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Water Quality Standards for the State of Florida's Lakes and Flowing Waters; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[EPA–HQ–OW–2009–0596; FRL–9228–7]

RIN 2040–AF11

Water Quality Standards for the State of Florida's Lakes and Flowing Waters

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA or Agency) is promulgating numeric water quality criteria for nitrogen/phosphorus pollution to protect aquatic life in lakes, flowing waters, and springs within the State of Florida. These criteria apply to Florida waters that are designated as Class I or Class III waters in order to implement the State's narrative nutrient provision at Subsection 62–302–530(47)(b), Florida Administrative Code (F.A.C.), which provides that "[i]n 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."

DATES: This final rule is effective March 6, 2012, except for 40 CFR 131.43(e), which is effective February 4, 2011.

ADDRESSES: An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.regulations.gov* to view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. For additional information about EPA's public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm*. Although listed in the index, some information is not publicly available, *i.e.,* Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyright material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the Docket Facility. The Office of Water (OW) Docket Center is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The OW Docket Center telephone number is 202–566–1744 and the Docket address is OW Docket, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC 20004. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744.

FOR FURTHER INFORMATION CONTACT: For information concerning this rulemaking, contact Danielle Salvaterra, U.S. EPA Headquarters, Office of Water, Mailcode: 4305T, 1200 Pennsylvania Avenue, NW., Washington, DC 20460; telephone number: 202–564–1649; fax number: 202–566–9981; e-mail address: *salvaterra.danielle@epa.gov.*

SUPPLEMENTARY INFORMATION: This supplementary information section is organized as follows:

Table of Contents

I. General Information

A. Executive Summary

Florida is known for its abundant and aesthetically beautiful natural resources, in particular its water resources. Florida's water resources are very important to its economy, for example, its $6.5 billion fishing industry.[1] However, nitrogen/phosphorus pollution has contributed to severe water quality degradation in the State of Florida. Based upon waters assessed and reported by the Florida Department of Environmental Protection (FDEP) in its *2008 Integrated Water Quality Assessment for Florida,* approximately 1,049 miles of rivers and streams (about 5% of total assessed streams), 349,248 acres of lakes (about 23% of total assessed lakes), and 902 square miles of estuaries (about 24% of total assessed estuaries) are known to be impaired for nutrients by the State.[2]

The information presented in FDEP's latest water quality assessment report, the *2010 Integrated Water Quality Assessment for Florida,* documents increased identification of assessed waters that are impaired due to nutrients. In the FDEP *2010 Integrated Water Quality Assessment for Florida,* approximately 1,918 miles of rivers and streams (about 8% of assessed river and stream miles), 378,435 acres of lakes (about 26% of assessed lake acres), and 569 square miles of estuaries[3] (about 21% of assessed square miles of estuaries)[4] are identified as impaired by

[1] Florida Fish and Wildlife Conservation Commission. 2010. *The economic impact of freshwater fishing in Florida. http://www.myfwc.com/CONSERVATION/Conservation_ValueofConservation_EconFreshwaterImpact.htm.* Accessed August 2010.

[2] Florida Department of Environmental Protection (FDEP). 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[3] The estimated miles for estuaries were recalculated in 2010. FDEP used revised GIS techniques to calculate mileages and corrected estuary waterbody descriptions by removing land drainage areas that had been included in some descriptions, which reduced the estimates of total estuarine water area for Florida waters generally, as well as for some of the estuary classifications in the 2010 report.

[4] For the Integrated Water Quality Assessment for Florida: 2010 305(b) Report and 303(d) List Update, Florida assessed about 3,637 additional miles of streams, about 24,833 fewer acres of lakes, and about 1,065 fewer square miles of estuaries than the 2008 Integrated Report. In addition, Florida reevaluated the WBID segment boundaries using "improved GIS techniques" for mapping. The most significant result of the major change in mapping was the reduction of assessed estuarine area from 3,726 to 2,661 square miles. The net result to the impaired waters for estuaries is that the percent of

nutrients.[5] The challenge of nitrogen/phosphorus pollution has been an ongoing focus for FDEP. Over the past decade or more, FDEP reports that it has spent over 20 million dollars collecting and analyzing data related to concentrations and impacts of nitrogen/phosphorus pollution in the State.[6] Despite FDEP's intensive efforts to diagnose and evaluate nitrogen/phosphorus pollution, substantial and widespread water quality degradation from nitrogen/phosphorus over-enrichment has continued and remains a significant problem.

On January 14, 2009, EPA determined under Clean Water Act (CWA) section 303(c)(4)(B) that new or revised water quality standards (WQS) in the form of numeric water quality criteria are necessary to protect the designated uses from nitrogen/phosphorus pollution that Florida has set for its Class I and Class III waters. The Agency considered (1) the State's documented unique and threatened ecosystems, (2) the large number of impaired waters due to existing nitrogen/phosphorus pollution, and (3) the challenge associated with growing nitrogen/phosphorus pollution associated with expanding urbanization, continued agricultural development, and a significantly increasing population that the U.S. Census estimates is expected to grow over 75% between 2000 and 2030.[7] EPA also reviewed the State's regulatory accountability system, which represents a synthesis of both technology-based standards and point source control authority, as well as authority to establish enforceable controls for nonpoint source activities.

A significant challenge faced by Florida's water quality program is its dependence and current reliance upon an approach involving resource-intensive and time-consuming site-by-site data collection and analysis to interpret non-numeric narrative criteria. This approach is used to make water quality impairment determinations under CWA section 303(d), to set appropriately protective numeric nitrogen and phosphorus pollution targets to guide restoration of impaired waters, and to establish numeric nitrogen and phosphorus goals to ensure effective protection and maintenance of non-impaired waters. EPA determined that Florida's reliance on a case-by-case interpretation of its narrative criterion in implementing an otherwise comprehensive water quality framework of enforceable accountability mechanisms was insufficient to ensure protection of applicable designated uses under Subsection 62–302.530(47)(b), F.A.C., which, as noted above, provides "[i]n 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."

In accordance with the terms of EPA's January 14, 2009 determination, an August 2009 Consent Decree, and June 7, 2010 and October 27, 2010 revisions to that Consent Decree, which are discussed in more detail in Section II.D, EPA is promulgating and establishing final numeric criteria for lakes and springs throughout Florida, and flowing waters (*e.g.,* rivers, streams, canals, *etc.*) located outside of the South Florida Region.[8]

Regarding numeric criteria for streams, the Agency conducted a detailed technical evaluation of the substantial amount of sampling, monitoring and associated water quality analytic data available on Florida streams together with a significant amount of related scientific analysis. EPA concluded that reliance on a reference-based methodology was a strong and scientifically sound approach for deriving numeric criteria, in the form of total nitrogen (TN) and total phosphorus (TP) concentration values for flowing waters including streams and rivers. This information is presented in more detail in Section III.B below.

For lakes, EPA is promulgating a classification approach using color and alkalinity based upon substantial data that show that lake color and alkalinity are important predictors of the degree to which TN and TP concentrations result in a biological response such as elevated chlorophyll *a* levels. EPA found that correlations between nitrogen/phosphorus and biological response parameters in the different types of lakes in Florida were specific, significant, and documentable, and when considered in combination with additional lines of evidence, support a stressor-response approach to criteria development for Florida's lakes. EPA's results show a significant relationship between concentrations of nitrogen and phosphorus in lakes and algal growth. The Agency is also promulgating an accompanying supplementary analytical approach that the State can use to adjust TN and TP criteria within a certain range for individual lakes where sufficient data on long-term ambient chlorophyll *a,* TN, and TP levels are available to demonstrate that protective chlorophyll *a* criterion for a specific lake will still be maintained and attainment of the designated use will be assured. This information is presented in more detail in Section III.C below.

EPA also evaluated what downstream protection criteria for streams that flow into lakes is necessary for assuring the protection of downstream lake water quality pursuant to the provisions of 40 CFR 130.10(b), which requires that water quality standards (WQS) must provide for the attainment and maintenance of the WQS of downstream waters. EPA examined a variety of lake modeling techniques and data to ensure protection of aquatic life in downstream lakes that have streams flowing into them. Accordingly, this final rule includes a tiered approach to adjust instream TP and TN criteria for flowing waters to ensure protection of downstream lakes. This approach is detailed in Section III.C(2)(f) below.[9]

Regarding numeric criteria for springs, EPA is promulgating a nitrate+nitrite criterion for springs based on stressor-response relationships that are based on laboratory data and field evaluations that document the response of nuisance [10] algae and periphyton growth to nitrate+nitrite concentrations in springs. This criterion is explained in more detail in Section III.D below.

Finally, EPA is promulgating in this notice an approach to authorize and allow derivation of Federal site-specific alternative criteria (SSAC) based upon EPA review and approval of applicant submissions of scientifically defensible

assessed estuaries impaired remains about the same in 2008 (24%) as in 2010 (21%).

