APPENDIX G-3

District staff's response to initial peer review report.

Southwest Florida Water Management District Response to the Initial Peer Review of Proposed Minimum Flows for the Lower Peace River and Lower Shell Creek

June 1, 2020

Natural Systems and Restoration Bureau
Resource Manamgment Division

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Yonas Ghile, Ph.D., P.H., Lead Hydrologist
XinJian Chen, Ph.D., PE, Chief Professional Engineer
Douglas A. Leeper, MFLs Program Lead
Chris Anastasiou, Ph.D., Chief Water Quality Scientist
Kristina Deak, Ph.D., Staff Environmental Scientist

Natural Systems and Restoration Bureau
Resource Management Division
Southwest Florida Water Management District
2379 Broad Street
Brooksville, Florida 34604

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Minimum Flows Peer Review Process and Purpose of this Report

On March 25, 2020, the Southwest Florida Water Management District voluntarily convened a panel for the independent, scientific peer review of minimum flows proposed for the Lower Peace River and Lower Shell Creek. Minimum flows are defined in the Florida Statutes as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Upon establishment by rule, minimum flows are used by the District or Department of Environmental Protection for water-use permitting, environmental resource permitting and water supply planning.

For minimum flows establishment, the Florida Statutes define independent scientific peer review as the review of scientific data, theories, and methodologies by a panel of independent, recognized experts in the fields of hydrology, hydrogeology, limnology, and other scientific disciplines.

The panel reviewing the proposed minimum flows for the Lower Peace River and Lower Shell Creek consisted of a Chairperson, David Tomasko, Ph.D., with Environmental Sciences Associates, Inc., and Panelists Laura Bedinger, Ph.D., with Water and Air Research, Inc., and Y. Peter Sheng, Ph.D., with Aqua Dynamics, Inc. The panel was tasked with reviewing the proposed minimum flows based on information included in a District report titled, “Proposed Minimum Flows for the Lower Peace River and Lower Shell Creek – Draft Report” dated March 20, 2020, and appendices associated with the report.

Three phases were identified for the peer review process. The initial phase, which has been completed, involved the panel’s review of the District’s draft minimum flows report and development of an initial peer review report that summarized panel findings and recommendations concerning the proposed minimum flows. The second phase, which served as the basis for development and dissemination of this “response” document by District staff, involved development of responses to the panel’s initial peer review report. In addition, the District’s draft minimum flows report was updated during the second review phase based on recommendations identified in the panel’s initial peer review report, and as noted in this response document. The third phase of the review will involve the panel’s consideration of this response document, the updated, draft minimum flows report, any other relevant information, and development of a final peer review report concerning the proposed minimum flows.

The Panel completed the first phase of their review by posting a report titled, “Scientific Peer Review Panel Review of ‘Proposed Minimum Flows for the Lower Peace River and Lower Shell Creek’ – Final Initial Report” to the review web forum on April 29, 2020.

Development of the panel’s initial peer review report during the first phase of the review was supported by the District through facilitation of publicly noticed and accessible,

internet-based teleconferences on April 3, 13, 20 and 27, 2020 and use of an internet-based web forum (web board) that became available on April 3, 2020. District facilitation of the review web forum continued through the second phase of the review and will also continue through the third review phase. Two internet-based teleconferences will also be facilitated by the District during the third phase of the review, to further support the panel's development of a final peer review report.

All Panel communications during the review process have occurred and will continue to occur only during the review teleconferences and through use of the review web forum. District facilitation and the panel's sole use of the teleconferences and web forum for review-related communications ensures panel activities are conducted in accordance with Florida's Government-in-the-Sunshine Law and provides opportunities for public comment on the review process and the proposed minimum flows for the Lower Peace River and Lower Shell Creek.

Format of the Panel's Initial Peer Review Report

In their initial peer review report, the panel tabularized general comments, comments pertaining to specific sections of the District's draft minimum flows report, typographical errors, and comments pertaining to the draft minimum flows report appendices. Supporting information concerning the panel comments was also provided in narrative form. In addition, specific comments and questions identified by each panelist in preparation for development of the panel's initial peer review report were included as appendices.

Format of District Staff Responses to the Initial Peer Review Report

District staff reviewed the panel's initial peer review report and developed staff responses to panel comments. A format similar to that used by the panel for presentation of their comments is employed here to organize the staff responses.

Staff responses to the tabularized panel comments are included in tabular format in this document. Additional responses associated with the supporting information included in narrative form in the body of the panel's report are also incorporated into the document, where appropriate. Staff responses to the specific comments and questions included in the appendix to the panel's initial peer review report are not included in this staff response document, as initial, draft responses to these comments were previously provided to the panel.

