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Response to Public Comments

TMDL Responsiveness Summary for TMDLs Proposed 2012

- WBIDs 2213P1 & 2213P2 Ortega and Cedar River

July 2013

Region 4

Atlanta, GA

Contents

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Numeric Nutrient Criteria Development

General response to comments regarding status of NNC in Florida:

Commenter's on this TMDL and other proposed TMDLs addressing nutrients in Florida have raised questions about whether and how these TMDLs are impacted by ongoing activities to establish numeric nutrient criteria in Florida.

In 1979, FDEP adopted narrative criteria for nutrients applicable to waters designated as Class I (Potable Water Supply), Class II (Shellfish Propagation or Harvesting), and Class III (Recreation and for propagation and maintenance of a healthy, well-balanced population of fish and wildlife). See paragraphs 62-302.530(47)(a) and (b), F.A.C. FDEP recently adopted numeric nutrient criteria (NNC) for many Class I, II, and III waters in the state, including streams. See sections 62-302.531 and .532, F.A.C. The State's NNC numerically interpret part of the state narrative criteria for nutrients, at paragraph 62-302.530(47)(b), F.A.C., which provides that nutrients may not cause an imbalance of flora and fauna. FDEP submitted its NNC to EPA for review pursuant to section 303(c) of the CWA and on November 30, 2012, EPA approved those criteria as consistent with the requirements of the CWA. The state criteria, however, are not yet effective for state law purposes.

Also, in November 2010, EPA promulgated numeric nutrient criteria for Class III inland waters in Florida, including streams, pursuant to a Consent Decree in Florida Wildlife Federation, et. al. v. EPA, No. 4:08-cv-00324-RH-WCS (N.D. Fla.). On February 18, 2012, the streams criteria were remanded back to EPA by the District Court for further explanation. On November 30, 2012, EPA re-proposed its stream NNC for those flowing waters not covered by Florida's NNC rule. Those criteria have not been finalized.

Therefore, for streams in Florida, the applicable nutrient water quality standard for CWA purposes remains the narrative criteria. While FDEP's nutrient rule is not yet effective for state law purposes, EPA believes that FDEP's numeric nutrient criteria represent FDEP's most recent interpretation of paragraph 62-302.530(47)(b), F.A.C. Also, the other part of the state narrative criteria for nutrients, at paragraph 62-302.530(47)(a), F.A.C., remains applicable to all Class I, II, and III waters in Florida.[1] Paragraph 62-302.530(47)(a) requires nutrients to be limited as necessary to prevent violations of other Florida water quality standards.

In developing the TMDLs for the consent decree, EPA considered both paragraphs 62-302.530(47)(a) and (b). The nutrient end point for these TMDLs represents the level of nutrients that will prevent nutrients from causing or contributing to nonattainment of the

[1] Paragraph 62-302.530(47)(a), F.A.C. will remain applicable to all Class I, II, and III waters even after FDEP's nutrient rule becomes effective. See subsection 62-302.531(1), F.A.C.

State's dissolved oxygen criteria pursuant to paragraph 62-302.530(47)(a). That endpoint, which requires that nutrients be reduced to natural background levels, was determined to be more stringent than the level of nutrients that may be necessary to prevent an imbalance of flora and fauna pursuant to paragraph 62-302.530(47)(b).

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General Comments on TMDLs

Mosaic

Comment:

Second, the Tampa Bay TMDLs appear to use as their regulatory target natural background conditions, rather than protection of designated use. The Clean Water Act authorizes EPA to set water quality criteria (and, by extension, TMDLs) to protect designated uses, not natural background conditions. *See* 33 U.S.C. § 1313(d)(1)(C) (authorizing states to establish TMDLs at levels to protect water quality standards); *see also, e.g.,* 40 C.F.R. §§ 131.11(a)(1), 131.3(b), 131,3(i) (defining water quality standards as consisting of, or as designed to protect, designated uses). In analogous circumstances, use of the wrong regulatory target to set water quality criteria has been found to be arbitrary and capricious. *See Florida Wildlife Federation v. Jackson,* 853 F. Supp. 1138, 1168,1169 (N.D. Fla. 2012) (striking as arbitrary and capricious EPA water quality criteria for Florida streams because EPA "aimed at the wrong target."). Thus, EPA's use of natural background conditions rather than designated use is legally, as well as technically, unjustified and without foundation.

Response:

The TMDL targets for the Tampa Bay area used the State of Florida's applicable water quality standards. In the case of these TMDLs the most restrictive water quality standard was the State's dissolved oxygen standard. Determining whether a waterbody is meeting its designated use is done by assessing the applicable water quality standards. In developing the TMDLs for the consent decree, EPA considered both paragraphs 62-302.530(47)(a) and (b). The nutrient end point for these TMDLs represents the level of nutrients that will prevent nutrients from causing or contributing to nonattainment of the State's dissolved oxygen criteria pursuant to paragraph 62-302.530(47)(a). That endpoint, which requires that nutrients be reduced to natural background levels, was determined to be more stringent than the level of nutrients that may be necessary to prevent an imbalance of flora and fauna pursuant to paragraph 62-302.530(47)(b).

Comment:

Third, as discussed in greater detail in the attached comments, EPA inappropriately based its TMDLs on the current FDEP DO criteria. *See* Fla. Admin. Code 62 302.530(30).