[5] FDEP. 2010. Integrated Water Quality Assessment for Florida: 2010 305(b) Report and 303(d) List Update.

[6] FDEP. 2009. Florida Numeric Nutrient Criteria History and Status. *http://www.dep.state.fl.us/water/wqssp/nutrients/docs/fl-nnc-summary-100109.pdf.* Accessed September 2010.

[7] U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. *http://www.census.gov/population/projections/SummaryTabA1.pdf.*

[8] For purposes of this rule, EPA has distinguished South Florida as those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee, hereinafter referred to as the South Florida Region. Numeric criteria applicable to flowing waters in the South Florida Region will be addressed in the second phase of EPA's rulemaking regarding the establishment of estuarine and coastal numeric criteria. (Please refer to Section I.B for a discussion of the water bodies affected by this rule).

[9] As provided by the terms of the June 7, 2010 amended Consent Decree, downstream protection values for estuaries and coastal waters will be addressed in the context of the second phase of this rulemaking process.

[10] Nuisance algae is best characterized by Subsection 62–302.200(17), F.A.C.: "Nuisance Species" shall mean species of flora or fauna whose noxious characteristics or presence in sufficient number, biomass, or areal extent may reasonably be expected to prevent, or unreasonably interfere with, a designated use of those waters.

recalculations that meet the requirements of CWA section 303(c) and EPA's implementing regulations at 40 CFR part 131. Total maximum daily load (TMDL) targets submitted to EPA for consideration as new or revised WQS would be reviewed under this SSAC process. This approach is discussed in more detail in Section V.C below.

Throughout the development of this rulemaking, EPA has emphasized the importance of sound science and widespread input in developing numeric criteria. Stakeholders have reiterated that numeric criteria must be scientifically sound. As demonstrated by the extent and detail of scientific analysis explained below, EPA continues to strongly agree. Under the CWA and EPA's implementing regulations, numeric criteria must protect the designated use of a waterbody (as well as ensure protection of downstream uses) and must be based on sound scientific rationale. (*See* CWA section 303(c); 40 CFR 131.11). In Florida, EPA relied upon its published criteria development methodologies [11] and a substantial body of scientific analysis, documentation, and evaluation, much of it provided to EPA by FDEP. As discussed in more detail below, EPA believes that the final criteria in this rule meet requirements for designated use and downstream WQS protection under the CWA and that they are clearly based on sound and substantial data and analyses.

B. Which water bodies are affected by this rule?

The criteria in this final rulemaking apply to a group of inland waters of the United States within Florida. Specifically, as defined below, these criteria apply to lakes and springs throughout Florida, and flowing waters (*e.g.,* rivers, streams, canals, *etc.*) located outside of the South Florida Region. For purposes of this rule, EPA has distinguished South Florida as those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee, hereinafter referred to as the South Florida Region. In this section, EPA defines the water bodies affected by this rule with respect to the Clean Water Act, Florida Administrative Code, and geographic scope in Florida. Because this regulation applies to inland waters, EPA defines fresh water as it applies to the affected water bodies.

The CWA requires adoption of WQS for "navigable waters." CWA section 303(c)(2)(A). The CWA defines "navigable waters" to mean "the waters of the United States, including the territorial seas." CWA section 502(7). Whether a particular waterbody is a water of the United States is a waterbody-specific determination. Every waterbody that is a water of the United States requires WQS under the CWA. EPA is not aware of any waters of the United States in Florida that are currently exempted from the State's WQS. For any privately-owned water in Florida that is a water of the United States, the applicable numeric criteria for those types of waters would apply. This rule does not apply to waters for which the Miccosukee Tribe of Indians or Seminole Tribe of Indians has obtained Treatment in the Same Manner as a State status for Sections 303 and 401 of the CWA, pursuant to Section 518 of the CWA.

EPA's final rule defines "lakes and flowing waters" (a phrase that includes lakes, streams, and springs) to mean inland surface waters that have been classified as Class I (Potable Water Supplies) or Class III (Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife) water bodies pursuant to Section 62–302.400, F.A.C., which are predominantly fresh waters, excluding wetlands. Class I and Class III surface waters share water quality criteria established to "protect recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife" pursuant to Subsection 62–302.400(4), F.A.C.[12]

Geographically, the regulation applies to all lakes and springs throughout Florida. EPA is not finalizing numeric criteria for Florida's streams or canals in south Florida at this time. As noted above, EPA has distinguished South Florida as those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee, hereinafter referred to as the South Florida Region. The Agency will propose criteria for south Florida flowing waters in conjunction with criteria for Florida's estuarine and coastal waters by November 14, 2011.

Consistent with Section 62–302.200, F.A.C., EPA's final rule defines "predominantly fresh waters" to mean surface waters in which the chloride concentration at the surface is less than 1,500 milligrams per liter (mg/L). Consistent with Section 62–302.200, F.A.C., EPA's final rule defines "surface water" to mean "water upon the surface of the earth, whether contained in bounds created naturally, artificially, or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the earth's surface." In this rulemaking, EPA is promulgating numeric criteria for the following waterbody types: lakes, streams, and springs. EPA's final rule also includes definitions for each of these waters. "Lake" means a slow-moving or standing body of freshwater that occupies an inland basin that is not a stream, spring, or wetland. "Stream" means a free-flowing, predominantly fresh surface water in a defined channel, and includes rivers, creeks, branches, canals, freshwater sloughs, and other similar water bodies. "Spring" means 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. Consistent with Section 62–312.020, F.A.C., "canal" means a trench, the bottom of which is normally covered by water with the upper edges of its two sides normally above water.

C. What entities may be affected by this rule?

Citizens concerned with water quality in Florida may be interested in this rulemaking. Entities discharging nitrogen or phosphorus to lakes and flowing waters of Florida could be indirectly affected by this rulemaking because WQS are used in determining National Pollutant Discharge Elimination System (NPDES) permit limits. Categories and entities that may ultimately be affected include:

[11] USEPA. 2000a. *Nutrient Criteria Technical Guidance Manual: Lakes and Reserviors.* EPA–822–B–00–001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[12] Class I waters also include an applicable nitrate limit of 10 mg/L and nitrite limit of 1 mg/L for the protection of human health in drinking water supplies. The nitrate limit applies at the entry point to the distribution system (*i.e.,* after any treatment); *see* Chapter 62–550, F.A.C., for additional details.

Category	Examples of potentially affected entities
Industry	Industries discharging pollutants to lakes and flowing waters in the State of Florida.
Municipalities	Publicly-owned treatment works discharging pollutants to lakes and flowing waters in the State of Florida.
Stormwater Management Districts	Entities responsible for managing stormwater runoff in Florida.

This table is not intended to be exhaustive, but rather provides a guide for entities that may be directly or indirectly affected by this action. This table lists the types of entities of which EPA is now aware that potentially could be affected by this action. Other types of entities not listed in the table, such as nonpoint source contributors to nitrogen/phosphorus pollution in Florida's waters may be affected through implementation of Florida's water quality standards program (*i.e.,* through Basin Management Action Plans (BMAPs)). Any parties or entities conducting activities within watersheds of the Florida waters covered by this rule, or who rely on, depend upon, influence, or contribute to the water quality of the lakes and flowing waters of Florida, may be affected by this rule. To determine whether your facility or activities may be affected by this action, you should carefully examine the language in 40 CFR 131.43, which is the final rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

D. How can I get copies of this document and other related information?

1. *Docket.* EPA has established an official public docket for this action under Docket Id. No. EPA–HQ–OW–2009–0596. The official public docket consists of the document specifically referenced in this action, any public comments received, and other information related to this action. Although a part of the official docket, the public docket does not include CBI or other information whose disclosure is restricted by statute. The official public docket is the collection of materials that is available for public viewing at the OW Docket, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC 20004. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The Docket telephone number is 202–566–2426. A reasonable fee will be charged for copies.

2. *Electronic Access.* You may access this **Federal Register** document electronically through the EPA Internet under the "Federal Register" listings at *http://www.epa.gov/fedrgstr/.*

An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.regulations.gov* to view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. For additional information about EPA's public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.* Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the Docket Facility identified in Section I.C(1).

