draft MFL will be helpful for future reviewers.

The District's explanations of the relative value of including information related to listed species was found to be responsive to the Panel's concerns. The revised draft MFL report includes more details about the relationship of sawfish life history stages and their relationship both freshwater inflows and salinity.

A summary of the Panel's review of District responses to Panel comments on Chapter 4 – Ecological Resources is shown in Table 6.

**Table 6 – Review of District Responses - Panel Comments on Chapter 4 Ecological Resources**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Plant community data set from 1998 is problematic* | We are not aware of any recent, comprehensive, species or genus-level vegetation maps for the Lower Peace/Shell System that would represent an update to the detailed information presented in Figure 4-1 in the original, draft minimum flows report.<br><br>However, we developed and included a replacement, coarser-level vegetation map based on the 2017 SWFWMD land use/cover GIS layers in the revised, draft minimum flows report.<br><br>In addition, we anticipate considering vegetation data collection and mapping needs for future evaluations of the system. | Yes | Updated information is much more helpful |
| *Status and trends in seagrass coverage in the LPR over time* | The District has been mapping seagrasses in Charlotte Harbor using aerial photography since 1988. Others have attempted to use older imagery to infer historical seagrass extent, but with very limited success.<br><br>For the Tidal Peace River segment of Charlotte Harbor, recent seagrass extent (estimated for 2014, 2016 and 2018) is greater today than any time since 1988, as shown below.<br><br>We included this figure and associated text in Section 4.1.5 of the revised, draft minimum flows report to augment the presented seagrass information. | Yes | Inclusion of such information is appreciated |

**Table 6 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Concern over shift in HBMP focus to physical factors, rather than fish communities, macroinvertebrates, and/or macroalgae* | In 1996, the Charlotte Harbor Hydrobiological Monitoring Program (HBMP) Scientific Review Panel reviewed the ongoing elements of the HBMP program and recommended several changes to the monitoring program study elements. The Panel recommended that HBMP monitoring should primarily focus on assessing long-term trends in key physical, chemical, and biological characteristics that can be directly linked to potential effects associated with withdrawals at the Peace River Manasota Regional Water Supply Authority's Peace River Facility. They also noted that less effort should be focused on indirect biological indicators that are not intended to evaluate influence of withdrawals, once a baseline level of information has been collected.<br><br>As summarized in Appendix A of the Peace River Hydrobiological Monitoring Program 2016 HBMP Comprehensive Report (JEI 2017), subsequent meetings of the HBMP Scientific Review panel have continued to shape the current HBMP. Reference to this summary document has been included in Section 3.3.1 of the revised, draft minimum flows report to provide additional information concerning the evolution of the HBMP.<br><br>We think the biological and other information collected to date and summarized in our draft minimum flows report is sufficient for development of recommended minimum flows for the Lower Peace/Shell System. We note that this information has been collected in support of the required HBMP, other monitoring programs, and studies specifically undertaken by the District to directly support minimum flows development.<br><br>However, in support of our adaptive management approach to minimum flows development and implementation, we continue to support ongoing data collection efforts for the Lower Peace/Shell system and will consider additional sampling and analysis of biological data as needed, for future minimum flow reevaluations. | Partially | The District should explain in greater detail the relationship(s) between biological data that will be continued to be collected to ensure compliance with the intent of the MFL, even if such data are not capable of being used for modeling purposes. |

**Table 6 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Fisheries Independent Monitoring newest data from 2016 not included in the modeling approach (Appendix E) or compared to data collected through 2013* | At the time of model development, the best available data were used. However, consideration of more recent data has been requested from the Florida Fish and Wildlife Conservation Commission (FWC) and a comparison of abundance of the taxa and size classes examined in this model will be performed to determine if there are any significant differences between modeled years and more recent sampling years. Results from this analysis will be included in future updates to the draft minimum flows report.<br><br>As noted in Section 4.2.1 of the draft minimum flows report, Call et al., (2013) performed a survey on fish communities within the Lower Peace River throughout 2007 to 2010 and found no temporal variation in fish communities across years, suggesting a generally stable system within the river.<br><br>To augment presentation of information on the fish assemblage in the Lower Peace/Shell System, the descriptive FWC Fisheries-Independent Monitoring data from 2018 presented in Section 4.2.1 of our original draft minimum flows report has been replaced with the most recent available data (2018) in the revised, draft minimum flows report. | Yes | Yes, the addition of additional data is useful. |

