Technical Assistance for Developing Nutrient Site-Specific Alternative Criteria in Florida

I. Background

A. Purpose

The purpose of this document is to provide information and further explanation on the use of the Federal site-specific alternative criteria (SSAC) provision for numeric nutrient criteria as provided for in 40 CFR 131.43 in the Final Rule, *Water Quality Standards for the State of Florida's Lakes and Flowing Waters* (Final Rule), published in the Federal Register on December 6, 2010 (75 Federal Register 75762). The key principles of this technical assistance document are the following:

- The ultimate goal will be to assure attainment of Florida's designated uses.
- EPA's review will be guided by adherence to existing and generally applicable regulatory requirements related to review of water quality standards (WQS) applicable to State waters.
- Application of the Federal SSAC provision is intended to consider adjustments to only those criterion values established in EPA's Final Rule and such adjustments are based on technically sound and detailed site-specific or watershed specific data and analysis.

B. What SSAC are and when they are appropriate

Clean Water Act (CWA) regulations at 40 CFR 131.11(a)(1) require that applicable water quality criteria must protect applicable designated uses. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. As provided at 40 CFR 131.10(b), a state's water quality standards, which include water quality criteria, developed under the CWA must also provide for the attainment and maintenance of water quality standards of downstream waters.

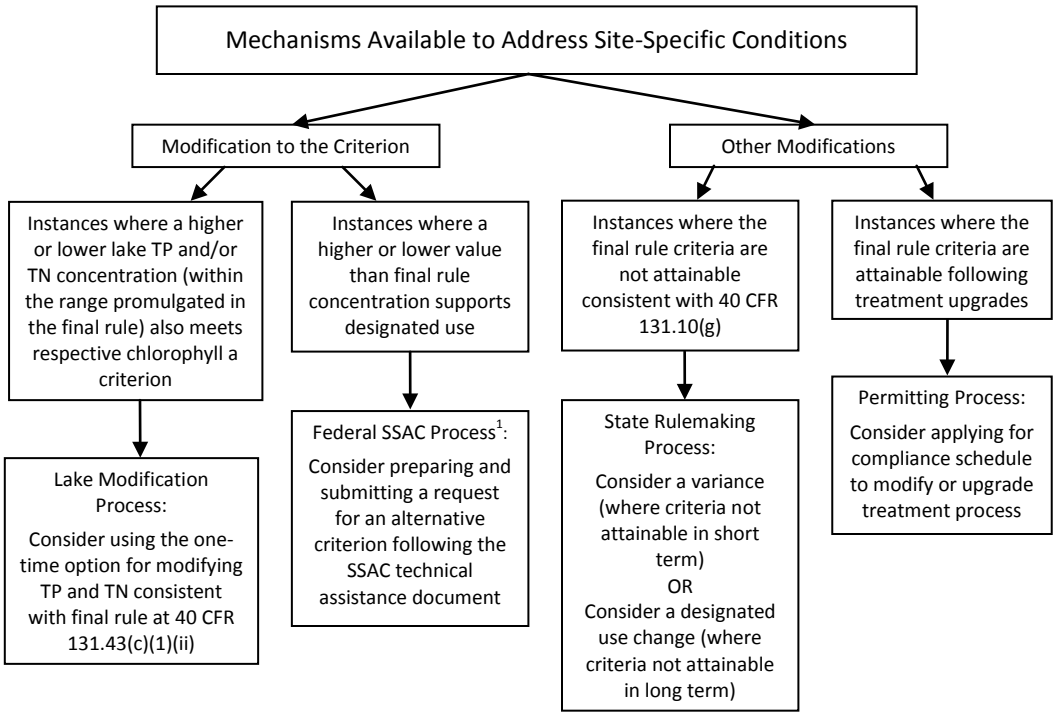
SSAC are alternative total nitrogen (TN), total phosphorus (TP) and chlorophyll *a* (Chl *a*) values to the criteria established in 40 CFR 131.43 in the Final Rule. SSAC do not modify the designated use(s) of a waterbody; rather, SSAC are alternatives to the otherwise applicable criteria that also protect the designated use(s) of the affected water. SSAC can apply to a single waterbody, waterbody segment, group of waterbodies, or watershed. These SSAC must meet the regulatory requirements of protecting the instream (or in-body) designated use of the affected waterbody and having a basis in sound science, and must also ensure the attainment and maintenance of downstream water quality standards. SSAC may be more or less stringent than the otherwise applicable Federal numeric nutrient criteria. In circumstances where an entity submits alternative criteria that are more stringent than those in EPA's final rule, the entity should include an analysis showing that EPA's promulgated criteria are not sufficiently

protective of the designated uses for that specific waterbody. In instances where a proposed SSAC addresses only one nutrient, then the numeric criterion for the other nutrient applicable for that waterbody would continue to apply.

A SSAC must be expressed in the form of a concentration along with its intended spatial application. The SSAC proposal may also include a criterion expressed as a corresponding load that is consistent with the proposed concentration, with the associated factors and assumptions. While a concentration is expected to be applicable for all purposes of the CWA, it is recognized that an associated load could be useful in source control. The entity requesting the SSAC should include documentation showing how the supplemental load information is consistent with the proposed SSAC concentration.

EPA believes that the SSAC process is a reasonable mechanism to address situations where adjustments to criteria are appropriate to address site-specific conditions, where such an adjustment is not already addressed in the Federal rule. An adjustment or flexibility that is already available in the Final Rule is the adjustment of TP and TN values for a lake using the modification provision described at 40 CFR 131.43(c)(1)(iii), which is self-implementing and does not require a SSAC. This technical assistance document focuses on adjustments, i.e., SSAC, at levels that still achieve designated use support and were described in the preamble to the Final Rule. However, the preamble to the Final Rule also identifies additional implementation flexibility tools available in the form of variances, compliance schedules and designated use changes (via use attainability analyses (UAAs)). Where otherwise applicable criteria cannot be achieved for reasons of technical or economic feasibility or other factors listed in 40 CFR 131.10(g), the State could adopt a variance or consider changing the designated use. Figure 1 provides a summary of when a certain mechanism might be appropriate for a given situation.

Figure 1. Mechanisms for Addressing Site-Specific Conditions



II. Process for Submitting a Proposed SSAC

The procedure for obtaining a Federal SSAC is outlined in Figure 2 and described in this section. Additional detail on the data requirements, analyses, and documentation necessary to support a SSAC submission is provided in Section III.

As provided in the Final Rule, a Federal SSAC may be established by the Regional Administrator of EPA Region 4 after due notice and opportunity for the public to comment. An entity seeking a SSAC must compile the supporting data, analyses, and expression of each alternative criterion in order to demonstrate that such alternative numeric criteria are fully

[1] The Federal SSAC process is separate and independent from Florida's SSAC process. The State has the option to submit a SSAC request to EPA under the Federal process described in this document and set forth at 40 CFR 131.43(e). There is no requirement in the Federal Rule that the State go through its own state-level Type I or Type II SSAC process before submitting a proposed SSAC to EPA for consideration. Florida's rules that describe the process for obtaining a state-level Type I or II SSAC can be found in F.A.C Chapter 62-302.800. The Federal SSAC process does not prevent the State from initiating and conducting its own rule making to develop new or revised criteria. Recently the State adopted new provisions for changing the designated use of its waterbodies. In any case where the State changes the designated use of a waterbody from Class I or III to something else, and EPA approves that change, EPA's federal criteria would no longer apply to that waterbody, and the federal SSAC provision would no longer be available for that waterbody. In any case where Florida adopts site-specific criteria for the revised non-Class I or III designated use, such revision would be subject to EPA's review under CWA section 303(c).

protective of the applicable designated use(s), in addition to any other additional supporting documentation. EPA will provide information on SSAC submissions and review status on EPA's Florida Nutrient Rule webpage.[2]

As part of EPA's review, the Regional Administrator will evaluate the technical basis of the proposed SSAC and whether the SSAC are protective of the designated use, based on sound science, and protective of downstream waters. Actions that may result include:

1. The Regional Administrator may decide to return the proposal to the entity with an explanation why the proposed SSAC application did not provide sufficient information for EPA to determine whether it meets CWA requirements or not.

