SL316

UF UNIVERSITY of FLORIDA
IFAS Extension

A Guide to EPA's Numeric Nutrient Water Quality Criteria for Florida[1]

Thomas Obreza, Mark Clark, Brian Boman, Tatiana Borisova, Matt Cohen, Michael Dukes, Tom Frazer, Ed Hanlon, Karl Havens, Chris Martinez, Kati Migliaccio, Sanjay Shukla, and Alan Wright[2]

Introduction

The purpose of this publication is to provide a basic, concise, and understandable description of the United States Environmental Protection Agency's (EPA) numeric nutrient criteria for Florida, the background events that led to its release, some pertinent scientific issues, and implications for the future[1].

What happened on November 14th, 2010?

EPA Administrator Lisa Jackson signed a final rule called "Water Quality Standards for the State of Florida's Lakes and Flowing Waters." This rule was published in the Federal Register on December 6, 2010.[2] It is effective as of March 6, 2012, except for a section of the rule related to implementation of Site Specific Alternative Criteria (explained later) that is effective as of February 4, 2011.

This final rule follows a proposed rule[3] first released by EPA on January 14, 2010, which was supplemented on August 3, 2010.[4] In conjunction with the proposed rule, EPA conducted 13 public hearings in six Florida cities and held a 90-day public comment period. During that time, EPA received more than 22,000 public comments about the rule.

What is this rule about?

The rule applies to lakes, springs, and inland flowing waters with the exception of south Florida canals (mostly south of Lake Okeechobee). The numeric criteria in the rule are intended to replace Florida's existing narrative nutrient criterion that states: "In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna." The final standards set numeric limits on the amount of nutrient pollution allowed in Florida's inland waters.

1. This document is SL316, one of a series of the Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date February 2010. Revised March 2011. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Thomas Obreza, Professor, Soil and Water Science Department; Mark Clark, Assistant Professor, Soil and Water Science Department; Brian Boman, Professor, IRREC; Tatiana Borisova, Assistant Professor, Food and Resource Economics Department; Matt Cohen, Assistant Professor, School of Forest Resources and Conservation; Michael Dukes, Associate Professor, Agricultural and Biological Engineering; Tom Frazer, Associate Professor, School of Forest Resources and Conservation; Ed Hanlon, Professor, SWFREC; Karl Havens, Professor, Florida Sea Grant College; Chris Martinez, Assistant Professor, Agricultural and Biological Engineering; Kati Migliaccio, Assistant Professor, TREC; Sanjay Shukla, Associate Professor, SWFREC; and Alan Wright, Assistant Professor, EREC; Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

Is Florida the only state where numeric water quality criteria have been required?

No. EPA's 1998 "National Strategy for the Development of Regional Nutrient Criteria" encouraged all states and tribes to adopt numeric nutrient water quality criteria as a more effective way to protect water resources from nutrient enrichment and to meet specific aspects of the Clean Water Act. A 2008 EPA status report[5] indicated that 19 states have adopted numeric nutrient standards for some or all of their lakes and reservoirs, and 14 states have adopted numeric nutrient standards for some or all of their rivers and streams.

What does "impaired water" mean?

An impaired water body is one that is polluted to the point where it does not meet its designated use. For example, a water body designated for swimming could become "impaired" if pollution increased to the point where it was not desirable or safe for people to swim. Or, a lake designated for aquatic life could become impaired if it became polluted to the point where certain types of fish that used to thrive there could no longer live. Or, an estuary could become impaired to the point where seagrasses could no longer grow. As a water body becomes impaired, the existing aquatic ecosystem changes for the worse, fish or wildlife habitat is degraded, and in extreme cases public health may be threatened.

How many impaired water bodies does the state of Florida have?

According to the Florida Department of Environmental Protection's (DEP) 2010 Integrated Water Quality Assessment for Florida, approximately 1,918 miles of rivers and streams (about 8% of assessed river and stream miles) and 378,435 acres of lakes (about 26% of assessed lake acres) were identified as impaired by nutrients. In addition, lakes, rivers, and streams classified as impaired increased 3% compared with the 2008 Water Quality Assessment. The extent of impairment may eventually be higher because not all of Florida's water bodies had been assessed as of 2010. Nutrients were ranked as the fourth major source of impairment for rivers and streams (after dissolved oxygen, mercury in fish, and fecal coliform contamination). For lakes and estuaries, nutrients ranked first and second, respectively.

