Response to Public Comments

TMDL Responsiveness Summary for TMDLs Proposed 2012:

- WBIDs 1443A, 1534, 1443B, 1443E Hillsborough River, Cow House Creek

July 2013

Region 4

Atlanta, GA

Contents

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).

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

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

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.

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

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

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

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:

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,

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 1443A/1534/1443B/1443E Hillsborough River, Cow House Creek

General

Michael Garrett, Michael Williams, City of Tampa, & FDOT

Comment:

1. WBID Assessment Reports were completed for three of the WBIDs within the TMDL as part of work conducted by local Stakeholders in cooperation with FDEP. These include Flint Creek (1522A), Cow House Creek (1534), and Two Hole Branch (1489). The

WBID Assessment Reports outline key aspects of the various WBIDs that are relevant to TMDL development, including defining conditions where the data do not support the development of a TMDL. The WBID Assessment Reports are included as part of the comments provided.

Response:

Thank you for including the WBID Assessment Reports. Because the waterbody was on the Florida's CWA section 303(d) list for nutrients and dissolved oxygen, EPA was required to consider the impacts of nutrients on dissolved oxygen, pursuant to paragraph 62-302.530(47)(a), F.A.C.e

Comment:

8. The image in Figure 7.1 is very blurry and hard to read. A clearer image is needed.

Response:

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

Comment:

2. In the description of the watershed (especially for WBID 1443E), there is no discussion of the Hillsborough River Dam. This is a key feature of the Hillsborough River and should be part of the discussion.

Response:

Additional information regarding the Hillsborough River Dam has been added to section 3.1.

Endpoints/Water Quality Targets

Michael Garrett, Michael Williams & FDOT

Comment:

3. At present, Florida is in the process of developing and approving revised DO criteria. While it is recognized that these criteria have not received final approval at this time, Florida Department of Environmental Protection (FDEP) acknowledges that the current DO standards are not appropriate, which led to the development of the new proposed DO criteria. Given this position regarding the DO standards, the determination that the system would not meet the DO criteria even under natural loadings does not reflect the "best science" as defined by EPA and FDEP and is inappropriate for defining load reductions.

Response:

EPA does acknowledge that Florida 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. If and when Florida changes their water quality standard for dissolved oxygen, this TMDL could be re-visited in the future.

Assessment

Michael Garrett, Michael Williams, City of Tampa, & FDOT

Comment:

3. Section 3.1: Hydrologic characteristics • The write up is incomplete. There is a good bit of unique and somewhat complicated hydrology in the various WBIDs and their connectivity. A clear demonstration that the author understands all of these aspects is critical to have confidence that the system is being modeled accurately. • There are multiple flow gaging stations presently active throughout the overall watershed. A map showing all active, and those active during periods of the model applications, should be provided, along with a detailed discussion of the flows. The figure below shows presently maintained flow stations along the main stem of the Hillsborough River. For the purposes of the report, the only station utilized was the most upstream station (02303000). There are two additional stations downstream (see figure, 02303330, 02304500), which need to be compared to the LSPC output to demonstrate that the LSPC hydrology is accurate. • The WBIDs along the main stem of the Hillsborough River should be discussed separately from the tributaries. The hydrology of each should be discussed. Some unique aspects of hydrology that should be discussed include: i. Flint Creek WBID hydrology is highly influenced by the flow out of Lake Thonotosassa which has a very large drainage area, ii. There is a spring (Sulfur Spring) that discharges into the upstream end of WBID 1443E. iii. There are numerous springs that discharge into the overall system and these should be discussed and identified. iv. WBID 1534 is bisected by the Tampa Bypass Canal and some of the watershed drains through this bisection.

Response:

EPA has included additional LSPC hydrology calibration figures for two downstream gages on the Hillsborough River, USGS 0203330 and 02304500, in the TMDL report. Many of the USGS gages on the tributaries to the Hillsborough River did not collect discharge data during the modeling period, or collected limited data during the period, which is why they were not used for calibration. The EPA has added calibration plots for two large tributaries draining to the Hillsborough River at USGS 02303205 and 02303420. Several springs are input into the LSPC model, including Crystal Spring and Sulpher

Spring. Springs with measured discharge great than 0.1 MGD were included the model. Measured flow and water quality data were processed into monthly timeseries, with processessing identical to that of point sources, and were input into the model as point sources.