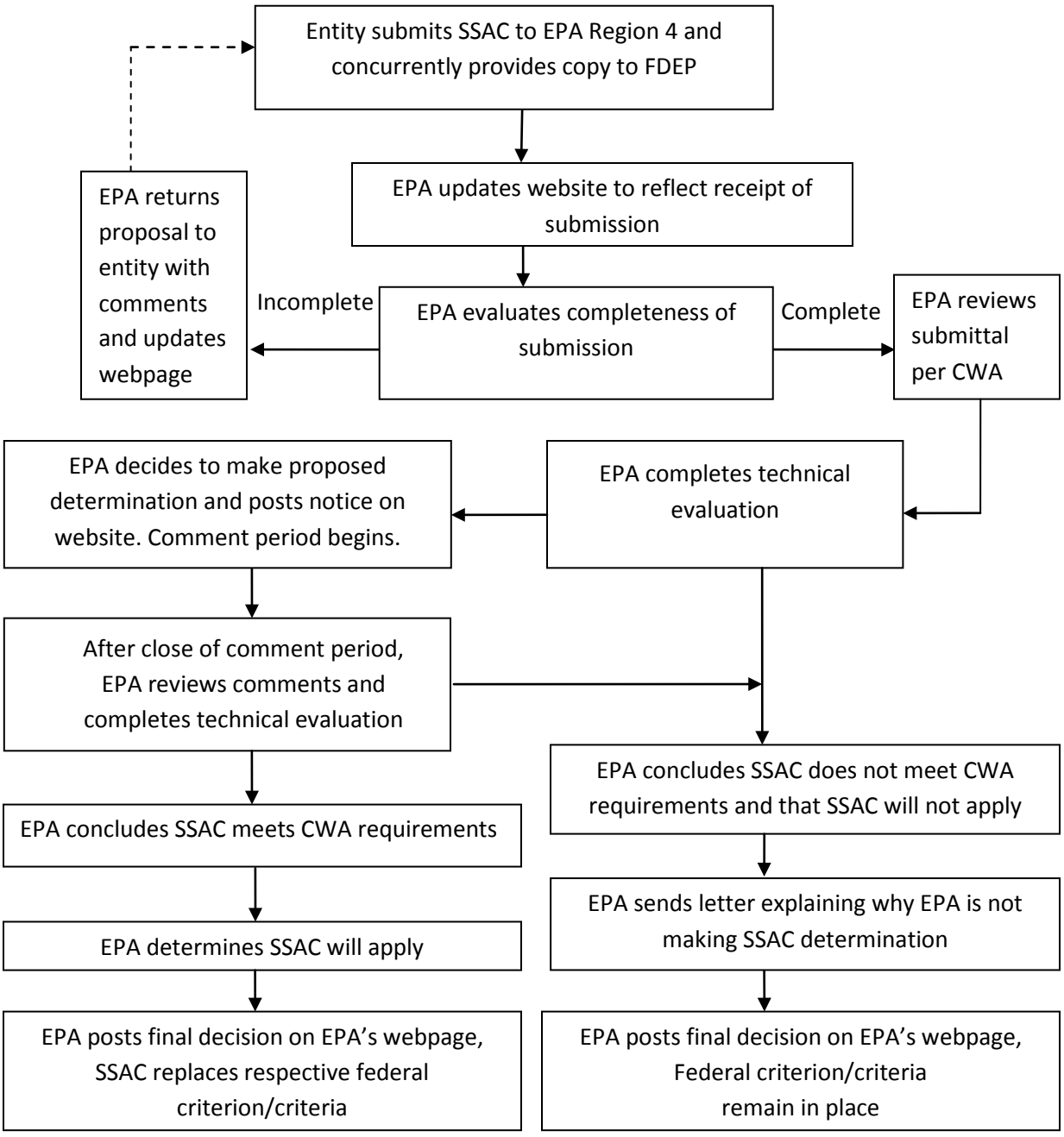
2. If the Regional Administrator decides that the proposal from the entity contains sufficient information to proceed, then EPA will prepare a technical evaluation[3] of the submitted material and an explanation for EPA's proposed decision. EPA will post a public notice on its website, providing a link to the technical evaluation and submitted materials and soliciting comments on the proposed SSAC. Written comments can be submitted by email or standard postal delivery. After the comment period ends, the Regional Administrator will determine whether or not the Federal SSAC meets the statutory and regulatory requirements of new or revised water quality standards, including 131.43(e) and 131.11. Either determination will be made publicly available with an explanation of the basis for the decision. If the Regional Administrator concludes the SSAC does not meet the statutory and regulatory requirements, such action does not preclude or prohibit the entity from initiating another submission process in the future if additional data become available.

3. If following EPA's technical evaluation, the Regional Administrator decides that the proposal from the entity contains insufficient information to support proceeding to public comment to propose the SSAC determination, then EPA will send a letter to the entity explaining why EPA is not making a proposed SSAC determination. This conclusion will also be made publicly available.

[2] Details about submitted SSAC applications can found on EPA's webpage for the Florida Nutrient Rule at http://water.epa.gov/lawsregs/rulesregs/florida_index.cfm.

[3] In these cases, EPA's technical evaluation will include a compilation of relevant materials so that the public can access a short synopsis of the proposed SSAC, its coverage, its justification, and EPA's initial conclusions whether the SSAC appears to meet the statutory and regulatory requirements.

Figure 2. Flow diagram of SSAC proposal process



A. Who may apply for a SSAC

EPA's Final Rule at 40 CFR 131.43(e) provides that any entity may submit a request for a SSAC directly to the Regional Administrator. The entity that petitions for a SSAC may be the State, a city or county, a municipal or industrial discharger, a citizen group, an environmental organization, or any other individual or organization. The entity requesting the SSAC bears the

burden of demonstrating that any proposed SSAC meets the requirements of the CWA and EPA's implementing regulations, specifically 40 CFR 131.10 and 131.11.

B. Where entities should submit SSAC proposals

Entities should submit SSAC proposals to EPA's Region 4 Regional Administrator. EPA requests that entities submit an electronic version of the SSAC proposal and all supporting materials to [email address]. If entities also wish to submit a paper version, it can be sent to [address].

If the entity submitting the request is not the State of Florida, the entity is also required to submit the proposed SSAC and supporting materials to the State at the same time those materials are submitted to EPA to notify the State and ensure that the State has the opportunity to provide comments to EPA.

C. Defining Physical Boundaries Where SSAC Would Apply

SSAC are alternative values to criteria set forth in the Final Rule that would be applied to a single waterbody (or waterbody segment), a group of waterbodies, or a watershed.

For each waterbody or segment of a waterbody, the submission should have a "fact sheet" in addition to the required supporting documentation. An example fact sheet is included as Figure 3, but in general the following information should be included:

- Location (e.g., county name, specific identifying location information, current waterbody identification or WBID[4], maps). The entity must identify any downstream waters that might be affected by the proposed SSAC.
- For each waterbody or segment, identification of the presently applicable numeric nutrient criteria and the recommended numeric nutrient criteria proposed as an alternative.
- Synopsis describing how the proposed SSAC would be fully protective of the applicable designated use(s) and based on a sound scientific rationale.
- Administrative history - Any assessment, 303(d) list, TMDL history, other prior interpretation of the narrative nutrient criteria, and/or previous permitting decisions/actions to document nutrient relevant history at the location.

[4] WBIDs are mentioned here for informational purposes. For purposes of delineating the extent of the location or area for which a SSAC is being requested, identification information such as specific watershed or tributary locations at the upstream and downstream reaches of the area should be used to describe the spatial extent.

Figure 3. Example "fact sheet" to include with a submittal

Fact Sheet: Proposed SSAC for Wet Creek	
Location Information	Located in Clear Water State Park (Greene County, Florida) SSAC will apply to Wet Creek from its headwaters to River Mile 8.5 (Lat-Long info) Currently WBID 7000 Map enclosed
Numeric Nutrient Criteria Comparison	Wet Creek is located in the Panhandle West NWR. Currently applicable criteria are: TP=0.06 mg/L , TN=0.67mg/L SSAC requested only for TP. No change proposed for TN of 0.67mg/L. Proposed TP SSAC: TP= 0.1 mg/L
Synopsis of Protection of Designated Use	*See Section III for additional details on how to document use support. Only a synopsis of this information is needed for the fact sheet.*
History of Assessment	This waterbody is in Group 1 and has been determined to be fully supporting its uses (for all water quality parameters) in the last 3 reporting cycles. Therefore it has never been listed as impaired nor had a TMDL completed.
Identification of Downstream Waters	Identify downstream waters/segments that could be affected.