How do nutrients affect Florida's water bodies?

All living things need nutrients to survive and grow, but elevated nutrient concentrations may impact the designated use of a water body. Many of our natural areas in Florida developed in a nutrient-limited condition. If nutrient concentrations increase in these areas, plant and algal growth can become excessive and harmfully affect other living things. A short-term example is when excess nutrients trigger an algal bloom that looks and smells bad and can result in poor-tasting drinking water. A longer-term example is when sustained algal growth reduces water clarity, which in turn decreases the amount of light reaching a lake bottom. The result can be a decrease in growth of aquatic plants that provide critical fish habitat.

On the other hand, some Florida lakes, streams, and springs are naturally high in phosphorus because these water bodies directly interact with phosphorus-rich bedrock and groundwater. It is important to distinguish a water body that is naturally high in nutrients from one that has become impaired due to excessive inputs of nutrients from human and/or animal sources.

So, what's the difference between "narrative" and "numeric" standards?

The Florida narrative standard uses descriptive language to determine the point at which water quality is no longer supporting the designated use of a particular water body. The language implies that at some as-yet-undefined concentration, it is expected that nutrients (e.g., nitrogen and/or phosphorus) could be harmful to the water body, and reaching these concentrations would cause the water body to become "impaired." This type of narrative standard can result in a water body becoming impaired before the level of nutrients that cause imbalance is determined.

A numeric standard defines the maximum nitrogen and/or phosphorus concentration in a water body that will maintain its designated use. A standard expressed numerically may eliminate the need for a case-by-case assessment of risk associated with nutrient enrichment. With a narrowly defined numerically expressed criterion, it is much easier to determine if a problem exists or if a known source of nutrients is a threat.

Here is an example of how a numeric water quality standard is expressed: "To protect rivers and streams in the western Florida panhandle, the yearly average total nitrogen concentration in the river or stream shall not surpass 0.67 ppm* more than once in a 3-year period." This example standard sets a nitrogen limit for a region of Florida (the western panhandle), but it does not get any more specific relative to one river versus another within that region.

*ppm = parts per million, which is identical to milligrams per liter (mg/L).

Both narrative and numeric standards allow some nutrients to exist in a water body. How do we know when we have too much?

Determining a specific number (nutrient concentration in the water) that protects the designated use of a particular water body without being over-protective is challenging for several reasons. One reason is that no two water bodies are exactly the same when it comes to the nutrient concentrations that will protect a water body from impairment. In fact, different water bodies will respond differently to nutrient inputs. In addition, natural nutrient concentrations can be quite high in many Florida waters.[7] Both of these reasons make it unlikely that just one number could apply to all of Florida.

If water bodies are grouped by their natural nutrient concentrations, and other factors that influence nutrient response are accounted for, then some of the natural variability discussed above can be sorted out. Creating appropriate groupings of water bodies that share similar natural nutrient concentrations and response characteristics is a critical part of establishing nutrient criteria that will appropriately protect the water bodies within the group. (See the Further Information section at the end of this document for details on how numeric nutrient criteria are developed.)

What happened to change the way DEP was addressing Florida's water quality issues?

In July 2008, an organization called Earthjustice, representing the Florida Wildlife Federation, the Conservancy of Southwest Florida, the Environmental Confederation of Southwest Florida, St. John's Riverkeeper, and the Sierra Club, filed a lawsuit against EPA. The suit: 1) claimed that there was an unacceptable delay by the federal government in setting limits for nutrient pollution; 2) claimed that EPA had previously determined that numeric nutrient criteria are necessary as described in the Federal Clean Water Act; and 3) further argued that EPA was obligated to promptly propose these criteria for Florida.

So, what happened as a result of the lawsuit?

