FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration, Bureau of Watershed Restoration

NORTHWEST DISTRICT • PENSACOLA BAY BASIN

Final TMDL Report

Appendix F:

Pensacola Bay Basin
Judges Bayou Marine (WBID 493B)
Judges Bayou Freshwater (WBID 493A)
Bayou Chico (WBIDs 846 and 846C)
North Escambia Bay (WBID 548AA)

Public Comments and Department Responses

June 7, 2013

Contents

Judges Bayou Marine

No individual public comments were received for Judges Bayou marine.

Judges Bayou Freshwater

No individual public comments were received for Judges Bayou freshwater.

Applied Technology and Management, Inc.

May 2, 2013

Mr. Steve Peene, Vice President
Applied Technology and Management, Inc.
1435 East Piedmont Drive, Suite 210
Tallahassee, Fl 32308

Dear Mr. Peene:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. Thank you for your insights and help in improving the quality of our TMDLs for the impaired waters in the Pensacola Bay Basin (WBIDs 846, 846C, 548AA, 493 and 493A). We have made applicable edits to the draft TMDL report as a result of your September 14, 2012 comments. Because of your efforts the TMDL will be improved. To aid you in reviewing our responses, we have summarized the key issues you identified below, followed by a response to each.

Bayou Chico (WBIDS 846, 846A)

ATM Comment 1.
Based upon the available data, it is clear that Bayou Chico does have issues relative to Chlorophyll a (Chla) and elevated nutrients. The issues presented below relate to the defensibility of the models used to quantify the Chla and nutrient conditions and the appropriate load reductions.

FDEP Response 1.
No response required.

ATM Comment 2.
The model grid of the receiving waters used in the EFDC hydrodynamic model and the WASP water quality model significantly misrepresents the system geometry. The quality of the physical representation is so poor that it makes any hydrodynamic or water quality inferences from the model unusable.

FDEP Response 2.
We agree that the GIS grid representation for the geometry of the waterbody (model grids) does not match the waterbody geometry in several areas. It is our understanding from EPA that within the EFDC input deck the actual geometry used by the models is more representative of

the waterbody. FDEP will work with EPA to provide you this information and to investigate the impact on water movement and water quality from a more refined model grid. In the meantime, plots of salinity predictions from the Upper and Lower areas of the Bayou and of the difference between the top and bottom layers of the model as compared to available data for these areas indicate the EFDC/WASP models are sufficiently representing both the water movement and the magnitude and seasonal changes in the salinity structure of the bayou. The limited paired data for surface and bottom salinities indicate that the model is reproducing the magnitude and seasonal signal of the measured data.

Mr. Steve Peene, Vice President
Applied Technology and Management, Inc.
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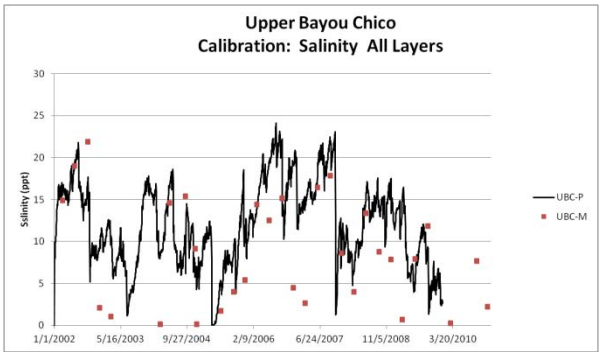

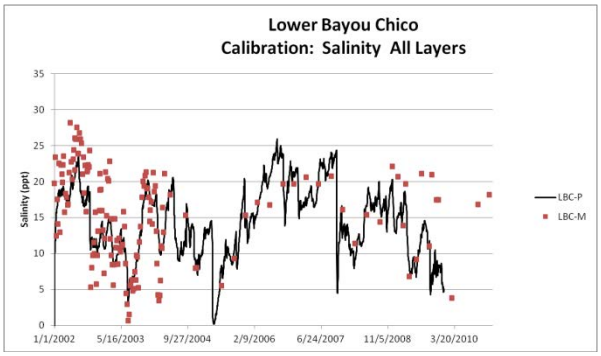

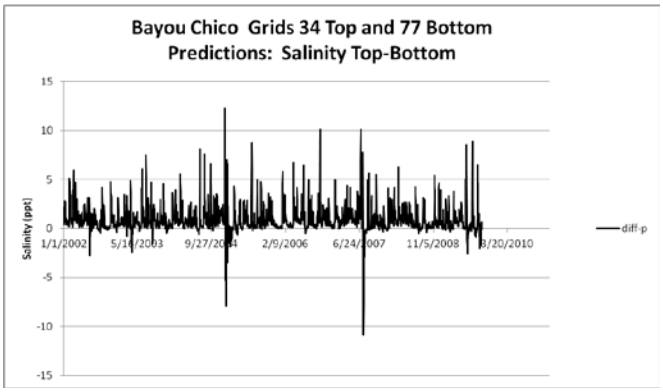

Additionally, calibration plots of water quality for temperature, Chlorophyll a (Chla), and nutrients contained in the draft report indicate that EFDC/WASP are sufficiently calibrated to accurately predict the long-term annual average responses of water quality in the bayou to changes in watershed loading. The TMDL has been developed for long-term annual average concentrations for the bayou TN (1.22 mg/L to 1.40 mg/L), TP (0.025 mg/L to 0.027 mg/L), and Chla (8.88 – 8.93 mg/L).

ATM Comment 3.

There is still missing information on the localized Bayou Chico model that needs to be provided for a complete review.

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FDEP Response 3.
We have requested the information from EPA and will forward it to you as soon as it is made available. In the meantime, the calibration information provided in the reports from the Upper and Lower areas of the Bayou indicate the EFDC/WASP models are sufficiently representing both the water movement and the magnitude and seasonal changes in the water quality constituents to be used for the development of the TMDL.

North Escambia Bay (WBID 548AA)

ATM Comment 4.
Neither the U.S. Environmental Protection Agency (EPA) model calibration, nor the Florida Department of Environmental Protection (FDEP) revised model calibration captures the unique characteristics of the localized higher Chla levels in North Escambia Bay. The end result of the modeling is to target a watershed-wide load reduction where, in reality, this may be a localized issue of readily available nutrients coming into this segment of the bay. At present, there is not enough information and the modeling is not able to help answer this question as it cannot replicate the system kinetics properly throughout the bay. Based on this uncertainty, the proposed watershed-wide total phosphorus (TP) load reduction is not supported.

FDEP Response 4.
FDEP believes that the FDEP version of the model accurately predicts the localized higher levels of CChla in North Escambia Bay. Additionally, subsequent to the draft report, FDEP has made numerous improvements in the model's predictive capabilities that have resulted in systemwide improvements in calibration for nutrients and Chla. The current FDEP version is well calibrated for both nitrogen and phosphorus throughout the bay and reproduces the elevated Chla concentrations in North Escambia Bay while maintaining the relative Chla relationships throughout the bay system. FDEP has revised and reposted the TMDL documentation at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). In the revised Chapter 7, FDEP commits to continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

ATM Comment 5.
There is still missing information on the localized Bayou Chico model that needs to be provided for a complete review.

FDEP Response 5.
We have requested the information from EPA and will forward it to you as soon as it is made available. In the meantime, the calibration information provided in the reports for North Escambia Bay indicate the EFDC/WASP models are sufficiently representing both the water movement and the magnitude and seasonal changes in the water quality constituents to be used for the development of the TMDL.

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ATM Comment 6.
Recommendations: For the Bayou Chico TMDL, it is recommended that the modeling be improved and the TMDL resubmitted. Improvements would include examination of the projected flows and loads from the LSPC model to assess if the LSPC parameterization from the Pensacola Watershed Model is reasonable (include comparisons to available water quality). An appropriate grid should be developed and the calibration of the EFDC and WASP models redone.

FDEP Response 6.
FDEP does not believe that the TMDL for Bayou Chico needs to be redone and resubmitted.

ATM Comment 7.
For the North Escambia Bay TMDL, it is recommended that further work (including use of the Estuarine, Coastal and Ocean Model (ECOM)/RCA models) be conducted to develop a model that is able to capture the unique conditions found in the data and properly represent the nutrient/Chla dynamics throughout the bay.

FDEP Response 7.
FDEP believes that the WASP model does adequately represent the Chla and nutrient data throughout the bay. FDEP agrees that additional data gathering and analysis may be warranted and that any significant new information should be incorporated into the models. Additionally, FDEP will work cooperatively with the stakeholders to resolve modeling related issues identified in Chapter 7 of the revised report. This will include the potential use of other models and will allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

Bayou Chico Detailed Comments

ATM Comment 8.
The data presented in Appendix B identify the chemistry data as daily averages. More than likely, these are one-time grab samples and do not represent daily averages.

FDEP Response 8.
The daily averages referenced in the report are averages for all stations at all times sampled in the WBID on a given day; as such they are daily averages for the WBID. These data are not intended to represent a balanced time-series of samples taken at even increments throughout each day. Clarifications have been made to the report.

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ATM Comment 9.
The report identifies high levels of inorganic nutrients coming out of Jackson Creek. Examination of the data for WBID 846 supports this assertion, since one station at the upper end of the WBID has high levels where it branches to the upper WBID 846C, which drains Jackson Creek. The data in WBID 846C also support this assertion.

FDEP Response 9.
No response required.

ATM Comment 10.
The data do support that there are nutrient issues within the system.

FDEP Response 10.
No response required.

ATM Comment 11.
The plots included in the main report that were taken from the appendices are for total nitrogen (TN) and total phosphorus (TP), but it would seem that presenting the inorganic results would be useful in the main report since these data clearly identify some anthropogenic impacts in the system.

FDEP Response 11.
FDEP appreciates this comment; however, the decision has been made to include only such tables and graphs in the main body of the report that are necessary to support the TMDL for TN and TP. The complete set of data and tables are provided in the attachments to facilitate examination of the data.

ATM Comment 12.
The Bayou Chico TMDL assessment relies upon LSPC modeling for a series of local subwatersheds. The report states that this model utilizes the parameterization in the Pensacola Bay Watershed model. The Pensacola Bay watershed modeling was prepared by EPA. The modeling report is referenced but not available. Other than a single figure showing the subwatersheds for the localized LSPC model, no other inputs, calibration plots, or results are provided for the Bayou Chico LSPC model. While there are no flow gages in the Bayou Chico subwatersheds, there are water quality monitoring stations to compare to. The assumption that watershed parameterization for the entire Pensacola Bay watershed would apply to Bayou Chico may not be reasonable.

FDEP Response 12.
The EPA has made available to the public copies of all documentation for the Pensacola Bay watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). The parameterization of LSPC can be provided to the FDOT upon request. When we contacted Escambia County for stormwater data that could be used to calibrate the LSPC predictions for

flows and loadings we were told that this data does not exist for the period (2002–09) that the model is simulating. If ATM could provide the data referenced in the comment we would be glad to compare it to the model predictions.

ATM Comment 13.
The TMDL relies upon receiving water simulations using the EFDC hydrodynamic model coupled with the WASP water quality model. FDEP presents information on the models inputs and calibration in Appendix E. While a good bit of the information is presented, some missing pieces include:
a. Table E.2.1 should also include the depths in the model. It is not clear what the Seg-top and Seg-bot values are
b. Plots of tidal forcing and salinity/temperature used at the open boundary
c. Plots of water quality constituents used at the open boundary

FDEP Response 13.
Clarifications have been added to Table E.2.1, (a) depth added and Top Segment ID and Bottom Segment ID. FDEP will work with EPA Region 4 to obtain plots of the EFDC boundary conditions. The open boundary water quality constituents are input as constants, therefore time series plots would be of no use (page 85 of draft report).

ATM Comment 14.
The figure below shows the model grid used for the EFDC and WASP models in Bayou Chico. This representation of the system is not useable. The grid significantly overestimates the entrance from Pensacola Bay into Bayou Chico. It significantly overestimates the surface area of the bay, which is one of the primary factors in the determination of tidal prism. It has widths on the order of hundreds of meters, where the waterbody is only around 10 meters. In model development, the shoreline representation is one aspect that can be accurate. Given the lack of tide data in the interior to assure that the tidal wave is progressing appropriately, an accurate representation of the geometric conditions is critical. This significant amount of error introduced at the starting point for the receiving water modeling makes everything else in the EFDC and WASP models suspect.