III. Data Requirements, Analyses, and Documentation Necessary to Support a SSAC Submission

A. Introduction

As described in Section V.C (1) of EPA's Final Rule for *Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters* (75 FR 75762 Dec 6, 2010), there are several approaches for developing SSAC to adjust chlorophyll *a*, total nitrogen (TN) or total phosphorus (TP) values contained in the Final Rule. One approach is to replicate the process that EPA used to develop its lake (131.43(c)(1)) and stream (131.43(c)(2)(i)) criteria, and to apply these methods to a smaller subset of waters. Another approach is to conduct a

biological, chemical, and physical assessment of lake and stream conditions. The Final Rule also has a general provision for using other scientifically defensible approaches to adjust existing criteria values that are protective of the designated use. An entity seeking SSAC should compile all of the supporting data, conduct the necessary analyses, develop the expression of alternative criteria, demonstrate that alternative numeric criteria values are fully protective of the applicable designated uses (i.e., both in the SSAC waterbodies and downstream waters), and prepare the supporting documentation to justify the change in criteria. The entity should demonstrate that any proposed SSAC meet the requirements of the CWA.[5] In circumstances where an entity submits alternative criteria that are more stringent than those in EPA's final rule, they should include an analysis showing that EPA's promulgated criteria are not sufficiently protective of the designated uses for that specific waterbody.

A Federal SSAC must be expressed in the form of a concentration. The SSAC proposal may also include a criterion expressed as a corresponding load that is consistent with the proposed concentration, with the associated factors and assumptions. While a concentration is expected to be applicable for all parts of the CWA, it is recognized that an associated load could be useful in source control. The entity requesting the SSAC should include documentation supporting the conclusion that the supplemental load information is consistent with the proposed SSAC concentration. Additional detail explaining concentration criteria and the supplemental loading information is described in section III.D.

As stated above, one approach for developing SSAC relies on the methodologies used by EPA in developing criteria for the final regulation. For lakes, this approach maintains the applicable value of chlorophyll *a,* based on lake color and alkalinity, and develops corresponding alternative TN and/or TP values. For streams, entities can use EPA's reference-based methodology to define a sub-region within one of EPA's nutrient watershed regions, and then (a) identify the subset of EPA reference sites located within the sub-region drawn from the broader regional set relied upon by EPA, or (b) develop a set of reference sites consisting of a combination of a subset of EPA's reference sites and additional sites that pass EPA's screening methodology to establish alternative TN and/or TP values.

A second general approach is to use a combination of biological, chemical, and physical assessment measures to demonstrate that the waterbody is meeting its designated uses. The entity can then propose concentrations of TN, TP, and/or chlorophyll *a* that reflect baseline conditions calculated from at least three consecutive years[6] of data as alternative criteria. For lakes and streams, entities can use methods and data similar to those used by EPA to show how

[5] EPA's implementing regulations include 40 CFR §§ 131.11 and 131.10(b).

[6] Three consecutive years should incorporate the most recently available data. However, if a different time period is utilized due to data availability, an explanation should be provided as to why data older than the most recent three consecutive years is appropriate.

the designated use is being met. For example, all of the screening attributes used by EPA for defining the reference sites for streams can be applied to the data from an individual stream to show healthy conditions.

A third general approach provides for entities to use other scientifically defensible approaches to modify TN, TP, and/or chlorophyll *a*. For example, entities can use several approaches to develop a new chlorophyll *a* response value for lakes that reflects a site-specific or regionally-specific attainment of applicable designated uses, and then define TN and/or TP values based on the new chlorophyll *a* response value. When using this approach, the entity should clearly show how the new chlorophyll *a* value represents attainment of the designated use. For streams, entities can use a number of methods to define a new relationship between a representative stream condition and attained designated uses, which can then be translated into protective TN and TP criteria.

For some waterbodies in Florida, total maximum daily loads (TMDLs) have been developed as a result of the waterbody being listed as impaired. The SSAC proposal can take advantage of the data and analyses performed in the TMDL to support the SSAC application. For example, a TMDL that used mechanistic modeling to establish the relationship between TN and TP with chlorophyll *a* in a lake could augment a lake SSAC under the other scientifically defensible methods approach described above. Additional considerations for TMDLs in the SSAC process are presented in Section IV.

The SSAC application should also demonstrate that the proposed alternative TN and TP criteria will ensure the attainment and maintenance of water quality standards of downstream waters (40 CFR 131.10(b)).

The next two sections present specific details on how to develop SSAC for lakes and streams using the three types of approaches. Throughout the discussion of the types of approaches, there is also mention of data quality considerations. These considerations are expanded on in Appendix A. EPA's intention is to make this information easily accessible and to illustrate what information should be documented in a Federal SSAC request. The goal is not to require any additional burden on an entity beyond what EPA utilized in its own criteria development effort. Not all of the requirements may apply in every case. Lastly, the purpose for including these details is to provide the entity with an idea regarding the types of data quality considerations that are already established by the State of Florida.

B. Developing Site-Specific Alternative Criteria for Lakes

There are three general approaches to developing SSACs for lakes including (1) applying EPA's methodology while maintaining the applicable chlorophyll *a* values specified in the Final Rule and deriving alternate TN and/or TP values based on local conditions; (2) using site-specific

biological, chemical, and physical data to show that a lake is meeting its designated use(s) and then using baseline conditions of TN, TP, and chlorophyll *a* levels as alternative criteria; or (3) using other scientifically defensible methods to derive chlorophyll *a*, TN, and TP values that can be shown to be protective of the designated use(s). For all proposed alternative lake values, the SSAC application must include a review and analysis of applicable downstream TN and TP criteria to confirm that the alternative lake values will meet the instream protection value (IPV) of any stream leaving the lake.

1. Replicating EPA Methodology for Lakes

This approach can be used if the entity proposes to adjust the Federally promulgated TN and/or TP criteria to values *outside* of the range[7] defined in the Final Rule while maintaining the promulgated chlorophyll *a* criterion. Under this process, SSAC lakes would remain in the same classes based on color and alkalinity as defined in the Final Rule, and keep the associated chlorophyll *a* values. First, identify the appropriate lake classification and corresponding chlorophyll *a* criterion:

- Colored lakes (color > 40 PCU[8]) – 20 µg/L chlorophyll *a*
- Clear lakes (color ≤ 40 PCU) with high alkalinity (alkalinity > 20 mg/L as $CaCO_3$) – 20 µg/L chlorophyll *a*
- Clear lakes (color ≤ 40 PCU) with low alkalinity (alkalinity ≤ 20 mg/L as $CaCO_3$) – 6 µg/L chlorophyll *a*

Next, establish a new stressor-response (empirical) relationship between chlorophyll *a* and TN and/or TP by using linear regression to relate TN/TP with chlorophyll *a* (see Figure 3 for an example). Identify the TN/TP concentration associated with the chlorophyll *a* criterion identified in the first step (i.e., where the chlorophyll *a* value intersects with the 75th percentile of predicted distribution of chlorophyll *a* values). This nutrient concentration becomes the proposed SSAC. The red line in Figure 4 shows the derivation of TN corresponding to 6 µg/L of chlorophyll *a*.

[7] See the modification provision at 40 CFR 131.43(c)(1)(iii)
[8] Platinum cobalt units (PCU)

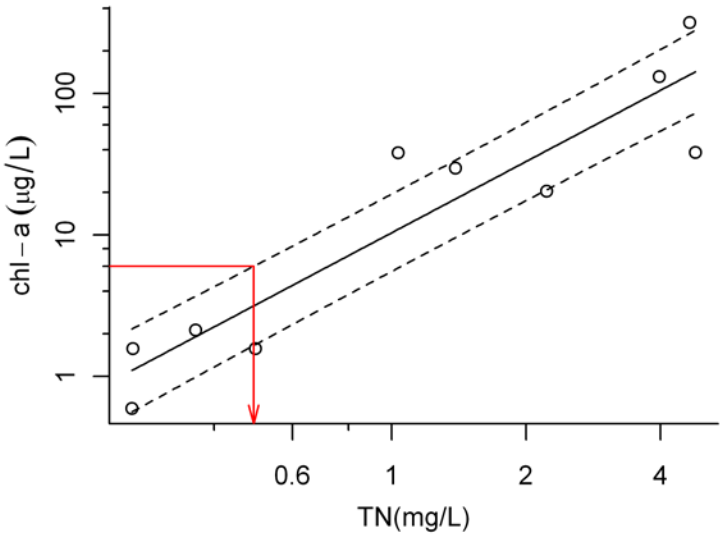


Figure 4. Example of site-specific nutrient stressor-response relationship. Solid line: mean relationship, dashed lines: 25th and 75th percentiles of the predicted distribution of chl-a values.