II. Background

A. Nitrogen/Phosphorus Pollution

1. What is nitrogen/phosphorus pollution?

Excess loading of nitrogen and phosphorus compounds,[13] is one of the most prevalent causes of water quality impairment in the United States. Nitrogen/phosphorus pollution problems have been recognized for some time in the U.S., for example a 1969 report by the National Academy of Sciences [14] notes "[t]he pollution problem is critical because of increased population, industrial growth, intensification of agricultural production, river-basin development, recreational use of waters, and domestic and industrial exploitation of shore properties. Accelerated eutrophication causes changes in plant and animal life—changes that often interfere with use of water, detract from natural beauty, and reduce property values." Inputs of nitrogen and phosphorus lead to over-enrichment in many of the Nation's waters and constitute a widespread, persistent, and growing problem. Nitrogen/phosphorus pollution in fresh water systems can significantly impact aquatic life and long-term ecosystem health, diversity, and balance. More specifically, high nitrogen and phosphorus loadings result in harmful algal blooms (HABs), reduced spawning grounds and nursery habitats, fish kills, and oxygen-starved hypoxic or "dead" zones. Public health concerns related to nitrogen/phosphorus pollution include impaired surface and groundwater drinking water sources from high levels of nitrates, possible formation of disinfection byproducts in drinking water, and increased exposure to toxic microbes such as cyanobacteria.[15] [16] Degradation of water bodies from nitrogen/phosphorus pollution can result in economic consequences. For example, given that fresh and salt water fishing in Florida are significant recreational and tourist attractions generating over six billion dollars annually,[17] changes in Florida's waters that degrade water quality to the point that sport fishing populations are affected, will also affect this important part of Florida's economy. Elevated nitrogen/phosphorus levels can occur locally in a stream or groundwater, or can accumulate much further downstream leading to degraded lakes, reservoirs, and estuaries where fish and aquatic life can no longer survive.

Excess nitrogen/phosphorus in water bodies comes from many sources, which can be grouped into five major categories: (1) Urban stormwater runoff—sources associated with urban land use and development, (2) municipal and industrial waste water discharges, (3) row crop agriculture, (4) livestock production, and (5) atmospheric deposition from the production of nitrogen oxides in electric

[13] To be used by living organisms, nitrogen gas must be fixed into its reactive forms; for plants, either nitrate or ammonia (Boyd, C.E. 1979. *Water Quality in Warmwater Fish Ponds.* Auburn University: Alabama Agricultural Experiment Station, Auburn, AL). Eutrophication is defined as the natural or artificial addition of nitrogen/phosphorus to bodies of water and to the effects of added nitrogen/phosphorus (National Academy of Sciences (U.S.). 1969. *Eutrophication: Causes, Consequences, Correctives.* National Academy of Sciences, Washington, DC.)

[14] National Academy of Sciences (U.S.). 1969. *Eutrophication: Causes, Consequences, Correctives.* National Academy of Sciences, Washington, DC.

[15] Villanueva, C.M. *et al.,* 2006. Bladder Cancer and Exposure to Water Disinfection By-Products through Ingestion, Bathing, Showering, and Swimming in Pools. *American Journal of Epidemiology* 165(2):148–156.

[16] USEPA. 2009. *What is in Our Drinking Water?.* United States Environmental Protection Agency, Office of Research and Development. *http://www.epa.gov/extrmurl/research/process/drinkingwater.html.* Accessed December 2009.

[17] Florida Fish and Wildlife Conservation Commission. 2010. *The economic impact of freshwater fishing in Florida. http://www.myfwc.com/CONSERVATION/Conservation_Valueof Conservation_EconFreshwaterImpact.htm.* Accessed August 2010.

power generation and internal combustion engines. These sources contribute significant loadings of nitrogen and phosphorus to surface waters, causing major impacts to aquatic ecosystems and significant imbalances in the natural populations of flora and fauna.[18] [19]

2. Adverse Impacts of Nitrogen/Phosphorus Pollution on Aquatic Life, Human Health, and the Economy

Fish, shellfish, and wildlife require clean water for survival. Changes in the environment resulting from elevated nitrogen/phosphorus levels (such as algal blooms, toxins from harmful algal blooms, and hypoxia/anoxia) can cause a variety of effects. The causal pathways that lead from human activities to excess nutrients to impacts on designated uses in lakes and streams are well established in the scientific literature (*e.g.,* Streams: Stockner and Shortreed 1976, Stockner and Shortreed 1978, Elwood *et al.* 1981, Horner *et al.* 1983, Bothwell 1985, Peterson *et al.* 1985, Moss *et al.* 1989, Dodds and Gudder 1992, Rosemond *et al.* 1993, Bowling and Baker 1996, Bourassa and Cattaneo 1998, Francoeur 2001, Biggs 2000, Rosemond *et al.* 2001, Rosemond *et al.* 2002, Slavik *et al.* 2004, Cross *et al.* 2006, Mulholland and Webster 2010; Lakes: Vollenweider 1968, NAS 1969, Schindler *et al.* 1973, Schindler 1974, Vollenweider 1976, Carlson 1977, Paerl 1988, Elser *et al.* 1990, Smith *et al.* 1999, Downing *et al.* 2001, Smith *et al.* 2006, Elser *et al.* 2007).[20]

When excessive nitrogen/phosphorus loads change a waterbody's algae and plant species, the change in habitat and available food resources can induce changes affecting an entire food chain. Algal blooms block sunlight that submerged grasses need to grow, leading to a decline of submerged aquatic vegetation beds and decreased habitat for juvenile organisms. Algal blooms can also increase turbidity and impair the ability of fish and other aquatic life to find food.[21] Algae can also damage or clog the gills of fish and invertebrates.[22] Excessive algal blooms (those that use oxygen for respiration during periods without sunlight) can lead to diurnal shifts in a waterbody's production and consumption of dissolved oxygen (DO) resulting in reduced DO levels that are sufficiently low to harm or kill important recreational species such as largemouth bass.

Excessive algal growth also contributes to increased oxygen consumption associated with decomposition (*e.g.* decaying vegetative matter), in many instances reducing

[18] National Research Council. 2000. *Clean coastal waters: Understanding and reducing the effects of nutrient pollution.* National Academies Press, Washington, DC; Howarth, R.W., A. Sharpley, and D. Walker. 2002. Sources of nutrient pollution to coastal waters in the United States: Implications for achieving coastal water quality goals. *Estuaries* 25(4b):656–676; Smith, V.H. 2003. Eutrophication of freshwater and coastal marine ecosystems. *Environmental Science and Pollution Research* 10(2):126–139; Dodds, W.K., W.W. Bouska, J.L. Eitzmann, T.J. Pilger, K.L. Pitts, A.J. Riley, J.T. Schloesser, and D.J. Thornbrugh. 2009. Eutrophication of U.S. freshwaters: Analysis of potential economic damages. *Environmental Science and Technology* 43(1):12–19.

[19] State-EPA Nutrient Innovations Task Group. 2009. *An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group.*

[20] For Streams:

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[21] Hauxwell, J., C. Jacoby, T. Frazer, and J. Stevely. 2001. *Nutrients and Florida's Coastal Waters:* Florida Sea Grant Report No. SGEB–55. Florida Sea Grant College Program, University of Florida, Gainesville, FL.

[22] NOAA. 2009. Harmful Algal Blooms: Current Programs Overview. National Oceanic and Atmospheric Administration. *http://www.cop.noaa.gov/stressors/extremeevents/hab/default.aspx.* Accessed December 2009.

oxygen to levels below that needed for aquatic life to survive and flourish.[23] [24] Mobile species, such as adult fish, can sometimes survive by moving to areas with more oxygen. However, migration to avoid hypoxia depends on species mobility, availability of suitable habitat, and adequate environmental cues for migration. Less mobile or immobile species, such as mussels, cannot move to avoid low oxygen and are often killed during hypoxic events.[25] While certain mature aquatic animals can tolerate a range of dissolved oxygen levels that occur in the water, younger life stages of species like fish and shellfish often require higher levels of oxygen to survive.[26] Sustained low levels of dissolved oxygen cause a severe decrease in the amount of aquatic life in hypoxic zones and affect the ability of aquatic organisms to find necessary food and habitat.

In freshwater, HABs including, for example, blue-green algae from the phylum of bacteria called cyanobacteria,[27] can produce toxins that have been implicated as the cause of a number of fish and bird mortalities.[28] These toxins have also been tied to the death of pets and livestock that may be exposed through drinking contaminated water or grooming themselves after bodily exposure.[29] Many other States, and countries for that matter, are experiencing problems with algal blooms.[30] Ohio on September 3, 2010,[31] for example, listed eight water bodies as "Bloom Advisory," [32] six water bodies as "Toxin Advisory," [33] and two waters as "No Contact Advisory." [34] Species of cyanobacteria associated with freshwater algal blooms include: *Microcystis aeruginosa, Anabaena circinalis, Anabaena flos-aquae, Aphanizomenon flos-aquae,* and *Cylindrospermopsis raciborskii.* The toxins from cyanobacterial harmful algal blooms can produce neurotoxins (affect the nervous system), hepatotoxins (affect the liver), produce lipopolysaccharides that affect the gastrointestinal system, and some are tumor promoters.[35] A recent study showed that at least one type of cyanobacteria has been linked to cancer and tumor growth in animals.[36] Cyanobacteria toxins can also pass through normal drinking water treatment processes and pose an increased risk to humans or animals.[37]

Health and recreational use impacts to humans result directly from exposure to elevated nitrogen/phosphorus pollution levels and indirectly from the subsequent waterbody changes that occur from increased nitrogen/phosphorus pollution (such as algal blooms and toxins). Direct impacts include effects to human health through potentially contaminated drinking water. Indirect impacts include restrictions on recreation (such as boating and swimming). Algal blooms can prevent opportunities to swim and engage in other types of recreation. In areas where recreation is determined to be unsafe because of algal blooms, warning signs are often posted to discourage human use of the waters.