**Table 6 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Should endangered species, such as sawfish and manatees, be included in MFL assessments?* | Endangered and listed species should be and are considered when developing minimum flows. For example, in Section 4.2.1 of the draft minimum flows report we noted that juvenile sawfish (<3 years of age) are able to move in response to salinity fluctuations with high site fidelity upon a return to baseline conditions, with large-scale movement most notable after significant freshwater inflow (>500 cubic meters per second) from tropical disturbances (Poulakis 2016).<br><br>We also noted that Sawfish movements examined in the Caloosahatchee River demonstrate downstream movement when salinities approach 0 psu and upstream movement at salinities approaching 30 psu (Poulakis 2013). Therefore, protection of the sensitive salinity habitat would not positively affect their distribution, although maintenance of natural freshwater flows would benefit their capacity to locate nursery grounds (Poulakis 2016).<br><br>Further we note that the species chosen for the HSM modeling used to support our minimum flow analyses reflect those with affinities for low salinity habitats.<br><br>A strong positive correlation between Common Snook (*Centropomus undecimalis*) abundance and flow was observed in the Lower Peace River (Blewett 2017). Body condition was also elevated during years of increased river flow. This increased abundance and condition with increased flow was hypothesized to be related to enhanced prey availability with greater floodplain inundation. Per the floodplain inundation analysis performed by HSW (2016) in support of our minimum flows work (Appendix D), the proposed minimum flows will not significantly impact total inundated floodplain wetland area associated with the baseline flow condition, and are therefore unlikely to impact the abundance or condition of Common Snook.<br><br>For development of minimum flows for river systems or creeks dominated by spring flow we typically consider manatee usage of thermal refuges during acute and chronic cold-water events. Given the lack of spring discharge to the Lower Peace/Shell system we do not think assessment of potential, flow-related changes in thermally-favorable habitat usage by manatees is necessary for our development of minimum flows for the river and creek. | The additional information included in the District's response is clarifying. | The District should consider including more of the information provided in the response to the final MFL report. In particular, information related to juvenile and age-specific salinity preferences of sawfish would be helpful to include in the final MFL. |

**Table 6 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *In Appendix E it is stated that "predicted CPUE grids" were derived from catch data and these predictions were used to generate the population estimates which were used to model the effect of water withdrawals* | Catch-per-unit-effort (CPUE) is a direct calculation from Florida Fish and Wildlife Conservation Commission's Fisheries Independent Monitoring (FIM) catch data, standardized to the gear type used. These data, all the data used for development of the habitat suitability models (HSMs), and the modeling results were considered the best available information at the time for support of the development of the proposed minimum flows. The fish population modeling using habitat suitability was not used as a criterion for development of the proposed minimum flows, rather it was used for consideration of potential effects of implementation of the proposed minimum flows on representative, important taxa populating the system. Because the model does not incorporate some factors, such as competition, predation and fishing pressure that can affect fish and invertebrate distributions, we used the model to assess how habitat suitability zones simulated under baseline condition would change with implementation of the proposed minimum flows. Like all models, the habitat models that we used to assess habitat suitability for several estuarine taxa, include limitations. We augmented Section 5.5.3 in the revised, draft minimum flows report to fully discuss these limitations and modeling uncertainties.<br><br>However, we continue to think the HSMs developed to support our minimum flows work are well suited for consideration of potential changes in habitat suitability between the baseline flow condition and reduced flow conditions. Regarding this potential habitat change assessment, we note that the flow reduction scenario assessed in support of our minimum flows analyses actually exceeds the allowable flow reductions prescribed by the minimum flows that are proposed for the Lower Peace River/Shell System. A maximum withdrawal limit was not included or used to develop the "minimum flows" scenario used to characterize habitat suitability with the HSM under reduced flow conditions.<br><br>The HSMs, in their current or an enhanced form may be used for future minimum flow evaluations for the Lower Peace River and Lower Shell Creek. They would likely not be used if alternative tools that provide superior information were to become available. | Yes | The revised MFL refers to the date "1880s" in the bulleted list at the end of the section. This likely is meant to be "1980s" |