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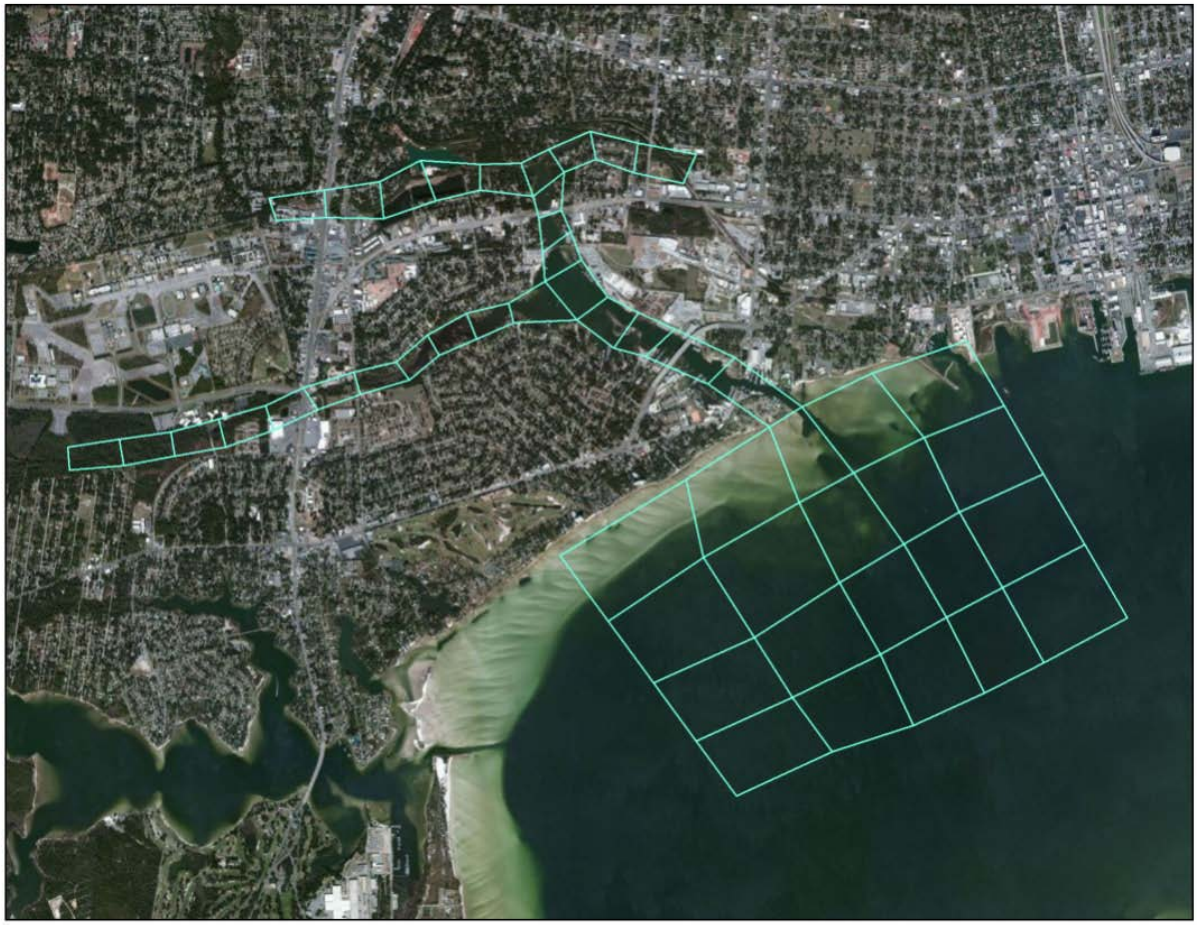

FDEP Response 14.
We agree that the GIS grid representation for the geometry of the waterbody (model grids) does not match the waterbody geometry in several areas. It is our understanding from EPA that within the EFDC input deck the actual geometry used by the models is more representative of the waterbody. FDEP will work with EPA to provide you this information and to investigate the impact on water movement and water quality from a more refined model grid. In the meantime, plots of salinity predictions from the Upper and Lower areas of the Bayou and of the difference between the top and bottom layers of the model as compared to available data for these areas indicate the EFDC/WASP models are sufficiently representing both the water movement and the magnitude and seasonal changes in the salinity structure of the bayou. The limited paired data for surface and bottom salinities indicate that the model is reproducing the magnitude and seasonal signal of the measured data. Additionally, calibration plots of water quality for temperature, Chlorophyll a (Chla), and nutrients contained in the draft report indicate that EFDC/WASP are sufficiently calibrated to accurately predict the long-term annual average

responses of water quality in the bayou to changes in watershed loading. The TMDL has been developed for long-term annual average concentrations for the bayou TN (1.22 mg/L to 1.40 mg/L), TP (0.025 mg/L to 0.027 mg/L), and Chla (8.88 – 8.93 mg/L).

ATM Comment 15.
The calibration comparison statistics are based upon the average predicted versus the average measured over the full VP. A table of acceptable errors is presented in the main report (Table 5.2). These error levels are generally assessed through different statistics such as root-mean-square (RMS) error, which calculates the difference statistics through time and is not based on annual averages. This method could result in large positive and negative errors throughout the simulations cancelling one another and may not be a reasonable representation of the errors.

FDEP Response 15.
We agree that there are statistical measures that can be used to evaluate the calibration and the model predicted results at specific locations in the waterbody. However, in this case, FDEP does not believe there are sufficient measured data to use these methods in a robust way. Additionally, as the TMDL is for waterbody-wide long-term annual average conditions, comparing the WBID average long-term measured data to the WBID wide long-term model predictions is appropriate.

ATM Comment 16.
Examination of the errors simply on an annual mean basis shows that, for some parameters, the errors are significant.

FDEP Response 16.
FDEP is satisfied, that taken as a whole, the model calibration is suitable for the development of the long-term annual average waterbody-wide TMDL.

ATM Comment 17.
The TMDL results show that the prescribed 30 percent reduction in TN and TP would bring the VP Chla levels down to 8.88 µg/L in the Upper Bayou and 8.93 µg/L in the Lower Bayou. The significant digits presented in these results need to be reduced since the model cannot predict Chla down to these levels. The existing conditions as outlined in the text for these two WBIDs are 9.43 µg/L and 10.37 µg/L for the Lower Bayou. This means that the 30 percent reduction resulted in an average drop of 0.5 µg/L in the Upper Bayou and 1.5 µg/L in the Lower Bayou. This is a very small drop in Chla for a 30 percent reduction that will have significant costs. Given the potential significant errors in the modeling identified earlier, this does not seem reasonable.

FDEP Response 17.
The question seems to be related to the number of significant digits given for the model predications and the relationship between the 30 percent reduction in watershed load and the resulting change in bayou Chla concentrations. First, it is FDEP's understanding that model

results are usually given with the same significant digits as the measured data. Second, the change in Chla in the Upper Bayou from the current long-term annual average of 9.43 µg/L from a 30 percent reduction is to 8.88 µg/L (a 5.8% reduction) and in the Lower Bayou from 10.37 µg/L to 8.93 µg/L (a 13.9 % reduction). Given the high concentrations of nutrients coming into the bayou, it was not unexpected that large reductions would be required to measurably reduce the Chla concentrations.

North Escambia Bay Detailed Comments

ATM Comment 18.
The data analyses identify that in terms of Chla levels, North Escambia Bay is responding differently than all other areas that are currently meeting their designated use. The bulk of the available data for Chla are at the A4 station, which is in the northeastern quadrant of the WBID. FDEP did extensive analyses on the data to try to determine if this station skews the results but did not determine a good reason to exclude. These data may also be identifying some localized sources and spatial preferences in the WBID, which FDEP acknowledges may be present along the eastern shoreline.

FDEP Response 18.
FDEP agrees and has modified Chapter 7 of the TMDL document to commit to develop a Basin Management Action Plan (BMAP) that will include a multi-year period for additional data collection and analysis to investigate the importance of data from shallow stations like A4 and to determine if there are unidentified local sources of PO4-P.

ATM Comment 19.
The North Escambia Bay TMDL assessment relies upon the LSPC modeling for the Pensacola Bay watershed that was prepared by EPA. The modeling report is referenced but not available. FDEP put the various inputs and calibrations for the model in Appendix E. This is helpful, but the full LSPC modeling report should be provided. The following comments relate to inputs and results presented.
a. Significant comparisons were provided at the Century gage but not at Molina. It would be beneficial to have full presentations of comparisons at Molina since it is the most downstream location.
b. For the TN loading at Century, the table provided in Appendix E (Table E.1.2.1) identifies that over the full period of the loading simulations, the model over predicts the load by 54 percent and, in any one year, the error was as high at 137 percent. Where errors are both positive and negative in individual years, a straight average does not reasonably depict the error magnitudes in any one year and can be misleading. The text in the document states that this error presented in Appendix E may not be accurate because the model is predicting the same as values used in another effort where they used data. According to the table, this is a comparison of the model to measured data so the statements in the report contradict what the table in the appendices is showing. This needs to be clarified. Similar issues exist for the TP loading.

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FDEP Response 19.
The EPA has made available to the public copies of all documentation for the Pensacola Bay and watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). Clarifications have been added to the report for TN. Given that the paired model vs. measured data calibration for TP is very good with only a 0.4 percent difference between the TP for the observed and modeled results, we do not agree that there are significant problems with the calibration.

ATM Comment 20.
The TMDL relies upon receiving water simulations using the EFDC hydrodynamic model (developed and calibrated by EPA), coupled with the WASP water quality model (initially developed and calibrated by EPA then modified by FDEP). FDEP presents some information on the model's inputs and calibration in Appendix E, but the full modeling reports by EPA need to be provided for a complete review. These are referenced but not available.

FDEP Response 20.
The EPA has made available to the public copies of all documentation for the Pensacola Bay watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). The calibration information provided in the reports indicates the EFDC/WASP models are sufficiently representing both the water movement and the magnitude and seasonal changes in the water quality constituents to be used for the development of the TMDL.

ATM Comment 21.
As stated in the text, the original EPA calibration was not able to reproduce the elevated Chla levels within North Escambia Bay. FDEP modified the model to better represent the elevated levels but, in the process, over predicted the Chl a conditions in the remaining portions of the bay. The bottom line is that neither the original EPA model nor the revised FDEP model is able to capture the unique condition that appears to exist within North Escambia Bay. FDEP does a good job of identifying some potential local sources in North Escambia Bay that may be creating this issue. Unfortunately, the end result of the modeling is to target a watershed-wide load reduction, where, in reality, this may be a localized issue of readily available nutrients coming into this segment of the bay. At present, there is not enough information and the modeling is not able to help answer this question since it cannot replicate the system kinetics properly throughout the bay. Based on this uncertainty, the proposed watershed-wide TN load reduction is not supported.

FDEP Response 21.
We believe that the model does capture the unique localized elevated Chla in North Escambia Bay (see Appendix E of draft report). Additionally, subsequent to the draft report, FDEP has made numerous improvements in the model's predictive capabilities that have resulted in systemwide improvements in calibration for nutrients and Chla. The current calibrated version is well calibrated for both nitrogen and phosphorus throughout the bay and reproduces the

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elevated Chla concentrations in North Escambia Bay while maintaining the relative Chla relationships throughout the bay system. FDEP is committed to work with all stakeholders to investigate possible local sources of phosphorus before final allocations are made under the Basin Management Action Plan and would invite all stakeholders to participate in this process.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.Cioccia@dep.state.fl.us.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us, if you have any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

Taminco Inc.

FDEP letter to Reba Heath, Taminco Inc., May 1, 2013

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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RICK SCOTT
GOVERNOR
HERSCHEL T. VINYARD JR.
SECRETARY

May 1, 2013

Ms. Reba Heath
Senior Environmental Specialist
Taminco Inc.
4575 Hwy. 90 East
Pace, FL 32571

Dear Ms Heath:

The Department appreciates the time and effort you put into reviewing these draft TMDLs. Taminco has requested that the DEP include effluent limits for total nitrogen and total phosphorous for your facility (NPDES permit FL0002313) as part of the Wasteload Allocation (WLA) component of the Total Maximum Daily Load (TMDL) for north Escambia Bay TMDL. A review of the subject permit notes that there shall be no discharge to surface waters except for amounts in excess of the land application system associated with 25-year, 24-hour daily rainfall events or equivalent chronic rainfall events. In the event that such an emergency discharge occurs, the permit requires monitoring for these constituents (weekly) and that Taminco shall submit a report to the Department within 30 days following the discharge as specified in Section I.E of the permit. The report shall include the cause and nature of the discharge, the duration of the discharge and the total gallons discharged. The report shall include rainfall measurement data and calculations to demonstrate that the discharge was due to the rainfall event. The DEP considers that these existing permit limitations provide reasonable assurance of compliance with applicable water quality standards.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.cioccia@dep.state.fl.us.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us, if you any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

www.dep.state.fl.us

Text of FDEP letter to Reba Heath, Taminco Inc., May 1, 2013

May 1, 2013

Ms. Reba Heath
Senior Environmental Specialist
Taminco Inc.
4575 Hwy. 90 East
Pace, FL 32571

Dear Ms. Heath:

The Department appreciates the time and effort you put into reviewing these draft TMDLs. Taminco has requested that the DEP include effluent limits for total nitrogen and total phosphorus for your facility (NPDES permit FL0002313) as part of the Wasteload Allocation (WLA) component of the Total Maximum Daily Load (TMDL) for north Escambia Bay TMDL. A review of the subject permit notes that there shall be no discharge to surface waters except for amounts in excess of the land application system associated with 25-year, 24-hour daily rainfall events or equivalent chronic rainfall events. In the event that such an emergency discharge occurs, the permit requires monitoring for these constituents (weekly) and that Taminco shall submit a report to the Department within 30 days following the discharge as specified in Section 1.E of the permit. The report shall include the cause and nature of the discharge, the duration of the discharge and the total gallons discharged. The report shall include rainfall measurement data and calculations to demonstrate that the discharge was due to the rainfall event. The DEP considers that these existing permit limitations provide reasonable assurance of compliance with applicable water quality standards.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.Cioccia@dep.state.fl.us.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us if you have any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

Georgia-Pacific LLC

May 3, 2013

B. Traylor Champion
Vice President – Environmental Affairs
Georgia-Pacific LLC
133 Peachtree Street
Atlanta, GA 30303

Dear Mr. Champion:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. Thank you for your insights and help in improving the quality of our TMDLs for the impaired waters in the Pensacola Bay Basin (WBIDs 846, 846C, 548AA, 493 and 493A). We have made applicable edits to the draft TMDL report as a result of your September 14, 2012 comments. Because of your efforts the TMDL will be improved. To aid you in reviewing our responses, we have summarized the key issues Georgia-Pacific (GP) identified below, followed by a response to each. The DEP responses to the July 7, 2012 Technical Memorandum from HDR HydroQual (HDR) and the September 14, letter from HDR are included as Attachment 1.