EPA is fully aware that this standard was established *forty* years ago, and FDEP has concluded that the criteria are no longer scientifically valid. FDEP is in the process of revising this standard, based on more recent and substantial scientific information on the biological impacts of DO on waterbodies. While FDEP has not yet finalized its revised DO

criteria, EPA absolutely could and should have made use of the more recent science that FDEP is relying on in setting a DO endpoint for these TMDLs.

To rely on a DO criterion that the Agency knows to be outdated when better and more reliable information and analysis is readily available, is not scientifically defensible and does not comport with the requirements of the Clean Water Act.

Response:

TMDLs are developed to the applicable water quality standards and cannot be used to establish a different water quality standard. There exists a separate process in establishing water quality standards. EPA does acknowledge that FDEP has begun the process of changing their dissolved oxygen criteria. Until this process is completed and approved by EPA pursuant to section 303(c) of the CWA, the current water quality standard for dissolved oxygen is effective for Clean Water Act purposes.

Comment:

1. The EPA proposed TMDLs fail to address the listed impairments or causative pollutants

The proposed TMDLs for all 18 WBIDs were derived using mechanistic models that assign nutrient loads based on achieving a natural DO condition (modeled DO concentrations in the absence of anthropogenic influence). In other words, the TMDL is based solely on achieving a certain DO condition. However, this approach ignores the listed impairments and causative pollutants for many of the subject waterbodies. In this set of 18 WBIDs, many different scenarios exist where EPA has failed to correctly address the listed impairments and/or causative pollutants.

For example, 11 of the 18 waterbodies are listed for nutrients based on current and/or historic chlorophyll-a concentrations along with listed impairments for DO, based on exceedances of the current DO standard (5.0 mg/L)[1]. The proposed TMDLs, while mentioning the established targets are DO and nutrients, do not in any way address the nutrient impairment separate from the DO impairment. The draft documents do not provide any evidence or explanation on how achieving the nutrient loads designed to address the DO impairment will also address the nutrient impairment based on chlorophyll-a concentrations. The mechanistic models used to develop the TMDLs assume a stoichiometric relationship between DO and nutrients that are used to predict a nutrient reduction target intended to increase DO levels. However, EPA provides no analysis in the TMDL documents identifying that any relationship between DO and nutrients exists in these waterbodies, and therefore no evidence that achieving the nutrient target will result in any effect on DO. Furthermore, EPA has provided no data or analysis to indicate that achieving the nutrient load targets proposed in the TMDLs will result in attainment of the

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chlorophyll- a thresholds set for fresh and estuarine waters in 62-303, F.A.C. By failing to equate nutrient concentrations and nutrient targets in these waterbodies with attainment of the chlorophyll-a thresholds (exceedances of which were the basis for the nutrient impairment listing), EPA has failed to derive meaningful TMDLs that address the impairment listings and provide scientifically defensible water quality goals.

Response:

When developing the TMDL, EPA has determined that the dissolved oxygen standard could not be met under a natural condition. This determination set all loadings of nutrients to a natural condition (no anthropogenic sources). Because Florida's regulations do not allow the abatement of natural conditions to meet water quality standards, EPA concludes that at the natural condition there are no other reductions needed because the dissolved oxygen standard represents the most sensitive endpoint.

Comment:

In addition to not addressing the nutrient impairments in the proposed TMDLs, EPA failed to utilize the most current information regarding some of the waterbodies. WBIDs 1498, 1513E, and 1513F are either not listed or have been delisted by FDEP for nutrients and DO; however, EPA, relying on outdated information, has proposed DO and nutrient TMDLs for these waterbodies. In the case of WBID 1498, the 1998 303(d) list of impaired waters lists the WBID as impaired for DO. As information from FDEP makes clear, during Florida's Group 1 Cycle 3 watershed assessment period, WBID 1498 was delisted for DO based on analysis that indicated the observed low DO was a natural condition and the waterbody exhibits a healthy biological community. This delisting was approved by Secretarial Order on February 12, 2013.

Response:

While some of these WBIDs have been placed in other categories of Florida's 303(d) list, they still remain listed for the purposes of the TMDL consent decree. All waterbodies were independently assessed by EPA and it was determined that they were impaired and TMDL needed to be developed.

Comment:

WBIDs 1513E and 1513F are new WBID designations resulting from splitting up the original WBID (1513) into two new WBIDs during the Group 1 Cycle 3 assessment period. WBID 1513 was included on EPA's 1998 303(d) list of impaired waters for DO and nutrients, but the two new WBIDs are not. In fact, FDEP lists WBIDs 1513E and 1513F as category 4d for DO (impaired but with no causative pollutant identified) and as category 3b (insufficient data) for nutrients. Under the Clean Water Act (CWA) and following EPA

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guidance, TMDLs are not required for category 4d or 3b listed waterbodies, only a category 5 listing requires TMDL development (FDEP 2012, see Table 7.5, pg. 120). Both of these designations (4d and 3b) require additional information and analysis to determine a causative pollutant or determine if the designated uses of the waterbody are attained. As described here, EPA has failed to accurately address the listed impairments for many of the waterbodies in the proposed TMDLs, and in at least a few cases has proposed TMDLs for waterbodies that are unnecessary. EPA should withdraw the proposed TMDLs until such time that the correct impairments can be addressed with analysis that reflects the most up to date information available for these waterbodies.