**Table 6 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Figure 4-2 difficult to review due color choices* | Figure 4-2 was reformatted for the revised, draft minimum flows report to improve clarity. | Mostly | The figure much improved, but should be made larger. |
| *Explain "decreased flow may also contribute to increases in dissolved oxygen concentrations". Add your response to p.76 of the report.* | Potential relationships between decreased flows and oxygen concentrations are explained in the papers cited in Section 4.2 of the draft minimum flows report, and we think these relationships are adequately summarized in the section.<br><br>However, we acknowledge that additional, potential effects of decreased flows could include those associated with an increase in the influence of tidal fluctuations which can lead to the formation of a well-mixed system. Also, if sediment loads from the watershed decrease as a function of reduced flows, water clarity could increase, leading to an increase in primary production.<br><br>We included additional text associated with these factors in the last paragraph of Section 4.2 of the revised, draft minimum flows report, and split the paragraph into two paragraphs to improve readability of the text. | Partially | The District's response, in Section 4.2 seems to refer to the potential for increased algal growth under low flow conditions, due to some combination of factors (e.g.., increased water clarity, increased residence time). However, algal growth only increases oxygen concentrations in day light hours – more phytoplankton means both higher highs (in the day) **and lower lows** (at night). Some discussion of algae's day/night impacts on DO is warranted.<br><br>The impacts of lower flows on oxygen may not be detectable with a data set that is based on daytime samples. Therefore, the concern remains, and the language in the revised MFL report is perhaps overly simplistic. |

## Comments on Chapter 5 – Resources of Concern and Modeling Tools

The revised draft MFL report was responsive to Panel concerns related to data limitations associated with various aspects and algorithms of the hydrologic model. The basis for observed differences in baseflow during different time periods, for different sub-basins, was given a more detailed discussion. The Panel and District both agree that these issues are particularly important for those portions of the LPR and LSC watershed that are downstream of USGS gage sites.

The revised draft MFL report more clearly spells out the data sets used to develop the algorithms in the PRIM modeling effort, as was requested by the Panel. The Panel noted that in the last MFL report (2010) the hydrologic model greatly over-estimated the ungaged flow from the watershed into the LPR and Charlotte Harbor, which has been acknowledged by the District in the revised draft MFL report

Portions of this chapter that had previously been internally inconsistent were modified in the revised draft MFL report. For example, the prior discrepancy between results shown in Table 5-1 and figures and text describing distinct upward trends in dry season flows have been addressed. In light of this issue, it is hoped that future MFL reports pay special attention to the potential for results from Seasonal Kendall Tau tests to be at odds with both parametric and non-parametric statistical tests that look at the same data sets on a monthly time step. The over application of the Seasonal Kendall Tau test can give rise to conclusions about a lack of trends that is based on the structure of data assignment in that test, rather than within-year trends that are obvious upon the display of data on monthly time steps.

As was noted in earlier sections, the Panel understands the District's reasons for not including a maximum flow diversion threshold for the LSC, even though such a value (400 cfs) was developed for the LPR. While the Panel appreciates the regulatory limitations associated with the development of MFL guidance, concerns over the role of LSC discharges on the ecological health of the LPR (below LSC) and Charlotte Harbor remain, regardless of the artificial distinction between the Upper and Lower portions of Shell Creek.

As noted previously, the Panel feels that the revised draft MFL report includes a more thorough explanation of why a 15% reduction in the salinity-habitat metric was considered protective, but it also believes that the District should keep in mind that not all regulatory programs that are meant to protect the quantity and quality of natural habitats similarly reply upon the conclusion that a 15% impact is the threshold for significant harm.

A summary of the Panel's review of District responses to Panel comments on Chapter 5 – Resources of Concern and Modelling Tools is shown in Table 7.