Comment:

4. Section 3.2: Climate – same comment as above, this section is weak. Once again, there is a good bit of data for the area (especially rainfall) that should be presented and discussed.

Response:

Section 3.1 provides a general overview of the climate and provides sufficient information. Processed precipitation and meteorological data for the models is provided in the weather file available as part of the administrative records.

Comment:

5. The water quality conditions in any WBID are a function of multiple causative factors, and these factors can be unique to that WBID. As such, a proper water quality assessment should focus on a WBID-by-WBID analysis outlining what the data show, any unique aspects of the data, and spatial differences in results within the WBID based upon sampling conducted at different locations and at different depths. The water quality assessment provided within the TMDL document simply provides lumped graphics with all stations from any one WBID, and a global discussion of ranges of data. Modeling of waterbodies requires a complete understanding of the conditions in that waterbody, and the water quality assessment is the first step in that understanding. The assessment provided is insufficient for the purpose of developing an understanding of the water quality conditions in the individual WBIDs.

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. 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. 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.

Comment:

6. The streamline shown in Figure 5.2 as being the Hillsborough River is not accurate. The river is shown as the cut off (Cow House Creek) rather than the actual stream that flows above.

Response:

Comment noted. The streamline currently shows the Cow House Creek cutoff.

Analytical Approach

Michael Garrett, Michael Williams, City of Tampa, & FDOT

Comment:

16. The report needs to provide a detailed discussion and plots of all EFDC model input conditions and coefficients including flows and meteorology.

Response:

Detailed plots of all EFDC inputs, conditions, and coefficients would be too lengthy to include in the TMDL report. The information is available in the EFDC input files, which is available as part of the administrative record.

Comment:

17. The grid representation presented in Figure 7.29 has numerous significant issues. Some key issues are:

• The grid representation of the upper end of Hillsborough Bay makes no sense. It appears that the modeler believes that the Hillsborough River flowing into Hillsborough Bay only mixes with the water in the main port channel. In reality, it can go in three directions upon exiting the river. The following graphic shows the general grid coverage near the mouth of the Hillsborough River. The grid should have been developed to cover the full areas into which the Hillsborough River flows, assuring that the boundary condition is far away enough to avoid boundary condition influence in the WBID areas of concern.

• The aspect ratios of the grids in the river portion are too large. Typically, aspect ratios should be kept on the order of 2:1. The ones in the river are upwards of 10:1.

• The grids provide a poor representation of the river. The grid should have been created to provide a more reasonable representation.

Response:

The current Hillsborough River grid follows the main flow of the Hillsborough River. EPA understands that flow in the Hillsborough River is dynamic and can move multiple directions when exiting. However, EPA was considered with the flow in WBID 1443E located upstream of Tampa Bay. A finer resolution grid would not alter the overall hydrology and water quality representation within Bullfrog Creek. The model was calibrated to salinity and temperature in the Hillsborough River. With respect to water quality, and calibration at this point shows that the model is not overestimating tidal amplitude within the River, indicating that the current grid and simulation is appropriate.

Comment:

18. There are four key long-term stations along the Hillsborough River monitored by the Environmental Protection Commission of Hillsborough County (EPC). These are shown in the following figure. The stations were identified in Section 5 of the TMDL Report and are 002, 137, 176, 152. The USGS gage (02304500) shown on the figure identifies the location of the dam and the upstream extent of the tidal Hillsborough River.

Response:

EPA has reviewed the figure and utilized two of the long term stations, 137 and 176, in the calibration of the tidally influenced portion of the Hillsborough River.

Comment:

19. The model used two layers in the vertical. This is not a sufficient number to represent conditions where estuarine systems show significant stratification. The data in the system show that the system is most often stratified and, at times, this stratification can be significant. The following plot shows the degree of stratification by calculating the difference in the surface and bottom salinity at EPC measurements from 2006 through 2010 when the EPC stations were sampled extensively over the vertical at EPC 137.

Response:

EPA acknowledges that stratification occurs in the Hillsborough River. By utilizing two vertical layers, the model was able to represent stratification that occurred in the tidally influenced area. One layer represented the surface layer and the other represented the bottom layer.

Comment:

20. The plots provided in the report do not identify if the data or model are surface or bottom and it appears that a lot of data are missing. For EPC 137, there are data for every month for all years. The plots show missing data in 2004 to 2006 and 2007. There are data in all these years. Most likely, the user did not process the data properly with an understanding that the data were taken over the vertical at different depths.