Response:

The listing category of 4D is a State of Florida listing category, where a causative pollutant could not be determined using their screen thresholds. While this is not category 5, it is not category 2 meeting designated uses and a TMDL has to be developed under the TMDL consent decree.

Comment:

2. It is inappropriate for EPA to base the proposed TMDLs on "natural conditions;" instead, achieving and maintaining Designated Uses must be the target.

In all five TMDL documents, EPA's mechanistic modeling exercise concludes Florida's current DO standard cannot be achieved without abating natural conditions. EPA states that their natural conditions modeling scenario (removal of all anthropogenic influence) results in DO concentrations that are still below the current DO standard. Therefore, EPA concludes the appropriate target would be to set the TMDL to achieve the "natural condition" instead of the water quality standard.

Section 303(d) of the federal Clean Water Act and the Florida Watershed Restoration Act state that TMDLs must be developed for all waters that are not meeting their designated uses (FDEP 2003). Further, a TMDL is defined by FDEP as maximum amount of a given pollutant that a water body can absorb and still maintain its designated uses (FDEP 2003). The waterbodies addressed in the proposed TMDLs are designated as Class II or III marine and fresh waters that have designated uses defined as shellfish propagation or harvesting (Class II) or fish consumption; recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife (Class III).

Response:

As previously stated above, EPA did not target natural conditions for these TMDLs. The State of Florida's dissolved oxygen criteria was used to determine the allowable a load.

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Because the dissolved oxygen criterion could not be met under the natural condition, there is no assimilative capacity for any anthropogenic sources.

Comment:

In the proposed TMDL documents, EPA has provided no support to equate the natural conditions modeling scenario with designated uses. TMDLs are set to achieve and maintain designated uses, not to achieve natural conditions. Therefore, EPA is aiming for the wrong target by deriving TMDLs for these waterbodies that are intended to achieve natural conditions.

Response:

See response above.

Comment:

Based on EPA's own analysis that indicates the current DO criterion cannot be met in these waterbodies, and that EPA has no basis for using "natural conditions" as a surrogate for designated use, EPA must present an alternate basis for setting a TMDL. EPA should evaluate the observed DO data in these waterbodies against the FDEP proposed DO criteria (FDEP 2013) that is expected to be finalized as soon as this month. Many of these waterbodies may currently achieve the proposed criteria, which will make them a candidate for delisting and render these proposed TMDLs inaccurate and moot. In cases where the waterbody may not meet the proposed DO criteria, a proposed TMDL set to achieve the revised DO standard would be more appropriate.

EPA should postpone development of these TMDLs until the FDEP has finalized the proposed DO criterion, or if EPA is compelled to develop these TMDLs now, the proposed criteria should be used as the target. Under the CWA, EPA is required to use the best available science to make sound regulatory decisions. FDEP and EPA are fully aware the existing DO criterion is 40 years old and was based on limited scientific information regarding the response of warm water species to low DO conditions (FDEP 2013). Many of Florida's minimally disturbed and healthy fresh and marine water systems naturally have DO that falls below the existing DO criteria (FDEP 2013). FDEP concluded that given the variety of physical, biological, chemical, and climatological factors that are capable of producing waters with naturally low DO conditions, the current DO criteria are overly simplistic and do not accurately reflect natural variability in DO or thresholds necessary to protect aquatic life (FDEP 2013). The proposed criteria represent the best available science using recently collected data in Florida's minimally disturbed waterbodies and were derived based on the low DO tolerances of Florida specific organisms. Any DO TMDL proposed by EPA needs to utilize the best available science reflected in the proposed DO criteria instead of the current, outdated, scientifically flawed

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DO criterion. Based on the fact that EPA has used the wrong regulatory target to derive these proposed TMDLs and that the existing DO criteria are known to be flawed and in the process of revision (FDEP 2013), EPA should withdraw these proposed TMDLs and revisit the impairment status of these waterbodies with respect to the proposed DO standard. Only after employing a scientifically defensible target, utilizing the best available science, can the determination be made on which waterbodies need a TMDL and what action should be taken.

Response:

These TMDLs were developed to the applicable water quality standard for dissolved oxygen for Clean Water Act purposes. EPA does acknowledge that the State of Florida has begun the process to change the dissolved oxygen standard, when and if this new standard is approved for Clean Water Act purposes, this TMDL can be reevaluated.

Comment:

3. The mechanistic models used by EPA are not properly documented, are poorly calibrated, and do not address the uncertainty of modeling results; thus, the proposed TMDL load allocations and reductions are flawed.