GP Comment 1.
Additionally, as set forth in more detail below, GP respectfully submits that:

- The impairment of WBID 548Aa has not been properly established because factors beyond chlorophyll a should be considered in determining impairment.
- If and when impairment has been properly established, the models used to determine the allocation need further evaluation and calibration to be scientifically valid.

According to the TMDL report[1)], the area of the North Escambia Bay identified as Watershed WBID 548AA was verified as impaired based solely on a determination that chlorophyll a annual averages exceeded the WBID's site specific threshold of 7.5 micrograms per liter (µg/L). The nutrient criteria in Florida are based on a narrative standard that requires a balanced flora and fauna community. Chlorophyll a is <u>not</u> a criterion in Florida's water quality standards[2)]. It is a parameter used to evaluate the health of a waterbody because elevated levels of chlorophylla <u>may</u> be related to nutrient impairment[3)]. <u>However, while chlorophyll a levels are used to evaluate water bodies, chlorophyll a is only one of many factors that should be considered.</u>

FDEP Response 1.
FDEP believes that the verified impairment for nutrients in North Escambia Bay (WBID 548AA) was properly established. FDEP followed all applicable federal and state laws and regulations in determining the impairment and establishing the Secretarial Adopted Verified List of Impaired Waters (adopted as rule November 2, 2010). If requested, FDEP will make copies of all official notices, public comments, and FDEP responses to public comments that all preceded the adoption by rule of the nutrient impairment for North Escambia Bay. FDEP is committed to

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Vice President – Environmental Affairs
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addressing your model related concerns as outlined in Chapter 7 of the revised report at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP will work cooperatively with all stakeholders to resolve these modeling related issues. This will include among other things considering additional model sensitivity runs and the potential use of other models and will allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

GP Comment 2.
In addition to the TMDL, FDEP is also developing site specific numeric nutrient criteria (NNC) for the Pensacola Bay system. As part of this development, FDEP evaluated potential nutrient enrichment symptoms for the watershed[4)]. FDEP's report indicates in Table 1 that there were no observed nutrient impacts on several accepted response variables, including dissolved oxygen levels, submerged aquatic vegetation and phytoplankton blooms in the North Escambia Bay. FDEP also noted there were ". . . increased chlorophyll a concentrations . . ." in the North Escambia Bay. Based on this one response variable, and ignoring the weight of evidence of the other response variables that demonstrated no impact, FDEP then concludes in the Executive Summary that, "Upper Escambia Bay nutrient criteria will be determined using water quality modeling and determined by the TMDL process".

FDEP Response 2.
FDEP would note that the additional endpoints GP references were not ignored; in fact they were examined as a part of the TMDL and incorporated into the target Chla concentration selected as the final target. Please see Chapter 5, Target Selection, in the reposted report that can be downloaded at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP would also note that the load reductions required to reduce the elevated levels of Chla in the impaired waterbody would have potentially been even greater if there had been accompanying impairments (anywhere in the system) for low dissolved oxygen or inadequate light penetration to support healthy seagrass beds.

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GP Comment 3.
In 2010, FDEP sought technical assistance to develop NNC for the Pensacola Bay system. A stakeholder group including Georgia-Pacific, Gulf Power, Emerald Coast Utility Association and Taminco engaged HDR/HydroQual to develop a water quality model to evaluate the Pensacola Bay system. As part of this effort, HDR/HydroQual reviewed FDEP's report and recommended that the appropriate water quality model should determine the nutrient loadings based on meeting acceptable sea grass light requirements and dissolved oxygen goals, and thence use these allowable nutrient loadings to determine the associated acceptable chlorophyll a levels[5)]. Georgia-Pacific agrees with that recommendation. Absent such an analysis, it is difficult or impossible to draw conclusions regarding what, if any, reductions are needed to meet FDEP's standard. FDEP used a similar modeling approach in developing the TMDL, failing to utilize the appropriate methodology to determine the chlorophyll a target and nutrient loadings.

FDEP Response 3.
FDEP is very appreciative of the stakeholder's long-standing cooperation and involvement in protecting the health of these waters. The TMDL for North Escambia Bay considered multiple endpoints; the level of appropriate Chla production in the impaired waterbody was one. The impaired waterbody and all downstream compartments of the bay were also examined for dissolved oxygen, Chla, light penetration, and algal blooms. Without the outstanding efforts of stakeholder group, in particular the HDR water quality model, we would not have been able to verify that these additional metrics would be met throughout the estuary (see Chapter 5 of the draft report).

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GP Comment 4.
The Escambia River (which is called the Conecuh River in Alabama) runs about sixty miles from the Alabama/Florida state line to the mouth of Escambia Bay[1)]. Because of the distance and complexity of the river, the impact of nutrient loads at the state line on the bay is difficult to determine. In 2008, AquaAeTer condicted a river impact study for Georgia-Pacific[6)], which was previously provided to FDEP. One of the objectives of this study was to quantify the impact on Escambia Bay from nutrient loadings originating in Alabama. The study concluded that the sources of nutrients from Alabama were not likely to have a significant impact on the Bay. This conclusion is supported by data in the TMDL report. For example, Figure 2.34 illustrates that chlorophyll a values are only high in the middle of the Upper Bay (WBID 548AA). The values are low as major portions of the river enter the bay from the north, sharply rising within WBID 548AA and then falling as the water flows southward[1)]. Furthermore, FDEP has reported that the nutrient concentrations at the Century monitoring station (near the Florida/Alabama line) are constant and the concentrations at the Molino site (between Century and the Bay) are decreasing. These facts do not provide any explanation or insight into why chlorophyll a levels are increasing in the Upper Bay. Figures presented by FDEP in the NNC Workshop for the Pensacola Bay system show that the TP concentrations in North Escambia Bay's WBID 548AA are constant while the total nitrogen and chlorophyll a levels are increasing[7)]. Together, this information demonstrates there is not a correlation between TP and the chlorophyll a levels in WBID 548AA and contradicts the modeling results that FDEP used to set the load allocations for TP in the proposed TMDL. Based on these inconsistencies and unanswered questions, Georgia-Pacific believes that the FDEP model is not scientifically valid, and there is no basis on which to determine that nutrient loads from Alabama are the cause of elevated chlorophyll a values in WBID 548AA.

FDEP Response 4.
FDEP notes that the referenced study was conducted in the river system and no samples were collected in the bay. The AquAeTer established model only included the river system and was intended to develop a detailed understanding of the dissolved oxygen dynamics in the river and not to predict impacts from watershed loadings on Chla in Escambia Bay. The figure referenced in the comments, Figure 2.34, is associated with the following text in the report "for CChla, the results indicate that the only area of the bay system that has a median concentration over 3.0 µg/L is North Escambia Bay, with a median concentration of 6.90 µg/L. The median CChla concentration in the majority of the system is at 2.50 µg/L. During the period 1995–2011 annual average CChla concentrations have increased in all areas of the bay except in East Bay (WBID 548H)." The fact that there is low Chla in the freshwater portions of the river upstream of the impaired WBID in Figure 2.34, does not in our opinion support a conclusion that the concentrations of nutrients in the river are not causing or contributing to the elevated Chla concentrations in the estuary that receives these loadings. The model used by EPA and FDEP clearly show that the nutrient loadings in the river have significantly increased over the natural condition and that reducing the current condition loadings of TP will significantly reduce the Chla concentrations in North Escambia Bay. While the statistical analysis shows that the TP

concentrations at Molino have been declining, it does not follow that the current loadings from upstream are at a level that will result in the restoration of North Escambia Bay without any additional reductions from current sources. Given that North Escambia Bay is believed to be phosphorus limited, it is not unreasonable to conclude that under most conditions, all available phosphorus is utilized to grow phytoplankton. Conversely, the non-limiting nutrient nitrogen, being in surplus, is found to be increasing over the same time frame that Chla concentrations have been increasing. Further evidence of this is that the model results indicate that if you add nitrogen, without additional phosphorus, the Chla does not respond and nitrogen concentrations simply increase. If you add phosphorus, but keep nitrogen the same, the Chla concentrations increase.

GP Comment 5.
FDEP used a model developed by the EPA to develop the TMDL and set load allocations. According to the FDEP TMDL report, the EPA model matched the measured data in the Pensacola Bay system "fairly well". However, the EPA model could not reproduce the high chlorophyll a concentrations measured within WBID 548AA. HDR/HydroQual has also developed a model for the Pensacola Bay system that does a very good job of reproducing measured water quality parameters throughout the system with the exception of the chlorophyll a data within WBID 548AA[7,8)].

It is our understanding that FDEP arbitrarily increased the algal growth rate and other algal related parameters in the EPA model to force it to match the chlorophyll a data in WBID 548AA; however, this change resulted in the model failing to match the measured data within other parts of the Pensacola Bay system. As a result, the model is not appropriately calibrated for nutrients and FDEP has not established a cause and effect relationship between nutrient loadings at the state line and chlorophyll a within WBID 548AA.

FDEP Response 5.
Based on information provided by HDR (July 25, 2012), the stakeholder model is also not performing well in Santa Rosa Sound, indicating that this area of the bay has higher annual average Chla concentrations than North Escambia Bay, in direct opposition to the measured data for these waters. Subsequent to the public workshop, FDEP has continued to refine the WASP model calibration to address the issues raised here as well as by other stakeholders. The current growth rate used in the FDEP version of the model is the same as that used by EPA and the model is now reproducing the spatial and temporal patterns in the data for the other sections of the bay. We look forward to working with the stakeholder group to resolve any remaining issues in both sets of models.

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GP Comment 6.
In the last paragraph of the TMDL, FDEP recognizes the modeling issues described above and recommends as part of the implementation plan that a model advisory committee be formed to direct further development and use of the HDR/HydroQual and EPA models. Georgia-Pacific agrees that further model development is needed. However, there is a lack of understanding about WBID 548AA that requires more scientific investigations to determine whether WBID 548A is impaired and supports the development of the selected model. We also believe that this evaluation should establish the appropriate chlorophyll a targets using the additional endpoints recommended by HDR/HydroQual.

FDEP Response 6.
FDEP does not agree that additional scientific studies are necessary to determine if WBID 548AA is impaired. The impairment status of the waterbody was resolved with the adoption of the Verified List of Impaired Waters for the Group 4 Basins as rule on November 2, 2010. FDEP is committed to working cooperatively with the stakeholders to resolve any remaining modeling related issues identified in Chapter 7 of the revised report. This will include additional model sensitivity runs, the potential use of other models and will allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

GP Comment 7.
Because there are so many unanswered questions concerning the TMDL, we believe that this effort should be part of TMDL development and not implementation. Final action on the TMDL is not appropriate until these issues have been addressed, including the proper calibration of the model.

FDEP Response 7.
FDEP believes that the model as currently configured is adequately calibrated to use in the development of the TMDL. FDEP does not agree that the adoption of the TMDL should wait until all uncertainty has been resolved.

GP Comment 8.
GP requests specific notice of intended action and a point of entry prior to adoption of the TMDL for the North Escambia Bay or furnishing the TMDL to EPA. It also requests that the potential cost to GP be included in the economic assessment. GP's early estimates are a potential cost of $40 million for its Brewton facility. The facility is just across the state line in Alabama (less than 5 miles), and there are considerable economic benefits in Florida from operating this facility and potential adverse economic impacts if the proposed TMDL and resulting allocations are adopted as proposed. It is important that these costs are considered.

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FDEP Response 8.
GP has been advised that FDEP has prepared a Statement of Estimated Regulatory Costs (SERC) and submitted the TMDL to the Florida legislature to be ratified by the legislature prior to adopting the TMDL as a rule and submitting it to EPA. As the Brewton Mill does not discharge to the impaired water directly, it was not given a wasteload allocation, nor assigned any load reductions, as part of the TMDL. Additionally, as stated in Chapter 6 of the TMDL report, under the load allocation section, FDEP will work within the BMAP process to establish the most equitable and cost-effective manner to allocate any nutrient reductions required of Alabama under the LA component of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.Cioccia@dep.state.fl.us.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us if you have any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

Gulf Power Company

May 1, 2013

Mr. James O. Vick
Director of Environmental Affairs
Gulf Power Company
One Energy Place
Pensacola, FL 32520-0328

Dear Mr. Vick:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. Thank you for your insights and help in improving the quality of our TMDLs for the impaired waters in the Pensacola Bay Basin (WBIDs 846, 846C, 548AA, 493 and 493A). We have made applicable edits to the draft TMDL report as a result of your September 14, 2012 comments. Because of your efforts the TMDL will be improved. To aid you in reviewing our responses, we have summarized the key issues you identified below, followed by a response to each. The FDEP responses to the July 7, 2012 Technical Memorandum from HDR HydroQual (HDR) and the September 14, letter from HDR are included as Attachment 1.

Gulf Power Comment 1.
Gulf Power identified three objectives for the North Escambia Bay nutrient TMDL.
1. The TMDL should protect the bay from nutrient over-enrichment.
2. Any nutrient reductions required by the TMDL should translate into appreciable environmental benefits.
3. The TMDL should enable the Plant Crist reuse project to continue to benefit the environment as planned and operated.

FDEP Response 1.
Recent data indicate that Chla levels may still be trending upward in North Escambia Bay. FDEP believes the proposed nutrient TMDL is protective of the bay from overenrichment of nutrients. The modeling conducted by FDEP demonstrates that the current Chla annual average concentrations (over 11 µg/L) will be reduced to below 7.5 µg/L and that this will be a significant environmental benefit. The draft TMDL has incorporated the current permit limits for Plant Crist as the WLA for the facility. This should enable the reuse project to continue as planned and operated.