**Table 7 - Panel Comments on Chapter 5 – Resources of Concern and Modeling Tools**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Figure 5-1 could be more clearly identified as to what the graphics are meant to represent, in terms of "exceedance"* | Figure 5-1 shows mismatch of fixed-date blocks using a long flow record (1950- 2014) and short flow record (2007- 2014) based on 75% exceedance (red dashed line) and 50% exceedance (blue dashed line). This is the reason for the change from date-based to flow-based blocks that are depicted in Figure 5-2. | Partially | Figures 5-1 and 5-2 are unchanged. The Panel believes that the since recent data is included in "the long flow record". it would also be useful to display the data using three data sets: period of record, period of record minus recent past, and then the recent past |
| *Timeframe and data sources used to develop the hydrodynamic model* | The timeframe used for the hydrodynamic model is briefly described in Section 5.5.1 and in Appendix C. Sources of bathymetric LiDAR and tide data are described in Sections 2.4 and 2.6. Flows are briefly described in Section 2.7 and Sections 5.3.2 and 5.3.3. More information about the hydrodynamic model was added in Section 5.5.1 of the revised, draft minimum flows report. | Yes | Yes |
| *Need to understand basis for variation in baseflow differences over different time periods* | Baseline flow from 1994 through 2006 was used with the PRIM model to simulate groundwater withdrawals and land use change impacts on Peace River flows. Baseline flow from 2007 through 2014, seasonally-corrected based on PRIM model run output, was used with the hydrodynamic model to simulate salinity, depth and water temperature in the Lower Peace/Shell System and Charlotte Harbor.<br><br>Baseline flow from 1950 through 2014 was used for comparison against gaged flow data for minimum flows status assessment, after seasonal correction has been made to gaged data based on the output of the PRIM model. Please see Section 7.1 and Table 7.1 in the revised, draft minimum flows report for additional information. | Yes | Yes |
| *Further clarify the meaning of "transitional flow triggers", using simple terminology such as "safety valves" to explain concept.* | The currently adopted Lower Peace River minimum flows are based on calendar date- based blocks, and a transitional "flow trigger" (625 cfs) was required when high flows remained depressed due to climatological conditions. The newly proposed minimum flows for the Lower Peace River were developed using flow-based blocks that include flows of 297 cfs and 622 cfs that respectively represent transitions between low to medium and medium to high flows. Similarly, flow transitions for the proposed minimum flows for Lower Shell Creek are 56 cfs and 137 cfs, respectively. Given that the proposed minimum flows for the Lower Peace River and Lower Shell Creek were developed for flow-based blocks associated with transitions from low to medium to high flows, the identification of additional flow triggers" as a "safety valve" to account for out-of-season flows is not necessary. | Yes | Yes |

**Table 7 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Helpful to include a graphical display of residence time/flushing rates* | We agree that transport timescales are useful for discussion of flow effects on dissolved oxygen concentrations and other environmental factors. In our future evaluations of dissolved oxygen and eutrophication in the Lower Peace/Shell System and Upper Charlotte Harbor, we will consider discussion and presentation of transport timescales information. | Partial | Yes |
| *Language related to impacts of hurricanes based on model runs* | For the minimum flow analyses, the hydrodynamic model was run from 2007 through 2014, a period which included major storm and drought events but not hurricanes.<br><br>In response to this question, we also think it is useful to note that minimum flows are to be established as the limit beyond which further withdrawals would be significantly harmful to the water resources or ecology of the area. Therefore, in the case of extreme high-flow conditions associated with hurricanes and other major storm events, achieving a minimum flow requirement is not anticipated to be an issue.<br><br>We add, however, that District rules allow for the consideration of public health and safety for implementation of all District rules and policies. | Yes | Yes |
| *Request for more information related to the hydrodynamic model, including consider the possibility of adding a short chapter which gives a holistic overview on the role of hydrodynamics (flow and water level, salinity, temperature, flushing) on water quality, ecology and fishery.* | Please see response 4g in Table 4 and 5i in Table 5 for our responses to this comment. | Yes | Yes |
| *Limitations of hydrologic model in ungaged portions of the watershed should be discussed in more detail* | Please refer to response 1f in Table 1 for our response to this comment. | Yes | Yes |
| *Suggested development of a dynamic water quality model, vs. empirical approaches* | Please refer to comment 1j in Table 1 for our response to this comment. | Yes | Yes |