All five proposed TMDLs employ a mechanistic modeling approach to developing load and wasteload allocations for nutrients (total nitrogen and/or total phosphorus) intended to address a listed nutrient and/or dissolved oxygen impairment. The models used in the approach are a combination of models: LSPC (watershed), EFDC (surface water), and WASP7 (water quality). The use of these models to justify specific load allocations and reductions for the 18 waterbodies is fundamentally flawed. First, EPA does not present proper documentation of the detailed structural and parameter assumptions that were made during model building. Second, model predictions are often very poor, with the model both under and overestimating key parameters in certain WBIDs according to the calibration results. Finally, the authors of the TMDL reports do not quantify model uncertainty and how that uncertainty affects the confidence we should have in the resulting load allocations and reductions.

a. EPA does not present model documentation

Each of the TMDL reports refers to the mechanistic models as a subset of the Tampa Bay model used for the EPA estuarine numeric nutrient criteria development, citing EPA Technical Support documents (USEPA 2012a and 2012b). However, review of the referenced TSDs reveal that while general information on the model setup (common to all Florida estuaries) was given in USEPA 2012a, there is no Tampa Bay specific information contained in either document because EPA chose not to propose its own estuarine criteria

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for Tampa Bay using this methodology. Instead, EPA accepted the values finalized by FDEP for Tampa Bay, which were based on an estuary-specific model that were specifically developed for the Tampa Bay estuary and its tributaries; the FDEP model may be a more appropriate basis for the proposed TMDLs than EPA's methodology. Because EPA did not finalize the Tampa Bay model for use in the proposed numeric nutrient criteria, it has provided no detailed documentation on how the Tampa Bay model, and consequently the models for these 5 TMDLs, was constructed. It is critical to the review and evaluation of any model to know how input parameters are defined, how they are averaged over space and time, how sensitive they are to deviations from assumed literature values, and how well- calibrated the final model is to observed data. The models used in these TMDL reports need a large number of input parameters, such as spatially-explicit soils, climate, and landuse or estimated chemical and physical ratios based on literature values. These input parameters may be difficult to or are rarely measured, exhibit a high degree of spatial heterogeneity, or may be especially sensitive. Averaging these values over space and time, or worse, using literature values collected in an unrelated system when observed data in Tampa Bay was not available, may mean that the resulting model is not representative of the actual system of interest (Shirmohammadi et al. 2006). The TMDL report authors do not provide any of the details needed to evaluate how decisions in input parameters, scaling, model algorithms, etc. have affected the overall uncertainty, accuracy, and applicability of the final model predictions of current and "natural" conditions.

Response:

The documentation for the development of the Tampa Bay wide models was available from EPA Region 4 upon request. Other commenter's were provided the documents. Furthermore all model input files were available during the commenting period. Literature values were not used to calibrate the EFDC/WASP models, the parameters and kinetic constants that were used in the model simulation were adjusted during the calibration process. For the watershed model many of the input data is spatially measured (soil type, landuse types, and meteorological conditions).

EPA routinely performs sensitivity analysis during the calibration process. What is presented to in the modeling report and/or in the development of the TMDL is best calibration to all observed data at all stations. A presentation of the sensitivity of model predictions to changes in constants and kinetics would not help in determining a TMDL as a set of conditions are needed for calculating a TMDL.

Comment:

b. Model predictions are often very poor for key parameters

One of the major flaws of these TMDL reports is that both the model calibration methodology and results are very poor. In these TMDL reports, the authors appear to

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verify model calibration by relying only a visual comparison of measured and modeled concentrations. (The authors may have performed other calibration exercises during the development of the original Tampa Bay model (USEPA 2012a), but they have provided no documentation on those specific methods or results for Tampa Bay in the Technical Support Document (USEPA 2012b).) Model performance can be and should have been calculated using standard arithmetic metrics (i.e. R-squared, standard error of the mean, bias, precision, etc.), so a rigorous evaluation of the ability of the model to reproduce the observed water quality can be performed. In addition, an examination of the limited calibration graphics in these

TMDLs indicate that the individual models often under or overestimate oxygen, nutrient, and chlorophyll concentrations compared to actual observed data. For example, the WASP model for Bullfrog Creek, 1666A, underestimates both measured total phosphorus (by 0.3 – 0.6 mg/L) and chlorophyll (by > 50 µg/L) concentrations, while the LSPC model overestimates observed dissolved oxygen concentrations for WBIDs 1489, 1522A, and 1534 (by 1 - 4 mg/L). Such poor calibration of model predictions under current condition scenarios compared to observed values can indicate the input data (soils, climate, water quality) is too limited, is not representative of the system, is scaled inappropriately, or is based on textbook assumptions that are not applicable in the system of interest. According to a study that reviewed how mechanistic models are used for TMDL applications, "many DO models are still not capable of simulating some of the most complex drivers of DO dynamics, partly because the scientific community does not yet fully understand these processes, and the models continue to require user−estimated inputs for these processes" (Muñoz-Carpena et al. 2006). Although the models used in these 5 TMDLs may be complex and capable of incorporating a wide variety of input data, a model is only valuable for regulatory use if it is able to realistically predict observed or theoretical conditions within an acceptable level of uncertainty. The poor calibration results of these 5 TMDLs mean that the model predictions are highly uncertain; using these results to quantify differences in current and natural scenarios is irresponsible.

Response:

EPA agrees that with just about any model application there is always room for improvement in the calibration. These TMDL models were calibrated to best represent average conditions; this is because the average condition will be evaluated for developing the TMDL.

EPA disagrees with the premise that water quality models are not capable of simulating the dissolved oxygen cycle. The commenter did not provide enough information to determine what element of the dissolved oxygen cycle is not represented.