After assessing the situation, EPA determined on January 14, 2009, that numeric standards were, in fact, needed to meet the requirements of the Clean Water Act. EPA also declared that Florida's existing narrative criteria were insufficient to protect water quality. This determination meant that, despite considerable and ongoing nutrient pollution control efforts by state agencies, water quality degradation remains a significant challenge, especially with Florida's documented unique and threatened ecosystems, agricultural activity, expanding urbanization and projected population growth.

In August 2009, EPA entered into a consent decree with the environmental groups to settle the 2008 litigation. (A consent decree is a voluntary agreement between the parties in a lawsuit.) EPA committed to propose numeric nutrient standards for lakes and flowing waters in Florida by January 2010 and for Florida's estuarine and coastal waters by January 2011. Final standards for inland waters were issued November 14, 2010, and will be implemented

March 6, 2012. EPA also committed to propose numeric nutrient water quality standards for Florida's estuarine coastal and southern inland flowing waters by November 14, 2011, and to establish final standards by August 15, 2012.

What did DEP do as a result of the consent decree?

DEP suspended their formal rulemaking process to establish numeric water quality criteria. During the past decade, Florida has spent more than $20 million to more fully understand nutrient pollution and control, and DEP has coordinated closely with EPA on this issue. Florida has more data describing its water quality than any other state, and DEP has shared these data with EPA. The two agencies have worked closely to analyze and interpret the data as the numeric criteria were developed and will continue to do so. However, it is EPA's position that although they have established the water quality standards, DEP is the primary agency responsible for implementing Clean Water Act programs in the state of Florida. EPA therefore defers to DEP to determine how to achieve these federal numeric criteria to meet the needs of Florida's citizens and environment. During the 15-month period between publication in the Federal Register and March 6, 2012, when the rule takes effect, DEP will be working to determine how exactly the rule will be implemented.

What does EPA's rule say?

The rule is long and detailed. The document published in the Federal Register[8] is 47 pages of text and footnotes. There is also a 156-page technical document[9] that provides scientific support for the criteria. Here are some highlights:

Who will be affected by this rule?

- Industries discharging pollutants to lakes and flowing waters.
- Publicly owned water treatment facilities.
- Entities responsible for managing stormwater runoff.
- Non-point source contributors to nutrient pollution. (Examples of these are agricultural production, managed landscapes, and urban areas. In short, everyone and everything in Florida.)

What do the numeric nutrient criteria look like?

Key points:

- This rule applies to "lakes and flowing waters," which are defined as inland surface waters that we either drink (Class I) or use for recreation and aquatic life support (Class III). Estuaries, coastal waters, and wetlands are not included at this time.
- The numeric criteria put forth are designed to support a balanced natural population of flora and fauna in lakes and flowing waters, while also ensuring the attainment and maintenance of the water quality standards for downstream waters. This statement means that the numeric criteria for a particular water body (a stream, for instance) were developed with two things in mind: the requirement of the stream itself, plus the requirement of any water body into which the stream flows (like a lake or estuary).

See tables 1 through 3 at the end of this document for specific numeric criteria.

Just how sensitive are Florida's water bodies to nutrients?

One way we can answer this question is by comparing the numeric nutrient standards to drinking water standards. For example, the drinking water standard for nitrate-nitrogen is 10 ppm, while the highest total N concentration found in the rule is about 1.9 ppm. (There is no phosphorus drinking water standard.) The rule's much lower concentration illustrates that some of Florida's aquatic ecosystems are sensitive to nutrients at concentrations much lower than those directly affecting humans.

In the case of Florida's aquatic ecosystems, changes in nutrient concentrations of a water body are more likely to cause an imbalance in aquatic life compared with a water body that has relatively

constant high or low nutrient concentrations. For example, if plant or algal growth is limited by lack of nitrogen or phosphorus in a lake, that particular lake will have an algae concentration proportional to the amount of bioavailable nitrogen or phosphorus. If more of the limiting nutrient is added to the lake, the algal growth will increase. This increase in plant growth can change the composition of the aquatic ecosystem, potentially resulting in impairment.