**Table 7 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Justification for the use of Charlie Creek watershed yields from 1950 to 1969 is needed* | Baseline flow for Lower Peace River was estimated based on Peace River Integrated Model (PRIM) outputs. Charlie Creek was simply used as a reference for a multi-decadal comparison of historical flows. The justification for this use of data from Charlie Creek is based on information presented in PB&J (2007) and trend analysis described in Section 5.3.1 of the minimum flows report. | Partially | Reference is made to the PBS&J report (2007) which used Charlie Creek's flow as not impacted by human activities during the 1950? To 1969 period. But, a reference to the natural condition of the watershed (included in the PBS&J report) would say why that's the case. |
| *Explanation needed for why PRIM model expects flow reductions with groundwater withdrawals in some locations, but increases in other locations* | As noted in Section 5.3.1, the Peace River Integrated Model (PRIM) was used to investigate effects of climate variability, groundwater pumping, land use changes and other factors on flows in the Peace River.<br><br>Also, as noted in the report section, flow reductions and increases for differing portions of the watershed are predicted based on the distribution of existing withdrawals, differing degrees of agricultural return flows from groundwater pumping due partly to the tighter confinement on the upper Floridan Aquifer in the lower Peace River area, and differing amounts of excess baseflow associated with agricultural withdrawals.<br><br>As recommended by the peer review panel, a monthly trend analysis has been conducted and the discussion in Section 5.3.1 of the revised, draft minimum flows report has been updated to indicate why groundwater withdrawals are associated with flow decreases in the Upper Peace watershed and some flow increases in Lower Peace region. | Yes | Section 5.3.1 better explains the totality of issues associated with increased flows in the dry season that are not explained by rainfall. |

**Table 7 - continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Relevant literature or basis for model algorithms for irrigation efficiencies differing between row crops and citrus are needed* | For development of baseline flow record used in the minimum flow analyses, irrigation efficiencies of 60 and 85% for row crops and citrus, respectively, were used to adjust Shell Creek flows by accounting for groundwater discharge that resulted from agricultural practices in the Shell Creek watershed. These assumed efficiencies are the same as those that were identified in the District's 2010 report on proposed minimum flows for the Lower Peace River and Lower Shell Creek.<br><br>As mentioned in the revised, draft minimum flows report in Section 5.3.3, the rates and periods of application were taken from the University of Florida Institute of Food and Agricultural Sciences (IFAS) recommendations for nearby Manatee County. | Yes | Reference to UF IFAS as a source of those coefficients is sufficient and appreciated. |
| *Logic for not including a maximum diversion quantity for LSC is not clear* | Please refer to response 2i in Table 2. | Partially | The District's reluctance to include a maximum diversion quantity for the Lower Shell Creek seems at odds with the inclusion of such guidance for the Lower Peace River. The logic for not including a maximum diversion quantity for Lower Shell Creek seems to rest on the statement (Section 6.2) that withdrawals are "…from Shell Creek Reservoir upstream of Hendrickson Dam, not directly from the lower portion of Shell Creek." This may be an important distinction for regulatory reasons, but it is not an important distinction as far as the protection of the health of the Harbor is concerned. |
| *Basis for 15% as threshold for "significant harm" needs more detail* | Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" section above for our response to this comment. | Partially | The reviewers feel that the District has sought to apply the best approach that can be reasonably expected to work in the absence of any potentially more conservative approaches such as inflection points or threshold values. |
| *Figure 3-22 caption says it is dissolved oxygen, but y-axis says chl a* | The Figure 3-22 caption was corrected in the revised, draft minimum flows report to indicate that the plot shows chlorophyll concentrations. | Mostly | Figure legend now correct in terming the data chlorophyll- but the legend refers to "surface, midwater and bottom" values, which does not appear to be correct, unless chlorophyll was collected at three depths in the water column |

## Comments on Chapter 6 – Recommended Minimum Flow Values

Many of the Panel's comments related to Chapter 6 and the proposed MFL values had been made in earlier portions of this report. These include the following:

- The shift from calendar-based to flow-based thresholds is to be commended
- Issues with the various algorithms and model components for the hydrologic model should be discussed in greater detail
- The District's logic for relying on a 15% change in habitat as being protective of "significant harm" should be elaborated on, and concerns related to why other techniques did not give rise to locally-relevant threshold guidance should be made more clearly
- The lack of a maximum flow diversion threshold for the LSC seems to be a function of a somewhat arbitrary truncation of the area of concern to that portion of the LSC upstream from its confluence with the LPR. No such restriction is placed on the LPR, which has a 400 cfs maximum diversion threshold which appears to be protective of portions of Charlotte Harbor beyond the downstream boundary of the LPR alone