Comment:

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c. EPA does not quantify model uncertainty and how that uncertainty affects the confidence we should have in the resulting load allocations and reductions

Muñoz-Carpena and others (2006) have expressed their concerns about how mechanistic models are used for TMDL applications and other regulatory purposes; their reviews included models (EFDC and WASP7) used by EPA in the five TMDLs we have discussed (Vellidis et al. 2006). The authors of the review had several important concerns that we feel are especially applicable to these 5 TMDLs for the Tampa Bay basin: a) authors overstate the power and understate the limitations of models, b) model selection should be adaptive and study-specific rather than using the same "toolbox" for every problem, and c) parameter sensitivity analysis and model uncertainty analysis of results are essential but rarely done. Robertson and others (2009) reiterates the importance of explicitly measuring and quantifying uncertainty in model predictions, discussing how predicted loads may differ superficially, but may not be statistically different when model uncertainty is taken into account. Model uncertainty analysis is particularly important for those TMDLs where the current condition and natural condition scenario dissolved oxygen predictions are almost identical (as seen in the dissolved oxygen cumulative distribution functions).

Response:

EPA does understand that it is critical to try to estimate uncertainty in model predictions. EPA relied on time variable mechanistic models to aid in the TMDL determination. These models were applied from 1997 through 2009, these long term simulations were conducted to account for meteorological variability and its impact on water quality. While it is possible to do uncertainty analysis at a single condition (steady state) there are no formal methods for conducting uncertainty analysis with time variable models. Instead of uncertainty analysis EPA routinely conducts sensitivity analysis of assumptions and parameters during the calibration process.

Comment:

The 2001 National Academy of Sciences report "Assessing the TMDL Approach to Water Quality Management" strongly recommends that EPA conduct an explicit uncertainty analysis as part of the TMDL process (NRC, 2001):

"The TMDL program currently accounts for the uncertainty embedded in the modeling exercise by applying a margin of safety (MOS); EPA should end the practice of arbitrary selection of the MOS and instead require uncertainty analysis as the basis for MOS determination. Because reduction of the MOS can potentially lead to a significant reduction in TMDL implementation cost, EPA should place a high priority on selecting and developing TMDL models with minimal forecast error."

The MOS is intended to reflect uncertainty in the forecast of the TMDL model(s). Despite the advice of the NRC (2001), EPA does not conduct an explicit analysis of uncertainty,

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and instead relies on simplistic assumptions of an implicit MOS "*since the TMDL targets for nutrients were set to natural background conditions."* EPA's implicit MOS assumes that the natural and current condition model scenarios are based on sound science and produce predictions that are comparable to observed data, an assumption that we have challenged in our discussion above. Thus, their implicit MOS provides no real assurance that their model-based allocations and reductions are realistic or would result in actual water quality improvements in the target waterbodies. To properly conduct an implicit MOS, the conservative model assumptions (e.g., model parameter choices) should reflect the uncertainty in these model assumptions/parameters, not the predicted endpoint (natural background conditions).

Given the complete lack of detailed parameterization information for these TMDL models, it is impossible for the reader to evaluate the model uncertainty in any detail. However, the poor calibration exhibited in the limited calibration analysis presented and the very minor differences in dissolved oxygen distributions between current and natural scenarios give very little support for the large percent load reductions that are proposed in these TMDLs. EPA should withdraw these TMDLs and perform a model sensitivity and uncertainty analysis to determine if the models are capable of realistically predicting current conditions and if the natural condition scenario is actually making predictions of dissolved oxygen that are statistically different from the current conditions scenario.

Response:

See previous response in regards to uncertainty analysis. As for the selection of an implicit margin of safety, the Clean Water Act defines it as a way to account for unknown information. It does not explicitly state that it should represent uncertainty in determination. EPA is aware of the comments from the National Academy of Sciences; EPA has asked the Academy for assistance in how to do the uncertainty analysis for time variable models and admitted they are no formal methods.

WBIDs 2213P1 & 2213P2 Ortega & Cedar River

General

Florida Department of Transportation

Comment:

3. Location maps are too small and are difficult to read.

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Response:

Comment noted. The current maps are able to demonstrate the current necessary data and will not be updated.

Comment:

2. The figure legends and axes are almost universally illegible particularly for the model calibration curves and presentations of data.

Response:

EPA believes that the figure legends and axes are legible.

Comment:

1. A glossary of acronyms is needed.

Response:

Acronyms used in the TMDL report are defined the first time they are used.

Source and Load Assessment

Florida Department of Transportation

Comment:

9. The land use specific discussions make statements regarding the relative event mean concentrations (EMCs) for each land use. For example, in Section 6.2.1, Urban Areas, there is a sentence that reads, "Land uses in this category typically have somewhat high total nitrogen event mean concentrations and average total phosphorus event mean concentrations." Literature values as well as values used in the model should be presented for each land use to validate these relative statements.

Response:

Modeling coefficients for each land use can be found in the models, which are available as part of the administrative record. Modeling coefficients were adjusted (within range of literature) to calibrate the watershed model to observed condition. Literature values reviewed include: USEPA. 1985. Rates, Constants, and Kinetics. Formulations in Surface Water Quality Modeling. 2nd ed. EPA/600/3-85/040. U.S. Environmental Protection Agency, Environmental Research Laboratory., Athens, GA. USEPA. 2000. BASINS Technical Note 6. Estimating Hydrology and Hydraulic Parameters for HSPF. EPA-823-R00-012. U.S. Environmental Protection Agency, Office of Water, Washington, DC. USEPA. 2006. BASINS Technical Note 8. Sediment Parameter and Calibration

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Guidance for HSPF. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Endpoints/Water Quality Targets

Florida Department of Transportation

Comment:

4. Section 4.1.1 identifies the TMDL target as levels of nutrients to prevent violations of Florida's DO criterion. The actual target presented is a "natural condition" for which there are still about 35 percent DO standard violations in both the Ortega and Cedar Rivers.