Panel Comments and District Staff Responses

Table 1. Overall Panel Comments and/or Concerns and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
1a	*MFL report was comprehensive, well-written and thorough*	We thank the panel for this comment.
1b	*Basing MFL on specific flows, vs. calendar dates, a good idea*	We thank the panel for this comment.
1c	*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.
1d	*Hydrodynamic modeling represents a substantial improvement from prior efforts*	We agree and thank the panel for this comment.
1e	*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. 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.
1f	*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. 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. 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. 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.

		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.
1g	*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. 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. 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. 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). 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.
1h	*Would be helpful to quantify actual or potential benefits associated with changes to existing MFL guidance*	Staff is required by State Law to use the best available information for the calculation of all minimum flows. We have used the best information available for our current determination of the proposed minimum flows for the Lower Peace River and Lower Shell Creek, and therefore do not think it is necessary or appropriate to make comparisons regarding resource protection between the existing and proposed minimum flows. That said, we note that the existing and proposed minimum flow for the Lower Peace River were both developed based on a 15% reduction in water volume with a salinity of <2 psu and are expected to provide similar levels of resource protection. However, the change from use of calendar-based blocks to flow-based blocks for the proposed minimum flows for the Lower Peace River and use of the flow-based blocks for the minimum flows proposed for Lower Shell Creek allows more withdrawals when high flows associated with storm events occur on any day of the year.
1i	*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*	We included additional information on the importance of hydrodynamics in several sections of the revised, draft minimum flows report. For example, we added text to the end of Section 1.5 that emphasizes the

	on bottom water hypoxia and other phenomena	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.
1j	*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. 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. 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.

		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. 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.
1k	*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. 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.
1l	*Analyze the potential impact of sea level rise on the MFL, using best*	We did not develop the proposed minimum flows based on future sea level conditions. However, we evaluated the proposed

	available SLR data for 2020-2050	minimum flows under three SLR scenarios to help determine when a future re-evaluation of the minimum flows may be necessary. 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. 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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 1

Narrative Panel Comment(s):
The Panel felt that the draft MFL report was obviously the result of 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 model, was universally viewed as impressive, and obviously indicative of the MFL process being approached in a thorough and professional manner by District staff.

District Staff Response:
We thank the panel for these comments.

Narrative Panel Comment:
The conversion of the MFL guidance from a calendar-based system to a flow-based guidance was considered to be a valuable improvement over the earlier guidance.

District Staff Response:
We agree and thank the panel for this comment.

Narrative Panel Comment(s):

The District's use of a 15% threshold for "significant harm" will be considered elsewhere in the report, but the primary concern raised by the Panel was not that there was anything inherently "wrong" with the threshold, but the District's MFL report contains language that suggests that threshold values for withdrawal limits should first focus on a search to develop locally-relevant threshold values, such as the 0.6' fish passage criteria used in the Upper Peace River MFL, or perhaps water quality "triggers" or inflection points for wetland inundation frequencies. A thorough and detailed review of the MFL does show that such locally-derived triggers were examined, and that no link could be made for water quality, and that wetland inundation triggers were less protective than the 15% salinity-habitat metric. However, the MFL report would be more useful for future reviewers (and future District staff, perhaps) if the process that led to the adoption of the 15% threshold value for the salinity-habitat metric was more thoroughly, yet succinctly, discussed in the Executive Summary and elsewhere in the report.

District Staff Response:

We appreciate the panel's support of our use of a percent-change approach to development of the proposed minimum flows for the Lower Peace River and Lower Shell Creek. We and the many independent scientific peer review panels that have assessed our previous minimum flows maintain assessment of flow-related habitat changes on a percentage basis is a reasonable and useful approach for establishing minimum flows. This approach permits evaluation of various environmental factors that exhibit a continuous or incremental response, without notable thresholds, to changes in flows.

When possible and reasonable, we use percent-change-in-habitat metrics in conjunction with threshold-based criteria for establishing minimum flows. This does not imply that we think either type of metric is superior. However, when available, consideration of both types of metrics collectively provides assurance that we are developing minimum flow recommendations based on the best available information.

We have typically used a fifteen percent change criterion for habitats and resources assessed in support of minimum flows development. These assessments have included changes in the area, volume and shoreline length exposed to specified salinities or salinity-ranges, changes in area and volume of thermally-favorable habitat, and changes in habitat suitability based on preferences for a variety of factors, including substrate/cover types, water depths, water velocities, water temperature and dissolved oxygen. We are pleased to note that percent-of-change approaches similar to those used by the District are under consideration or being used by other water management districts within the state and elsewhere by other regulatory groups.