On the other hand, if nutrient concentrations in a water body are naturally high, the aquatic ecosystem that developed there is supported by and in some respects dependent on these high nutrient concentrations. One result of human habitation in Florida is the importation of nutrients to our watersheds, some of which ultimately end up in water bodies. It does not take much "extra" nutrient to upset the balance and cause ecosystem change.

What is meant by "site-specific alternative criteria?"

Site-specific alternative criteria (SSAC) are water quality standards that differ from the statewide standard. The SSAC meets the regulatory requirement of protecting a water body, but it is tailored to account for site-specific conditions. Site-specific alternative criteria may be more or less stringent than the state standard, but in either case, the SSAC must be based on sound science. Any entity, private or public, can apply for SSAC. To apply for a federal SSAC, the applicant must:

1. Compile supporting data, conduct analysis, and develop alternative criteria with supporting documentation demonstrating that the alternative criteria will protect the designated use.

2. Notify the state (if the entity is not the state), and include all supporting documentation so that the state can comment on the proposed SSAC.

3. Submit the proposed SSAC to the EPA Region 4 Administrator for evaluation based on its technical merits and protectiveness. The administrator will then decide either to 1) publish a public notice and take comments, 2) return the proposal for additional information, 3) reject the proposal, or 4) find that the proposed SSAC is appropriate and approve the alternative criteria.

How will the state deal with existing impaired waters already targeted for nutrient load reduction?

Many of Florida's impaired waters already have numeric nutrient limits that were set to restore the water quality to its designated use. This program is known as the TMDL, or Total Maximum Daily Load program. This program is governed by the 1999 Florida Watershed Restoration Act (FWRA)[10] and subsequent revisions to it. Since TMDL nutrient targets are typically developed in response to a site-specific impairment issue, some have suggested that all existing TMDL nutrient targets should be automatically adopted as SSAC. Although determining a TMDL has significant information to bear on the SSAC process, the final rule does not automatically adopt existing TMDLs as SSACs. Instead, all TMDLs must be vetted through the SSAC process and take into account any new relevant information before they can be adopted as SSAC. Since establishing TMDLs has been an ongoing process, new information that has been generated could be used to modify the SSAC appropriately, in effect updating the original TMDL with additional knowledge about the system.

So, what does all of this mean to Floridians, and what are the implications for the future?

The intent of the rule is to better protect Florida's water resources from excess nutrient enrichment so that these resources can continue to provide the designated uses on which we depend and which we enjoy. The challenge is that everyone who lives in or visits our state contributes to nutrient enrichment. It may be through a septic tank, a central sewer system, walking a dog, raising and feeding animals, fertilizing lawns and gardens, or managing nutrients on a large farming operation, just to name a few examples. We all benefit from protecting water bodies from excess nutrients, but we must also recognize that we are ultimately the source of these nutrients.

Our present regulations for Class I and Class III waters state that nutrient enrichment cannot detrimentally affect flora and fauna in aquatic ecosystems. The only action that could change this

statement is a fundamental re-working of the 1972 Federal Clean Water Act, which is not likely to happen.

At this point, in response to EPA's numeric nutrient standards, the state will either develop an implementation plan or derive its own numeric criteria for Florida's Class I and Class III waters (that would then need approval by EPA). Either way, numeric nutrient standards will become the new criteria that Florida uses to protect surface water bodies from nutrient pollution.

Specifically, what does the rule mean for municipalities?

Many Florida cities have what are called "Municipal Separate Stormwater Systems" (MS4s, for short) that collect polluted stormwater runoff and discharge it to surface waters belonging to the state. Many of these MS4s are regulated, meaning discharges must be permitted in compliance with the National Pollution Discharge Elimination System (NPDES) just like publicly owned wastewater treatment facilities. EPA's rule will affect municipalities that operate both MS4s and wastewater treatment facilities if meeting the numeric nutrient criteria for the receiving or downstream water body requires that more stringent limits be put in place when their NPDES permit is renewed. The estimated cost for this implementation ranges from $0.1 billion (EPA) to $8.4 billion (DEP) annually. The cost estimate varies substantially due to uncertainties associated with implementation, as well as specific technologies that will be required to meet the various pollution control targets.

Specifically, what does the rule mean to agriculture?