Response:

EPA reviewed the available data in IWR 44 which was used for calibration. No salinity data was available for these years at station 137. The Environmental Protection Commission of Hillsborough County should contact FDEP if these data were accidently excluded from IWR 44.

Comment:

22. There is an additional station, EPC 152 (see following plot of the available stations), that is located further upstream of EPC 176 and had monthly data from 2002 to 2010. This station was not used for comparison to the model. It also shows similar levels of stratification and should have been used to see if the model is allowing salinity to progress up the system sufficiently.

Response:

EPA agrees that stratification occurs in the Hillsborough River. EPC 152 was not used in comparison of the model because stations EPC 137 and EPC 176 provided sufficient data for calibration. The salinity calibration at these two stations was accurate and indicated that the model was correctly simulating the tidal influence in the Hillsborough River.

Comment:

24. Overall the EFDC hydrodynamic model calibration is not sufficient. Key processes that govern the transport and exchange along the tidal portion of the river are not accounted for or demonstrated within the report. This is not a simple, small tributary, but rather a large riverine/estuarine system that has complex hydrodynamics driven by tidal fluctuations and stratification.

Response:

EPA acknowledges that this is a large riverine/estuarine system. The current WASP and EFDC model are able to represent the water quality and hydrodynamics of the system, which indicate that the current model setup is sufficient to represent the transport and exchange.

Comment:

25. The report needs to provide a detailed discussion and plots of all WASP model input conditions and coefficients including inflowing concentrations and assumptions for sediment oxygen demand (SOD) and other benthic processes. Of specific interest would be what data were utilized to provide the inflowing concentrations over the dam, i.e., data or LSPC model simulations.

Response:

EPA used USGS measured data at station 02304500 which is located immediately downstream of the dam. This ensured that the correct flow and loadings were input into the EFDC and WASP model. WASP coefficients and concentrations were available in the WASP model, which was provided as part of the administrative record.

Comment:

30. The nutrient species comparisons with the data based upon the WASP model output should be provided.

Response:

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

Comment:

27. Examination of the data at one of the available data stations (EPC 152) shows that there is a clear correlation between salinity stratification and DO stratification in the system. At times, there are significant levels of DO stratification (see the following plot). As such, in order for the WASP model to be useful in simulating DO conditions, it must be shown that the model accurately represents the level of stratification and its changing nature. This was not done.

Response:

EPA acknowledges that stratification occurs in the Hillsborough River. By utilizing two vertical layers, the model was able to represent stratification that occurred in the tidally influenced area. One layer represented the surface layer and the other represented the bottom layer. The current WASP model plots in the TMDL report show the surface layer calibration in the Hillsborough River.

Comment:

29. As was defined for the EFDC model, two layers is not sufficient to represent the levels of stratification in the system.

Response:

EPA acknowledges that stratification occurs in the Hillsborough River. By utilizing two vertical layers, the model was able to represent stratification that occurred in the tidally influenced area. One layer represented the surface layer and the other represented the bottom layer.

Comment:

28. In the DO plots, it is unclear if surface or bottom data are compared. Given the levels of stratification, this is important.

Response:

The TMDL report presents the DO calibration in the surface layer of the model.

Comment:

21. Similar stratification is seen in EPC Station 176. This station only had data from 2009 onward.

Response:

EPA agrees that stratification does occur in the Hillsborough River.

Comment:

26. As with the EFDC model, the WASP water quality model comparisons do not include all available stations, specifically EPC 152 and EPC 002.

Response:

EPA believes that the water quality data at stations EPC 137 and EPC 176 provided sufficient data for calibration.

Comment:

15. Comparison with available tides in the McKay Bay entrance with those used in the tidal forcing (based upon definition of starting time in PSER file) seems to indicate the tidal forcing might be in error.

Response:

EPA believes the current tidal forcing is adequate and able to simulate the the hydrodynamics in Hillsborough River due to the current calibration of salinity and temperature.

Comment:

23. There is also an EPC station located at the mouth of the Hillsborough River where it meets Hillsborough Bay (see plot). This is EPC 002. This station also should have been used to provide model comparisons.

Response:

EPC 002 was not used in comparison of the model because stations EPC 137 and EPC 176 provided sufficient data for calibration.