The revised draft MFL does not incorporate all of the Panel's concerns, most notably the continued lack of a maximum diversion threshold for the LSC. And while the Panel understands the District's logic and rationale for not including such guidance, the Panel believes that the concerns that merited the development of a maximum diversion quantity for the LPR exist for the LSC as well, even if the LSC boundaries of concern to the MFL are complicated by the artificial distinction between the LSC and the rest of its watershed due to the man-made structure of the Hendrickson Dam.

A summary of the Panel's review of District responses to Panel comments on Chapter 6 – Recommended Minimum Flow Values is shown in Table 8.

**Table 8 - Panel Comments on Chapter 6 – Recommended Minimum Flow Values**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Would a 400 cfs value for the LPR apply during all conditions, including tropical storms and/or hurricanes?* | Yes. The 400 cfs maximum withdrawal for the Lower Peace River is applicable at all times. The only exceptions would occur during a period defined by a policy decision or directive of the District Governing Board, or an Order issued by the District's Executive Director. We further note that hurricanes and king tides are extreme hydrological events and we do not expect PRMRWSA to withdraw water during these events, especially during hurricanes. | Yes | Yes |
| *Estimates of expected rates of sea level rise are lower than more recent studies by NOAA suggest are likely over the next few decades* | Please refer to response 1l and 2j for our responses to this comment. | Yes | Yes |
| *Logic for not including a maximum diversion quantity for LSC is not clear* | Please refer to response 2i in Table 2. | Partially | The District's reluctance to include a maximum diversion quantity for the Lower Shell Creek seems at odds with the inclusion of such guidance for the Lower Peace River. The logic for not including a maximum diversion quantity for Lower Shell Creek seems to rest on the statement (Section 6.2) that withdrawals are "…from Shell Creek Reservoir upstream of Hendrickson Dam, not directly from the lower portion of Shell Creek." This may be an important distinction for regulatory reasons, but it is not an important distinction as far as the protection of the health of the Harbor is concerned. |
| *15% threshold value for "significant harm" needs further support, rather than reference that others have found it reasonable* | Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" section above for our response to this comment. | Partially | The reviewers feel that the District has sought to apply the best approach that can be reasonably expected to work in the absence of any potentially more conservative approaches such as inflection points or threshold values. |

Finally, a summary of the Panel's review of District responses to various noted typos, or other miscellaneous comments is shown in Table 9.

**Table 9 – Typos and Comments on Various Appendices**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Appendix E – page 7 – typo* | The incorrect usage of the acronym "BF" to refer to the Baseline flow condition used for the habitat suitability modeling will be corrected to "BL" in the appendix or an errata sheet will be added to the appendix to identify the typographical error. | Yes | Presumably |
| *Section 5.1 – typo* | The misspelling of "indicators" in Section 5.1 was corrected in the revised, draft minimum flows report. | Yes | Yes |
| *Page 84 – typo – add "on data from a 13-year period"* | We were not able to determine where to add the identified phrase to the report. We will seek further panel guidance to help address this comment. | No | . First sentence of second paragraph appears to need revision in revised draft MFL report. |
| *Page 96 – typo, first sentence "result in"* | We corrected this typo (i.e., changed "resulting" to "result in") in the first numbered item listed in Section 5.4 of the revised, draft minimum flows report. | Yes | Yes |
| *Page 95 – clarification needed* | We were not able to determine where clarification was needed on this page of the report. We will seek further panel guidance to help address this comment. | Yes | Considering replacing language with "freshwater plants that tolerate some combination of salinity levels and durations" |
| *Page 117 – "psu" missing from first sentence of second paragraph, also change spacing* | We included the missing "psu" metric in the first sentence of the paragraph after Table 6-4 within Section 6.3 of the revised, draft minimum flows report. We did not, however, note any spacing issues on the section page. | Partially | The unit "psu" added, but the report should, add spaces between less than signs and the number 2, and check for spacing around < and > throughout the MFL report |
| *Appendix C should be a separate chapter* | Instead of creating a new report chapter, we chose to amend information on the hydrodynamic model development included in Chapter 3 and especially in Chapter 5. Please see response 4g in Table 4 and 5i in Table 5 for our responses to this comment. | Yes | Yes |
| *Page 16 – typo in title* | Changed "HYDROLGIC" to "HYDROLOGIC" in the Chapter 2 title. | Yes | Yes |
| *Page 47 replace "is" with "in" first sentence of 3.3.1.2.* | We could not locate text on page 47 of the original draft report that seemed to need revision. However, we improved the referenced sentence in the revised, draft minimum flows report by changing "water" to "waters" in the first sentence of Section 3.3.1.2. | Yes | Yes, |
| *Figure 3-11, page 57 – model failed to predict several observed salinity peaks* | We think the referenced mismatches are mostly due to errors in the downstream salinity boundary condition during the wet season. We note that the original University of South Florida model for the system had a worse match at the Mote Marine station. | Yes | Yes |