The new empirical relationship should be based on at least three consecutive years of data. For statistical robustness, however, at least ten pairs of data[9], in which each data pair represents the annual average TN or TP and chlorophyll *a* for a particular lake or sampling location, are preferable if such data are available. Data used to compute annual averages should be collected over the course of the year to capture seasonal differences. Moreover, the data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis (refer to EPA's *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs* (EPA-822-B-00-001) for examples of sampling recommendations). There should be a clear association (or correlation) between the TN/TP data and the chlorophyll *a* data being used to develop SSAC. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

2. Site-Specific Biological, Chemical, and Physical Data

Using this approach, first assemble a data set that includes biological, chemical, and physical data to show how the lake is presently attaining its designated use(s). The

[9] Accurately estimating an empirical relationship between a stressor and a response requires at least 10 samples (Harrell FE, 2001. Regression Modeling Strategies. Springer-Verlag, Inc., New York, NY). Calculating ten annual averages of TN or TP and chlorophyll *a* may be achievable by using long-term monitoring data available in some lakes or by combining data from nearby, similar lakes.

documentation of attainment of designated uses should be based on at least three consecutive years of data. Each of the annually averaged samples should include biological, chemical, and physical parameters and include TN, TP, and chlorophyll *a* for a particular lake or sampling location. In addition, the data for computing the annual averages should be collected over the course of the year to capture seasonal differences, and should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis. Refer to EPA's *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs* (EPA-822-B-00-001) for examples of sampling recommendations. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Supporting physical, chemical and biological data may include the following:

- Historical quantitative water quality data (e.g., TN, TP, chlorophyll *a*, dissolved oxygen, clarity, temperature, average depth)
- Qualitative information (e.g., long term observations of water for the presence of algal mats or fish kills, surrounding land uses)
- Presence of balanced native flora and fauna
- Consideration of the range of diel fluctuations in dissolved oxygen (DO)
- Similarity between current conditions and historical ones

Here is an example of a data set that includes physical, chemical and biological parameters to support a demonstration of how a lake presently meets designated uses:

- Chemical water quality data including at least three consecutive years of DO, chlorophyll *a*, TN and TP data
- 2 Lake Vegetation Index (LVI) calculations (LVIs must both be > 46; assuming 2 samples from at least 3 consecutive years)
- Habitat assessment (including presence/absence of native flora and fauna)

Finally, propose the alternative numeric criteria (e.g., TN, TP, and/or chlorophyll *a*) based on concentrations that reflect baseline conditions calculated from at least three consecutive years of data with a justification for the adjustment and explain how the changes will ensure maintaining the designated uses.

3. Other Scientifically Defensible Methods

EPA recognizes that there may be other scientifically defensible methods that can be used to develop an alternative chlorophyll *a* endpoint that is protective of designated uses and then relate TN and TP concentrations in one or more lakes to the alternative endpoint. The

following are general examples using stressor-response, mechanistic modeling, and reference-based approaches.

a. Stressor-Response Approach

First, determine an alternative chlorophyll *a* response endpoint (i.e., different from those used by EPA in the Final Rule), and clearly demonstrate how this response endpoint supports the attainment of the designated use(s) of the lake using site-specific data. Then, determine the stressor-response (empirical) relationship[10] between the new chlorophyll *a* response endpoint and TN and TP. Data may include:

- Long-term data set (at least three consecutive years of data) that includes the alternate chlorophyll *a* endpoint, TN, TP, and any other relevant data
- Alternative scientifically defensible trophic status metric

For relating the new chlorophyll *a* endpoint to TN and/or TP for a lake, the new empirical relationship should be based on at least three consecutive years of data. For statistical robustness, however, at least ten pairs of data[11], in which each data pair represents the annual average TN or TP and chlorophyll *a* for a particular lake or sampling location, are preferable if such data are available. Data used to compute annual averages should be collected over the course of the year to capture seasonal differences. Data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Next, use statistical techniques, such as linear or multivariate regression, to relate TN and TP with chlorophyll *a*. Evaluate whether the accuracy and precision of the estimated stressor-response relationship[12] are sufficient to inform nutrient criteria derivation. Finally, pick the point at which the prediction interval value of chlorophyll *a* is equivalent to the new chlorophyll *a* criterion as the new TN and/or TP criterion, and justify the use of the point selected in the distribution (e.g., the 75th percentile). Then, translate this chlorophyll *a* value to

[10] U.S. EPA 2010. Using Stressor-Response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. U.S. Environmental Protection Agency, Office of Water, Washington DC.

[11] Accurately estimating an empirical relationship between a stressor and a response requires at least 10 samples (Harrell FE, 2001. Regression Modeling Strategies. Springer-Verlag, Inc., New York, NY). Calculating ten annual averages of TN or TP and chlorophyll *a* may be achievable by using long-term monitoring data available in some lakes or by combining data from nearby, similar lakes.

[12] U.S. EPA 2010. Using Stressor-Response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. U.S. Environmental Protection Agency, Office of Water, Washington DC.

the new TN and TP criterion. Justify and use valid stressor-response analysis to derive TN and TP based on the alternate chlorophyll *a* value.

b. Mechanistic Modeling

Identify a sound scientific model[13] and justify why a specific model was chosen. Describe how the model represents the attributes of the lake being evaluated and how the model can be used to show TN/TP and chlorophyll *a* are related in the lake to meet the designated use (e.g., a stressor-response relationship between a lake index metric and chlorophyll *a* to establish the chlorophyll *a* endpoint). After adequately showing that the lake designated uses are being met, apply the model using site-specific data to estimate the chlorophyll *a* endpoint based on existing conditions and determine TN and TP levels consistent with the chlorophyll *a* endpoint. Document the model calibration procedures.

Model calibration and modeling results should be based on at least three consecutive years of data. Each of the samples should represent the annual average for each of the biological, chemical, and physical parameters used in developing the modeled relationship, and include TN, TP, and chlorophyll *a* for a particular lake or sampling location. Data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis (refer to EPA's *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs* for examples of sampling recommendations). Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

c. Reference Condition Approach

Identify a group of lakes (or observations within a lake) with similar, naturally expected conditions to each other taking into consideration regional variability[14]. Screen sites/observations to identify the subset of reference lakes that is minimally impacted/least disturbed. Describe the data quality screening methodology used and show how it results in a set of reference conditions that are minimally impacted/least disturbed.

Demonstrate that adequate data are available to pursue this methodology. The data sufficiency requirements for showing how the reference site can document that the designated uses are being met should be based on at least three consecutive years of data. Each of the samples should represent the annual average for each of the biological, chemical, and physical

[13] For example, use the TMDL compendium on models: U.S. EPA 1997. Compendium of Tools for Watershed Assessment and TMDL Development. EPA 841-B-97-006.

[14] U.S. EPA 2000. Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs. EPA-822-B-00-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

parameters used in developing the reference condition, and include TN, TP, and chlorophyll *a* for a particular lake or sampling location. Data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis (refer to EPA's *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs* for examples of sampling recommendations).

Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Determine how many reference sites and observations represent natural variability of the lakes in the analysis, and then justify the number of reference sites selected (refer to EPA's *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs*). Develop a distribution for chlorophyll *a*, TN and TP from the reference sites. Select and justify the appropriate percentile for deriving the alternative numeric nutrient criteria for TN, TP and/or Chl *a* based on available data and show how the set of reference sites meets the designated uses.

C. Developing Site-Specific Alternative Criteria for Streams

There are three general approaches for developing SSAC for streams including (1) applying EPA's methodology by using a set of reference conditions (i.e., a subset of reference sites from EPA's sites or a combination of EPA sites and additional sites) that demonstrate attainment of designated uses; (2) using site-specific biological, chemical, and physical data to show that a specific stream or watershed is meeting the designated stream uses; or (3) using other scientifically defensible methods to derive TN and TP values that can be shown to be protective of the designated uses.

In all cases, explain and demonstrate how the proposed alternative stream TN and TP values continue to provide for the attainment and maintenance of the water quality standards of downstream waters. For SSAC stream segments with downstream lakes, use the methodology described in the Final Rule. For SSAC stream segments with downstream streams/rivers/canals, if the proposed alternative TN and/or TP criteria are less than or equal to the instream protective value (IPV) for the downstream stream segment, then the site-specific stream criteria meet the test for downstream protection; otherwise, if the proposed SSAC stream criteria are greater than the IPV for the downstream stream segment, then the SSAC application must include the analysis and data to demonstrate how the proposed alternative site-specific stream criteria will assure that the downstream IPV is met.

1. Replicating EPA Methodology for Streams

For streams, entities can use the EPA's reference-based methodology to define a sub-region within one of EPA's nutrient watershed regions and then (a) develop a subset of reference sites from the set of regional reference sites used by EPA or (b) develop a set of reference sites consisting of a combination of a subset of EPA's regional reference sites and additional sites that pass the EPA reference site screening methodology to establish alternative TN and/or TP values. The entity should use all reference sites in the sub-region.

First, identify the sub-region for which a refined TN and/or TP value is desired. If using the EPA set of reference sites, identify the subset of reference sites within the sub-region. If additional reference sites are being included, screen sites/observations, based on screening criteria identified in EPA's Final Rule, to identify the reference site set that is minimally impacted/least disturbed. Demonstrate that the reference sites are minimally impacted/least disturbed.