During the next 10 to 20 years, the sustainability of Florida's agricultural production as we know it today will be a hotly debated topic. In the short term (i.e., the next 5 years or so), numeric standards are not likely to have a great effect on agriculture for those producers that voluntarily enroll in the Florida Department of Agriculture and Consumer Services (DACS) BMP program[11] and then implement appropriate BMPs in their operations. The FWRA specifies that the BMP program is the method agriculture will use to meet water quality standards.

The perspective of DEP and DACS is that the FWRA will continue to govern agriculture, regardless of numeric standards imposed by EPA. Agricultural operators in good standing in the DACS BMP program receive a presumption of compliance with water quality standards even after acceptance of numeric criteria by DEP. The state of Florida is highly invested in the BMP program, and it is not likely to go away anytime soon. However, in the long term (5 to 10 years and beyond), BMP program requirements will likely change as a result of numeric nutrient criteria. With numeric standards, the success of the existing BMP program will be much easier to assess. It is likely that more aggressive and expensive practices ("second generation" BMPs) will be required. It will be important to document the success of existing BMPs to ensure credit is established for ongoing commitments.

Legal and scientific challenges to the rule

There are presently at least eight legal and/or scientific challenges to EPA's numeric nutrient criteria rule for Florida, including a legal challenge from the State Attorney and the State Commissioner of Agriculture, and a lawsuit filed by the Florida League of Cities and the Florida Stormwater Association. Principal arguments associated with these challenges are outlined below.

- Several procedural counts related to the Federal Administrative Procedures Act have been challenged including:
    - ○ Arbitrary and capricious standard of review;
    - ○ Final agency action in excess of authority, short of statutory right; and
    - ○ Failure to observe proper procedures.
- The use of a reference condition and associated percentile of the nutrient distribution as a means to establish nutrient criteria for in-stream protection after no cause-and-effect (or dose-response) relationship between the

in-stream concentrations of nutrients and either total nitrogen or total phosphorus were found has been challenged as arbitrary and capricious.

- There is insufficient recognition of natural variations in regional phosphorus concentration for lakes and therefore final lake criteria would require "restoration" of some lakes to likely non-attainable levels that would not have occurred naturally.
- Models proposed for use in streams to determine the "downstream protection value" are not appropriate for use on shallow subtropical Florida lakes.
- The 0.35 mg/L nitrate + nitrite standard for springs has not been evaluated for all springs. State studies have shown that values as high as 0.44 mg/L could occur in spring boils and vents without demonstrating negative biological response.
- EPA, by not exempting existing TMDLs from the rule, is failing to recognize the already-approved TMDLs. Its change in position without adequate explanation and support in the record is arbitrary and capricious and an abuse of discretion.
- EPA has failed to adequately disclose the rulemaking's technical basis, regulatory implications, and economic impacts and thereby frustrated the public's right to effectively participate in the process.

Further Information

A timeline describing the development of numeric nutrient criteria in Florida

- In 1998, EPA initiated their "National Strategy for the Development of Regional Nutrient Criteria." The intent was to assist states and tribes in adopting numerical nutrient criteria into state water quality standards as a more effective means to protect water resources from nutrient enrichment.
- In 2000 and 2001, EPA published technical guidance to develop nutrient criteria in lakes/reservoirs, rivers/streams, and estuaries/coastal waters.
- In July 2004, DEP entered into a development plan with EPA to establish numeric nutrient criteria for Florida.
- In 2007, the plan was revised and mutually agreed upon by EPA to more accurately reflect the evolved strategy and technical approach DEP had developed.
- In 2008, a lawsuit seeking to require EPA to promulgate numeric nutrient water quality standards for Florida waters was filed by the Florida Wildlife Federation in an effort to speed up the process of numeric nutrient development and adoption.
- On January 14, 2009, EPA formally determined that Florida's existing narrative criteria on nutrients in water was insufficient to ensure protection of the state's water bodies as required under the Clean Water Act.
- In August 2009, USEPA entered into a consent decree with the Florida Wildlife Federation to settle the 2008 litigation, committing to propose numeric nutrient standards for lakes and flowing waters in Florida by January 14, 2010, and for Florida's estuarine and coastal waters by January 2011, with final standards to be established by October of those years.
- On January 14, 2010, EPA released their proposed numeric nutrient criteria rule, and it was published in the Federal Register 12 days later.
- On August 3, 2010, EPA released a supplement to their proposed numeric nutrient criteria rule providing additional data and soliciting comment regarding modifications they were considering based on comments received about the 1/14/2010 proposed rule.
- On November 14, 2010, EPA released their final numeric nutrient criteria rule, and it was published in the Federal Register on December

6, 2010. The rule takes effect 15 months later on March 6, 2012.