As noted in the Executive Summary and other sections of the draft minimum flows report we focused on a variety of environmental factors for development and consideration of the proposed minimum flows for the Lower Peace River and Lower Shell Creek, including: maintenance of biologically relevant salinities with water volumes, shoreline lengths and bottom areas associated with salinities ranging from 2 to 20 psu; inundation of floodplain wetlands; habitats for selected fish species and Blue Crab; and water quality. Also, as noted throughout the report, our proposed minimum flows were based on the criterion exhibiting the greatest sensitivity to flow reductions.

In addition, we note that 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 legislative and regulatory directives through the District's permitting and planning programs and activities.

As recommended by the panel, we amended the Executive Summary (see paragraph 7) of the revised draft minimum flows report to note this aspect of the percent-of-flow approach.

Finally, in response to this panel comment, we note that our recommended use of flow-based blocks rather than calendar-based blocks for the proposed Lower Peace and Lower Shell minimum flows addresses differing environmental responses that may be associated with specific flow thresholds or ranges. For example, during the typical summer wet season, high flows would be subject to the allowable flow reduction associated with the minimum flows proposed for Block 3. However, if flows during the typical wet season fall within the flow-range associated with Block 2 (the medium flow range block), the allowable percent-of-flow reductions associated with the Block 2 minimum flows rather than the allowable percent-of-flow reduction associated with the Block 3 would be applicable. This use of flow-based blocks achieves a goal similar to that which was used for development of the "flow trigger" used for the currently adopted Lower Peace River minimum flows.

Narrative Panel Comment(s):
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 continued to have limitations.

District Staff Response:
Please refer to response 1f in Table 1 for our response to these comments.

Narrative Panel Comment(s):
The Panel also sought to have the MFL report include reference to other regulatory guidance documents. For example, while the draft MFL report included reference to the lack of compliance of the LPR with various water quality criteria developed by FDEP, it did not include reference to the Pollutant Load Reduction Goal (PLRG) developed for Charlotte Harbor. While this is not a specific charge of the enabling legislation for setting MFLs, 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.

District Staff Response:
Please refer to response 1e in Table 1 for our response to this comment.

Narrative Panel Comment(s):
Issues associated with the potential influence of the Caloosahatchee River and/or inflows from the south were of concern to the Panel, especially in light of recent adverse impacts to seagrass resources along the eastern wall – impacts that could be attributed to the Peace River, given its much closer proximity.

District Staff Response:
Please refer to response 1k in Table 1 for our response to this comment.

Narrative Panel Comment(s):
In view of rapidly accelerating 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. For example, as a first step the impact of SLR on the volume of 2-psu water in 2020-2050 could be investigated using the low, medium, and high SLR values corresponding to the 50 percentile SLR projection for 2100 (3.3 ft global mean sea level rise of 3.3 ft) from NOAA (2017). The NOAA projection for Fort Myers in 2035 is 0.47, 0.80, 1.22 ft for the low, medium, high scenarios, respectively. The USACE SLR values used by the District are 0.2, 0.35, 0.76 ft, based on their 2013 report. Due to the increasing SLR and Florida Governor's effort in building coastal resiliency against the rising sea level, the Panel felt it is prudent for the District to use the best available information on SLR in its consideration of the potential impact of SLR on the MFL.

District Staff Response:
See response 1l in Table 1 for our response to these comments.

Narrative Panel Comment(s):
In consideration of the rapidly changing climate, the Panel recommends that, during its five-year evaluation with the regional water supply planning, the District evaluates the

current and future climate conditions to determine if the MFL needs to be updated sooner than its regular schedule.

District Staff Response:
Climate change can affect natural systems and may also affect water supply sources and patterns of water-use demand. As noted in the District's draft 2020 regional water supply plan (SWFWMD 2020-in preparation), for water supply needs and projects, the District has assumed a "monitor and adapt" approach toward climate change. We will continue to actively monitor current research projects, both locally and nationally, interpret the results, and initiate appropriate actions deemed necessary to protect our water resources against the effects of climate change.

As noted in response 1l in Table 1, our current and future investigations of sea level change highlight our adaptive management approach (see responses 1f and 1g in Table 1) to potential effects of sea level rise on the Lower Peace/Shell System.

We note however, that there are limitations to prioritization of water bodies for minimum flows and levels development and reevaluation. These constraints include current and future District staffing and budgetary considerations for the numerous, water bodies currently prioritized for minimum flows establishment.

Table 2. Panel Comments on Executive Summary and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
2a	*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. We incorporated additional information concerning significant harm into the first paragraph of the Executive Summary in the revised, draft minimum flows report.
2b	*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. 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. 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.
2c	*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. 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. 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.
2d	*Concern over LSC low flow conditions*	Please refer to response 2i in this table.
2e	*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.
2f	*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

2g	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: *"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."* "*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."* 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.
2h	*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.
2i	*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.