Demonstrate that adequate data are available to pursue this methodology. The data sufficiency requirements for showing how the reference site can document that the designated uses are being met should be based on at least three consecutive years of data. Each sample set of TN, TP, Stream Condition Index (SCI) and chlorophyll *a*[15] should be independent and representative of the conditions for which the annual average for each of the biological, chemical, and physical parameters could be calculated. Data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis. Refer to EPA's *Nutrient Criteria Technical Guidance Manual: Rivers and Streams* (EPA-822-B-00-002) for examples of sampling recommendations. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Determine the number of reference sites and observations that are adequate to represent natural variability. Develop a distribution of TN, TP and chlorophyll *a* using the reference sites, and select a percentile of the resulting distribution of reference sites. To replicate EPA's methodology for streams, use the 90th percentile for reference sites and the 75th percentile for the SCI in the West Central region when deriving the alternative criteria.

[15] Chlorophyll a and SCI provide pertinent information on the condition of the waterbody, although they were not parameters included as stream criteria under this rule or subject to the alternative criteria derivation of this rule.

2. Site-Specific Biological, Chemical, and Physical Data

Using this approach, first assemble a data set that includes biological, chemical, and physical data to show how the stream segment is presently meeting its designated use(s). The documentation of attainment of designated uses should be based on at least three consecutive years of data. Each of the samples should represent the annual average for each of the biological, chemical, and physical parameters and should include TN and TP for a particular stream or sampling location. In addition, data for computing annual averages should be collected over the course of the year to capture seasonal differences and should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis. Refer to EPA's *Nutrient Criteria Technical Guidance Manual: Rivers and Streams* (EPA-822-B-00-002) for examples of sampling recommendations. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Supporting physical, chemical and biological data may include the following:

- Historical quantitative water quality data (e.g., TN, TP, chlorophyll *a*, dissolved oxygen (DO), total suspended solids, clarity, temperature, depth, flow rates)
- Qualitative information (e.g., long term observations of water for the presence of algal mats or fish kills, riparian habitat)
- Presence of balanced native flora and fauna
- Stream Condition Index > 40 or other valid metric for streams and other flowing waters
- Consideration of the range of diel fluctuations in dissolved oxygen
- Similarity between current conditions and historical ones

Here is an example of a data set that includes physical, chemical and biological parameters to support a demonstration of how a stream presently meets designated uses:

- Chemical water quality data including at least three consecutive years of DO, TN and TP data
- 4 Stream Condition Index (SCI) samples (SCIs must all be > 40; assuming 2 samples from 2 stations from at least 3 consecutive years)
- Information on hydrologic disturbance/channelization
- Landscape Development Intensity (LDI) score of $\leq$ 2 in the 100 m wide by 10 km upstream corridor and $\leq$ 3 within the watershed
- Habitat assessment (including presence/absence of native flora and fauna)

Finally, propose the alternative numeric criteria (e.g., TN, TP, and/or chlorophyll *a*) based on concentrations that reflect baseline conditions calculated from at least three

consecutive years of data with a justification for the adjustment and explain how the changes will ensure maintaining the designated uses.

3. Other Scientifically Defensible Methods

EPA recognizes that there may be other scientifically defensible methods that can be used to develop alternative TN and TP concentrations that are protective of designated uses. Stressor-response, reference, and mechanistic modeling approaches are described here as examples.

a. Stressor-Response Approach

Develop one or more response endpoints (e.g., chlorophyll *a*, periphyton, or metric/index) with links to nutrients that show that the stream designated uses are being met. First, determine the response endpoint using an empirical relationship that is scientifically justified by site-specific data. The alternative endpoint(s) must meet existing Florida water quality standards for that parameter. Then, determine the stressor-response relationship[16] between the new response endpoint and TN and TP. Provide data to justify using the alternate endpoint value (i.e., how it protects designated use) and how the alternate TN and TP values were derived. Data may include:

- Long-term data set (at least three consecutive years of data) that includes the alternate endpoint, TN, TP, and any other relevant data
- Alternative scientifically defensible trophic status metric appropriate for this waterbody type

For data sufficiency, documentation showing how an alternate endpoint indicates the designated uses are being met should include at least three consecutive years of data. For statistical robustness, however, at least ten samples[17] are preferable if such data are available. Each of the samples should represent the annual average for each of the biological, chemical, and physical parameters used in developing the stressor-response relationship, and should include TN and TP for a particular stream or sampling location. In addition, data used to compute annual averages should be collected over the course of the year to capture seasonal differences. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C),

[16] U.S. EPA 2010. Using Stressor-Response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. U.S. Environmental Protection Agency, Office of Water, Washington DC

[17] Accurately estimating an empirical relationship between a stressor and a response requires at least 10 samples (Harrell FE, 2001. Regression Modeling Strategies. Springer-Verlag, Inc., New York, NY). Calculating ten annual averages of TN or TP and chlorophyll *a* may be achievable by using long-term monitoring data available in some lakes or by combining data from nearby, similar lakes.

FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Establish the relationship between the long-term data and/or trophic status metric and the endpoint in the SSAC stream(s). Use statistical techniques, such as linear or multivariate regression, to relate TN and TP with the response endpoint. Evaluate whether the accuracy and precision of the estimated stressor-response relationship[18] is sufficient to inform nutrient criteria derivation. Identify the point in the predicted distribution of the endpoint values that is equivalent to the desired endpoint threshold. Justify the use of the point selected in the distribution (e.g., the 75th percentile, see Figure 4). Then translate this endpoint value to the new TN/TP criterion. Justify and use valid stressor-response analysis to derive TN and TP based on the alternate endpoint value.

b. Reference Condition Approach

For streams, entities can also develop reference sites that differ from those developed using EPA's reference-based methodology. For example, the entity could define a sub-region within one of EPA's nutrient watershed regions and then (a) develop a set of reference sites using a different screening methodology than that used by EPA or (b) develop a set of reference sites from outside of the region in which the SSAC stream segments are located. For the former, the entity can use reference sites in the West Central region, and use biological information (e.g., SCI scores) for other regions, as a variant to EPA's methodology for streams. For the latter, the entity could use EPA's reference site screening methodology or develop a different screening methodology. In all cases, if a new screening methodology is developed, document how the new screening methodology ensures that the reference sites represent minimally impacted/least disturbed conditions.

The first step is to identify the sub-region for which a refined TN and/or TP value is desired. Show how the streams in this sub-region are similar. If using any of EPA's set of reference sites, identify the subset of reference sites. If additional reference sites are being included, screen sites/observations based on the desired screening criteria (either EPA's or a newly developed one), to identify the reference site set that is minimally impacted/least disturbed.

Demonstrate that adequate data are available to support this methodology. The data sufficiency requirements for showing how the reference site can document the designated uses are being met should be based on at least three consecutive years of data. Each of the samples should represent the annual average for each of the biological, chemical, and physical

[18] U.S. EPA 2010. Using Stressor-Response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. U.S. Environmental Protection Agency, Office of Water, Washington DC.

parameters used in developing the reference condition and should include TN and TP for a particular stream or sampling location. Data should be collected at locations within the waterbodies to represent the variability of waterbodies used in the analysis. Refer to EPA's *Nutrient Criteria Technical Guidance Manual: Rivers and Streams* (EPA-822-B-00-002) for examples of sampling recommendations. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Determine the number of reference sites and observations that are adequate to represent natural variability. Develop a distribution of TN and TP using the reference sites, and select a percentile of the resulting distribution of reference sites. Derive the alternate criteria using that percentile, and justify the selection of the percentile based on the available data.

c. Mechanistic Models

Develop a response endpoint (e.g., chlorophyll *a*, periphyton, dissolved oxygen, or metric/index) for the stream segment. The response endpoint should have a link to nutrients and reflect protection of the designated use. The alternative endpoint(s) must meet existing Florida water quality standards for that parameter.

Provide data to support the alternative response endpoint values and document the derivation of the endpoint values. Model calibration and modeling results should be based on at least three consecutive years of data. Each of the samples should represent the annual average for each of the biological, chemical, and physical parameters used in developing the modeled relationship, and includes TN and TP for a particular stream segment or sampling location. Data should be collected and modeled at the appropriate spatial scale to represent the waterbodies used in the analysis. Document all methods and assumptions associated with data collection and analysis. Refer to Appendix A which discusses Florida's Quality Assurance Rule (62-160 F.A.C), FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07), and other details on data sufficiency and quality requirements.