Mr. James O. Vick
Director of Environmental Affairs
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Gulf Power Comment 2.
Gulf Power believes there are significant uncertainites regarding the complex varibles affecting water quality in the North Escambia Bay system. These uncertainities, in their opinon, limit DEP's ability to establish appropriate nutrient endpoints and determine the nutrient load reductions (if any) needed to support a health and well balanced population of flora and fauna. Accordingly, Gulf Power repectfully requests that DEP carefully consider the technical comments provided by HydroQual (July 27, 2012 and September 14, 2012) and work with local stakeholders to ensure that the nutrient TMDL reflects the best available scentific information before it is finalized. Gulf Power requested that adsditional detials regarding the scope amnd objectivies of actions DEP has committed to under take in Chapter 7 of the draft report be included in section 7.5 of the report.

Gulf Power would like to work with DEP to resolve uncertainites underlying the North Escambia Bay Draft Nutrient TMDL Report.

FDEP Response 2.
FDEP is committed to addressing your model related concerns as outlined in Chapter 7 of the revised report (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP will work cooperatively with all stakeholders to resolve these modeling-related issues. This will include among other things considering additional model sensitivity runs and the potential use of other models and will allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.Cioccia@dep.state.fl.us.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us if you have any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

Attachment

Emerald Coast Utility Authority

May 2, 2013

Donald C. Palmer, P.E.
Water Reclamation Director
ECUA
2980 Old Chemstrand Rd.
Cantonment, FL 32533

Dear Mr. Palmer:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. Thank you for your insights and help in improving the quality of our TMDLs for the impaired waters in the Pensacola Bay Basin (WBIDs 846, 846C, 548AA, 493 and 493A). We have made applicable edits to the draft TMDL report as a result of your September 15, 2012 comments. Because of your efforts the TMDL will be improved. To aid you in reviewing our responses, we have summarized the key issues you identified below, followed by a response to each. The DEP responses to the July 7, 2012 Technical Memorandum from HDR HydroQual (HDR) and the September 14, letter from HDR are included as Attachment 1.

ECUA Comment 1.
ECUA appreciates the opportunity to comment on the FDEP draft nutrient TMDL for North Escambia Bay. Additionally, we appreciate the opportunity to work with HydroQual, FDEP, and others on developing a model of the Escambia Bay system for use in developing scientifically sound decisions for any changes in the management of the bay.

As you are aware, we have spent a considerable amount of time and money developing and building a joint project with Gulf Power. This project has many environmental benefits and resulted in a removal of a surface water discharge from the Main Street Wastewater Treatment Plant to Pensacola Bay which is adjacent to Escambia Bay. This was a permitted discharge of 20 mgd which was averaging around 16 mgd when the removal of the flow started. This project resulted in the use of billions of gallons of reclaimed water by Gulf Power.

First, we encourage FDEP to enable this project to continue as currently permitted and maintain the benefits to the environment that it now provides.

FDEP Response 1.
FDEP has incorporated the current condition nutrient loadings of the referenced project into the WLA component of the TMDL.

ECUA Comment 2.
Secondly, we believe there are some unanswered questions about the nutrients in this area of the bay as outlined by our consultant, HydroQual, in the attached letter (September 14, 2012). We believe FDEP must continue to work to answer these questions to ensure that any nutrient reductions translate into appreciable environmental benefits.

Donald C. Palmer, P.E.
Water Reclamation Director
ECUA
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FDEP Response 2.
FDEP is committed to addressing your model related concerns as outlined in Chapter 7 of the revised report (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP will work cooperatively with all stakeholders to resolve these modeling-related issues. This will include among other things considering additional model sensitivity runs and the potential use of other models and will allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes. FDEP has provided responses to the HydroQual (HDR) 9/14/2012 in Attachment 1.

ECUA Comment 3.
ECUA agrees with the draft TMDL report's WLA for Plant Crist to allow the ECUA-Gulf Power reuse project to continue to benefit the environment and to protect the health of both the Escambia River and North Escambia Bay.

FDEP Response 3.
No response required.

In closing, we thank you for your interest in water quality issues in your area and look forward to working with you on implementing this and future TMDLs. The Basin Management Action Plan (BMAP) Coordinator for the Pensacola Bay basin is Stephen Cioccia and he will be able to assist you with any questions on the BMAP process. His contact information is phone (850) 245-8618 and e-mail Stephen.Cioccia@dep.state.fl.us.

Please contact me at Jan Mandrup-Poulsen@dep.state.fl.us, if you have any questions.

Sincerely,

Jan Mandrup-Poulsen, Environmental Administrator
Watershed Evaluation and TMDL Section

Attachment 1

FDEP Responses to HDR HydroQual Comments

The HDR September 14. 2012 letter incorporates by reference a July 27, 2012 Technical Memorandum from HDR to Gulf Power, Georgia-Pacific, ECUA, and Taminco. The HDR comments and FDEP responses to the July 27, 2012 memo are provided below, followed by HDR comments and FDEP responses to the September 14, 2012 letter.

July 27, 2012

TECHNICAL MEMORANDUM

Richard M. Markey (Gulf Power),
Robert W. Sackellares (Georgia-Pacific),
Don Palmer (ECUA), Reba Heath (Taminco)

From: Andrew J. Thuman, P.E.
Richard R. Isleib, P.E.

The EPA has completed modeling of the Escambia/Pensacola Bay watershed along with hydrodynamic and water quality modeling of the Escambia/Pensacola Bay system from 1997-2009. These models are being developed as part of the EPA efforts to determine marine numeric nutrient criteria (NNC) for the bay system. Early in 2012, HDR|HydroQual met with EPA and their modeling contractor (Titrates) to received copies of the input files for the EPA models. These models include the following:
- LSPC (Loading Simulation Program in C++) runoff and watershed loads for both point and nonpoint sources for the entire Escambia/Pensacola Bay watershed;
- EFDC (Environmental Fluid Dynamics Code) circulation due to watershed freshwater runoff, tides, density driven boundary conditions and meteorological conditions); and
- WASP (Water Quality Simulation Program) using an eutrophication model framework that includes nitrogen, oxygen (DO), chlorophyll--a (chl-a), BOD and light extinction).

We have reviewed the LSPC, EFDC and WASP model files received to date and present our review comments on the models below. It should be noted, that we have only reviewed files received. A more thorough review of the model documentation information is available. Our review is separated into three sections for the three models along with a summary review section.

LSPC Watershed Model
Our review of the LSPC watershed model is presented below and our focus was on the Pacific Brewton Mill point source load, nonpoint source loads and atmospheric deposition.

HDR Comment 1.
The total nitrogen (TN) and total phosphorus (TP) loads calculated in the LSPC model are represented as completely dissolved (i.e., they contain no particulate fractions). This does not reflect observed data nor represent runoff from the large percentage of forested and wetland land uses in the watershed. Observed Environmental Planning & Analysis (EP&A) data from

1997-1998 in the Escambia River indicate the following percentages of particulate organic nitrogen (PON) and phosphorus (POP):
- PON is about 15% of the TN and 26% of the total organic nitrogen (TON); and
- POP is about 27% of the TP and 36% of the total organic phosphorus (TOP).
- The calculated TN and TP LSPC model loads are divided into organic and inorganic nutrient fractions using a 50:50 split. Observed EP&A data from 1997-1998 in the Escambia River indicate an inorganic nitrogen percentage of 41% and inorganic phosphorus percentage of 32%.
- The Georgia-Pacific Brewton Mill point source load is zero in the LSPC model until 2/2007 for the main Outfall 001; until 1/2002 for internal Outfall 002; until 3/2007 for internal Outfall 01A; and until 2/2007 for internal Outfall 01B. As noted, internal mill outfalls were also assigned in the LSPC model even though they do not discharge to the Conecuh/Escambia River and are used as internal monitoring points. The main mill discharge to the river is from Outfall 001. Revised mill loads were developed from effluent data provided by Georgia-Pacific and setup in the LSPC model. This new set of LSPC model inputs were provided to FDEP. The model calibration in the Escambia River should be re-assessed with the correct Brewton Mill loads assigned in the model.
- Given the incorrect assignment of the Brewton Mill load, other model inputs in the LSPC model should be reviewed to make sure they are assigned correctly.

FDEP Response 1.
FDEP has incorporated the corrected Georgia-Pacific loads into the model. FDEP also agrees that additional data gathering, analysis, and model sensitivity analysis may be warranted regarding the particulate and dissolved fractions of nutrients and that any new information should be incorporated into the models. To this end, FDEP has revised the TMDL documentation, particularly Chapter 7, to allow up to three years of additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 2.
What is the basis for the ground water and interflow TN, TP and BOD concentrations assigned to the three watershed groups in the LSPC model? These concentrations are either assigned as constant in time or time-variable. The ground water and interflow concentrations range from: 0.2-3.2 mg/L TN; 0.003-0.12 mg/L TP; and 0.4-7.0 mg/L BOD for interflow and 0.8-1.4 mg/L BOD for groundwater.

FDEP Response 2.
The EPA has made available to the public copies of all documentation for the Pensacola Bay watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). This information contains the full documentation for the LSPC model.

HDR Comment 3.
Hydrodynamic Model (EFDC)
- The EFDC model uses 5 vertical layers, which is carried over to the WASP water quality model. Although the model seems to reproduce the observed salinity stratification based on the available presentation material, questions remain as to how well the vertical salinity profiles are reproduced when using only 5 layers. For example, were model parameters adjusted outside of typical ranges to achieve the model stratification?
- Further review of the EFDC model is warranted as only a cursory review has been completed.

FDEP Response 3.
The EPA has made available to the public copies of all documentation for the Pensacola Bay and watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). Based on the FDEP evaluation, the EFDC model appears to be reproducing surface and bottom salinity regimes, including seasonal stratification. FDEP will work cooperatively with the stakeholders to resolve any remaining modeling related issues, per Chapter 7 of the revised report, before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 4.
Water Quality Model (WASP)
Atmospheric loads are assigned in the WASP model at 0.1 mg/m2/d (0.36 kg/ha/yr) for both NH4 and NO3. Hagy (2010)1 and FDEP (2010)2 report roughly 3.6 kg/ha/yr with 90% of the load assigned as NO3 based on local National Atmospheric Deposition Program (NADP) data. This order of magnitude difference in atmospheric loads between observed and assigned in the model should be assessed through further model sensitivity analyses.

FDEP Response 4.
FDEP agrees that additional model sensitivity analysis should be conducted to address this issue.

HDR Comment 5.
The water quality model does not include a sediment diagenesis model to calculated sediment oxygen demand (SOD) and sediment nutrient fluxes as a function of particulate organic matter delivery to the sediment. The WASP model assigns constant in time but spatially variable SOD rates that are temperature corrected. Sediment nutrient fluxes are not assigned. The SOD rates assigned in the WASP model are higher than measurements completed in 1997-1998 by EP&A and in 2010 by EPA. Attachment 1 presents a comparison of the WASP model assigned SOD rates and those measured in the bay system.

As can be seen, the model assigned SOD rates are typically higher than observed particularly in the Pensacola Bay region. Although there can be a lot of variability in measured SOD rates, the WASP model has a bias to higher SOD rates than observed.

FDEP Response 5.
FDEP has initiated discussions with EPA to address this concern and supports a model sensitivity analysis that would bracket the values used by both HDR and EPA as well as, if practical, incorporate a sediment diagenesis model into the WASP model framework.

HDR Comment 6.
The WASP model phytoplankton nitrogen to carbon (N:C) ratio is set at 0.4 and the phosphorus to carbon (P:C) ratio is set at 0.019. Although the P:C ratio is a typical value used, the N:C represents a very high value. These ratios can be based on the Redfield ratios that represent a mixed population of algae. The Redfield P:C ratio is 0.024 and the N:C ratio is 0.18. The EPA Rates Manual3 does indicate a potential N:C ratio range of 0.05-0.43 but all except for one literature reference indicate N:C ratios less than 0.25. It seems use of a high N:C ratio in the model was needed to either calculate higher phytoplankton levels in the model and/or reduce the calculated nitrogen levels in the model to better reproduce the observed data. A model sensitivity to a lower N:C ratio (e.g., Redfield ratio of 0.18) is recommended to assess the impact on the model phytoplankton and nitrogen calibration.

FDEP Response 6.
FDEP has calibrated the phytoplankton phosphorus to carbon ratio to 0.025 and 0.176 for the nitrogen to carbon ratio. These values reflect typical Redfield ratios.

HDR Comment 7.
The EPA WASP model inorganic nutrient calibration points to an algal nitrogen limitation, probably caused by the high N:C ratio. The data and literature indicate the bay system is typically phosphorus limited, especially in the northern portions of the bay. Co-limitation or nitrogen limitation is observed closer to the Gulf and Santa Rosa Sound.

FDEP Response 7.
FDEP has calibrated the phytoplankton phosphorus to carbon ratio to 0.025 and 0.176 for nitrogen to carbon ratio. These values reflect typical Redfield ratios of a phosphorus-limited or co-limited system.

HDR Comment 8.
The WASP model uses a temperature corrected BOD oxidation rate of 0.1/day. This BOD oxidation rate can be high for large systems such as the Escambia/Pensacola Bay system with rates more on the order of 0.05/day. Long-term BOD studies were completed in the bay system during 1997-1998 from which BOD oxidation rates were determined for samples collected in the bay system. The average BOD oxidation rate from these tests was 0.05/day. A model sensitivity to a BOD oxidation rate of 0.05/day is recommended to assess the impact on the model BOD and DO calibration.

FDEP Response 8.
FDEP has initiated discussions with EPA to address this concern and supports a model sensitivity analysis that would bracket the values used by both HDR and EPA.

HDR Comment 9.
It appears that the SOD rate was used to calibrate the WASP model to observed DO levels. All of the EPA water quality stations used for model calibration fall into segments that have an assigned SOD value above the measured data. In many cases, the assigned SOD is different in the model segment where the station observed data is located than in adjacent model segments. Also since a sediment diagenesis model was not used in the WASP model, it is not clear if the calibration SOD rates are changed for the non-anthropogenic condition model run.