		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. 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. 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. 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 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 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. 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.
2j	*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. 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. 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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 2

Panel Comment(s):
The Panel found that it would be helpful for the draft MFL to attempt to define the terms "significant harm" and "best available information" in the Executive Summary. While not all terms will be clearly defined, their use in the Executive Summary suggests that they are standard phrases recognizable to the reader, which they are not.

District Staff Response:
Please see responses 2a and 2b in Table 2 for our response to these comments.

Narrative Panel Comment(s):
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.

District Staff Response:
Please see response 2i in Table 2 for our response to this comment.

Narrative Panel Comment(s):
The report recognized that climate change has significantly affected the sea level and precipitation in the region. In a changing climate, as the sea level rise continues to accelerate in the world and specifically in southwest Florida, the impact of SLR on MFL will need to be fully addressed at some time in the near future. Baseline flow will need to incorporate future SLR and flow conditions, instead of completely relying on averaged long-term historical flows.

District Staff Response:
In our minimum flows report we acknowledge the potential effects of sea level change on the Lower Peace/Shell System. We further note that sea level and climate-related changes are integrated into the hydrologic data used to support development of the proposed minimum flows. As part of our analyses, we have also considered possible future conditions through assessment of potential effects of sea level rise on salinity conditions in the system and Charlotte Harbor.

We anticipate using a similar approach for future minimum flow assessments of the Lower Peace/Shell System, with the expectation that sea-level-rise effects and climatic effects will generally be integrated into the hydrologic data (e.g., stream flows) used for the analyses. Based on our adaptive management approach to minimum flows development, we also anticipate incorporation of any additional, relevant information concerning climatic effects on hydrological data that may become available.

Table 3. Panel Comments on Chapter 1 – Introduction and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
3a	*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.
3b	*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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 3

Narrative Panel Comment(s):
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.

District Staff Response:
We thank the panel for their comments concerning the introduction information included in Chapter 1 of the draft minimum flows report. Regarding our definition of significant harm, please refer to our response 2a in Table 2.

Table 4. Panel Comments on Chapter 2 – Physical and Hydrologic Description and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
4a	*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. 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.
4b	*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. 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.
4c	*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. 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. For development of the hydrodynamic model for Charlotte Harbor, all the variables associated with elevation are referenced to NAVD88.
4d	*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. 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.

4e	*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. 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.
4f	*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.
4g	*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 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.

		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. 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). 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.
4h	*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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 4

Narrative Panel Comment(s):
Figures 2-2 and 2-3 could be made clearer and easier to read. And the use of "%" should be used rather than "percent' to shorten the report.

District Staff Response:
Please refer to response 4a in Table 4 for our response concerning Figures 2-2 and 2-3. With regard to using "%" vs. "percent" or "percentage", we used "%" when referring to a specific numeric value, retained "percent" in "percent-of-flow" terminology, and retained "percentage" when referring to values generally, when specific numeric values were not being described.

Narrative Panel Comment(s):
More substantively, the elevation and bathymetry data appear to be compromised to some extent by the use of both NGVD29 and NAVD88 as datums for elevation, as tied to LiDAR and the development of the hydrologic model.

District Staff Response:
Please refer to response 4c in Table 4 for our response to this comment.

Narrative Panel Comment(s):
The Panel felt that the draft MFL should more clearly describe the timeline of development of MFL guidance, as it relates to water supply. As MFLs must take into consideration existing water supply needs, the timing of the development of water supply plans and MFLs could be addressed earlier and more succinctly in the draft MFL report.

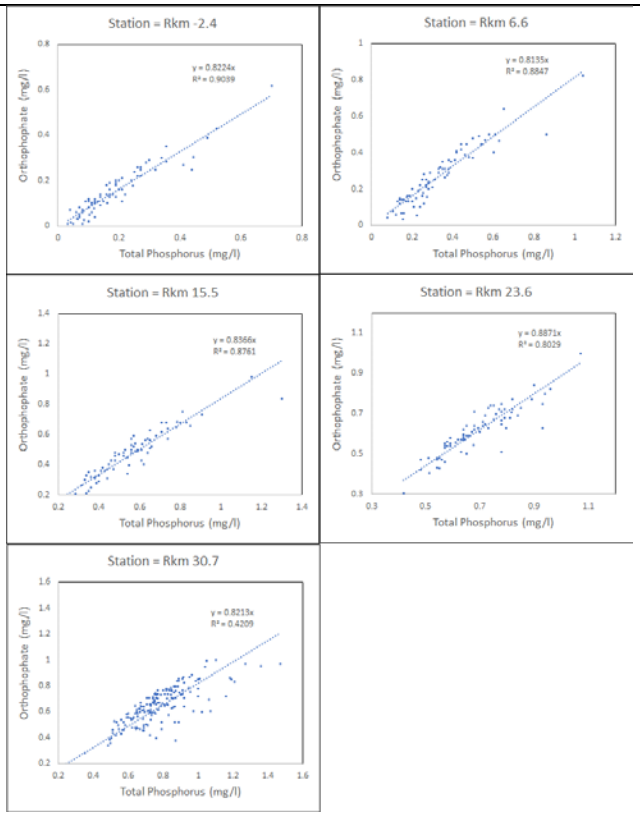
District Staff Response:
Please refer to response 4d in Table 4 to these comments.