Comment:

2. The TMDL loads are all based on the LSPC model simulation of the natural condition. While this is a common practice in TMDL development, there are no assurances that the model is accurately projecting the natural background loads. The "natural" TN and TP concentrations projected by the LSPC model are not reasonable based upon the conditions of the system in the area and, therefore, the loads are not reasonable. It would be useful to do some comparisons of what the natural load is with more pristine waterbodies so that some determination can be made of how realistic the natural condition loads are. This is especially relevant based on the recommended load reductions identified as they relate to DO. The TMDL would require around 90 percent reductions in TP and 50 to 60 percent reductions in TN. The analyses of the data would not seem to support this level of reduction.

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:

4. The watershed modeling does not appear to account for some specific hydrologic aspects of the system that are critical. Additionally, significant amounts of available local data (including numerous flow measurement locations) were not utilized in the LSPC model calibration.

Response:

EPA utilized the available USGS gages in LSPC flow calibration. Several significant hydrologic aspects were included, such as the Hillsborough River Dam and numerous springs, in model development. FDOT needs to be more specific in regards to what they consider to be significant hydrologic aspects of the system.

Comment:

7. The analytic approach relies upon three different models. This includes the LSPC model to simulate the loads entering receiving waters and the hydrology within the freshwater reaches, EFDC to simulate the hydrodynamics within the tidal portions of the Hillsborough River below the dam, and WASP to simulate water quality conditions in the freshwater reaches and the tidal portion of the Hillsborough River. The following provides comments on each model system in general and by WBID.

Response:

The analytical approach did use three models- LSPC, EFDC, and WASP.

Comment:

9. LSPC Model Inputs • For the LSPC model subwatersheds and reaches, it is necessary to provide the physical information, i.e. reach lengths, depths, slopes, etc., so that the reasonableness of them can be assessed against the physical characteristics of the system. These data would usually be provided is a separate modeling report or an appendix. • A detailed presentation of the model inputs, i.e., rainfall, meteorology, is needed. • Data on the model parameters by subwatershed must be provided, including all physical coefficients, etc., as well as the water quality model coefficients. • There are spring flows entering the system at various locations. How these are handled needs to be provided.

Response:

The complete list of physical, hydrologic, and chemical inputs and all relevant model coefficients is too lengthy to include in the modeling report. The administrative record for this TMDL contains all of the models and their associated input files, including LSPC reach length, depth, and slopes. Additionally, the processed rainfall and meteorology data used in the model is available in the administrative record. Several springs are input into the LSPC model, including Crystal Spring and Sulpher Spring. Springs with measured

discharge great than 0.1 MGD were included the model. Measured flow and water quality data were processed into monthly timeseries, with processessing identical to that of point sources, and were input into the model as point sources.

Comment:

10. LSPC Hydrology Calibration • For the watershed model hydrologic calibration, only a single station is utilized and presented. That is U.S. Geological Survey (USGS) 02303000, which is on the main stem of the Hillsborough River near Zephyrhills. This station is a fairly upstream station and does not represent the full drainage coming into the system. There are two gages located downstream (see image presented in Comment 3). Prior to use of the model for any existing and future scenarios, additional hydrologic comparisons must be provided. • There are numerous flow gages located on tributaries of the Hillsborough River throughout the watershed. Data showing comparisons using all available data need to be provided to show that tributary hydrology is being represented accurately. • As even the natural condition loading is dependent upon an initial model that is accurately calibrated, this first step not being done properly negates any use of the model for future or natural condition scenarios.

Response:

EPA has included additional LSPC hydrology calibration figures for two downstream gages on the Hillsborough River, USGS 0203330 and 02304500, in the TMDL report. Many of the USGS gages on the tributaries to the Hillsborough River did not collect discharge data during the modeling period, or collected limited data during the period, which is why they were not used for calibration. The EPA has added calibration plots for two large tributaries draining to the Hillsborough River at USGS 02303205 and 02303420. The addition of these gages demonstrates that the flow calibration at the Hillsborough River is adequately representing the flow regime of the Hillsborough River and its tributaries.