FDEP Response 9.
Based on conversations with EPA, it our understanding that measured SOD rates were used at the model grid representing this location and all other rates were derived by krigging between these measured data. The SOD rates used in the existing condition (calibration) model were also used in the non-anthropogenic condition. FDEP is working with EPA to incorporate a sediment diagenesis model into the WASP model framework.

HDR Comment 10.
The lack of sediment nutrient fluxes in the WASP model may also be important. These nutrient fluxes increase with lower DO, so if DO improves there are less inorganic nutrients to support algal growth. Thus, a nutrient source is missing under calibration conditions and a benefit (a smaller load from the sediment) is missing under non-anthropogenic conditions. The

HDR|HydroQual model calculates higher inorganic nutrient concentrations in the bottom waters, which is supported by the data.

FDEP Response 10.
FDEP will work cooperatively with the stakeholders to this issue by conducting additional model sensitivity runs and examine the potential use of other models before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 11.
Based on a review of the model calibration to observed data presented by EPA at the 1/19/2012 stakeholder meeting in Pensacola, the following observations are presented:
- Although the overall LSPC model calibration (1998-2009) percent error for TN is good the year to year percent error can be very large. TP percent error was not presented.

FDEP Response 11.
The full EPA calibration documentation, including all calibration results, is available at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). The FDEP recalibration documentation is available at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm).

HDR Comment 12.
- The EFDC model temperature calibration (2001-2009) is very good.
- The EFDC model salinity calibration (2007-2009) is very good although calibration to vertical salinity profiles is not presented.
- The WASP model chl-a, ammonia (NH3) and nitrite-nitrate (NO2+NO3) calibration (2002-2004) appears to be good but the model calculated orthophosphate (PO4) levels appear to be greater than observed. The over-calculation of the PO4 levels could also lead to the model indicating a nitrogen limitation in the bay system.

FDEP Response 12.
DEP's recalibration of the WASP model resulted in PO4 concentrations that are at levels indicating phosphorus or co-limitation in the bay. A copy of the reposted report can be obtained at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm).

HDR Comment 13.
- The WASP model DO calibration (2002-2004) appears to represent the seasonal and vertical stratification observed in the data although year to year variability does seem to be captured fully.
- The WASP model light extinction calibration (2002-2004) appears to be underestimated in upper Escambia Bay.

FDEP Response 13.
FDEP will continue to work cooperatively with the stakeholders to resolve issues related to the light extinction coefficients in upper Escambia Bay by conducting additional model sensitivity runs and examine the potential use of other models before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 14.
- The HDR|HydroQual model calculation of stratification (salinity and DO) is more dependent on the river flow than the EPA model based on model-data comparisons at stations P03-P06. The EPA model shows little response to river flow at these stations, which may be due to the high assigned SOD rates that are assigned in the EPA model.

FDEP Response 14.
FDEP will continue to work cooperatively with the stakeholders to resolve issues related to the SOD rates used in the WASP model by conducting additional model sensitivity runs and examining the potential use of other models before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 15.
It should be noted, that this model review is based on the information available. That is, the 1/12/2012 EPA model presentation and the various LSPC, EFDC and WASP model input files received to date. A more detailed review of the EPA modeling is recommended as complete documentation on the modeling effort is available. In order to make good management decisions regarding water quality in the Escambia/Pensacola Bay system, the modeling issues raised here and corrections that are needed should be addressed before any decisions are made.

FDEP Response 15.
The full EPA calibration documentation is available at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222). The FDEP recalibration documentation is available at (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP will continue to work cooperatively with the stakeholders to resolve issues related to the SOD rates used in the WASP model by conducting additional model sensitivity runs and examine the potential use of other models before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

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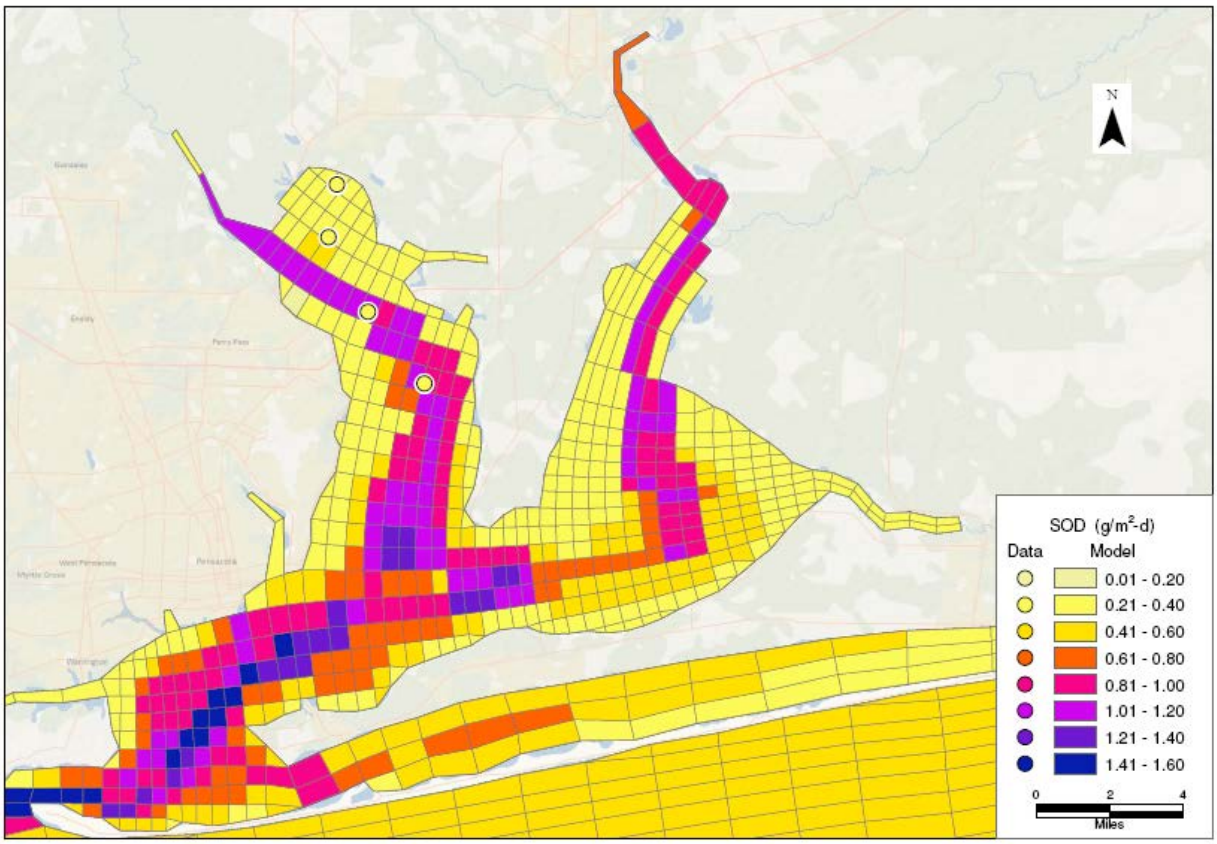
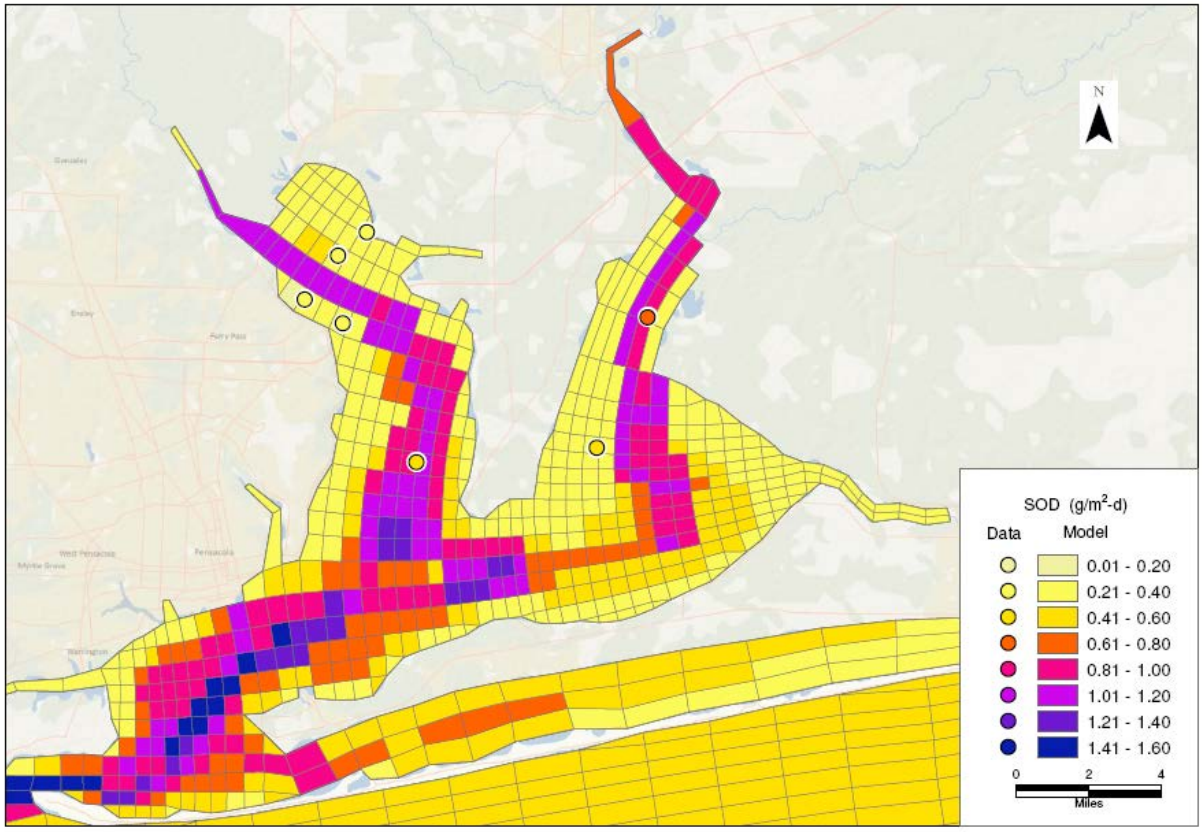


Sediment Oxygen Demand
WASP Model Input Versus Data at 20°C (9/1997)



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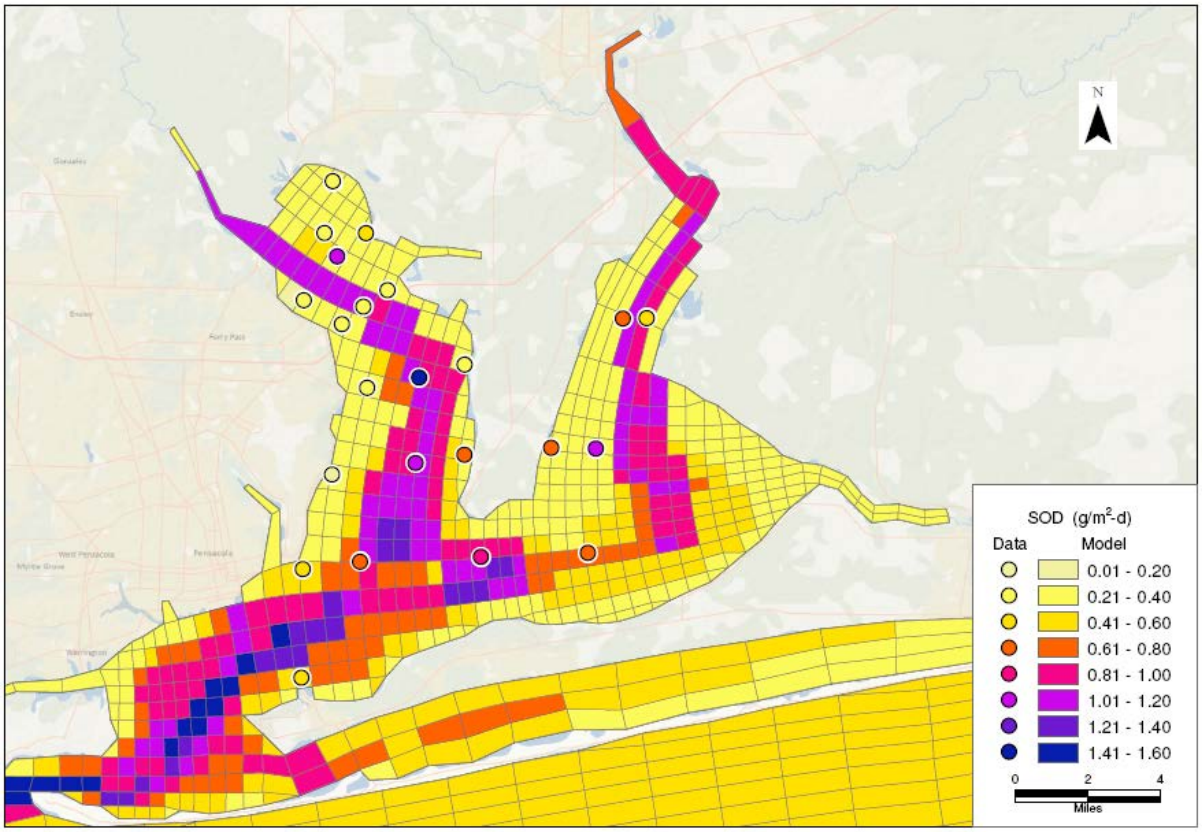