How are numeric nutrient criteria developed?

There are two main approaches to determine numeric nutrient criteria: 1) stressor-response relationship and 2) reference condition.

In the case of a stressor-response relationship, experiments or monitoring of water bodies within a particular group are studied to determine the nutrient concentration at which an impact on the designated use is no longer acceptable. This method is the most desirable approach, as it directly relates the nutrient "stressor" with the undesirable biological "response."

When there is not enough information to determine stressor-response, then a reference approach is used. First, healthy water bodies are identified in a particular region. Then, water quality data from these water bodies are scrutinized, and numeric nutrient criteria are based on the distribution of nutrient concentrations found. In other words, a healthy water body must be under the "threshold" for impairment, whatever that threshold might be.

With the reference approach, it is assumed that biological integrity is protected as judged by the minimally impacted reference conditions, and that increasing nutrient concentrations greater than reference would unacceptably impact the designated use. Both stressor-response relationships and the reference approach were used by EPA to develop the rule.

Another challenging aspect in the development of numeric nutrient criteria is that the nutrient concentration determined for a particular water body must also protect downstream water bodies. For example, if a stream is flowing into a lake or an estuary, then the nutrient criteria established for the stream must protect not only its designated use, but also the designated use of the downstream lake or estuary.

Determining the nutrient concentration in a stream that will protect downstream uses first requires nutrient criteria to be established for the downstream receiving water body. Next, the volume of stream flow received by the downstream water body as well as the mass of nutrients that might naturally be removed as the water flows down the stream are determined. From this information, a nutrient concentration within the stream that will match the downstream water body nutrient criteria can be determined. The lower of the two criteria (in-stream protection or downstream protection) is used to establish the numeric nutrient criteria for that water body.

All of the data used by EPA to develop the rule can be found at http://water.epa.gov/lawsregs/rulesregs/florida_index.cfm#supp

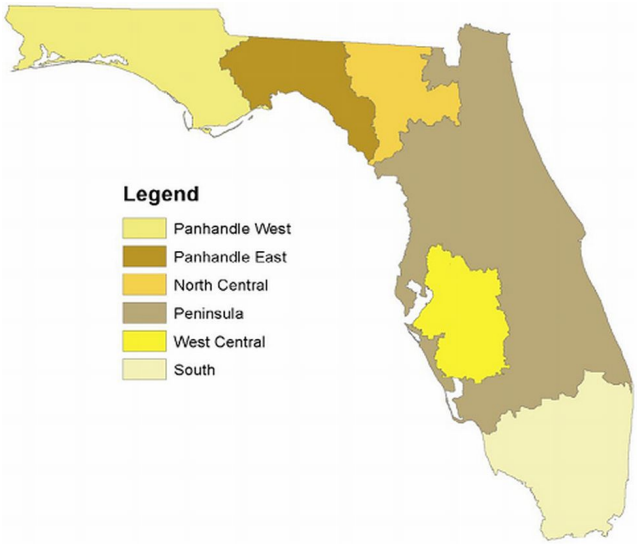

Figure 1. Map of watershed regions applicable to rivers and streams numeric water quality criteria.

Notes:

[1]Details can be found from the EPA, http://www.epa.gov/waterscience/standards/rules/florida/factsheet.html#summary, verified March 23, 2011.

[2]See http://edocket.access.gpo.gov/2010/pdf/2010-29943.pdf, verified March 23, 2011.

[3]See http://edocket.access.gpo.gov/2010/pdf/2010-1220.pdf, verified March 23, 2011.