Nitrate in drinking water can cause serious health problems for humans,[38] especially infants. EPA developed a Maximum Contaminant Level (MCL) of 10 mg/L for nitrate in drinking water.[39] In the 2010 USGS National Water-Quality Assessment Program report, nitrate was found to be the most frequently detected nutrient in streams at concentrations greater than 10 mg/L. The report also found that concentrations of nitrate greater than the MCL of 10 mg/L were more prevalent and widespread in groundwater used for drinking water than in streams.[40] Florida has adopted EPA's recommendations for the nitrate MCL in Florida's regulated drinking water systems and a 10 mg/L criteria for nitrate in Class I waters. FDEP shares EPA's concern regarding blue-baby syndrome as can be seen in information FDEP reports on its drinking water information for the public: "Nitrate is used in fertilizer and is found in sewage and wastes from human and/or farm animals and generally gets into drinking water from those activities. Excessive levels of nitrate in drinking water have caused serious illness and sometimes death in infants less than six months of age [41] * * * EPA has set the drinking water standard at 10 parts per million (ppm) [or 10 mg/L] for nitrate to protect

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[23] NOAA. 2009. Harmful Algal Blooms: Current Programs Overview. National Oceanic and Atmospheric Administration. *http://www.cop.noaa.gov/stressors/extremeevents/hab/default.aspx.* Accessed December 2009.

[24] USGS. 2009. *Hypoxia.* U.S. Geological Survey. *http://toxics.usgs.gov/definitions/hypoxia.html.* Accessed December 2009.

[25] ESA. 2009. *Hypoxia.* Ecological Society of America. *http://www.esa.org/education_diversity/pdfDocs/hypoxia.pdf.* Accessed December 2009.

[26] USEPA. 1986. *Ambient Water Quality Criteria for Dissolved Oxygen Freshwater Aquatic Life.* EPA–800–R–80–906. Environmental Protection Agency, Office of Water, Washington DC.

[27] CDC. 2010. *Facts about cyanobacteria and cyanobacterial harmful algal blooms. Centers for Disease Control and Prevention. http://www.cdc.gov/hab/cyanobacteria/facts.htm.* Accessed August 2010.

[28] Ibelings, Bas W. and Karl E. Havens. 2008 *Chapter 32: Cyanobacterial toxins: a qualitative meta-analysis of concentrations, dosage and effects in freshwater, estuarine and marine biota. In* Cyanobacterial Harmful Algal Blooms: State of the Science and Research Needs. From the Monograph of the September 6–10, 2005 International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC–HAB) in Durham, NC. *http://www.epa.gov/cyano_habs_symposium/monograph/Ch32.pdf.* Accessed August 19, 2010.

[29] WHOI. 2008. *HAB Impacts on Wildlife.* Woods Hole Oceanographic Institution. *http://www.whoi.edu/redtide/page.do?pid=9682.* Accessed December 2009.

[30] FDEP. 2010. Blue Green Algae Frequently Asked Questions. *http://www.dep.state.fl.us/water/bgalgae/faq.htm.* Accessed August 2010.

[31] Ohio DNR. 2010. News Release September 3, 2010. *http://www.epa.state.oh.us/portals/47/nr/2010/september/9-3samplingresults.pdf.* Accessed September 2010.

[32] Defined as: Cautionary advisory to avoid contact with any algae. Ohio DNR. 2010. News Release September 3, 2010. *http://www.epa.state.oh.us/portals/47/nr/2010/september/9-3samplingresults.pdf.* Accessed September 2010.

[33] Defined as: Avoid contact with any algae and direct contact with water. Ohio DNR. 2010. News Release September 3, 2010. *http://www.epa.state.oh.us/portals/47/nr/2010/september/9-3samplingresults.pdf.* Accessed September 2010.

[34] Defined as: Avoid any and all contact with or ingestion of the lake water. This includes the launching of any watercraft on the lake. Ohio DNR. 2010. News Release September 3, 2010. *http://www.epa.state.oh.us/portals/47/nr/2010/september/9-3samplingresults.pdf.* Accessed September 2010.

[35] CDC. 2010. Facts about cyanobacteria and cyanobacterial harmful algal blooms, Centers for Disease Control and Prevention. *http://www.cdc.gov/hab/cyanobacteria/facts.htm.* Accessed August 2010.

[36] Falconer, I.R., and A.R. Humpage. 2005. Health Risk Assessment of Cyanobacterial (Blue-green Algal) Toxins in Drinking Water. *International Journal of Research and Public Health* 2(1): 43–50.

[37] Carmichael, W.W. 2000. *Assessment of Blue-Green Algal Toxins in Raw and Finished Drinking Water.* AWWA Research Foundation, Denver, CO.

[38] For more information, refer to Manassaram, Deana M., Lorraine C. Backer, and Deborah M. Moll. 2006. *A Review of Nitrates in Drinking Water: Maternal Exposure and Adverse Reproductive and Developmental Outcomes.* Environmental Health Perspect. 114(3): 320–327.

[39] USEPA. 2007. *Nitrates and Nitrites: TEACH Chemical Summary.* U.S. Environmental Protection Agency. *http://www.epa.gov/teach/chem_summ/Nitrates_summary.pdf.* Accessed December 2009.

[40] Dubrovsky, N.M., Burow, K.R., Clark, G.M., Gronberg, J.M., Hamilton P.A., Hitt, K.J., Mueller, D.K., Munn, M.D., Nolan, B.T., Puckett, L.J., Rupert, M.G., Short, T.M., Spahr, N.E., Sprague, L.A., and Wilber, W.G. 2010. *The quality of our Nation's waters—Nutrients in the Nation's streams and groundwater, 1992–2004:* U.S. Geological Survey Circular 1350, 174p. Available electronically at: *http://water.usgs.gov/nawqa/nutrients/pubs/circ1350.*

[41] The serious illness in infants is caused because nitrate is converted to nitrite in the body. Nitrite interferes with the oxygen carrying capacity of the child's blood. This is an acute disease in that symptoms can develop rapidly in infants. In most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin. (source: FDEP. 2010. Drinking Water: Inorganic Contaminants. Florida Department of Environmental Protection. *http://www.dep.state.fl.us/water/drinkingwater/inorg_con.htm.* Accessed September 2010.)

against the risk of these adverse effects [42] * * * Drinking water that meets the EPA standard is associated with little to none of this risk and is considered safe with respect to nitrate." [43]

Human health can also be impacted by disinfection byproducts formed when disinfectants (such as chlorine) used to treat drinking water react with organic carbon (from the algae in source waters). Some disinfection byproducts have been linked to rectal, bladder, and colon cancers; reproductive health risks; and liver, kidney, and central nervous system problems.[44 45]

Economic losses from algal blooms and harmful algal blooms can include increased costs for drinking water treatment, reduced property values for streams and lakefront areas, commercial fishery losses, and lost revenue from recreational fishing, boating trips, and other tourism-related businesses.

In terms of increased costs for drinking water treatment, for example, in 1991, Des Moines (Iowa) Water Works constructed a $4 million ion exchange facility to remove nitrate from its drinking water supply. This facility was designed to be used an average of 35–40 days per year to remove excess nitrate levels at a cost of nearly $3000 per day.[46]

Fremont, Ohio (a city of approximately 20,000) has experienced high levels of nitrate from its source, the Sandusky River, resulting in numerous drinking water use advisories. An estimated $15 million will be needed to build a reservoir (and associated piping) that will allow for selective withdrawal from the river to avoid elevated levels of nitrate, as well as to provide storage.[47]

In regulating allowable levels of chlorophyll *a* in Oklahoma drinking water reservoirs, the Oklahoma Water Resources Board estimated that the long-term cost savings in drinking water treatment for 86 systems would range between $106 million and $615 million if such regulations were implemented.[48]

3. Nitrogen/Phosphorus Pollution in Florida

Florida's flat topography causes water to move slowly over the landscape, allowing ample opportunity for nitrogen and phosphorus to dissolve and eutrophication responses to develop. Florida's warm and wet, yet sunny, climate further contributes to increased run-off and ideal temperatures for subsequent eutrophication responses.[49]

As outlined in the EPA January 2009 determination and the January 2010 proposal, water quality degradation resulting from excess nitrogen and phosphorus loadings is a documented and significant environmental issue in Florida. FDEP notes in its *2008 Integrated Water Quality Assessment* that nutrient pollution poses several challenges in Florida. For example, the FDEP *2008 Integrated Water Quality Assessment* notes: "the close connection between surface and ground water, in combination with the pressures of continued population growth, accompanying development, and extensive agricultural operations, present Florida with a unique set of challenges for managing both water quality and quantity in the future. After trending downward for 20 years, beginning in 2000 phosphorus levels again began moving upward, likely due to the cumulative impacts of nonpoint source pollution associated with increased population and development. Increasing pollution from urban stormwater and agricultural activities is having other significant effects. In many springs across the State, for example, nitrate levels have increased dramatically (twofold to threefold) over the past 20 years, reflecting the close link between surface and ground water." [50] To clarify current nitrogen/phosphorus pollution conditions in Florida, EPA analyzed recent STORET data pulled from Florida's Impaired Waters Rule (IWR),[51] (which are the data Florida uses to create its integrated reports) and found increasing levels of nitrogen and phosphorus compounds in Florida waters over the past 12 years (1996–2008). Florida's IWR STORET data indicates that levels of total nitrogen have increased from a State-wide average of 1.06 mg/L in 1996 to 1.27 mg/L in 2008 and total phosphorus levels have increased from an average of 0.108 mg/L in 1996 to 0.151 mg/L in 2008.