Comment:

i. Biochemical oxygen demand (BOD): It appears that the label on graph 7.14 is wrong. This is likely BOD5 not carbonaceous biochemical oxygen demand (CBOD). Basically, all data are non-detectable, so no real data are provided for comparison. There are no data at the downstream station either. ii. TN: Limited data are available for TN and provided in the comparison on Figure 7.19. The following figure shows the TN data from the station just downstream. Clearly, there is a trend in the data that is not seen in the LSPC simulations. Additionally, it is clear that the LSPC simulations over predict the TN levels. iii. TP: Limited data are provided in Figure 7.24 for comparison. The following figure shows TP data from just downstream. The bulk of the data are between 0 and 0.1 milligrams per liter (mg/L). The model shows nearly all data above 0.1 mg/L. Clearly

the model appears to be over predicting the TP levels in this reach of the Hillsborough River.

Response:

Figure 7.14 has been correct to read BOD and BOD5. EPA utilized all available data for calibration, but there was limited BOD5 data in the Hillsborough River. EPA uses the best available information available to calibrate the watershed and water quality models and reviews the calibration to make sure that it is representing the range and trends of the data. The current LSPC calibration presented in the model represents the best overall calibration that could be achieved to all calibration water quality stations utilized in the Hillsborough LPSC model.

Comment:

• WBID 1443B – Middle Hillsborough River i. Based on the results presented, TN data are generally between 1.0 and 1.5 mg/L, while the model results are generally above 2.0 mg/L. The model clearly is over predicting the TN levels.

Response:

The model is able to represent the overall trends and data ranges in the Hillsborough River. EPA uses the best available information available to calibrate the watershed and water quality models and reviews the calibration to make sure that it is representing the range and trends of the data. The current LSPC calibration presented in the model represents the best overall calibration that could be achieved to all calibration water quality stations utilized in the Hillsborough LPSC model.

Comment:

1. EPA used a series of complex watershed and receiving water models to assess the DO responses to changes in nutrient loads. Based upon a review of the TMDL document and supporting information (model files), significant technical issues were raised relative to the adequacy of the models' representation of the system and the model calibration. While the documentation is helpful, some model development details are not provided, some key model-to-data comparisons are not provided, some methods of model application are not reasonable, and some of the calibration and validation results presented bring the models into question.

Response:

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 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:

• WBID 1522A – Flint Creek i. The model significantly over predicts the DO levels in the system throughout the simulations. ii. BOD levels are significantly under predicted. iii. The model under predicts TN values throughout the simulation period. iv. The model under predicts TP levels. v. It needs to be pointed out that the water quality conditions within Flint Creek are primarily driven by the water quality kinetics occurring with Lake Thonotosassa. A WBID assessment report provided at the end of this document demonstrates this relationship. It is clear that the LSPC simulations do not account for this aspect.

Response:

The model is able to represent the overall trends and data ranges in the Hillsborough River and its tributaries. EPA uses the best available information available to calibrate the watershed and water quality models and reviews the calibration to make sure that it is representing the range and trends of the data throughout. Lake Thonotosass was represented as a separate LSPC sub-watershed. The LSPC model represented the simple dynamics of the flow pathway within WBID 1522A. Data within the WBID was limited, and EPA was unable to locate information regarding discharge from Lake Thonotosassa, therefore it was determined that using LSPC to represent loadings from surrounding watershed and the lake would adequately represent the concentrations.

Comment:

• WBID 1489 – Two Hole Branch i. The model-to-data comparisons do not use all of the data. The FDEP 21fltpa24030049 station is utilized solely. There are additional data available via stations 21FLHILL524 and 21FLBRA1489-A which should be used. ii. DO: The model is clearly not representing the measured conditions. The model actually doesn't appear to show the system violating the existing standards. iii. BOD5: No data are provided for comparison. There is a small amount of data if the other stations are utilized. iv. TN: It appears from the limited amount of data that the model's prediction of TN concentration is high. v. TP: While the TP levels are on the same overall mean levels, the model does not seem to capture some of the range of values.

Response:

EPA believes that the current model is able to simulate the trends in both TN and TP. TN data in WBID 1489 ranged from 0.5 mg/L to 2 mg/L, with one data point measured at 4 mg/L. The modeled TN values are within this same range. Additionally, the modeled TP ranges from 0.1 mg/L to 0.6 mg/L, which is the same range that the measured water quality data, indicating that the model does capture the range of values. EPA utilized one station within each WBID for calibration, and used the station that had the overall best available data. The DO calibration in Two Hole Branch was the best overall calibration that EPA could achieve.