Narrative Panel Comment(s):
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. While the hydrodynamic model is viewed as a substantial improvement from the work included in the 2010 MFL report, the hydrologic model has limitations related to those portions of the watershed located downstream of gages. Also, and touched on later, the factors that account for the conclusion that a result of groundwater withdrawals is a reduction in baseflow in parts of the Peace River watershed, but an increase in baseflow in locations such as Joshua Creek – those factors should be discussed in greater detail. The assumptions and data limitations associated with quantifying the water budget from both ungauged and gauged sources should be more clearly discussed.

District Staff Response:
Please refer to responses 1f in Table 1, 4g and 4h in Table 4, 5i and 5j in Table 5, and 7c, 7k and 7l in Table 7 for our responses to these comments.

Table 5. Panel Comments on Chapter 3 – Water Quality and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
5a	*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.
5b	*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.
5c	*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.

		 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 3.3.1.1.5 of the revised, draft minimum flows report.
5d	*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.
5e	*Definition needed for "flow-lag"*	Please see response 4e in Table 4 for our response to this comment.
5f	*Various figures have legends that appear to be mislabeled*	Numerous figure legends were corrected in the revised, draft minimum flows report.
5g	*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.

5h	*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.
5i	*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.

5j	*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.
5k	*More refined explanation needed for isohaline location trend analyses*	Please refer to response 5o in this table.
5l	*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. 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.
5m	*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. See response 1j for additional information concerning our response.
5n	*Flow-salinity relationships in Figure 3-11 include stations at or below the confluence of the LSC,*	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

	but flows from the LSC are not included	caption and associated text within Section 3.3.2.1 of the revised, draft minimum flows report were updated.
5o	*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. 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. 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.
5p	*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.

		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. 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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 5

Narrative Panel Comment(s):
The Panel felt that some of the figures in the draft MFL were not overly useful, or could benefit from restructuring. For example, Figure 3-3 shows the variability in levels of salinity at various locations in the LPR. However, the analyses were conducted on 40 years of data, and variability could be due to seasonal variability, inter-annual variability, or some combination of both. Figure 3-3 is not entirely clear, as to what it is meant to convey to the reader. Suggestions were raised as to how the data could be displayed to address these concerns. For example, additional box and whisker plots could be displayed for pre and post MFL salinity data would be informative for the reader. Similar modifications could be make [sic: made] for DO (Figure 3-4) and chlorophyll-a (Figure 3-5), nitrogen (Figure 3-7) and phosphorus (Figure 3-8).

District Staff Response:
We agree that variability in the salinity data presented in Figure 3-3 could 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.

Janicki Environmental, Inc. (2019) performed a time-series analysis for each water quality constituent at each monitoring station, with particular emphasis on distinguishing between the effects of periods prior to and after implementation associated with implementation of the currently established minimum flows, by separating data collected before and after January 1, 2011. The evaluation showed no significant deleterious alteration of any water quality constituent.

They also supplied time series plots for constituents over time within their report (pp. 35-39 of JEI, Inc. [2019], which is included as an appendix to the draft minimum flows report) and the appendices of their report (Appendix F and G), which the panel may be directed to for further information. From evaluation of the time series plots, the relatively large error bars shown in the box and whisker plots likely reflect seasonal variation, rather than significant inter-annual variation. Further analysis of temporal variation by smaller subsets of years is unlikely to yield additional informative results.

Narrative Panel Comment(s):
Related to this issue, Figures 3-12 to 3-16 are confusing, as the label on the y-axis does not match what the draft MFL report suggests is displayed. This likely is a result of a "short cut" in terms of description of what the graphics are intended to display. A more detailed description of the intent of the figures (what they are meant to convey) would be useful, as they currently are confusing to the reader.

District Staff Response:
Please refer to response 5l in Table 5 for our response to this comment.

Narrative Panel Comment(s):
The draft MFL report seems to focus on flows and residence time, as an influence on concentrations of chlorophyll a. While this is a worthwhile issue to investigate, 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 consideration. As well, the role – if any – of zooplankton grazing should be at least mentioned as an additional moderating influence on chlorophyll-a concentrations.

District Staff Response:
Please see response 5b in Table 5 for our response to this comment.