The combination of the factors reported by FDEP and listed above (including population increase, climate, stormwater runoff, agriculture, and topography) has contributed to significant nitrogen/phosphorus effects to Florida's waters.[52] For example, newspapers in Florida regularly report about impacts associated with nitrogen/phosphorus pollution; recent examples include reports of algal blooms and fish kills in the St Johns River [53] and reports of white foam associated with algal blooms lining parts of the St. Johns River.[54] Spring releases of water from Lake Okeechobee into the St Lucie Canal, necessitated by high lake levels due to rainfall, resulted in reports of floating mats of toxic *Microcystis aeruginosa* that prompted Martin and St Lucie county health departments to issue warnings to the public.[55]

The *2008 Integrated Water Quality Assessment* lists nutrients as the fourth major source of impairment for rivers and streams in Florida (after dissolved oxygen, mercury in fish, and fecal coliforms). For lakes and estuaries, nutrients are ranked first and second, respectively. These same rankings are also confirmed in FDEP's latest *2010 Integrated Water Quality Assessment.*

[42] EPA has also set a drinking water standard for nitrite at 1 mg/L. To allow for the fact that the toxicity of nitrate and nitrite are additive, EPA has also established a standard for the sum of nitrate and nitrite at 10 mg/L. (source: FDEP. 2010. Drinking Water: Inorganic Contaminants. Florida Department of Environmental Protection. *http://www.dep.state.fl.us/water/drinkingwater/inorg_con.htm.* Accessed September 2010.)

[43] FDEP. 2010. Drinking Water: Inorganic Contaminants. Florida Department of Environmental Protection. *http://www.dep.state.fl.us/water/drinkingwater/inorg_con.htm.* Accessed September 2010.

[44] USEPA. 2009. *National Primary Drinking Water Regulations.* Contaminants. U.S. Environmental Protection Agency. Accessed *http://www.epa.gov/safewater/hfacts.html.* December 2009.

[45] National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule, 40 CFR parts 9, 141, and 142. U.S. Environmental Protection Agency, FR 71:2 (January 4, 2006). pp. 387–493. Available electronically at: *http://www.epa.gov/fedrgstr/EPA-WATER/2006/January/Day-04/w03.htm.* Accessed December 2009.

[46] Jones, C.S., D. Hill, and G. Brand. 2007. Use a multifaceted approach to manage high sourcewater nitrate. *Opflow* June pp. 20–22.

[47] Taft, Jim, Association of State Drinking Water Administrators (ASDWA). 2009. Personal Communication.

[48] Moershel, Philip, Oklahoma Water Resources Board (OWRB) and Mark Derischweiler, Oklahoma Department of Environmental Quality (ODEQ). 2009. Personal Communication.

[49] Perry, W. B. 2008. Everglades restoration and water quality challenges in south Florida. *Ecotoxicology* 17:569–578.

[50] FDEP. 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[51] IWR Run 40. Updated through February 2010.

[52] FDEP. 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[53] Patterson, S. 2010, July 23. *St John's River Looks Sick.* Florida Times Union. *http://jacksonville.com/news/metro/2010-07-23/story/st-johns-looks-sick-nelson-says.* Accessed September 2010.

[54] Patterson, S. 2010, July 21. *Foam on St. John's River Churns Up Environmental Interest.* Florida Times Union. *http://jacksonville.com/news/metro/2010-07-21/story/foam-st-johns-churns-environmental-questions.* Accessed October 2010.

[55] Killer, E. 2010, June 10. *Blue-green Algae Found Floating Near Palm City as Lake Okeechobee Releases Continue.* Treasure Coast Times. *http://www.tcpalm.com/news/2010/jun/10/blue-green-algae-found-floating-near-palm-city-o/.* Accessed October 2010.

According to FDEP's *2008 Integrated Water Quality Assessment,*[56] approximately 1,049 miles of rivers and streams, 349,248 acres of lakes, and 902 square miles of estuaries are impaired by nutrients in the State. To put this in context and as noted above, approximately 5% of the total assessed river and stream miles, 23% of the total assessed lake acres, and 24% of the total assessed square miles of estuaries are impaired for nutrients according to the 2008 Integrated Report.[57] In recent published listings of impairments for 2010, Florida Department of Environmental Protection lists nutrient impairments in 1,918 stream miles (about 8% of the total assessed stream miles), 378,435 lake acres (about 26% of total assessed lake acres), and 569 square miles of estuaries (about 21% of total assessed estuarine square miles).[58]

Compared to FDEP's *2008 Integrated Water Quality Assessment,* the *2010 Integrated Water Quality Assessment* shows an increase in nutrient impairments for rivers and streams (from approximately 1000 miles to 1918 miles) and lakes (from approximately 350,000 lake acres to 378,435 lake acres). While the square miles of estuaries identified as impaired by nutrients decreased from 2008 to 2010 (from approximately 900 to 569 square miles), the *2010 Integrated Water Quality Assessment* notes that all square miles of estuaries in the report were decreased based on improved GIS techniques and corrected waterbody descriptions.[59] Consequently, the decrease in estuarine square miles identified as impaired by nutrients in 2010 does not necessarily reflect a corresponding decrease in nitrogen/phosphorus pollution affecting Florida's estuarine water bodies.

FDEP has expressed concern about nitrogen/phosphorus pollution in Florida surface waters,[60] in addition to concerns about freshwater harmful algal blooms and the potential for adverse human health impacts as noted in FDEP's *2008 Integrated Water Quality Assessment.*[61] This concern is underscored by a toxic blue-green algae bloom that occurred north of the Franklin Lock on the Caloosahatchee River in mid-June 2008. The Olga Water Treatment Plant, which obtains its source water from the Caloosahatchee and provides drinking water for 30,000 people, was forced to temporarily shut down as a result of this bloom.[62]

There has also been an increase in the level of pollutants, especially nitrate, in groundwater over the past decades.[63] The Florida Geological Survey concluded that "The presence of nitrate and the other nitrogenous compounds in ground water, is not considered in Florida to be a result of interaction of aquifer system water with surrounding rock materials. Nitrate in ground water is a result of specific land uses." [64]

Historically, nitrate+nitrite concentrations in Florida's spring discharges were estimated to have been around 0.05 mg/L or less, which is sufficiently low to restrict growth of algae and vegetation under "natural" conditions.[65] Of 125 spring vents sampled by the Florida Geological Survey in 2001–2002, 42% had nitrate+nitrite concentrations exceeding 0.50 mg/L and 24% had concentrations greater than 1.0 mg/L.[66] In the same study, mean nitrate+nitrite levels in 13 first-order springs were observed to have increased from 0.05 mg/L to 0.9 mg/L between 1970 and 2002. Overall, data suggest that nitrate+nitrite concentrations in many spring discharges have increased by an order of magnitude or a factor of 10 over the past 50 years, with the level of increase closely correlated with anthropogenic activity and land use changes within the karst regions of Florida where springs most often occur.[67]

Nitrates are found in ground water and wells in Florida, ranging from the detection limit of 0.02 mg/L to over 20 mg/L. Monitoring of Florida Public Water Supplies from 2004–2009 indicates that exceedances of nitrate maximum contaminant levels (MCL) (which are measured at the entry point of the distribution system and represent treated drinking water from a supplier) reported by drinking water plants in Florida ranged from 34–40 annually, during this period.[68]

About 10% of Florida residents receive their drinking water from a private well or small public source not inventoried under public supply.[69] A study in the late 1980s conducted by Florida Department of Agriculture and Consumer Services (FDACS) and FDEP, analyzed 3,949 shallow drinking water wells for nitrate.[70] [71] Nitrate was detected in 2,483 (63%) wells, with 584 wells (15%) above the MCL of 10 mg/L. Of the 584 wells that exceeded the MCL, 519 were located in Lake, Polk,

[56] FDEP. 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[57] FDEP. 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[58] FDEP. 2010. Integrated Water Quality Assessment for Florida: 2010 305(b) Report and 303(d) List Update.