Response:

EPA acknowledges that in the natural condition scenario DO values are still less than 5mg/L. However, there was an increase in DO concentrations, specifically in values less than 5 mg/L, in the natural condition scenario as compared to the existing condition scenario. Therefore, the natural condition scenario is more protective of the waterbodies.

Comment:

5. FDEP has already adopted a DO and nutrient TMDL for the Ortega River (WBID 2213P1). The TMDL used a GLM approach to identify the relationships between DO and nutrients and determined that a 30 percent reduction in TN would result in violation of the DO standard of 5 mg/L less than 3 percent of the time. Similar improvements were predicted for Chl a, thus explicitly addressing the nutrient impairment. EPA has not approved this TMDL, presumably because the predicted DO is not above 5 mg/L 100 percent of the time. EPA's proposed TMDL, however, with 70 to 90 percent reductions in TN, TP, and BOD, results in a violation of the DO standard about 35 percent of the time. The FDEP TMDL represents a much more rigorous data analysis and investigation of the actual relationships between nutrients and low DO and is more technically defensible than the proposed EPA TMDL. The disparity of results between the two TMDLs is itself enough to call into question the less rigorous EPA TMDL.

Response:

Assessment

Florida Department of Transportation (FDOT)

Comment:

7. Only data from Impaired Waters Rule (IWR) Run 44 through December 31, 2009 are presented or considered in the analyses. Additional data collected since December 2009

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and provided in IWR Runs 45, 46, and 47 should be included in the discussion and analyses.

Response:

During initial model development and calibration only data from IWR 44 was available. The model was evaluated through 2009, therefore including additional data from sucessive IWR iteratives will not assist in model calibration or TMDL analysis.

Comment:

8. Water quality data in the Ortega River are very limited and not sufficient for TMDL development.

Response:

The assessment and modeling for Ortega River was derived using the best available information at the time of the development of the TMDL, which included DO data collected during several years in several months. The mode was calibrated to nutrient data located in Cedar River, which was part of the same LSPC, EFDC, and WASP models. The Ortega and Cedra River models were well calibrated to the data collected and was able to represent the measured water quality trends.

Comment:

6. The discussions of available water quality data and the water quality regime of the waterbodies are not sufficient. This section should identify specific stations where DO and nutrient violations occur and provide some discussion of the observed relationships between low DO and TN, TP, and BOD. Data should be presented for each individual station instead of combined. The problem areas need to be isolated and analyzed with respect to other contributing factors, e.g., flow. Detailed data analyses are required to understand the system and apply the model appropriately.

Response:

Please see response to comment 2. EPA's goal in presenting measured water quality data is to provide the public both a quantitative and qualitative view of the overall health of each WBID. All stations located within each WBID are considered when identifying water quality violations, and given the amount of monitoring data that is available for any given WBID, it can be difficult to provide meaningful information for each station within WBIDs.

Comment:

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1. Florida Department of Environmental Protection (FDEP) adopted a nutrient and DO TMDL into rule on November 2, 2009 for WBID 2213P1, Ortega River. WBID 2213P as included on the Consent Decree originally included both 2213P1 and 2213P2 but was later subdivided. FDEP had not yet identified DO and nutrient impairments in Cedar River so it only adopted a TMDL for Ortega River. The TMDL used a General Linear Model (GLM) approach to identify the relationships between DO and nutrients and determined that a 30 percent reduction in total nitrogen (TN) would result in violation of the DO standard of 5 mg/L less than 3 percent of the time. Similar improvements were predicted for Chlorophyll a (Chl a), thus explicitly addressing the nutrient impairment. This level of reduction is consistent with the nutrient TMDL for the Lower St. Johns River. The U.S. Environmental Protection Agency (EPA) has not approved FDEP's TMDL for Ortega River, presumably because the predicted DO is not above 5 mg/L 100 percent of the time. EPA's proposed TMDL, however, with 70 to 90 percent reductions in TN, total phosphorus (TP), and biochemical oxygen demand (BOD), results in a violation of the DO standard about 35 percent of the time. The FDEP TMDL represents a much more rigorous data analysis and investigation of the actual relationships between nutrients and low DO and is more technically defensible that the proposed EPA TMDL. At a minimum, the proposed TMDL needs to include an explanation of EPA's objections to FDEP's TMDL and why EPA's proposed TMDL is better.

Response:

The Florida Department of Environmental Protection (FDEP) adopted a nutrient and DO TMDL into rule on November 2, 2009 for these WBIDs was not approved by EPA because it failed to demonstrate the dissolved oxygen standard was being protected.

Comment:

2. An important aspect of any evaluation of a waterbody is a detailed and comprehensive data analysis. This type of analysis defines what the conditions are and what a model needs to simulate. The discussions and analyses presented in Section 5 are insufficient. As noted above, FDEP expended considerable effort to relate nutrients and low DO in the development of its TMDL for Ortega River. This effort should be given greater weight of consideration than the current EPA effort.