Narrative Panel Comment(s):
This section includes analyses on water quality variables that need additional attention. For example, Section 3.3.1.3 on "chlorophyll" does not specify that the analyses refer to chlorophyll-a that is corrected for the presence of phaeophytin. The state of Florida's regulatory programs for water quality no longer accept un-corrected chlorophyll-a for analysis. If the water quality data sets used for analysis were not corrected for phaeophytin, they are of limited value for comparison with other systems and with relevant regulatory criteria. The reader should not have to search in the appendices to determine what the word "chlorophyll" refers to.

District Staff Response:
On page 49, paragraph 2 of our original, draft minimum flows report we note that "[f]or, simplicity, in this report, chlorophyll a is denoted as chlorophyll." Also, page 43 of

Appendix F to the draft minimum flows report states “[t]he HBMP data are reported as uncorrected Chlorophyll."

Section 3.3.1.3 of the revised, draft minimum flows report was updated to include additional text that clarifies the chlorophyll data that were analyzed and discussed.

Narrative Panel Comment(s):
The draft MFL reports on “Ortho-phosphorus” which likely refers to concentrations of orthophosphate, not Total Phosphorus. Orthophosphorus appears to be a bit of technical jargon short cut for orthophosphate, which is the dissolved inorganic form of phosphorus. While this could represent 90% of the total pool of phosphorus, it could also represent a substantially smaller percentage. The suggestion made by the Panel is to conduct analyses on those stations and data sets that have total phosphorus, as that is the most complete form of nutrient content, and is also the nutrient form for which FDEP’s NNC criteria have been developed.

District Staff Response:
Please refer to response 5c in Table 5 for our response to these comments.

Narrative Panel Comment(s):
The draft MFL report discuses status and trends in both TKN and nitrate plus nitrite, but does not add the two together to calculate the abundance of Total Nitrogen. Since Total Nitrogen is the form of nutrient that is most complete, and is the form of nitrogen in FDEP’s NNC criteria, and the form that is involved in the PLRG for Charlotte Harbor, these using Total Nitrogen, not TKN and nitrate plus nitrite.

District Staff Response:
As noted in response 5d in Table 5, information on Total Nitrogen was added to the revised, draft minimum flows report.

Narrative Panel Comment(s):
When exploring empirical relationships between LPR flows and salinity in the LPR, it should be noted that two of the stations involved in those assessments are located below the confluence of the LSC. On an annual basis, LSC flows average about 20 to 30% of the flow of the LPR. Therefore, not including LSC flows in the flow vs. salinity empirical relationships could limit the explanatory power of the derived relationships.

District Staff Response:
We agree. As noted in response 5n in Table 5, Shell Creek flows were combined with Lower Peace River flows the for stations at and below the confluence of Shell Creek and the Peace River.

Narrative Panel Comment(s):
The Panel also suggested the District consider the value of a mechanistic water quality model for the LSC, LPR and Upper Charlotte Harbor. Such a mechanistic model, although my not be [sic: not] necessary for the MFL for LPR and LSC, should benefit a variety of water management decisions on the Charlotte Harbor estuarine-riverine system by the District. The Panel, however, recognizes that developing such a model would require addressing the influences of factors and parameters that may or may not have been adequately understood/quantified and more data may be needed.

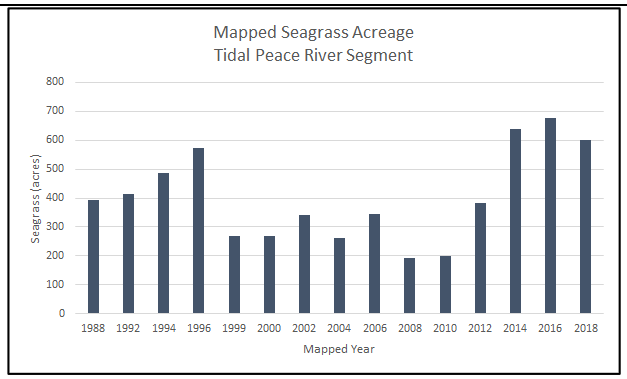
District Staff Response:
As indicated in response 5m in Table 5, please refer to response1j in Table 1 for our response to this comment.

Narrative Panel Comment(s):
Hypoxia was mentioned numerous times in the report and during our discussions. It would be good to have a more comprehensive discussion in the report on the naturally-occurring as well as non-naturally-occurring hypoxia, how they impact the Charlotte Harbor system, how they are influenced by the high flow from Peace River (e.g., what rate of flow triggers hypoxia? 20000 cfs? 1000 cfs?), and how will they be affected by the MFL.

District Staff Response:
Please see response 1i in Table 1, response 2g in Table 2 and response 5p in Table 5.