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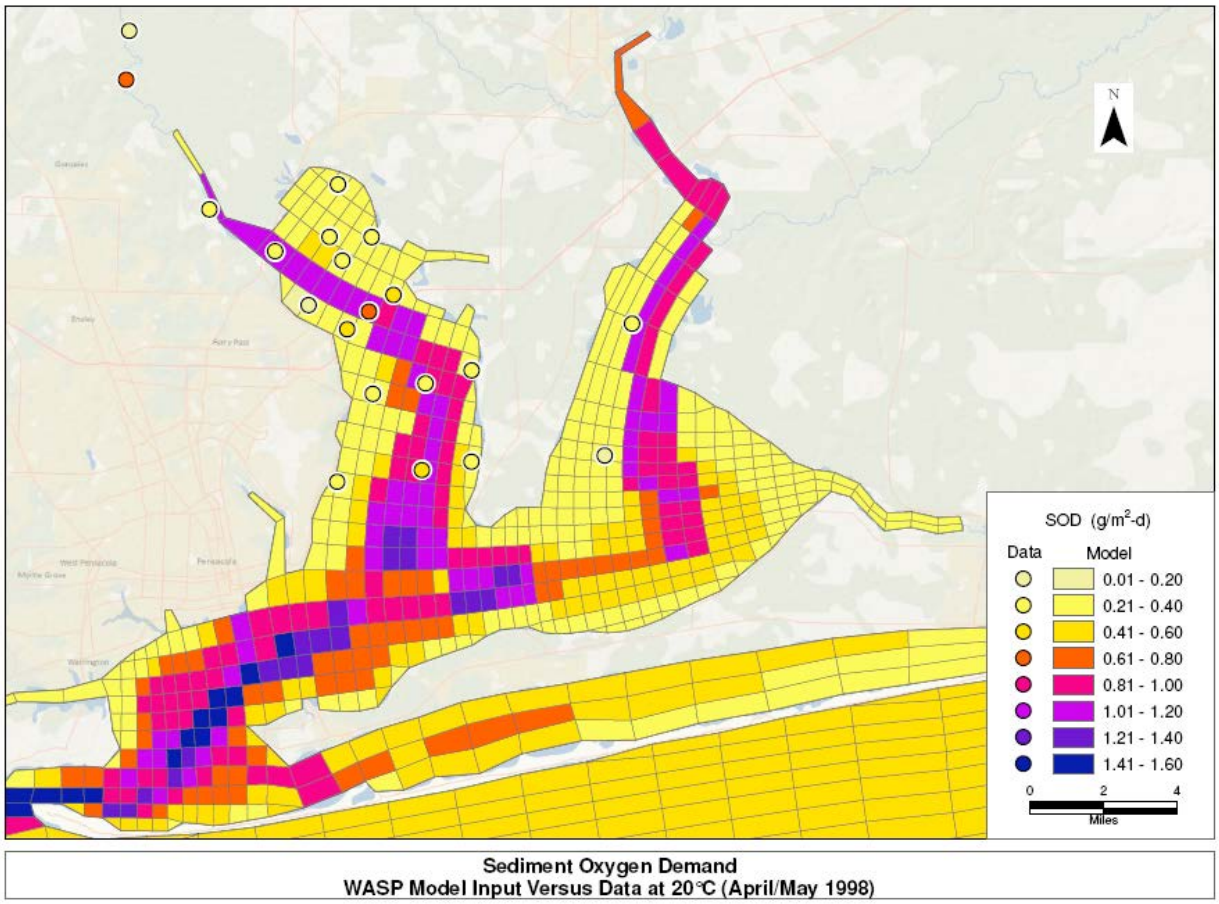

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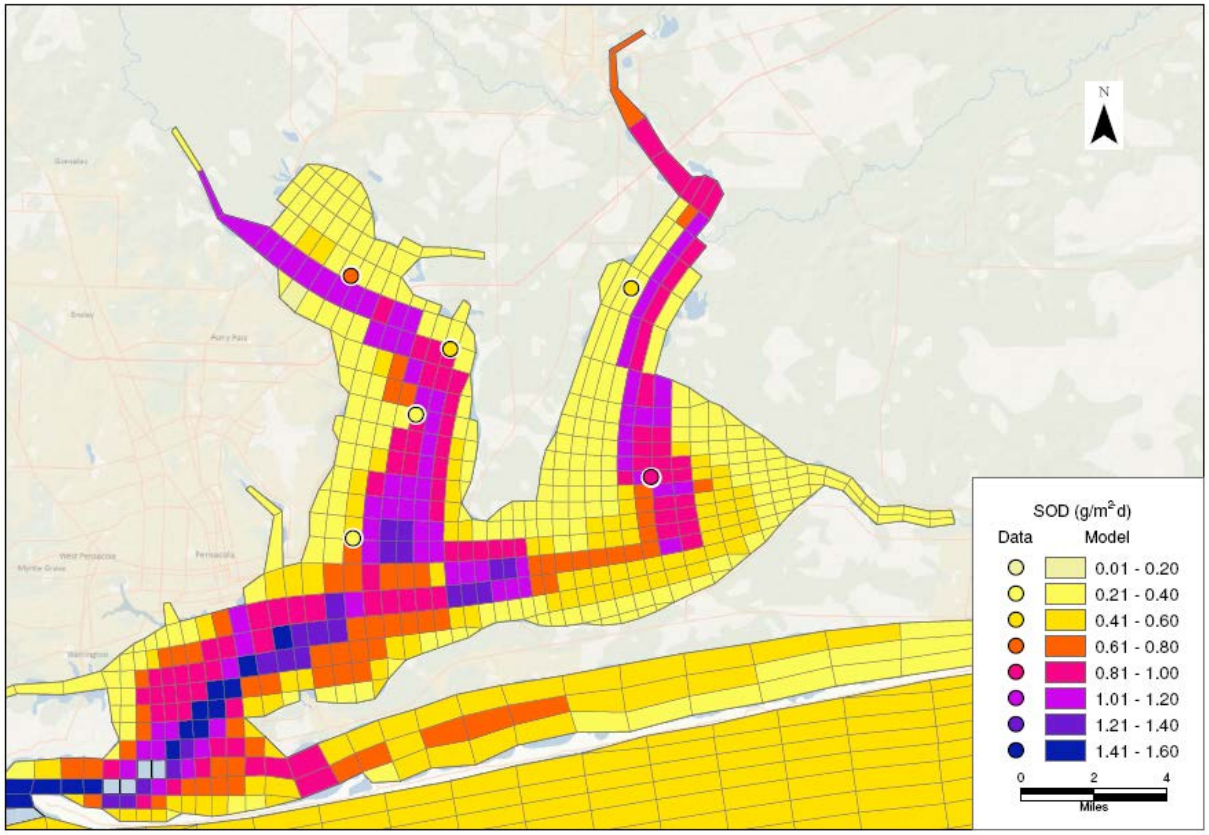

Sediment Oxygen Demand
WASP Model Input Versus Data at 20 ℃ (2010)

HDR September 14, 2012 Letter

September 14, 2012

Comments by HDR HydroQual on behalf of:

Gulf Power Company
Georgia-Pacific
Emerald Coast Utilities Authority
Taminco Inc. Pensacola, FL

Re: Review of the FDEP Draft Nutrient & Dissolved Oxygen TMDL Report

We have reviewed the following Florida Department of Environmental Protection (FDEP) draft nutrient and dissolved oxygen (DO) TMDL report for impaired WBIDs in the Pensacola Bay system. Nutrient TMDLs: North Escambia Bay WBID 548AA; Judges Bayou WBID 493B; Bayou Chico WBID 846C; Bayou Chico WBID 846; and Dissolved Oxygen TMDL: Judges Bayou WBID 493A; August 15, 2012

Section 2.3.3 – Escambia Bay (WBID 548AA) Impairments
The historic minimum chl-a level is based on the lowest 5-year average for the period of record. Calculation of a 5-year average requires that there must be annual means (must include data in all 4 quarters) from at least 3 years of the 5-year period. The annual average is then calculated by averaging each calendar quarter average. It is stated that FDEP reviewed the available data and established the chl-a target as 7.5 µg/L (50% above the historic minimum).

Draft TMDL Report Review September 14, 2012 Page 2
Since the chl-a target used for the TMDL is based on the historic minimum chl-a level and drives the entire TMDL and associated nutrient reductions, the following questions are posed.

HDR Comments 1.
From what 5-year period is the historic minimum chl-a level of 5 µg/L based on? From FDEP 303(d) verified impaired waters list information; it appears this period is 1975-1979.

FDEP Response 1.
FDEP would like to note that the TMDL target is not the historical minimum that was used as the impairment threshold, but rather a weight-of-evidence approach that considered this value and the relationship between CChla concentrations and seagrasses in the healthy portions of the estuary together with a margin of safety (see response to Comment 7 below). FDEP would also like to note that the original historical minimum as recorded in the FDEP 303(d) Verified List of impaired waters was 4.1 µg/L (50% above this would be 6.15 µg/L, not 7.5 µg/L). In order to address stakeholder concerns about detection limits, use of uncorrected Chlorophyll a results, and other data issues, FDEP had recalculated the historical minimum to be 5 µg/L for which a 50% increase would be 7.5 µg/L.

We also note that the 1998 WBID 548A was split into Class III marine (548AA) and Class II Marine (548AC).

The historical minimum was based on the period 1975–79, the data below is only from WBID 548AA.

Historical Minimum Uncorrected Chla, 1975–79

- = Empty cell/no data

-	Q1	Q2	Q3	Q4	Annual Avg
1975		170.5	1.0		NO
1976	1.1	1.0	1.0	5.6	2.2
1977	1.0	4.1	5.0	5.0	3.8
1978	8.8	5.0	6.3	5.4	6.4
1979	5.0	6.0	-	-	NO
Average	**-**	**-**	**-**	**-**	**4.1**

HDR Comment 2.
Is it from an earlier time period that either used a less precise chl-a technique or from a period when past toxic conditions in the upper bay inhibited phytoplankton growth?

FDEP Response 2.
The original historical minimum of 4.1 µg/L was based on data from 1975–79. In recognition of stakeholder concerns that toxic conditions in the bay during this period may have inhibited phytoplankton growth, FDEP looked at data from later periods and adjusted the historical minimum to 5 µg/L. This changed the impairment threshold from 6.15 µg/L to 7.5 µg/L.

HDR Comment 3.
Did the data used include both corrected and uncorrected chl-a measurement techniques?

FDEP Response 3.
The data qualifiers for corrected and uncorrected were not always correctly recorded during this time frame. It is presumed that at least some, if not all, of these data were uncorrected.

HDR Comment 4.
Would nutrient loads from this time period (i.e., when the historic minimum chl-a level was set) represent healthy conditions for the upper bay?

FDEP Response 4.
The historical minimum Chla used to establish the threshold for impairment is considered a one-sided test. In the case of nutrients, the listing threshold and the TMDL determination of assimilative capacity are independent. While the TMDL process is triggered by the listing, the restoration target can be above or below the listing threshold, depending on the determination of assimilative capacity. The model is set up to run for the period 2002–09. FDEP is pursuing a TMDL that utilizes the data from around the bay related to seagrasses as the target for restoration of the upper bay (see response to Comment 7 below) and a model calibrated to the 2002–09 period. The nutrient loading that represents healthy conditions in the bay would be the loading in the calibrated model that results in achieving all water quality standards and restoring designated uses.

HDR Comment 5.
Are nutrient loads from this period greater than they are currently?

FDEP Response 5.
The relationship between the historical loading (1975–79) and the 2002–09 nutrient loadings has not been explored, and, as noted above, would be immaterial.

HDR Comment 6.
The 2007 Draft TMDL for Nutrients in Escambia Bay WBID 548A (USEPA, 2007), discussed development of the historic minimum chl-a. It appears that both corrected and uncorrected chl-a data may have been used along with data extending back into the 1970s. The chl-a data presented were also from the old WBID 548A. WBID 548A has since been split into WBIDs 548AA (upper Escambia Bay) and 548AC (lower Escambia Bay). Lower Escambia Bay (WBID 548AC) will have lower chl-a levels than WBID 548AA and could impact the calculation of the historic minimum Chla.

a. Therefore, we request that the historic minimum chl-a be re-calculated with data from WBID 548AA using corrected chl-a data. This final chl-a dataset should also be provided for review. In order to assess whether Escambia River flow conditions could be affecting chl-a levels in North Escambia Bay, we analyzed Escambia River flow data from the USGS Century gage and chl-a data from North Escambia Bay (WBID 548AA) from 1973-2009. Figure 1 presents annual average chl-a with river flow presented as a percentile. The flow percentile was calculated by ranking the annual average river flow over the period of record (1935-2010). The historic minimum period (1975-1979) experienced higher flows than the more recent assessment period (2003-2009). The average flow percentile during the 1975-1979 historic minimum period is 77% with an average flow during this period of 8,751 cfs. During the assessment period (2003-2009), the average flow percentile is 49% with an average flow during this period of 5,990 cfs. Although there were years with similar flows but greater chl-a levels, the historic minimum period reflects a higher flow condition than the assessment period and may also contribute to the lower chl-a levels observed during the historic minimum period used to set the TMDL chl-a target of 7.5 µg/L.

FDEP Response 6.
The impairment in North Escambia Bay (WBID 548AA) is based on the Secretarial Adopted Verified List of Impaired Waters for the Group 4 Basins, November 2, 2010. Questions related to the derivation of the impairment threshold were most appropriate at the time of the listing. The Chla data utilized before 1980 could possibly include both corrected and uncorrected results. Subsequent to 1980, the data were properly identified so results can be easily interpreted. All data used in the original determination can be made available (IWR Run 22). While the overall average flow for the 1975–79 and 2002–09 periods are different, the model simulation contains both low flow years and high flow years. Running a model of this kind from the 1970s to current conditions in order to capture all combinations of flow is not practical or warranted.