Response:

Section 5 adequately details the measured water quality data by providing a statistical summary of the measured data and providing figures of the measured data. As discussed in Section 5 of the TMDL report, there are several factors that may affect the concentration of dissolved oxygen in a waterbody. Among these factors is anthropogenic over-enrichment of nutrients (i.e. nitrogen and phosphorus) and oxygen-demanding substances (quantified as biochemical oxygen demand). Nutrient levels affect DO concentrations directly and

indirectly. The process of nitrification, in which bacteria convert ammonia-nitrogen to nitrate-nitrogen, directly consumes oxygen from the water. Indirect effects of excessive nutrient loading involve over-stimulation of aquatic plant growth, which leads to exacerbated diurnal swings in DO as the plants photosynthesize during daylight hours, and respire at night. Replenishment of oxygen levels may be inhibited if excessive growth of aquatic plants above the water surface blocks sunlight from reaching submerged vegetation, reducing their ability to photosynthesize. Decomposition of algal and other types of organic matter, such as dead plants and animals, also uses up DO from the water.

Analytical Approach

Florida Department of Transportation

Comment:

11. There is no discussion of water quality inputs for the LSPC model, e.g., constant EMCs versus build-up, wash-off coefficients. Since these values determine the ultimate loads to the system, this information must be presented and justified in the report.

Response:

The LSPC event mean concentrations are part of the model input files that are made available upon request. The citations for the event mean concentrations used in the LPSC model are: A. Harper, H.H. 2011. New Updates to the Florida Runoff Concentration (EMC) Database. Environmental Research & Design, Inc. B. Harper, H.H. and D.M.Baker. 2007. Evaluation of Current Stormwater Design Criteria within the State of Florida. Final Report prepared for Florida Department of Environmental Protection. Environmental Research & Design, Inc. Orlando, FL. C. Reiss, K.C., Evans, J., and M.Brown. 2009. Summary of Available Literature on Nutrient Concentrations and Hydrology for Florida Isolated Wetlands. Final Report prepared for Florida Department of Environmental Protection. University of Florida, Gainesville, FL.

Comment:

17. The CBODU existing conditions graphs for both WBIDs show frequent spikes to greater than 20 mg/L, with some more than 25 mg/L. This corresponds to BOD5 values of about 13 to 17 mg/L based on the conversion factor of 1.5 provided in the report. These are not values frequently seen in Florida's water quality data. Out of 253,222 total BOD5 measurements in the IWR Run 47 database, just 1,659 had values greater than 13 mg/L, and 1,062 were above 17.0 mg/L. EPA's model is not predicting reasonable results and should not be used for TMDL development.

Response:

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The data presented is CBODU, which typically has a ratio of 1.5 or higher than BOD5, which should be considered when reviewed the data. The watershed model utilized EMC values from literature to simulate BOD5, which indicate that model is adequately representing BOD5 in the system.

Comment:

22. The natural condition load, or rather the difference between the natural condition load and the existing load, determines the reductions required to comply with the TMDL. There is basically no information provided to demonstrate that the LSPC model is reasonably simulating the hydrology and loading under the existing condition or that the conversion to natural is reasonable.

Response:

EPA relies on the natural condition scenario to determine if all applicable water quality standards can be met when there are no anthropogenic sources. EPA realizes to parameterize a watershed to a natural condition requires some assumptions. EPA Region 4 has been using this methodology to develop nutrient TMDLs for over 8 years. While the methodology is not perfect, it does use best available information and technical approach to determine whether a particular water quality standard could ever be met. This methodology has been improved through the years based upon feedback from stakeholders and FDEP. Florida regulations will not allow the abatement of a natural condition; this determination is needed to determine the maximum load reduction that would have to occur without reducing to below natural conditions.

Comment:

18. The WASP/EFDC grid shows several areas that are included as open water but that are actually marinas or land. The grid resolution and representation of the shoreline should be improved.

Response:

The grid resolution is adequate to model the hydrodynamics in Cedar and Ortega River. A finer resolution grid which took into account all the small mangrove inlets and channels would not alter the overall hydrology and water quality representation within the Rivers.

Comment:

19. For a WASP model, comparison of the nitrogen and phosphorus species should be presented.

Response:

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Both TN and TP are presented and are well calibrated to available data, and TMDL reductions are applied to these two parameters.

Comment:

21. The report states that the conversion to natural condition is made by converting anthropogenic land uses to upland forest and forested wetland at the same ratio as found in the current condition land use. Some discussion of how reasonable this assumption is should be included, particularly since it assumes the destruction of large wetland areas for development. It is also common practice to also adjust the rate of sediment oxygen demand (SOD), but the role of SOD in the model, both existing and natural conditions, is not discussed.

Response:

In the model all parameterization of anthropogenic EMC values were changes to forested land use EMCs. Following the initial natural condition scenario run, sediment oxygen demand (SOD) was revised by using the following formula: SODrevised= (Avg Chlanatural / Avg Chlaexisting) * SOD. The lower, revised SOD represents the change expected in SOD following excessive nutrient removal from the system.

Comment:

16. Model "calibrations" for TN and TP in Ortega River each use two data points and the "calibration" for Chl a uses no data points.