Comment:

12. The Tampa Bay NNC model was identified as providing the tidal forcing at the open boundary. A comparison of NNC model (in this report) with the tides at the nearby NOAA station in McKay Bay should have been provided to give confidence in the open boundary utilized.

Response:

The Tampa Bay NNC was calibrated using NOAA station data. Calibration information was available in the Tampa Bay estuary report. Additionally, the tidal forcing information used was available as part of the EFDC model in the administrative records.

Comment:

13. The text is inconsistent in its description of how tidal forcing was done for the Hillsborough River Estuary Model. The text first states "The Hillsborough River Estuary model used hourly water surface elevation time series data from the National Oceanic and Atmospheric Administration (NOAA) tidal stations to simulate tides at the open boundary". Later in the same paragraph it states "the Tampa Bay model was used to simulate the open boundary conditions in the Hillsborough River Estuary model." Based upon examination of the PSER file, it appears that the latter statement is the correct one, since the input file indicates the larger model was used and the data are output at 2-hour intervals.

Response:

The text had been updated to clarify that the Tampa Bay outputs were used to simulate tides in the Hillsborough River.

Comment:

14. As discussed above, the tidal forcing in the model is at a 2-hour interval. Generally, to provide an accurate representation of forcing tides for a model, one would use data spaced

at a maximum of 30 minutes to 1 hour. This indicates a lack of understanding of hydrodynamic modeling in tidally driven systems.

Response:

The Gulf of Mexico has relatively small tides when compared to open oceans because it has a narrow connection with the Atlantic Ocean. Additionally, because the mouth of the Hillsborough River is located in Tampa Bay, tidal influence is less pronounced and the tidal fluctation is typically less than a meter, and occurs diurnally. Because of the small tides, a 2-hour interval is sufficient to model the tidally driven hydrodynamic system.

Comment:

11. LSPC/WASP Water Quality Calibration • For each WBID, the WASP model coefficients used in the reach simulations need to be provided to allow assessment of the reasonableness. • Since the WASP model is utilized, a discussion of the speciation of the nutrient data from the LSPC model simulations (which predicts TN and TP) need to be provided. • Comparisons of the nutrient species (i.e., organic versus inorganic) WASP predictions with the available data needs to be provided. • WBID 1443A – Upper Hillsborough River i. In the upper watershed, there are some stations that, while not in the WBID, are along the main stem just downstream of the WBID. The station utilized for calibration has limited data (from 2001 to 2005). The downstream station, which is located at the crossing of the Hillsborough River with US39, has data through 2010. ii. Temperature: The temperature calibration is poor. This is the easiest of the parameters to simulate and it is clear that the data do not show the temperatures going as low as the model shows. As temperature is a key factor in DO solubility, the errors here make DO predictions suspect. iii. DO: The calibration plot shows a limited amount of DO data in comparison to the model results and, for a good bit of the data, the model clearly does not accurately predict the DO values. As discussed above, there is a station immediately downstream where a significant amount of DO data is available for the calibration. If the data from the downstream station are viewed, a clear difference in the DO conditions by year is evident. The model shows each year as nearly identical (see the following graph).

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 to include in the modeling report. Moreover, the administrative record for this TMDL contains all of the models and their associated input and output files, and this information is available to the public. Both TN and TP are presented and are well calibrated, and TMDL reductions are applied to these two parameters. Several water quality stations were used to develop the Tampa Bay and Hillsborough water quality calibrations. EPA utilized a station on the Hillsborough River in WBID 1443A for calibration purposes. EPA also

presented a downstream station on the Hillsborough River in WBID 1443B in the TMDL report. EPA reviewed the temperature calibration for WBID 1443A and found that it was reasonable simulating temperature. The measured water quality data was not collected in December or January, when stream temperature is often the lowest. Therefore, it is reasonable to assume that the model is accurately predicting temperature in these months. Additionally, at the downstream station in WBID 1443B, measured temperature data ranged from 9 degrees to 12 degrees during these months, indicating that the calibration in WBID 1443A is accurate. EPA has also reviewed the DO calibration in the Hillsborough River. DO vary at temporal and spatial scales due to many biological, chemical, and physical processes. This variation is often cyclical with annual repeating signals due air temperature which effects the growth of phytoplankton and controls the concentration of DO that can be dissolved in the water column. The DO calibration varies at each calibration station, and EPA has provided the best overall calibration that could be achieved.