HDR Comment 7.
Given, the potential issues with selecting a historic minimum period to set the TMDL chl-a target, we recommend that the TMDL chl-a target be revised based on an approach that considers the health of the bay (DO, light levels, algal blooms, biological data) similar to what we are using to assess nutrient loads with the HDR|HydroQual estuary model.

FDEP Response 7.
FDEP notes that the historical minimum was not selected as the final determinative target for restoration. FDEP believes that the Chla restoration target for North Escambia Bay is well founded. The TMDL target will be based on restoring healthy, well-balanced natural populations of flora and fauna from the effects of anthropogenic nutrient enrichment. As reported by FDEP (2012) seagrasses are one of the most nutrient sensitive biological endpoints in the bay. Therefore, the TMDL target for restoration will focus on determining the nutrient concentrations needed to achieve a chlorophyll-based target that will allow for healthy seagrass beds and otherwise result in meeting all nutrient related water quality standards.

In an estuary such as Pensacola Bay that is dominated by a large, alluvial river (Escambia River), it is important to recognize that the oligohaline zone (the lower salinity portion of the estuary where river water first enters the estuary) has very different ecological characteristics than the higher salinity areas in the lower reaches of the estuary that are more influenced by Gulf of Mexico waters. Because of their distinct ecological characteristics, there should be different expectations for nutrients, turbidity, chlorophyll, and biological productivity in these oligohaline areas. FDEP report notes that during the past 27 years, the annual geometric mean chlorophyll *a* (based on a minimum of 4 values per station per year) in Santa Rosa Sound, where healthy seagrass beds prevail, has ranged from 0.8 to 7.95 micrograms per liter (µg/L). Except for slightly higher values in certain bayous (Chico, Grande, and Texar), chlorophyll a in most of Pensacola Bay (lower Escambia Bay, East Bay, main Pensacola Bay) also had chlorophyll values in this range, suggesting that current nutrient and chlorophyll *a* conditions are appropriate for seagrass protection in these areas.

In establishing the target for the TMDL, it is important to consider that low salinity areas (i.e., areas where freshwater rivers initially mix with more saline estuarine waters) may be expected to exhibit higher nutrient and chlorophyll a levels than higher salinity open water areas. For this reason, FDEP believes that a CChla target in the upper end of the range (0.8 µg/L – 7.95 µg/L) would be appropriate for the oligohaline waters of North Escambia Bay. Because chlorophyll *a* annual average concentrations less than 7.95 µg/L are not expected to interfere with the ability of submerged aquatic vegetation (SAV) to photosynthesize, targeting nutrient concentrations that result in a long-term annual average CChla concentration below this level will result in a level of production that represents a healthy system.

The target for the TMDL will be to reduce the long-term (2002–09) annual average CChla in WBID 548AA in the FDEP version of WASP from the current level in the calibrated model of 10.07 µg/L to a long-term annual average concentration of less than 7.95 µg/L and to provide for a margin of safety. In addition, as to use of the CChla target of less than 7.95 µg/L in North Escambia Bay, FDEP will utilize other endpoints to assure that water quality standards are met throughout the bay system. These additional endpoints will include DO, light availability, and the potential for algal blooms.

HDR Comment 8.
Section 2.7 – North Escambia Bay Data (WBID 548AA)
Water quality data from North Escambia Bay (WBID 548AA) are presented in the report to show trends in the chl-a, total nitrogen (TN) and total phosphorus (TP) data from the period of record. In order to highlight these trends, FDEP IWR data from Run 45 were extracted from the database and are presented in Figures 2 and 3. Figure 2 presents the North Escambia Bay (WBID 548AA) data and Figure 3 presents data from the lower Escambia River (WBID 10D) to assess nutrient loads to the upper bay. The data in these figures are presented as quarterly

averages and for chl-a include both corrected and uncorrected data. The green line represents a linear regression of the data over time starting from 1975 (beginning of historic minimum 5-year period).

The data from North Escambia Bay show the increasing trend in chl-a data but relatively stable TN and TP levels (i.e., little to no trend). In order to see if nutrient loadings from the Escambia River may be increasing and the potential cause for the increasing chl-a trend, the FDEP data near Molino are presented in Figure 3. The Escambia River data show slightly decreasing or no trends in the chl- a, TN and TP data. Table 1 presents data averages for two periods based on the availability of North Escambia Bay chl-a data (1975-1994 and 1997-2012).

Table 1. Water Quality Data Summary Parameter Escambia River (WBID 10D) North Escambia Bay (WBID 548AA)

Parameter	Escambia River (WBID 10D) Time Period 1975–1994	Escambia River (WBID 10D) Time Period 1997–2012	North Escambia Bay (WBID 548AA) Time Period 1975–1994	North Escambia Bay (WBID 548AA) Time Period 1997–2012
Chl-a (µg/L)	4.2	2.3	7.8	11.1
TN (mg/L)	0.60	0.57	0.69	0.71
TP (mg/L)	0.048	0.037	0.043	0.045

Based on the data presented in the draft FDEP TMDL report and summarized here, there does not appear to be any correlation between North Escambia Bay chl-a and nutrient levels (i.e., increasing trend in chl-a with small to no increases in nutrients). In the Escambia River, nutrient levels have been decreasing over time and, therefore, would not seem to be driving the increases in chl-a in North Escambia Bay. The stakeholders propose to work with the Department to further understand this apparent disconnect between nutrient and chl-a levels in North Escambia Bay to ensure the best TMDL is proposed.

FDEP Response 8.
FDEP appreciates the commitment of the stakeholders to work with FDEP and has revised Chapter 7 of the TMDL report to reflect the FDEP commitment to continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 9.
Chapter 5 – Determination of Assimilative Capacity
We request copies of the three EPA Technical Support Document references (USEPA 2012a,b,c) that present the various models developed to support the EPA marine nutrient criteria and FDEP draft TMDL development.

FDEP Response 9.
The EPA has made available to the public copies of all documentation for the Pensacola Bay and watershed modeling at (http://www.regulations.gov/#!docketDetail;D-epa-hq-ow-2010-0222).

HDR Comment 10.
We previously submitted comments on the EPA models used to complete the FDEP draft TMDL (HDR|HydroQual Technical Memorandum dated 7/27/2012) and by reference re-state those comments here.

FDEP Response 10.
See Comments to July 27, 2012 Technical Memorandum above.

HDR Comment 11.
Draft TMDL Report Review September 14, 2012 Page 4
Section 5.3.2 – Judges Bayou (WBIDs 493A and 493B)
The reference condition approach used to address the DO impairment in the freshwater tributaries may not guarantee DO improvements if the low DO is not related to nitrogen loading. Given the large TN reduction identified in the draft TMDL (74%), further investigation is warranted to relate nitrogen loading to the DO impairment.

FDEP Response 11.
The EPA provided FDEP with an LSPC and WASP model for this (Judges Bayou) watershed. This model provides an additional line of evidence that reductions in watershed loadings of nitrogen will result in increases in the stream DO. Copies of these models and the preliminary results will be provided upon request.

HDR Comment 12.
Section 5.3.3 – TMDL North Escambia Bay (WBID 548AA)
Since the chl-a target used for the TMDL drives the entire TMDL and associated nutrient reductions, we are again recommending that the TMDL chl-a target be revised based on an approach that considers the health of the bay (DO, light levels, algal blooms, biological data) similar to what we are using to assess nutrient loads with the HDR|HydroQual estuary model.

FDEP Response 12.
See FDEP Response 7 above.

HDR Comment 13.
We would like to work with the Department to resolve the issues with data availability in North Escambia Bay (WBID 548AA). This will help ensure that proper endpoints are set for the TMDL. Since much of the available chl-a data in North Escambia Bay is primarily from one station near Floridatown at the end of a pier in shallow water (Station A4), the use of this data to represent the entire North Escambia Bay WBID for assessment purposes is questionable. Although there are some datasets that suggest Station A4 data are similar or less than a true North Escambia Bay wide average, there are other datasets that suggest the Station A4 data are greater than a true bay wide average. For example, the FDEP October 2011 chl-a results show higher chl-a levels at Station A4 than the bay wide average. Further effort is required to resolve the data issues associated with the Station A4 data and determination of a bay wide average.

FDEP Response 13.
FDEP notes that at any particular point in time Chla results at two different stations in WBID 548AA can be different; on one day, one station is higher, on another day it is a different station. The patchy nature of Chla concentrations in this area of the bay is well documented. FDEP provided a detailed examination of the temporal and spatial differences in Chla data in the

impaired WBID. Based on that evaluation we do not see a significant station bias in the results. FDEP appreciates the commitment of the stakeholders to work with FDEP to resolve this issue and has revised Chapter 7 of the TMDL report to reflect the FDEP commitment to continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 14.
Results from the LSPC watershed model significantly over-predict the observed Escambia River TN loads (particularly during the 2002-2009 TMDL period) and may be the reason why EPA had to use a very high algal nitrogen:carbon ratio (0.4) to calibrate the bay model. During this same time period, the LSPC watershed model also over-predicts the observed river TP loads. These LSCP watershed model loading issues should be resolved before proceeding with the TMDL in addition to using the correct Brewton Mill loads provided to FDEP in June.

FDEP Response 14.
FDEP has incorporated the correct Brewton Mill loads into the LSPC model. FDEP will continue working with stakeholders to address the calibration of LSPC and the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 15.
EPA/DEP WASP Calibration (WBID 548AA) – page 104
In order to use the EPA bay models to complete the TMDL, FDEP modified various model parameters so that the model calculated chl-a levels in North Escambia Bay better reproduced the data at Stations A4 (near shore) and PO2 (mid-bay). A summary of the original EPA and revised FDEP chl-a calibration results at these stations is presented in Table 2. In general, the FDEP revised calibration improved the comparison to chl-a data at Station A4 (model minus data difference of 1.8 µg/L by FDEP vs. -4.7 µg/L by EPA) but the comparison at Station PO2 is too high for 2 out of the 3 years. More importantly, when reviewing the time-series model calibration to the observed data at Stations A4 and PO2, the FDEP revised model over-calculates the observed nutrient data. In addition, in an effort to improve the model calibration in North Escambia Bay, the FDEP revised calibration significantly over-calculates chl-a and nutrients in the rest of the Pensacola Bay system (Escambia River, lower Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay and Santa Rosa Sound) based on model-data results presented in Appendix E.8. Besides presenting the nutrient and chl-a FDEP revised calibration, it is requested that the FDEP revised calibration for DO also be provided for review since DO is also an integral component of the nutrient TMDL.

Table 2. Summary of EPA & FDEP Model Chl-a Calibration

[- = Empty cell/no data]

Year	Station PO2 Observed	Station PO2 Original EPA Model Calculated	Station PO2 Revised FDEP Model Calculated	Station A4 Observed	Station A4 Original EPA Model Calculated	Station A4 Revised FDEP Model Calculated
2002	14.47	4.92	11.07	11.40	5.70	12.79
2003	3.91	5.01	8.18	13.05	8.24	14.54
2004	5.77	5.00	8.87	13.33	6.69	12.57
2005	-	4.69	7.59	8.62	7.21	12.44
2006	-	5.44	13.84	14.27	6.04	15.66
2007	-	5.85	11.87	11.05	6.79	13.50
2007	-	5.80	10.77	13.15	7.21	13.43
2008	-	5.27	9.03	7.85	7.10	12.31

Given the model over-prediction of nutrients and chl-a in other parts of the bay brings into question whether the better agreement with the chl-a data at Station A4 in the upper bay is really driven by the increased chl-a levels calculated in the rest of the bay system. That is, does the significant over- calculation of nutrients and chl-a in other parts of the bay, coupled with tidal mixing, cause the model calculation of higher chl-a levels in North Escambia Bay? If this is the case, then the cause for the higher chl-a levels in the upper bay at Station A4 is still not known, particularly with observed nutrient levels either remaining the same or decreasing over time.

FDEP Response 15.
Subsequent to the August Public Workshop, FDEP continued working with stakeholders and to refine the model calibration. As a result, the current calibrated version of WASP addresses many of the concerns expressed above. The revised model reports have been reposted and are available at: (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP is working with Region 4 EPA to provide the requested DO calibration information.

HDR Comment 16.
On the top of page 107, there is a discussion on the various load reduction scenarios completed when trying to determine the TMDL loads to meet the chl-a target in the upper bay. It appears that TN reductions and TN/TP reductions did not result in chl-a reductions over just TP reductions alone, which is noted to be potentially due to the model over calculating nitrogen. Also, TP reductions from just the Escambia River (including Bayou Mulatto and Indian Bayou) were not possible to achieve the chl-a target because the reductions would be lower than the non- anthropogenic condition. The only way to achieve the 7.5 µg/L chl-a target was to reduce TP loads by 35% from the entire Pensacola Bay watershed. This result does not seem correct considering that the upper bay is probably more controlled by circulation and nutrient loads from the Escambia River and surrounding watersheds than nutrient loads from the rest of the Pensacola Bay watershed.

FDEP Response 16.
Both the measured data and the model simulations indicate that phosphorus is the limiting nutrient and that nitrogen is in surplus in the bay. This is the primary factor why the addition of nitrogen alone does not result in any measurable increase in Chla concentrations. While the nutrient loads and water flows from the Escambia River are certainly among the major factors

controlling Chla in the upper bay, the modeling has shown that the system is an interconnected estuary and that it is the cumulative impact from all sources that must be addressed.

HDR Comment 18.
Draft TMDL Report Review September 14, 2012 Page 6
Again, is this modeling result (35% TP reduction from all loads to the Pensacola Bay system) due to the fact that the FDEP revised model over-calculates nutrients and chl-a throughout the bay system.