Table 6. Panel Comments on Chapter 4 – Ecological Resources and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
6a	*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. 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. In addition, we anticipate considering vegetation data collection and mapping needs for future evaluations of the system.
6b	*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. 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.

		 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.
6c	*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. 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. 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. 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.
6d	*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. 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. To augment presentation of information on the fish assemblage in the Lower Peace/Shell System, the descriptive FWC Fisheries-Independent Monitoring data from 2016 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.
6e	*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). 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). 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. 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. 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.
6f	*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*	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

	to model the effect of water withdrawals	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 5.3.3 in the revised, draft minimum flows report to fully discuss these limitations and modeling uncertainties. 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. 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.
6g	*Figure 4-2 difficult to review due color choices*	Figure 4-2 was reformatted for the revised, draft minimum flows report to improve clarity.
6h	*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. 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. 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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 6

Narrative Panel Comment(s):
The Panel was concerned about the reasonableness of analyses related to plant communities that were last quantified in 1998. It is not known to the Panel if the physical locations of various plant communities have changed over time since 1988, although 22 years of sea level rise could result in migration of some communities upstream, in response to increased marine influence.

District Staff Response:
As noted in response 6a in Table 6, we updated the general vegetation cover map in the revised, draft minimum flows report.

Narrative Panel Comment(s):
Members of the Panel would like the draft MFL report to more thoroughly discuss the reason(s) why biotic variables such as fish abundance, macroinvertebrates, and/or macroalgae are not currently monitored to the same extent as they were in past years. 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 would be helpful.

District Staff Response:
Please refer to comment 6c in Table 6 for our response to these comments.

Narrative Panel Comment(s):
The Panel observed the levels of extrapolation involved in using HSM (habitat suitability modeling) to determine the effects of minimum flow conditions on the seven fish and one commercially important invertebrate. Populations were estimated and then effects on these estimated populations via changes in environmental conditions (temperature and salinity only) were modeled.

District Staff Response:
Please refer to comment 6f in Table 6 for our response to this comment.

Narrative Panel Comment(s):
Questions related to the relative use (if any) by listed species should be considered, especially as how they were included (sawfish) in the proposed MFL for the Caloosahatchee River. The report could be a little more detailed/specific about the relationship of sawfish lifestages to salinity/freshwater flows. It might be helpful to NOT include rarely occurring species in the development of MFL guidance, but the draft MFL

should at least include language that suggests why the decision to not include them is an appropriate decision.

District Staff Response:
Please refer to comment 6e in Table 6 for our response to these comments.

Table 7. Panel Comments on Chapter 5 – Resources of Concern and Modeling Tools, and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
7a	*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.
7b	*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.
7c	*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. 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.

7d	*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.
7e	*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.
7f	*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. 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. We add, however, that District rules allow for the consideration of public health and safety for implementation of all District rules and policies.
7g	*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.
7h	*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.
7i	*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.
7j	*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.

7k	*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. 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. 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.
7l	*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.

		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.
7m	*Logic for not including a maximum diversion quantity for LSC is not clear*	Please refer to response 2i in Table 2.
7n	*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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 7

Narrative Panel Comment(s):
Members of the Panel felt that data limitations associated with various aspects and algorithms of the hydrologic model should be better addressed. Differences in baseflow during different time periods, for different sub-basins, require more detailed discussion.

These issues are particularly important for those portions of the LPR and LSC watershed that are downstream of USGS gage sites. Even for locations that are in gaged portions of the LPR and LSC watersheds, the following issues should be discussed in greater detail:

- *Why is it expected that some parts of the LPR watershed would have reduced baseflow with increased groundwater withdrawals, while other areas would have increased baseflow?*

District Staff Response:
Please refer to response 7k in Table 7 above for our response to this comment.

- *If Charlie Creek's hydrologic yield (cfs/square mile) during 1950 to 1969 is a good reference condition, why is that? Is this due to the characteristics of the watershed being more "natural" than other locations at other times?*

District Staff Response:
Please refer to response 7j in Table 7 above for our response to this comment.

- *As the algorithms in the PRIM modeling effort are important for the hydrologic model development, it should be more clearly stated where relevant algorithms came from, lest a reader conclude that the algorithms were developed after the model runs, as opposed to the algorithms perhaps being <u>modified</u> from default values during the calibration phase of model development.*

<u>District Staff Response:</u>
We agree. We only included the final PRIM report (2012) on predictive model simulation results in the appendices to the draft minimum flows report. There are two other PRIM reports (2008 and 2011) that briefly describe the sources of data information, model structure and assumptions, as well as calibration and validation results. If necessary, we can provide the reports to the review panel and as appropriate consider citing them in the revised, draft minimum flows report.

<u>Narrative Panel Comment(s):</u>
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 seems to have been acknowledged by the District.