[59] FDEP. 2010. Integrated Water Quality Assessment for Florida: 2010 305(b) Report and 303(d) List Update.

[60] "While significant progress has been made in reducing nutrient loads from point sources and from new development, nutrient loading and the resulting harmful algal blooms continue to be an issue. The occurrence of blue-green algae is natural and has occurred throughout history; however, algal blooms caused by nutrient loading from fertilizer use, together with a growing population and the resulting increase in residential landscapes, are an ongoing concern." FDEP. 2010. Integrated Water Quality Assessment for Florida: 2010 305(b) Report and 303(d) List Update.

[61] "Freshwater harmful algal blooms (HABs) are increasing in frequency, duration, and magnitude and therefore may be a significant threat to surface drinking water resources and recreational areas. Abundant populations of blue-green algae, some of them potentially toxigenic, have been found statewide in numerous lakes and rivers. In addition, measured concentrations of cyanotoxins—a few of them of above the suggested guideline levels—have been reported in finished water from some drinking water facilities." FDEP. 2008. Integrated Water Quality Assessment for Florida: 2008 305(b) Report and 303(d) List Update.

[62] Peltier, M. 2008. *Group files suit to enforce EPA water standards.* Naples News. *http://news.caloosahatchee.org/docs/NaplesNews_080717.htm.* Accessed August 2010.

[63] Scott, T.M., G.H. Means, R.P. Meegan, R.C. Means, S.B. Upchurch, R.E. Copeland, J. Jones, T. Roberts, and A. Willet. 2004. *Springs of Florida.* Bulletin No. 66. Florida Geological Survey, Tallahassee, FL. 677 pp.

[64] FL Geological Survey. 1992. Special Publication No. 34, Florida's Ground Water Quality Monitoring Program, (nitrate-pp 36–6).

[65] Maddox, G.L., J.M. Lloyd, T.M. Scott, S.B. Upchurch and R. Copeland. 1992. *Florida's Groundwater Quality Monitoring Program—Background Hydrochemistry.* Florida Geological Survey Special Publication No. 34, Tallahassee, FL.

[66] Scott, T.M., G.H. Means, R.P. Meegan, R.C. Means, S.B. Upchurch, R.E. Copeland, J. Jones, T. Roberts, and A. Willet. 2004. *Springs of Florida.* Bulletin No. 66. Florida Geological Survey, Tallahassee, FL. 677 pp.

[67] Katz, B.G., H.D. Hornsby, J.F. Bohlke and M.F. Mokray. 1999. *Sources and chronology of nitrate contamination in spring water, Suwannee River Basin, Florida.* Water-Resources Investigations Report 99–4252. U.S. Geological Survey, Tallahassee, FL. Available electronically at: *http://fl.water.usgs.gov/PDF_files/wri99_4252_katz.pdf.*

Scott, T.M., G.H. Means, R.P. Meegan, R.C. Means, S.B. Upchurch, R.E. Copeland, J. Jones, T. Roberts, and A. Willet. 2004. *Springs of Florida.* Bulletin No. 66. Florida Geological Survey, Tallahassee, FL. 677 pp.

[68] FDEP. 2009. *Chemical Data for 2004, 2005, 2006, 2007 2008, and 2009.* Florida Department of Environmental Protection. *http://www.dep.state.fl.us/water/drinkingwater/chemdata.htm.* Accessed January 2010.

[69] Marella, R.L. 2009. *Water Withdrawals, Use, and Trends in Florida, 2005.* Scientific Investigations Report 2009–5125. U.S. Geological Survey, Reston, VA.

[70] Southern Regional Water Program. 2010. *Drinking Water and Human Health in Florida. http://srwqis.tamu.edu/florida/program-information/florida-target-themes/drinking-water-and-human-health.aspx.* Accessed January 2010.

[71] T.A. Obreza and K.T. Morgan. 2008. *Nutrition of Florida Citrus Trees* 15 months after publication of the final rule, except for the Federal site-specific alternative criteria (SSAC) procedure in section 131.43(e) of the rule which will go into effect 60 days after publication. 2nd ed. SL 253. University of Florida, IFAS Extension. *http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf.* Accessed September 2010.

and Highland counties located in Central Florida. Results of monitoring conducted between 1999 and 2003 in a network of wells in that area indicated that of the 31 monitoring wells, 90% exceeded the nitrate drinking-water standard of 10 mg/L one or more times.[72] [73] FDEP monitored this same area (the VISA monitoring network) in 1990, 1993, and 1996, analyzing samples from 15–17 wells each cycle and reported median concentrations ranging from 17 to 20 mg/L nitrate, depending on the year.[74] Some areas of Florida tend to be more susceptible to groundwater impacts from nitrogen pollution, especially those that have sandy soils, have high hydraulic conductivity, and have overlying land uses that are subject to applications of fertilizers and animal or human wastes.[75] For example, USGS reports that in Highland county, highly developed suburban and agricultural areas tend to have levels of nitrates in the surficial groundwater that approach and can exceed the State primary drinking water standard of 10 mg/L for public water systems. Other areas in Highland county that are less developed tend to have much lower levels of nitrates in the surficial groundwater, often below detection levels.

The Floridian aquifer system is one of the largest sources of ground water in the U.S., and serves as a primary source of drinking water in Northern Florida. The Upper Floridian aquifer is unconfined or semiconfined in areas in Northern Florida, but is also confined by the overlying surficial aquifer system which is used for water supply. Wells in unconfined areas of the Upper Floridian aquifer tested in northern Florida had nitrate levels higher than 1 mg/L in 40% of wells; 17% of samples from the semiconfined area had nitrate levels above 1 mg/L. In both aquifer systems this indicates the widespread impact of nitrate on groundwater quality in this area.[76] [77] This baseline sampling indicates a pattern of widespread nitrate occurrence in the Upper Floridian aquifer from two decades ago. A portion of these early samples exceeded 10 mg/L nitrate (25 of the 726 samples taken from this unconfined or semi-confined aquifer; 50 of the 421 water samples from the surficial aquifer).

Growing population trends in Florida contribute to the significant challenge of addressing nitrogen/phosphorus pollution in Florida. Historically, the State has experienced a rapidly expanding population. Significantly growing demographics are considered to be a strong predictor of nitrogen/phosphorus loading and associated effects because of increases in stormwater runoff from increased impervious surfaces and increased wastewater treatment flows both of which typically contain some level of nitrogen/phosphorus.[78] Florida is currently the fourth most populous State in the nation, with an estimated 18 million people.[79] The U.S. Census bureau predicts the Florida population will exceed 28 million people by 2030, making Florida the third most populous State in the U.S.[80]

B. Statutory and Regulatory Background

Section 303(c) of the CWA (33 U.S.C. 1313(c)) directs States to adopt WQS for their navigable waters. Section 303(c)(2)(A) and EPA's implementing regulations at 40 CFR part 131 require, among other things, that State WQS include the designated use or uses to be made of the waters and criteria that protect those uses. EPA regulations at 40 CFR 131.11(a)(1) provide that States shall "adopt those water quality criteria that protect the designated use" and that such criteria "must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." As noted above, 40 CFR 130.10(b) provides that "[i]n designating uses of a waterbody and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters."

States are also required to review their WQS at least once every three years and, if appropriate, revise or adopt new standards. (*See* CWA section 303(c)(1)). Any new or revised WQS must be submitted to EPA for review and approval or disapproval. (*See* CWA section 303(c)(2)(A)). Finally, CWA section 303(c)(4)(B) authorizes the Administrator to determine, even in the absence of a State submission, that a new or revised standard is needed to meet CWA requirements. The criteria finalized in this rulemaking translate Florida's narrative nutrient provision at Subsection 62–302–530(47)(b), F.A.C., into numeric values that apply to lakes and springs throughout Florida and flowing waters outside of the South Florida Region.[81]

C. Water Quality Criteria

Under CWA section 304(a), EPA periodically publishes criteria recommendations (guidance) for use by States in setting water quality criteria for particular parameters to protect recreational and aquatic life uses of waters. Where EPA has published recommended criteria, States have the option of adopting water quality criteria based on EPA's CWA section 304(a) criteria guidance, section 304(a) criteria guidance modified to reflect site-specific conditions, or other scientifically defensible methods. (*See* 40 CFR 131.11(b)(1)). For nitrogen/phosphorus pollution, EPA has published under CWA section 304(a) a series of peer-reviewed, national technical approaches and methods regarding the development of numeric criteria for lakes and reservoirs,[82] rivers and streams,[83] and estuaries and coastal marine waters.[84]

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[72] T.A. Obreza and K.T. Morgan. 2008. *Nutrition of Florida Citrus Trees.* 2nd ed. SL 253. University of Florida, IFAS Extension. *http://edis.ifas.ufl.edu/pdffiles/SS/SS47800.pdf.* Accessed September 2010.