Identify a sound scientific model[19] and justify why a specific model was chosen. Describe how the model represents the attributes of the stream segment(s) being evaluated and how the model can be used to show TN/TP and the response endpoint are related in the stream segment(s) to meet the designated use (e.g., a stressor-response relationship between a stream index metric and chlorophyll *a* to establish the chlorophyll *a* endpoint). Apply the model using

[19] For example, the TMDL compendium: U.S. EPA 1997. Compendium of Tools for Watershed Assessment and TMDL Development. EPA 841-B-97-006.

site-specific data to estimate the endpoint based on existing conditions and determine TN and TP levels consistent with the endpoint. Document the model calibration procedures.

D. Use of Concentration-Based Criteria and Supplemental Load Information

EPA established TN and TP criteria as concentrations based on several factors. The ability to assess concentrations of TN and TP is a function of direct measures of the nitrogen and phosphorus constituents in a waterbody. This gives all interested parties, including managers and the public, numeric values of nutrients that are easy to understand and use. In contrast, the ability to assess loads in a receiving water requires the measurement of concentrations of all nitrogen and phosphorus constituents from each source (including sources such as urban and agricultural runoff and atmospheric deposition) and the associated flows from these sources. In addition, loads are often an estimated measurement due to the necessity of estimating concentrations from the various sources (in particular intermittent ones) and associated flows.

EPA also considered the ecological response of the effects of excess nutrients in developing criteria as concentrations. For algal growth, the concentration of nutrients combined with favorable growing conditions results in algal production. Because loads of TN and TP can be delivered to a waterbody over varying time periods, the resulting concentration of TN and TP can vary as well. For example a large load delivered over a short period of time will most likely result in a higher concentration than the same load delivered over a long period of time. Loads to waterbodies over time tend to integrate some of the fluctuations in nutrient inputs from various sources.

EPA recognizes how these criteria affect implementation of other Clean Water Act Programs, such as the relationship of the TMDL program to dischargers and nonpoint sources. While the result of a TMDL is load and wasteload allocations to nonpoint and point sources, the basis for the TMDL target is ultimately a concentration of nutrients in a receiving water. EPA's requirement that SSAC criteria be expressed as concentrations does not compromise existing or past TMDLs, NPDES permits, or other CWA actions that have load-based requirements.

IV. Considerations for using TMDL Targets to Derive SSAC proposals

A total maximum daily load (TMDL) represents the maximum amount of a pollutant allowed to enter a waterbody by law, based upon the best available data and information at the time, so that the waterbody will meet and continue to meet the water quality standards for that particular pollutant. The principles, data requirements and types of analyses needed for the development of TMDLs can be similar to those necessary for SSAC development. In this

section, EPA provides some general guidelines for requesting a SSAC based on work previously completed for a previously developed TMDL.

In order to use data and analyses developed for TMDLs in support of a proposed SSAC, the following questions need to be addressed in the documentation supporting the SSAC:

- Do the data and analyses support the designated use (i.e., translates the narrative nutrient criterion) in the subject water, based upon the most current available information?
- Is there adequate supporting documentation to demonstrate support of the designated use?
- Does it ensure adequate protection of downstream water quality standards?

Regarding the question of designated use support, there should be information on how the conclusions indicate values which are protective of balanced natural populations of aquatic flora and fauna, what the initial assumptions were, whether these assumptions are still valid, what was being demonstrated at the time, and whether the target was derived – directly or indirectly – from a threshold impairment. Any new data about the system should be considered. Considerations for export of nutrients downstream (that could affect attainment and maintenance of WQS standards downstream), and delay in the response to nutrient inputs should also be addressed.

EPA recommends that entities follow the expectations outlined in Section III in addition to those in this section in order to demonstrate that the proposed SSAC are fully protective of the designated use(s).

Appendix A. Data Quality

A. Data Quality Considerations for Developing Site-Specific Alternative Nutrient Criteria for Florida Lakes

As described in Section V.C(1) of EPA's Final Rule for *Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters*, there are several approaches for developing SSAC. One approach is to replicate the one that EPA used to develop lake criteria and apply this method to a smaller subset of waters. Another approach is to conduct a biological, chemical, and physical assessment of lake conditions to develop SSAC. A general provision for using another scientifically defensible approach that is protective of the designated use is also provided. A description of the data quality considerations for developing SSAC for these approaches is provided below.

FDEP's *Quality Assurance* Rule 62-160[20] (Appendix A) describes the minimum field and laboratory QA, methodological and reporting requirements used to assure that chemical, physical, biological, microbiological, and toxicological data used by FDEP are appropriate and reliable. It applies to all FDEP programs, projects, studies, and other activities that involve the measurement, use, or submission of environmental data or reports to FDEP with the exception of those activities related to air quality and meteorological studies that have no requirements for contamination of soil, water or tissue. Part II (*Field Procedures*) of Rule 62-160 discusses approved field procedures and recordkeeping and reporting requirements for field procedures. Part III (*Laboratory Certification Procedures*) of Rule 62-160 covers laboratory certification, approved laboratory methods, approval of new and alternative laboratory methods, and recordkeeping and reporting requirements for laboratory procedures. Part IV (*Miscellaneous*) discusses sample preservation and holding times, electronic signatures, research field and laboratory procedures, field and laboratory audits, and data validation. In addition to the data verification and validation procedures described in Rule 62-160.670(1) and (2), F.A.C., FDEP evaluates data quality using the data quality indicators described in FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07)[21] (Appendix B).

1. Data Quality Objectives Used in EPA's Approach for Developing Lake Criteria

If an entity chooses to apply EPA's approach for developing lake criteria to a smaller subset of waters, it should use the same data quality objectives used by EPA for developing this approach. As described in Section 2.2.2 of the *Technical Support Document for U.S. EPA's Final Rule for Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters* (USEPA 2010), EPA downloaded chlorophyll-*a* (chl-*a*) and selected water chemistry data (alkalinity, color, nitrogen species, phosphorus species, pH, dissolved oxygen) from Florida lakes from the Florida *Impaired Waters Rule*

[20] Florida Department of Environmental Protection (FDEP). 2008. Rule 62-160. *Quality Assurance*. Effective 12-3-08.

[21] Florida Department of Environmental Protection (FDEP). 2008. DEP-EA *001/07 Process for Assessing Data Usability*. Florida Department of Environmental Protection, Bureau of Standards and Special Projects, Environmental Assessment Section.

(IWR), 62-303, F.A.C.[22] database, which comprises all of the STORET data for Florida. The IWR data set includes several years of monitoring data from FDEP and other entities (public and private) in Florida. These data were augmented by FDEP with some of its own data not stored in the IWR database. FDEP queried its own Laboratory Information Management System (LIMS) for QA information not provided in IWR.

1.1 Impaired Waters Rule (62-303, Florida Administrative Code)

Florida's STORET database design is dictated by the *Impaired Waters Rule*, 62-303, F.A.C.[23] (Appendix D). This rule establishes a methodology to identify impaired waters based on representative data that will be included on Florida's verified list of impaired waters. The rule covers evaluations of aquatic life use support, biological assessment, interpretation of narrative nutrient criteria, primary contact and recreation use support, fish and shellfish consumption use support, drinking water use support and protection of human health.

In Section 62-303.320 (*Aquatic Life-Based Water Quality Criteria Assessment*), it is noted that *objective and credible data* must be used to determine whether a water segment should be placed on the impaired waters planning list. Data sufficiency and quality requirements in Section 62-303.320 include those listed below:

(2) Data from FDEP's STORET database or its successors should be used as the primary source of data for determining whether samples do not meet water quality criteria.

(3) In general, data older than 10 years should not be considered representative of current conditions.

(4) A minimum of 10 samples should be collected from a water segment over a 10 year period, with at least 5 temporally independent samples. Temporally independent samples should be collected at least one week apart regardless of whether samples are collected at different locations within the segment.

(5) For predominantly marine waters, FDEP will evaluate both the minimum allowable DO concentration of 4.0 mg/L and the daily average DO criterion of 5.0 mg/L using Table 1 in Section 62-303.320. At least 4 temporally independent samples should be required to calculate the daily average for any given day. For DO, temporally independent is at least 4 hours apart.

(7) Values that exceed possible physical or chemical measurement constraints (e.g., pH > 14) and data transcription errors will be excluded from the assessment. If statistical procedures are used to identify outliers, FDEP will evaluate these outliers and determine whether they should be considered invalid and not included in the assessment. If the data are excluded, FDEP will note in the record that data were excluded and why they were excluded.