<u>District Staff Response:</u>
We agree that we have acknowledged and addressed this issue with the original hydrodynamic model used for establishing the currently adopted minimum flows for the Lower Peace River. For some of the ungaged watersheds, we have used a drainage ratio method using nearby gaged data and reduced the over-estimation. As noted in response 7h in Table 7, our response to this comment is include in response 1f in Table 1.

<u>Narrative Panel Comment(s):</u>
Portions of this chapter appear to be internally inconsistent. For example, Table 5-1 displays result of a Seasonal Kendall Tau test that found no monotonic trends over time for flows in Joshua Creek, and yet figures and text in the same section refer to the observed increases in dry season flows during the period of April to May as being evidence of an anthropogenic influence on dry season flows. The District should consider that the use of a Seasonal Kendall Tau test can give results at odds with an examination of flow data on a monthly time step, and consider a flow analysis on the monthly time step most useful for their discussion and later model development.

<u>District Staff Response:</u>
We agree. Trend analysis using monthly time-step has been conducted. Information associated with this analysis and new results have been added to Section 5.3.1 of the revised, draft minimum flows report.

Narrative Panel Comment(s):
As was noted in earlier sections, the basis for there not being a maximum flow diversion threshold for the LSC, while such a value (400 cfs) exists for the LPR should be better explained. While the Panel realizes that the District is currently working to develop a recovery strategy for low flow conditions for the LSC, this issue relates to high flows, and the Panel does not yet understand why a similar maximum flow diversion threshold could not be developed for the LSC, particularly for times when inflows to the reservoir are matched (or nearly so) by outflows into the LSC from the reservoir.

District Staff Response:
Please see response 2i in Table 2 for our response to this comment.

Narrative Panel Comment(s):
As was noted elsewhere, the draft MFL report should further develop the reason(s) why a 15% reduction in the salinity-habitat metric is considered to not be problematic, vs. other thresholds.

District Staff Response:
Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" section above for our response to this comment.

Table 8. Panel Comments on Chapter 6 – Recommended Minimum Flow Values and District staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
8a	*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.
8b	*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.
8c	*Logic for not including a maximum diversion quantity for LSC is not clear*	Please refer to response 2i in Table 2.
8d	*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.

Supporting Narrative Panel Comments and District Staff Responses Associated with Table 8

Narrative Panel Comment(s):

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

- *The shift from calendar-based to flow-based thresholds is to be commended*

District Staff Response:
We thank the panel for this comment.

- *Issues with the various algorithms and model components for the hydrologic model should be discussed in greater detail*

District Staff Response:
We updated the revised, draft minimum flows report to clearly address uncertainty issues associated with development and use of the UnLESS hydrodynamic model and other models for salinity habitat assessment (see Section 5.1.1.4), floodplain inundation (see Section 5.5.2) and fish and invertebrate habitat suitability modeling (see Section 5.5.3).

- *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'*

District Staff Response:
Please refer to the "Table 1 - Supporting Narrative Panel Comment and District Staff Responses" section above for our response to this comment.

- *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.*

District Staff Response:
Please refer to response 2i in Table 2.

Narrative Panel Comment(s):
In addition to previously raised concerns, the Panel felt that incorporating sea level rise scenarios was very useful, but that the more recent values derived by NOAA would be the most appropriate values to use.

District Staff Response:
Please refer to response 1l and 2j for our responses to this comment.

Table 9. Panel-identified Typos and Comments on Various Appendices and District Staff Responses.

Comment/ Response Identifier	Summary of Panel Concern/Comment	District Staff Response
9a	*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.
9b	*Section 5.1 – typo*	The misspelling of "indicators" in Section 5.1 was corrected in the revised, draft minimum flows report.
9c	*Page 88 – 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.
9d	*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.
9e	*Page 98 – 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.
9f	*Page 113 – "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.
9g	*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.
9h	*Page 16 – typo in title*	Changed "HYDROLGIC" to "HYDROLOGIC" in the Chapter 2 title.

9i	*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.
9j	*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.
9k	*Caption of Figure 3-27 typo*	We deleted "shows" from the caption for Figure 3-27 in the revised, draft minimum flows report.
9l	*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. 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. 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.
9m	*Appendix C – typo on page 42*	This typographical error was corrected in the revised appendix.
9n	*Appendix C – typo on page 44*	This typographical error was corrected in the revised appendix.
9o	*Appendix C – definition of shoreline*	The shoreline length is the actual length of the shoreline calculated by the

	e length needed	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. This descriptive information for shoreline length was included in the revised version of Appendix C.
9p	*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. 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. 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.

9q	*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.
9r	*Consider adding conversion table*	We included a conversion table in the revised, draft minimum flows report.