**Table 9- continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Caption of Figure 3-27 typo* | We deleted "shows" from the caption for Figure 3-27 in the revised, draft minimum flows report. | No | Highlighted but not removed. |
| *Use of wind data from nearby airports might be helpful* | We looked at these sources for wind data to use for model development and applications but determined there are not enough wind data measurement stations in the region to allow us to describe the spatial variability of the Charlotte Harbor system. For simplicity, we chose to use a single wind station for our analyses.<br>As noted in Appendix C (Chen 2020), we used wind data measured at the SWFWMD Peace River II ET site prior to 2/7/2013 and data from the Mote Marine station after that date.<br><br>We agree that is would be beneficial to use multiple wind stations for modeling efforts similar to those undertaken for our minimum flow analyses, and we will consider this recommendation for future studies. | Yes | Yes |
| *Appendix C – typo on page 42* | This typographical error was corrected in the revised appendix. | Yes | Presumably |
| *Appendix C – typo on page 44* | This typographical error was corrected in the revised appendix. | Yes | Presumably |
| *Appendix C – definition of shoreline e length needed* | The shoreline length is the actual length of the shoreline calculated by the hydrodynamic model. The dynamically coupled 3D-2DV model can track shoreline variations and allow the computation of the shoreline length at every time step. In the 3D model, because bottom elevations are defined and given at the four corners of the Cartesian grid, shoreline can be calculated using the bilinear interpolation with known water level if all grid corners are not submerged or emerged. In the 2DV model, the shoreline length can be calculated based on the water level, the grid length, and the river width, which varies with both vertically and longitudinally.<br><br>This descriptive information for shoreline length was included in the revised version of Appendix C. | Yes | Presumably |

**Table 9- continued**

| Summary of Panel Concern/Comment | District Staff Response | Panel Satisfaction with District Response? | Revised MFL Report Modified to the Panels' Satisfaction? |
|---|---|---|---|
| *Appendix C – need justify not including influences of Caloosahatchee River and other significant sources of freshwater inflow on Charlotte Harbor* | Although Caloosahatchee River flow was not directly used as boundary conditions near the mouth of the river, its effects are included in the hydrodynamic model, as the Caloosahatchee River flow was included in the USF WFCOM model.<br><br>Specifically, the effects of Caloosahatchee River flow were indirectly considered in the water level, salinity, and temperature boundary conditions, as the USF model included Caloosahatchee and its flow.<br><br>This question provides a good opportunity to emphasize that the sharing of information concerning minimum flows and other resource management issues among the state water management districts and other agencies/organizations charged with water resource management is an important component of water resource management in Florida. | Mostly | The Panel recommends that a more formal relationship with the SFWMD be used to share current and future information on the potential impacts to at least the lower portions of Charlotte Harbor "proper" of discharges from the Caloosahatchee River. |
| *Caption for Figure 2-13 needs a space* | We corrected this typo by adding a space between "through" and "2018" in the caption for Figure 2-13 in the revised, draft minimum flows report. | Yes | Yes |
| *Consider adding conversion table* | We included a conversion table in the revised, draft minimum flows report. | Yes | The table should also include Rkm |