Due to the over-calculation of nutrients and chl-a in all other areas of the Pensacola Bay system except for North Escambia Bay, the FDEP revised model is not suitable for use in determination of the TMDL. Further effort is needed to better understand the processes controlling nutrient dynamics and chl-a growth in North Escambia Bay and proper representation of these processes are needed to ensure the best criteria are proposed for the TMDL.

FDEP Response 18.
Subsequent to the August Public Workshop, FDEP continued working with stakeholders and to refine the model calibration. As a result, the current calibrated version of WASP addresses many of the concerns expressed above. The revised model reports have been reposted and are available at: (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm).

HDR Comment 19.
Chapter 6 – Determination of the TMDL
On page 116, the TP load reduction is applied equally to the stateline for Alabama loads while the load reductions were determined based on where the watersheds loads enter the bay system. Since there may be nutrient loss from the stateline to the mouth of the Escambia River (i.e., “pour point”), potential TP reductions at the stateline may be lower than that required at the “pour point”. This would also be applicable for allocations assigned to the stateline for the Blackwater River and at other upstream locations in the contributing watersheds.

FDEP Response 19.
FDEP acknowledges this concern and is committed to work within the BMAP process to establish the most equitable and cost effective manner to allocate any nutrient reductions required of Alabama under the LA component of the TMDL. One series of model simulations could be to reduce nutrients within LSPC at the state line instead of at the “pour points” to determine appropriate levels of reductions, if any. Alternatively, it may be possible that the reduced loads at the pour points can be hindcast to predict the initial loads at the state line.

HDR Comment 20.

The following summarizes our major comments on the draft TMDL.

Given, the potential issues with selecting a historic minimum period to set the TMDL chl-a target, we recommend that the TMDL chl-a target be revised based on an approach that considers the health of the bay (DO, light levels, algal blooms, biological data) similar to what we are using to assess nutrient loads with the HDR|HydroQual estuary model.

FDEP Response 21.
See FDEP responses to HDR Comments 1, 3, 6, 7, and 12.

HDR Comment 22.
Based on available North Escambia Bay data, there does not appear to be any correlation between upper bay chl-a and nutrient levels (i.e., increasing trend in chl-a with small to no increases in nutrients). This apparent disconnect between nutrient and chl-a levels in North Escambia Bay needs to be resolved to ensure the best TMDL is proposed.

FDEP Response 22.
Both the measured data and the model simulations indicate that phosphorus is the limiting nutrient and that nitrogen is in surplus in the bay. Given that North Escambia Bay is believed to be phosphorus limited, it is not unreasonable to conclude that all available phosphorus is utilized to grow phytoplankton. Conversely, the non limiting nutrient nitrogen, being in surplus, is found like Chla to be increasing over time. Further evidence of this is that the model results indicate that if you add nitrogen, without additional phosphorus, the Chla does not respond and nitrogen concentrations simply increase. If you add phosphorus but keep nitrogen the same, the Chla concentrations increase. FDEP will continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 23.
The issues with data availability in North Escambia Bay (WBID 548AA) should be better resolved to ensure development of a proper TMDL. Since much of the available chl-a data in North Escambia Bay is primarily from one station near Floridatown, the use of this data to represent the entire North Escambia Bay WBID for assessment purposes is questionable. Further effort is required to resolve the data issues associated with the Station A4 data and determination of a bay wide average.

FDEP Response 23.
FDEP will continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.

HDR Comment 24.
Given the model over-prediction of nutrients and chl-a in other parts of the bay brings into question whether the better agreement with the chl-a data at Station A4 in the upper bay is really driven by the increased chl-a levels calculated in the rest of the bay system. This model over-prediction of nutrients and chl-a coupled with the need to reduce TP loads by 35% from the entire Pensacola Bay watershed to achieve the 7.5 µg/L chl-a target is at odds with the general understanding that the upper bay is probably more controlled by circulation and nutrient loads from the Escambia River and surrounding watersheds.

FDEP Response 24.
Subsequent to the August Public Workshop, FDEP continued working with stakeholders to refine the model calibration and target selection. See response to Comment 7 above for an explanation of the target selection. As a result, the current calibrated version of WASP addresses many of the concerns expressed above. The revised model reports have been reposted and are available at: (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm).

HDR Comment 25.
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Due to the over-calculation of nutrients and chl-a in all other areas of the Pensacola Bay system, the FDEP revised model is not suitable for use in determination of the TMDL. Further effort is needed to better understand the processes controlling nutrient dynamics and chl-a growth in North Escambia Bay and proper representation of these processes in the model. The stakeholders propose working together with the Department to ensure that the TMDL has the appropriate endpoints.

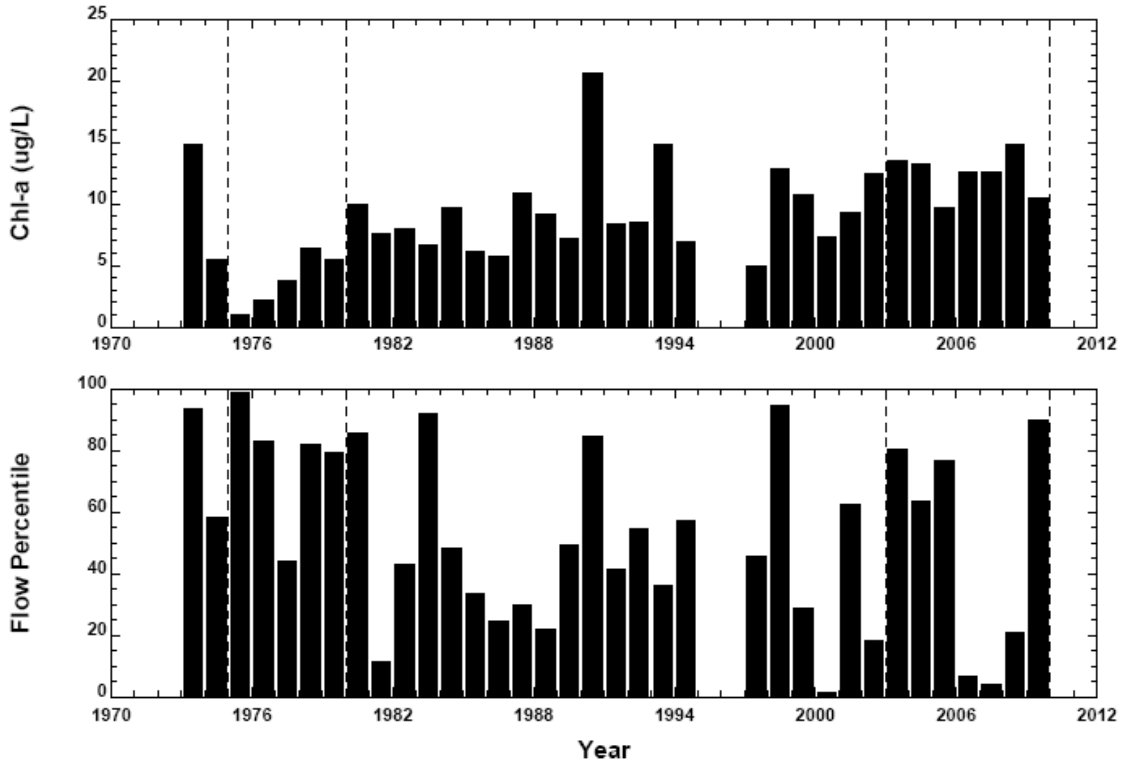

Figure 1. Upper Escambia Bay Annual Average Chl-a and Flow Percentile (1973-2009)
(FDEP IWR Database Run 45 for WBID 548AA and USGS at Century)

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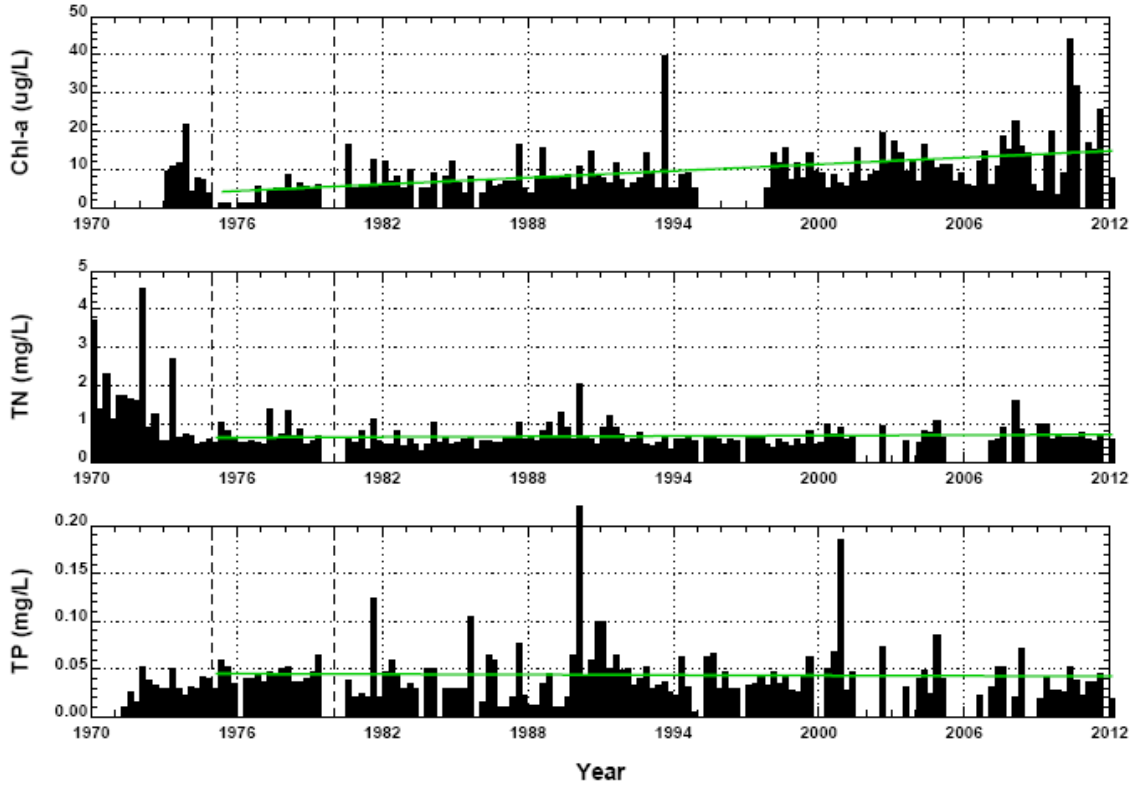

Figure 2. Upper Escambia Bay Chl-a, TN and TP Quarterly Average Data (1970-2011)
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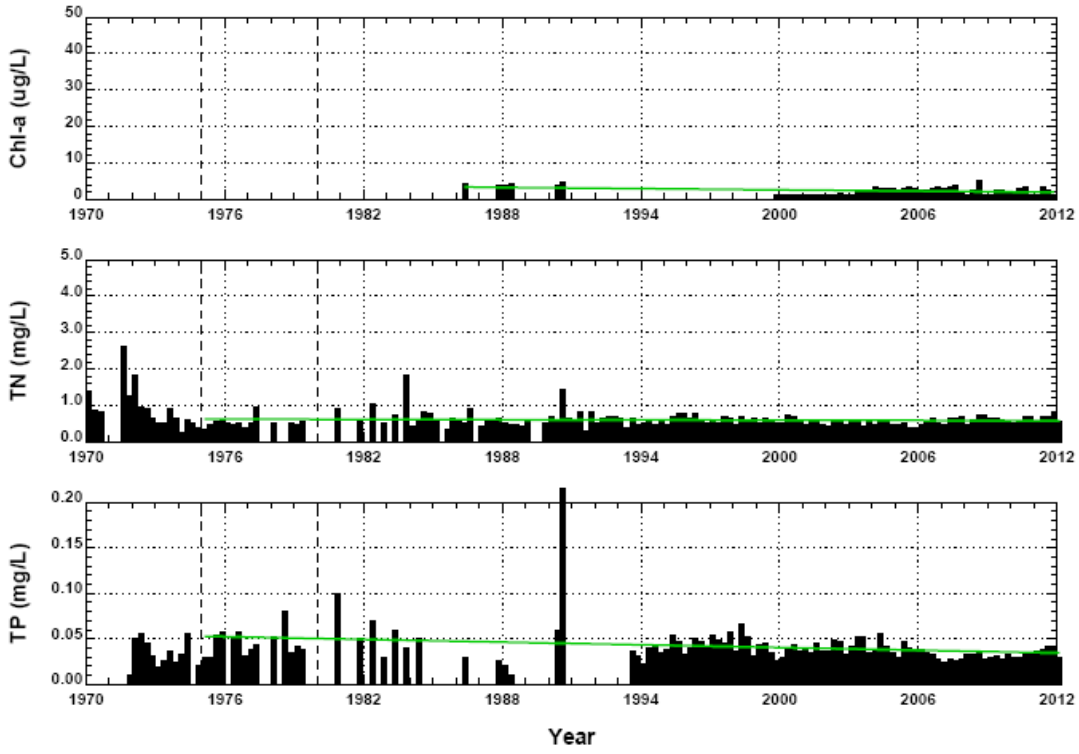

Figure 3. Escambia River Chl-a, TN and TP Quarterly Average Data (1970-2011)
(FDEP IWR Database Run45 WBID 10D)

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FDEP Response 25.
Subsequent to the August Public Workshop, FDEP continued working with stakeholders and to refine the model calibration. As a result, the current calibrated version of WASP addresses many of the concerns expressed above. The revised model reports have been reposted and are available at: (http://www.dep.state.fl.us/water/tmdl/repost_tmdl.htm). FDEP will continue working with stakeholders to address the need for any additional studies and model refinements before making detailed allocations to the WLA stormwater and LA components of the TMDL. This approach is pursuant to Paragraph 403.067(6)(b), Florida Statutes.