[4]See http://edocket.access.gpo.gov/2010/pdf/2010-19140.pdf, verified March 23, 2011.

[5]See http://www.epa.gov/waterscience/criteria/nutrient/files/report1998-2008.pdf, verified March 23, 2011.

[6]Florida recognizes five designated uses for public water resources: Class I is water used for drinking; Class II is water used to produce shellfish; Class III is water used for recreation (e.g., swimming) and aquatic life support; Class IV is water used for agriculture; and Class V is water used for navigation, utility, and industrial purposes. Each type of water use has specific quality standards that determine if the designated use is being maintained.

[7]Studies conducted by the University of Florida and data collected as part of the LAKEWATCH program indicate a wide range of natural nitrogen and phosphorus concentrations among Florida lakes, mainly due to differences in the availability of these nutrients in soils and sediments.

[8]See http://edocket.access.gpo.gov/2010/pdf/2010-29943.pdf, verified March 23, 2011.

[9]See http://water.epa.gov/lawsregs/rulesregs/upload/floridatsd1.pdf, verified March 23, 2011.

[10]See http://www.dep.state.fl.us/water/tmdl/docs/ch99-223.pdf, verified March 24, 2011.

[11]See http://www.floridaagwaterpolicy.com/AtaGlance.html, verified March 24, 2011.

Table 1. *Numeric criteria for lakes. A lake is a freshwater body that is not a stream or other water course, with some open water free from vegetation above the water surface. For a given lake, the annual geometric mean of chlorophyll a, Total N, or Total P concentrations shall not exceed the applicable criterion concentration more than once in a 3-year period.*

A	B	C	D	E	F
		Baseline criteria		Modified criteria[a]	
	Chlorophyll *a* (mg/L)[b]	Total N (mg/L)	Total P (mg/L)	Total N (mg/L)	Total P (mg/L)
Colored lakes[c]	0.020	1.27	0.050	1.27 – 2.23	0.05 – 0.16
Clear lakes, high alkalinity[d]	0.020	1.05	0.030	1.05 – 1.91	0.03 – 0.09
Clear lakes, low alkalinity	0.006	0.51	0.010	0.51 – 0.93	0.01 – 0.03

[a] If chlorophyll *a* is below the criterion in column B and there are representative data to calculate ambient-based, lake-specific, modified TP and TN criteria, then DEP may calculate such criteria within these bounds from ambient measurements to determine lake-specific, modified criteria.

[b] Chlorophyll *a* is an indicator of phytoplankton biomass (microscopic algae) in a water body, with concentrations reflecting the integrated effect of many of the water quality factors that may be altered by human activities.

[c] Colored lakes are distinguished from clear lakes based on the amount of dissolved organic matter they have free from turbidity. Dissolved organic matter concentration is reported in Platinum Cobalt Units (PCU). Colored lakes have values greater than 40 PCU and clear lakes have values less than or equal to 40 PCU.

[d] Alkaline lakes are distinguished from acid lakes based on their concentration of $CaCO_3$. Alkaline lakes have greater than 20 mg/L $CaCO_3$, while acid lakes have values less than or equal to 20 mg/L $CaCO_3$.

Table 2. *Numeric criteria for rivers and streams, defined as free-flowing surface waters in defined channels, including rivers, creeks, branches, canals (outside south Florida), and freshwater sloughs. For a given river or stream, the annual geometric mean of Total N, or Total P concentrations shall not exceed the applicable criterion concentration more than once in a 3-year period.*

Watershed region*	In-stream protection value criteria	
	Total N (mg/L)	Total P (mg/L)
Panhandle West	0.67	0.06
Panhandle East	1.03	0.18
North Central	1.87	0.30
West Central	1.65	0.49
Peninsula	1.54	0.12

*See Figure 1. for a map of these regions.

Table 3. *Numeric criteria for springs (a site at which ground water flows through a natural opening in the ground onto the land surface or into a body of surface water):*

Nitrate (NO_3^-) + nitrite (NO_2^-)-nitrogen shall not surpass a concentration of 0.35 mg/L as an annual geometric mean more than once in a 3-year period.