TMDL Determination

Michael Garrett, Michael Williams & FDOT

Comment:

31. In all WBIDs, the TMDL is based upon the determination that even under "natural" loading conditions, the DO would not meet the Florida State Standard. Based upon this determination, the TMDL is defined as the "natural" condition loading as defined by the LSPC model, and the percent reductions are based upon the difference between the LSPC "natural" load and the LSPC existing load. While the determination that the WBIDs would not meet DO criteria even under "natural" loading may not be incorrect, the modeling presented within this report is not sufficient to make that determination (see previous comments on model calibration).

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:

34. Given these issues with the LSPC model calibration at all levels (hydrology and water quality), it is not appropriate to utilize the model for any future or existing condition projection purpose and, therefore, the results provided for the TMDL are not defensible.

Response:

EPA believes, as stated in responses to previous comments, which the LSPC water quality model is adequately calibrated and can be used to establish TMDL load reductions and

conditions.

Comment:

35. The report states: "During the development of this TMDL, it was determined that the natural condition scenario (removal of all anthropogenic sources and land uses) did not meet the Florida standards for DO. The DO was greater during the natural condition run, and nutrient loadings from the natural condition scenario were therefore used to determine the TMDL in accordance with the Natural Conditions narrative rule." The following comments are made relative to this statement: • Previous comments have shown that all of the models (LSPC, WASP) have significant issues in their projection of DO. Therefore, they are not useable in assessing DO compliance. • If the models were deemed reliable, the cumulative distribution plots (Figures 7.51 through 7.56) would seem for some of the WBIDs to demonstrate that the waterbodies would be in compliance with the 5.0 mg/L standard given Florida's Impaired Waters Rule (IWR) rule (approved by EPA), which allows for 10 percent of the values being below the criteria. This includes WBIDs 1443A, 1489, 1522A, and possibly 1534.

Response:

EPA believes that the LSPC and WASP water quality models are adequately calibrated and can be used to establish TMDL load reductions and conditions, including natural condition loads. When EPA approved the Impaired Waters Rule (IWR), it agreed with the assessment methodology of the binomial test for impairment. That assessment methodology does not, however, change the frequency component of Florida's water quality standards. Rather, as set out more fully in EPA's 2008 determination following the agency's review of the 2007 amendments to the IWR and associated documents, the binomial test does not than a new frequency component allowing ambient waters to exceed criteria 10% of the time. Rather, the binomial test uses a probability value of 10%, which serves as a data reliability provision related to the number of samples necessary to conclude that criteria have been exceeded in the waterbody as a whole. Similarly, Florida's dissolved oxygen water quality standard does not allow an exceedance frequency, thus the TMDL scenario cannot allow an exceedance.

Comment:

32. Comments on the LSPC hydrologic and water quality calibrations presented above identify that this model is not sufficiently calibrated (or demonstrated to be calibrated) through the presentations provided. As such, it is not usable for predictive purposes, i.e., determination of "natural" condition loads.

Response:

EPA believes, as stated in responses to previous comments, that the LSPC water quality model is adequately calibrated and can be used to establish TMDL load reductions and conditions, including natural condition loads.

Comment:

33. Table 7.3 provides the "natural condition" instream concentrations predicted by the

LSPC and WASP models based upon the input of the natural land uses. The values for TN and TP are unreasonable as natural condition concentrations. Given that the system is in what is termed the Bone Valley, TP concentrations of 0.01 mg/L to 0.03 mg/L are not possible. Additionally, the levels of TN (near 0.5 mg/L) in the freshwaters of the Hillsborough River do not make sense. The Hillsborough River watershed has significant natural wetland inputs and these inputs (which create the high color conditions in the system) have naturally high levels of organic nitrogen. Prior to publishing values for natural conditions in TMDLs, EPA needs to review the available literature on the area to determine what constitutes "natural" nutrient levels in these systems. As has been stated in multiple comments provided to EPA in the past, where natural conditions are utilized to define a TMDL, they must demonstrate that their "natural" condition modeling is reasonable.

Response:

EPA agrees that high organic levels are correlated with color and may be indicative of natural blackwater systems, and can often be found in areas with significant wetland inputs. However, anthropogenic land uses are greater than 50 percent of the contributing land uses to the impaired WBIDs. 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.