[73] USGS. 2009, November. *Overview of Agricultural Chemicals: Pesticides and Nitrate. http://fl.water.usgs.gov/Lake_Wales_Ridge/html/overview_of_agrichemicals.html.* Accessed September 2010.

[74] FDEP. 1998. *Ground Water Quality and Agricultural Land Use in the Polk County Very Intense Study Area (VISA).* Florida Department of Environmental Protection, Division of Water Facilities. *http://www.dep.state.fl.us/water/monitoring/docs/facts/fs9802.pdf.* Accessed September 2010.

[75] USGS. 2010. *Hydrogeology and Groundwater Quality of Highlands County, FL.* Scientific Investigations Report 2010–5097. U.S. Geological Survey, Reston, VA.

[76] Berndt, M.P., 1996. *Ground-water quality assessment of the Georgia-Florida Coastal Plain study unit—Analysis of available information on nutrients, 1972–92.* Water-Resources Investigations Report 95–4039. U.S. Geological Survey, Tallahassee, FL.

[77] Berndt, Marian P., 1993. *National Water-Quality Assessment Program-Preliminary assessment of nitrate distribution in ground water in the Georgia-Florida Coastal Plain Study Unit, 1972–90.* Open-File Report 93–478. U.S. Geological Survey.

[78] National Research Council, Committee on Reducing Stormwater Discharge Contributions to Water Pollution. 2008. *Urban Stormwater Management in the United States.* National Academies Press, Washington, DC.

[79] U.S. Census Bureau. 2009. 2008 Population Estimates Ranked by State. *http://factfinder.census.gov.* Accessed January 2010.

[80] U.S. Census Bureau. 2009. 2008 Population Estimates Ranked by State. *http://factfinder.census.gov.* Accessed January 2010.

[81] The criteria finalized in this rulemaking do not address or translate Florida's narrative nutrient provision at Subsection 62–302.530(47)(a), F.A.C. Subsection 62–302.530(47)(a), F.A.C., remains in place as an applicable WQS for CWA purposes.

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

[83] USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[84] USEPA. 2001. *Nutrient Criteria Technical Manual: Estuarine and Coastal Marine Waters.*

EPA based the methodologies used to develop numeric criteria for Florida in this regulation on its published guidance on developing criteria that identifies three general approaches for criteria setting. The three types of empirical analyses provide distinctly different, independently and scientifically defensible, approaches for deriving nutrient criteria from field data: (1) Reference condition approach derives candidate criteria from observations collected in reference waterbodies, (2) mechanistic modeling approach represents ecological systems using equations that represent ecological processes and parameters for these equations that can be calibrated empirically from site-specific data, and (3) empirical nutrient stressor-response modeling is used when data are available to accurately estimate a relationship between nutrient concentrations and a response measure that is directly or indirectly related to a designated use of the waterbody (*e.g.,* a biological index or recreational use measure). Then, nutrient concentrations that are protective of designated uses can be derived from the estimated relationship).[85] Each of these three analytical approaches is appropriate for deriving scientifically defensible numeric nutrient criteria when applied with consideration of method-specific data needs and available data. In addition to these empirical approaches, consideration of established (*e.g.,* published) nutrient response thresholds is also an acceptable approach for deriving criteria.[86]

For lakes, EPA used a stressor-response approach to link nitrogen/phosphorus concentrations to predictions of corresponding chlorophyll *a* concentrations. EPA used a reference-based approach for streams, relying on a comprehensive screening methodology to identify least-disturbed streams as reference streams. For springs, EPA used algal or nitrogen/phosphorus thresholds developed under laboratory conditions and stressor-response relationships from several field studies of algal growth in springs. For each type of waterbody, EPA carefully considered the available data and evaluated several lines of evidence to derive scientifically sound approaches (as noted above) for developing the final numeric criteria.

Based on comments received from the Scientific Advisory Board (SAB), EPA has modified a draft methodology guidance document on using stressor-response relationships for deriving numeric criteria, which is available as a final technical guidance document.[87] In addition, the reference-based and algal or nitrogen/phosphorus threshold approaches have been peer reviewed and have been available for many years.

As mentioned above, the criteria finalized in this rulemaking translate Florida's narrative nutrient provision at Subsection 62–302.530(47)(b), F.A.C., ("[i]n 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") into numeric values that apply to lakes and springs throughout the State and flowing waters outside of the South Florida Region. EPA believes that numeric criteria will expedite and facilitate the effective implementation of Florida's existing point and non-point source water quality programs in terms of timely water quality assessments, TMDL development, NPDES permit issuance and, where needed, Basin Management Action Plans (BMAPs) to address nitrogen/phosphorus pollution. EPA notes that Subsection 62–302.530(47)(a), F.A.C. ("[t]he discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Sections 62–302.300, 62–302.700, and 62–4.242, F.A.C.") could result in more stringent nitrogen/phosphorus limits, where necessary to protect other applicable WQS in Florida.

D. EPA Determination Regarding Florida and EPA's Rulemaking

On January 14, 2009, EPA determined under CWA section 303(c)(4)(B) that new or revised WQS in the form of numeric water quality criteria for nitrogen/phosphorus pollution are necessary to meet the requirements of the CWA in the State of Florida. As noted above, the portion of Florida's currently applicable narrative criterion translated by this final rule provides, in part, that "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." (*See* Subsection 62–302.530(47)(b), F.A.C.). EPA determined that Florida's narrative criterion alone was insufficient to ensure protection of applicable designated uses. The determination recognized that Florida has a comprehensive regulatory and non-regulatory administrative water quality program to address nitrogen/phosphorus pollution through a water quality strategy of assessments, non-attainment listing and determinations, TMDL development, and National Pollutant Discharge Elimination System (NPDES) permit regulations; individual watershed management plans through the State's BMAPs; advanced wastewater treatment technology-based requirements under the 1990 Grizzle-Figg Act; together with rules to limit nitrogen/phosphorus pollution in geographically specific areas like the Indian River Lagoon System, the Everglades Protection Area, and Wekiva Springs. However, the determination noted that despite Florida's existing regulatory and non-regulatory water quality framework and the State's intensive efforts to diagnose nitrogen/phosphorus pollution and address it on a time-consuming and resource-intensive case-by-case basis, substantial water quality degradation from nitrogen/phosphorus over-enrichment remains a significant challenge in the State and conditions are likely to worsen with continued population growth and land-use changes.

Overall, the combined impacts of urban and agricultural activities, along with Florida's physical features and important and unique aquatic ecosystems, made it clear that the current reliance on the narrative criterion alone and a resource-intensive, site-specific implementation approach, and the resulting delays that it entails, do not ensure protection of applicable designated uses for the many State waters that either have been listed as impaired and require loadings reductions or those that are high quality and require protection from future degradation. EPA concluded that numeric criteria for nitrogen/phosphorus pollution will enable the State to take necessary action to protect

EPA–822–B–01–003. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

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

USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 2001. *Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters.* EPA–822–B–01–003. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 2008. *Nutrient Criteria Technical Guidance Manual: Wetlands.* EPA–822–B–08–001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

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

[87] USEPA. 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 designated uses in a timely manner that will ensure protection of the designated use. The resource-intensive efforts to interpret the State's narrative criterion contribute to substantial delays in implementing the criterion and, therefore, undercut the State's ability to provide the needed protections for applicable designated uses. EPA, therefore, determined that numeric criteria for nitrogen/phosphorus pollution are necessary for the State of Florida to meet the CWA requirement to have criteria that protect applicable designated uses. EPA determined that numeric water quality criteria would strengthen the foundation for identifying impaired waters, establishing TMDLs, and deriving water quality-based effluent limits in NPDES permits, thus providing the necessary protection for the State's designated uses in its waters. In addition, numeric criteria will support the State's ability to effectively partner with point and nonpoint sources to control nitrogen/phosphorus pollution, thus further providing the necessary protection for the designated uses of the State's water bodies. EPA's determination is available at the following Web site: *http://www.epa.gov/waterscience/standards/rules/fl-determination.htm.*

While Florida continues to work to implement its watershed management program, the impairments for nutrient pollution are increasing as evidenced by the 2008 and 2010 *Integrated Water Quality Assessment for Florida* report results, and the tools to correct the impairments (TMDLs and BMAPs) are not being completed at a pace to keep up. Numeric criteria can be used as a definitive monitoring tool to identify impaired waters and as an endpoint for TMDLs to establish allowable loads necessary to correct impairments. When developing TMDLs, as it does when determining reasonable potential and deriving limits in the permitting context, Florida translates the narrative criterion into a numeric target that the State determines is necessary to meet its narrative criterion and protect applicable designated uses. This process involves a site-specific analysis to determine the nitrogen and phosphorus concentrations that would "cause an imbalance in natural populations of aquatic flora or fauna" in a particular water.