(8) FDEP will consider all readily available water quality data collected and analyzed in accordance with Chapter 62-160, F.A.C. If requested, the sampling agency must provide to the Department

[22] Florida Department of Environmental Protection (FDEP). 2007. Chapter 62-303. Identification *of Impaired Surface Waters.* Effective 9-4-07.
[23] Florida Department of Environmental Protection (FDEP). 2007. Chapter 62-303. Identification *of Impaired Surface Waters.* Effective 9-4-07.

all of the data quality assessment elements listed in Table 2 of the Department's Guidance Document *Data Quality Assessment Elements for Identification of Impaired Surface Waters* (DEP EAS 01-01, April 2001).

(10) Surface Water data with values below applicable PQLs or MDLs will be assessed in accordance with rules 62-4.246(6)(b)-(d) and (8), F.A.C. If there are no analytical methods with MDLs below a criterion, then the method with the lowest MDL should be used.

Data sufficiency and quality requirements described in Section 62-303.330 (*Biological Assessment*) include those listed below.

(1) Biological data must meet the requirements of paragraphs (3) and (8) in Section 62-303.320 (see above).

(2) Bioassessments used to assess streams and lakes include BioRecons, Stream Condition Indices (SCIs), and the benthic macroinvertebrate component of the Lake Condition Index (LCI), which only applies to clear lakes with a color less than 20 platinum cobalt units. Samplers must comply with QA requirements of 62-160, F.A.C., attend at least 8 hours of FDEP sanctioned training, and pass a FDEP sanctioned field audit that verifies the sampler follows the applicable SOPs in Chapter 62-160, F.A.C.

Data sufficiency and quality requirements described in 62-303.350 (*Interpretation of Narrative Nutrient Criteria*) include those listed below.

(2a) Data must meet the requirements of paragraphs (2)-(4), (7), and (8) in Section 62-303.320 (see above).

(2b) Collect samples from each season in any given year to calculate a Trophic State Index (TSI) or annual mean chlorophyll-*a* value for that year.

(2c) If there are multiple chlorophyll-*a* or TSI values within a season, the average value for a season should be calculated from the individual values and the four quarterly values should be averaged to calculate the annual mean for that calendar year.

(2d) For data collected after the effective date of the IWR, individual TSI values will only be calculated when the nitrogen, phosphorus, and chlorophyll data were collected at the same time and location.

(2e) If there are insufficient data to calculate a TSI or an annual mean chlorophyll-a value in the planning period, data from four consecutive seasons can be used.

(2f) Annual mean values are required from at least 4 years when evaluating a change in TSI over time pursuant to paragraph 62-303.352(3), F.A.C.

(2g) Only corrected chlorophyll-*a* values should be used after effective date of the IWR, except for data used to establish historical chlorophyll-*a* levels.

(3) To calculate a 5-year average chlorophyll-a or TSI value for comparing changes to historical levels, there must be at annual mean values from at least 3 years of the 5-year period.

1.2. Florida's Data Quality Assessment Elements for Identification of Impaired Surface Waters (DEP EAS 01-01)

As described in Florida's *Impaired Waters Rule* (62-303, Florida Administrative Code)[24], FDEP may request and evaluate all of the data quality assessment elements listed in Table 2 of Florida's *Data Quality Assessment Elements for Identification of Impaired Surface Waters*[25]. This data quality assessment elements document also provides in Table 1, the level of data quality assessment that should be conducted for data used for identifying impaired surface waters. The following recommended quality assessment checks in provided in Table 1 of Florida's *Data Quality Assessment Elements for Identification of Impaired Surface Waters*:

- Review to determine if analyses were conducted within holding times
- Review for qualifiers indicative of problems
- Screen comments for keywords indicative of problems
- Review laboratory certification status for particular analyte at the time analysis was performed
- Review data to determine if parts are significantly greater than the whole (e.g., ortho-P > total phosphorus, or NH_3 > TKN)
- Screen data for realistic ranges (e.g., is pH < 14?)
- Review detection limits and quantitation limits against Department criteria and program action levels to ensure adequate sensitivity
- Review for blank contamination

2. Recommended Data Quality Procedures for Conducting a Biological, Chemical, and Physical Assessment of Lake Conditions

2.1 Field Activities and Field Measurements

If an entity wants to conduct a biological, chemical, and physical assessment of lake conditions to support SSAC development, it should follow FDEP's approved Standard Operating Procedures (SOPs) for field activities and field measurements described in DEP-SOP-001/01 (March 31, 2008) (available from FDEP's website at http://www.dep.state.fl.us/labs/bars/sas/qa/sops.htm). Entities that conduct or support field activities and field measurements for FDEP are required to follow these SOPs under Rule 62-160.210 (*Approved Field Procedures*), F.A.C. If an entity would like to apply for a new or alternative field procedure, it should follow the requirements of Rule 62-160.220 (*Approval of New and Alternative Field Procedures*), F.A.C. It should be noted that alternative procedures cannot be approved for the following DEP-SOP-001/01 methods:

[24] Florida Department of Environmental Protection (FDEP). 2007. Chapter 62-303. Identification *of Impaired Surface Waters*. Effective 9-4-07.
[25] Florida Department of Environmental Protection (FDEP). 2001. *Data Quality Assessment Elements for Identification of Impaired Surface Waters*. DEP EAS 01-01, April 2001.

- FS 7410 Rapid Bioassessment (Biorecon) Method;
- FS 7420 Stream Condition Index (D-Frame Dipnet) Sampling;
- FS 7460 Lake Condition Index Lake Composite Sampling;
- FT 3000 Aquatic Habitat Characterization;
- FS 7220 Qualitative Periphyton Sampling;
- FS 7230 Rapid Periphyton Survey;
- FS 7310 Lake Vegetation Index Samping (LVI).

2.2 Analytical Laboratory Certification and Procedures

An entity planning to conduct a biological, chemical, and physical assessment of lake conditions to support SSAC development should ensure that samples are analyzed by a laboratory that is certified by Florida's Department of Health's Environmental Laboratory Certification Program, as described in Rule 62-160.300, F.A.C. Laboratories should comply with relevant FDEP-approved methods as provided in Rule 62-160.320 (*Approved Laboratory Methods*), F.A.C. In addition, the laboratory should operate a QA program consistent with the quality systems standards of the National Environmental Laboratory Accreditation Conference (NELAC), as described in Rule 62-160.300(6), F.A.C. A link to the NELAC website and standards and National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory list pages is provided on FDEP's website at http://www.dep.state.fl.us/labs/bars/sas/qa/sops.htm.

If an entity would like to apply for the use of a new or alternative laboratory method, it should follow the requirements of Rule 62-160.330 (*Approval of New and Alternative Laboratory Methods*), F.A.C.

2.3 Florida Department of Environmental Protection's Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract (DEP-QA-002/02)

In addition to following DEP-SOP-001/01 methods, it is recommended that entities planning to conduct a biological, chemical and physical assessment of lake conditions to support SSAC prepare a Sampling and Analysis Plan (SAP) in accordance with *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract* (DEP-QA-002/02)[26] (Appendix C). This document describes the content that should be included in a SAP for collecting and analyzing data for FDEP as well as requirements for documentation and recordkeeping, reporting, and data quality control.

[26] Florida Department of Environmental Protection (FDEP). 2002. *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract*. DEP-QA-002/02. Florida Department of Environmental Protection, Bureau of Laboratories, Environmental Assessment Section,Tallahassee, Florida

3. Recommended Data Quality Procedures for Using Another Scientifically Defensible Approach for Developing SSAC that Is Protective of the Designated Use

An entity might decide to use another scientifically defensible approach for developing SSAC that is protective of the designated use *other than* (or *in addition to*) applying EPA's approach for developing lake criteria to a smaller subset of waters or conducting a biological, chemical, and physical assessment of lake conditions. For example, an entity might want to include additional monitoring data from non-FDEP sources that were collected for a purpose other than Florida nutrient criteria development for lakes (secondary data) instead of (or in addition to) Florida's IWR database (refer to Section 2.2.2 of the TSD) to develop an SSAC. These secondary data should be checked to ensure that they are suitable and usable for developing SSAC.

As provided below, Section 62-160.670 (*Data Validation by the Department*), F.A.C. (refer to Appendix A), describes what information should be checked to ensure that data are suitable and usable for a specific purpose.