Response:

The model calibration utilized the best available data. EPA acknowledges that very little data was collected in the Cedar and Ortega River systems. Data was available in the Cedar River, and this was used for calibration.

Comment:

20. Tables 7.1 and 7.3 do not present results for Chl a. In addition, the statistic being presented is not defined, i.e., is it annual average or something else? Where data are available in the WBID, a comparison of the model output to actual data should be provided.

Response:

The statistics being presented is annual average. Statistics for available data in the WBIDs are presented in Section 5. Chlorophyll a was not presented in the tables.

Comment:

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14. Figure 7.14 presents a calibration plot of 5-day biochemical oxygen demand (BOD5) in Ortega River, but the modeled parameter shown is ultimate carbonaceous biochemical oxygen demand (CBODU). Since BOD5 is the parameter being used to define reductions for the TMDL, all plots should be converted back to BOD5, and in no case should BOD5 measured data be plotted with modeled CBODU output.

Response:

Given the retention times in the model domain, there is very little difference between comparing ultimate BOD with 5-day BOD.

Comment:

12. The flow calibration shown in Figure 7.3 is poor. The model significantly over predicts both the high and low flows. Flows in the 20 to 30 percentile are 65 to 75 percent too high, and flows at the 95th percentile are about 50 percent too high.

Response:

The current model provides the best calibration that could be achieved given current available watershed data and available calibration time in the Ortega River. Overall, the model is able to represent the general flow dynamics that occur in the Ortega River. It should be noted that flows at the 95th percentile are over predicted by less than 2 cfs.

Comment:

10. There is a significant amount of information missing from the TMDL report regarding how the modeling was performed and, as such, a complete review of the model and its assumptions is not possible. The presentation of the inputs and calibration of the localized models must be complete and able to stand alone to allow an assessment of their ability to simulate the hydrologic, hydrodynamic, and water quality process in the Ortega River/Cedar River Basin. There is a significant amount of missing information relative to the inputs and coefficients used in the models. This includes the LSPC, EFDC, and WASP models.

Response:

Please see response to comment 6. Additionally, EPA Region 4 makes all of the model(s), model input(s) and data that are used to develop a TMDL available to the public upon request. The modeling tools that are used are engineering tools that allow EPA to make informed decisions when determining a TMDL. These tools are very complex and to document every feature, parameter, constant or data point that is used in the model(s) would be very difficult. All of the modeling tools are publically available and include very detailed user's manual that provide a description of the input and how it is used in the

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model. Initial model constants are set to typical values from like areas where the model has been was applied in the past. During the calibration process it is not uncommon to change several constants to better represent the current area being modeled.

Comment:

5. The EPA prediction of "natural" condition loadings and in-stream nutrient concentrations is a critical aspect to this TMDL. More detailed assessment of the reasonableness of the "natural" conditions needs to be provided. This includes providing a complete listing of all input coefficients and parameters to the LSPC, WASP, and EFDC models within the TMDL report or, preferably, a separate model report.

Response:

EPA relies on the natural condition scenario to determine if all applicable water quality standards can be met when there are no anthropogenic sources. EPA realizes to parameterize a watershed to a natural condition requires some assumptions. EPA Region 4 has been using this methodology to develop nutrient TMDLs for over 8 years. While the methodology is not perfect, it does use best available information and technical approach to determine whether a particular water quality standard could ever be met. This methodology has been improved through the years based upon feedback from stakeholders and FDEP. Florida regulations will not allow the abatement of a natural condition; this determination is needed to determine the maximum load reduction that would have to occur without reducing to below natural conditions. Additionally, there were no changes to input coeffcicients and parameters in the natural condition, with the exception of SOD. In the natural condition scenario the only model changes involved changing anthropogenic land uses to forested land uses.

Comment:

4. There is a significant amount of information missing from the TMDL report regarding how the modeling was performed and, as such, a complete review of the model and its assumptions is not possible. The presentation of the inputs and calibration of the localized models must be complete and able to stand alone to allow an assessment of their ability to simulate the hydrologic, hydrodynamic, and water quality process in the Ortega River/Cedar River Basin. There is a significant amount of missing information relative to the inputs and coefficients used in the models. This includes the LSPC, EFDC, and WASP models.

Response:

EPA believes that the report was sufficient to describe what was done. The complete list of physical, hydrologic, and chemical inputs and all relevant model coefficients is too lengthy

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to include in the modeling report. The administrative record for this TMDL contains all of the models and their associated input files. This information is available to the public upon request and may be reviewed at any time

Comment:

3. The existing condition scenario is developed using little to no data, and the calibrations are poor to non-existent.

Response:

The current calibration utilized the best available data. The model is well calibrated in the Cedar River.

Comment:

15. Model calibrations are shown and existing conditions defined using little to no data. The BOD existing condition for Ortega River (3.63 mg/L) is calculated in the model using a "calibration" to two measurements that were below the laboratory method detection limit (MDL) of 2.0 mg/L. The BOD existing condition for Cedar River (5.15 mg/L) is calculated using no data at all.

Response:

The model calibration utilized the best available data. EPA acknowledges that very little data was collected in the Cedar and Ortega River systems.

Comment:

13. A map of locations of flow and weather stations used in the watershed model should be included in the report.

Response:

This information is provided in the St. Johns modeling report which is available as part of the administrative record.

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