" (a) Completeness of the Department requested data package(s) and the response of involved parties to any Department requests for additional data;

(b) Integrity of samples as determined by complete and proper sample transmittal documentation, and records that demonstrate adherence to proper preservation, transport or other sample handling protocols, as applicable;

(c) Proper use of sample collection methods;

(d) Proper selection and use of analysis methods;

(e) Sufficient use and routine evaluation of quality control measures to establish the precision, accuracy, sensitivity, and potential bias associated with the analytical system and associated results;

(f) Proper instrument calibration and verification procedures;

(g) Documentation of all generated data as provided in Rules 62-160.240 and 62-160.340, F.A.C.;

(h) Ability to reconstruct all field sampling and laboratory procedures through the documentation and records of the laboratory or field sampling organization as provided in Rules 62-160.240 and 62-160.340, F.A.C.;

(i) Ability to trace data in the final report to a specific sampling site, date, and time;

(j) Status of the laboratory's certification through the DOH ELCP as provided in Chapter 64E-1, F.A.C., for any given analyte or category of analytes; and

(k) Appropriateness of the collected data as related to the specific data quality objectives of the Department program activity or project for which they were collected including those data being considered for secondary use."

In addition, as described in 62-160.670(3), F.A.C., data should be evaluated against the following data quality indicators described in FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07)[27] (Appendix B):

3.0 Laboratory control sample or spike (LCS), including evaluation of LCS recovery

4.0 Matrix spikes (MS), including evaluation of MS recovery

5.0 Surrogate spikes

6.0 LCS duplicates or replicates (LCSD) and matrix spike duplicates (MSD)

7.0 Sample duplicates (SD)

8.0 Calibrations

9.0 Method blanks or other analytical blanks

10.0 Field quality control blanks (trip blanks, field blanks or equipment blanks)

11.0 Holding times

12.0 Quality control check samples for BOD, chlorophyll, and matrix-specific evaluation for known or suspected interferences

13.0 Sample preservation checks

14.0 Evaluation of the reported MDL

15.0 Evaluation of the reported PQL

16.0 Evaluation of reversals (parts versus whole comparison), where sample results are evaluated to determine whether the sum of reported parts or fractions for a sample analyte result exceed 120 percent of the corresponded reported or calculated whole.

It is also recommended that secondary data be evaluated against the documentation and recordkeeping requirements, reporting requirements, and quality control requirements of FDEP's *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract* (DEP-QA-002/02) (Appendix C)[28].

If it is determined during the data evaluation process that secondary data do not meet the data quality objectives described above for nutrient criteria development, these data should not be used for SSAC development.

[27] Florida Department of Environmental Protection (FDEP). 2008. DEP-EA *001/07 Process for Assessing Data Usability*. Florida Department of Environmental Protection, Bureau of Standards and Special Projects, Environmental Assessment Section.

[28] Florida Department of Environmental Protection (FDEP). 2002. *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract*. DEP-QA-002/02. Florida Department of Environmental Protection, Bureau of Laboratories, Environmental Assessment Section,Tallahassee, Florida

B. Data Quality Considerations for Developing Site Specific Alternative Nutrient Criteria for Florida Rivers and Streams

As described in Section V.C(1) of EPA's Final Rule for *Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters*, there are several approaches for developing SSAC. One approach is to replicate the one that EPA used to develop river and stream criteria and apply this method to a smaller subset of waters. Another approach is to conduct a biological, chemical, and physical assessment of river and stream conditions to develop SSAC. A general provision for using another scientifically defensible approach that is protective of the designated use is also provided. A description of the data quality considerations for developing SSAC for these approaches is provided below.

FDEP's *Quality Assurance* Rule 62-160[29] (Appendix A) describes the minimum field and laboratory QA, methodological and reporting requirements used to assure that chemical, physical, biological, microbiological, and toxicological data used by FDEP are appropriate and reliable. It applies to all FDEP programs, projects, studies, and other activities that involve the measurement, use, or submission of environmental data or reports to FDEP with the exception of those activities related to air quality and meteorological studies that have no requirements for contamination of soil, water or tissue. Part II (*Field Procedures*) of Rule 62-160 discusses approved field procedures and recordkeeping and reporting requirements for field procedures. Part III (*Laboratory Certification Procedures*) of Rule 62-160 covers laboratory certification, approved laboratory methods, approval of new and alternative laboratory methods, and recordkeeping and reporting requirements for laboratory procedures. Part IV (*Miscellaneous*) discusses sample preservation and holding times, electronic signatures, research field and laboratory procedures, field and laboratory audits, and data validation. In addition to the data verification and validation procedures described in Rule 62-160.670(1) and (2), F.A.C., FDEP evaluates data quality using the data quality indicators described in FDEP's *Department of Environmental Protection Process for Assessing Data Usability* (DEP-EA-001/07)[30] (Appendix B).

1. Data Quality Considerations that EPA Used in Developing Nutrient Criteria for Florida Rivers and Streams

If an entity chooses to apply EPA's approach for developing river and stream criteria to a smaller subset of waters, it should use the same data quality objectives that EPA used for this approach. As described in Section 1.3.1 of the *Technical Support Document for U.S. EPA's Final Rule for Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters* (USEPA 2010), EPA used the *All Streams Data Set* (see Appendix A3 of the Technical Support Document [TSD], *Data Supporting EPA's Reference Approach for Deriving Numeric Nutrient Criteria for Florida Streams*) to develop river and

[29] Florida Department of Environmental Protection (FDEP). 2008. Rule 62-160. *Quality Assurance*. Effective 12-3-08.

[30] Florida Department of Environmental Protection (FDEP). 2008. DEP-EA *001/07 Process for Assessing Data Usability*. Florida Department of Environmental Protection, Bureau of Standards and Special Projects, Environmental Assessment Section.

stream nutrient criteria. The *All Streams Data Set* contains all available nutrient data from Florida's STORET and GWIS databases that meet FDEP data quality requirements, as described in FDEP QA rule 62-160 and their "*Process for Assessing Data Usability*." EPA reviewed these FDEP data quality assurance procedures and determined that they were consistent with EPA quality assurance policies.

2. Recommended Data Quality Procedures for Conducting a Biological, Chemical, and Physical Assessment of River and Stream Conditions

2.1 Field Activities and Field Measurements

If an entity wants to conduct a biological, chemical, and physical assessment of river or stream conditions to support SSAC development, it should follow FDEP's approved Standard Operating Procedures (SOPs) for field activities and field measurements described in DEP-SOP-001/01 (March 31, 2008) (available from FDEP's website at http://www.dep.state.fl.us/labs/bars/sas/qa/sops.htm). Entities that conduct or support field activities and field measurements for FDEP are required to follow these SOPs under Rule 62-160.210 (*Approved Field Procedures*), F.A.C. If an entity would like to apply for a new or alternative field procedure, it should follow the requirements of Rule 62-160.220 (*Approval of New and Alternative Field Procedures*), F.A.C. It should be noted that alternative procedures cannot be approved for the following DEP-SOP-001/01 methods:

- FS 7410 Rapid Bioassessment (Biorecon) Method;
- FS 7420 Stream Condition Index (D-Frame Dipnet) Sampling;
- FS 7460 Lake Condition Index Lake Composite Sampling;
- FT 3000 Aquatic Habitat Characterization;
- FS 7220 Qualitative Periphyton Sampling;
- FS 7230 Rapid Periphyton Survey;
- FS 7310 Lake Vegetation Index Samping (LVI).

2.2 Analytical Laboratory Certification and Procedures

An entity planning to conduct a biological, chemical, and physical assessment of river or stream conditions to support SSAC development should ensure that samples are analyzed by a laboratory that is certified by Florida's Department of Health's Environmental Laboratory Certification Program, as described in Rule 62-160.300, F.A.C. Laboratories should comply with relevant FDEP-approved methods as provided in Rule 62-160.320 (*Approved Laboratory Methods*), F.A.C. In addition, the laboratory should operate a QA program consistent with the quality systems standards of the National Environmental Laboratory Accreditation Conference (NELAC), as described in Rule 62-160.300(6), F.A.C. A link to the NELAC website and standards and National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory list pages is provided on FDEP's website at http://www.dep.state.fl.us/labs/bars/sas/qa/sops.htm.

If an entity would like to apply for the use of a new or alternative laboratory method, it should follow the requirements of Rule 62-160.330 (*Approval of New and Alternative Laboratory Methods*), F.A.C.

2.3 Florida Department of Environmental Protection's Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract (DEP-QA-002/02)

In addition to following DEP-SOP-001/01 methods, it is recommended that entities planning to conduct a biological, chemical, and physical assessment of river or stream conditions, prepare a Sampling and Analysis Plan (SAP) in accordance with FDEP's *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract* (DEP-QA-002/02)[31] (Appendix C). This document describes the content that should be included in a SAP for collecting and analyzing data for FDEP as well as requirements for documentation and recordkeeping, reporting, and data quality control.

[31] Florida Department of Environmental Protection (FDEP). 2002. *Requirements for Field and Analytical Work Performed for the Department of Environmental Protection Under Contract*. DEP-QA-002/02. Florida Department of Environmental Protection, Bureau of Laboratories, Environmental Assessment Section,Tallahassee, Florida