When deriving NPDES water quality-based permit limits, Florida initially conducts a site-specific analysis to determine whether a proposed discharge has the reasonable potential to cause or contribute to an exceedance of its narrative water quality criterion. The absence of numeric criteria make this "reasonable potential" analysis more complex, data-intensive, and protracted. Following a reasonable potential analysis, the State then evaluates what levels of nitrogen and phosphorus would "cause an imbalance in natural populations of aquatic flora or fauna" and translates those levels into numeric "targets" for the receiving water and any other affected waters. Determining on a State-wide, water-by-water basis the levels of nitrogen and phosphorus that would "cause an imbalance in natural populations of aquatic flora or fauna" is a difficult, lengthy, and data-intensive undertaking. This work involves performing detailed location-specific analyses of the receiving water. If the State has not already completed this analysis for a particular waterbody, it can be very difficult to accurately determine in the context and timeframe of the NPDES permitting process. For example, in some cases, site-specific data may take several years to collect and, therefore, may not be available for a particular waterbody at the time of permitting issuance or re-issuance.

The January 14, 2009 determination stated EPA's intent to propose numeric criteria for lakes and flowing waters in Florida within 12 months of the January 14, 2009 determination, and for estuarine and coastal waters within 24 months of the determination. On August 19, 2009, EPA entered into a Consent Decree with Florida Wildlife Federation, Sierra Club, Conservancy of Southwest Florida, Environmental Confederation of Southwest Florida, and St. Johns Riverkeeper, committing to the schedule stated in EPA's January 14, 2009 determination to propose numeric criteria for lakes and flowing waters in Florida by January 14, 2010, and for Florida's estuarine and coastal waters by January 14, 2011. The Consent Decree also required that final rules be issued by October 15, 2010 for lakes and flowing waters, and by October 15, 2011 for estuarine and coastal waters. FDEP, independently from EPA, initiated its own State rulemaking process in the spring/summer of 2009 to adopt nutrient water quality standards protective of Florida's lakes and flowing waters. FDEP held several public workshops on its draft numeric criteria for lakes and flowing waters. In October 2009, however, FDEP decided not to bring the draft criteria before the Florida Environmental Regulation Commission, as had been previously scheduled.

Pursuant to the Consent Decree, EPA's Administrator signed the proposed numeric criteria for Florida's lakes and flowing waters on January 14, 2010, which was published in the **Federal Register** on January 26, 2010. EPA conducted a 90-day public comment period for this rule that closed on April 28, 2010. During this period, EPA also conducted 13 public hearing sessions in 6 cities in Florida. EPA received over 22,000 public comments from a variety of sources, including environmental groups, municipal wastewater associations, industry, State agencies, local governments, agricultural groups, and private citizens. The comments addressed a wide range of issues, including technical analyses, policy issues, economic costs, and implementation concerns. In this notice, EPA explains the inland waters final rule and provides a summary of major comments and the Agency's response in the sections that describe each of the provisions of the final rule. EPA has prepared a detailed "Comment Response Document," which includes responses to the comments contributed during the public hearing sessions, as well as those submitted in writing on the proposed rule, and is located in the docket for this rule.

On June 7, 2010, EPA and Plaintiffs filed a joint notice with the Court extending the deadlines for promulgating numeric criteria for Florida's estuaries and coastal waters, flowing waters in south Florida (including canals), and the downstream protection values for flowing waters into estuaries and coastal waters. The new deadlines are November 14, 2011 for proposing this second phase of criteria, and August 15, 2012 for publishing a final rule for these three categories. This will allow EPA time to hold a public peer review by EPA's Scientific Advisory Board (SAB) of the scientific methodologies for estuarine and coastal criteria, flowing waters in south Florida, and downstream protection values for estuaries and coastal waters.

Based upon comments and new data and information received during the public comment phase of the January 2010 proposed rule, on August 3, 2010 EPA published a supplemental notice of data availability and request for comment related to the Agency's January 26, 2010 notice of proposed rulemaking. In its supplemental notice, EPA solicited comment on a revised regionalization approach for streams, additional information and analysis on least-disturbed sites as part of a modified benchmark distribution approach, and additional options for developing downstream protection values (DPVs) for lakes. EPA did not solicit additional comment on any other provisions of the January 2010 proposal. EPA received 71 public comments from a variety of sources, including local and State governments, industry, and environmental groups. As mentioned above, EPA provides a summary of major comments and the Agency's response in the sections that describe each of the provisions of the final rule. Responses to comments submitted during the public comment period associated with the supplemental notice are also included in EPA's detailed "Comment Response Document," located in the docket for this rule.

On October 8, 2010, EPA filed an unopposed motion with the Court requesting that the deadline for signing the final rule be extended to November 14, 2010. The Court granted EPA's motion on October 27, 2010. EPA used this additional time to review and confirm that all comments were fully considered.

In accordance with the January 14, 2009 determination, the August 19, 2009 Consent Decree, and the June 7, 2010 and October 27, 2010 revisions to that Consent Decree, in this final notice EPA is promulgating final numeric criteria for streams, lakes, and springs in the State of Florida.[88]

III. Numeric Criteria for Streams, Lakes, and Springs in the State of Florida

A. General Information

For this final rule, EPA derived numeric criteria for streams, lakes and springs to implement Florida Subsection 62–302.530(47)(b), F.A.C.[89] This final rule also includes downstream protection values (DPVs) to ensure the attainment and maintenance of the WQS for downstream lakes. Derivation of these criteria is based upon an extensive amount of Florida-specific data. EPA has carefully considered numerous comments from a range of stakeholders and has worked in close collaboration with FDEP technical and scientific experts to analyze, evaluate, and interpret these Florida-specific data in deriving scientifically sound numeric criteria for this final rulemaking.

To support derivation of the final streams criteria, EPA screened and evaluated water chemistry data from more than 11,000 samples from over 6,000 sites statewide. EPA also evaluated biological data consisting of more than 2,000 samples from over 1,100 streams. To support derivation of the final lakes criteria, EPA screened and evaluated relevant lake data, which consisted of over 17,000 samples from more than 1,500 lakes statewide. Finally, for the final springs criterion, EPA evaluated and relied on scientific information and analyses from more than 40 studies including historical accounts, laboratory scale dosing studies and field surveys.

In deriving these final numeric values, the EPA met and consulted with FDEP expert scientific and technical staff on numerous occasions as part of an ongoing collaborative process. EPA carefully considered and evaluated the technical approaches and scientific analysis that FDEP presented as part of its July 2009 draft numeric criteria,[90] as well as its numerous comments on different aspects of this rule. The Agency also received and carefully considered substantial stakeholder input from 13 public hearings in 6 Florida cities. Finally, EPA reviewed and evaluated further analysis and information included in more than 22,000 comments on the January 2010 proposal and an additional 71 comments on the August 2010 supplemental notice.

EPA has created a technical support document that provides detailed information regarding the methodologies discussed herein and the derivation of the final criteria. This document is entitled "Technical Support Document for EPA's Final Rule for Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters" ("EPA Final Rule TSD for Florida's Inland Waters" or "TSD") and is part of the record and supporting documentation for this final rule. As part of its review of additional technical and scientific information, EPA has documented its consideration of key comments and issues received from a wide range of interested parties during the rulemaking process. This analysis and consideration is included as part of a comment response document entitled "Response to Comments—EPA's Numeric Criteria for Nitrogen/Phosphorus Pollution in the State of Florida's Lakes and Flowing Waters" that is also part of the record and supporting documentation for this final rule.

This section of the preamble describes EPA's final numeric criteria for Florida's streams (III.B), lakes (III.C), and springs (III.D), with the associated methodologies EPA employed to derive them. Each subsection includes the final numeric criteria (magnitude, duration, and frequency) and background information and supporting analyses. Section III.E discusses the applicability and implementation of these final criteria.

As discussed, the scientific basis for the derivation of the applicable criteria for streams, lakes and springs in this final rule is outlined below and explained in more detail in the Technical Support Document accompanying this rulemaking. The final criteria and related provisions in this rule reflect a detailed consideration and full utilization of the best available science, data, literature, and analysis related to the specific circumstances and contexts for deriving numeric criteria in the State of Florida. This includes, but is not limited to, the substantial quantity and quality of available data in Florida, Florida's regional hydrologic, biological, and land use characteristics, and the biological responses in Florida's surface water systems.

B. Numeric Criteria for the State of Florida's Streams

(1) Final Rule

EPA is promulgating numeric criteria for TN and TP in five geographically distinct watershed regions of Florida's streams classified as Class I or III waters under Florida law (Section 62–302.400, F.A.C.).

TABLE B–1—EPA'S NUMERIC CRITERIA FOR FLORIDA STREAMS

Nutrient watershed region	Instream protection value criteria	
	TN (mg/L) *	TP (mg/L) *
Panhandle West [a]	0.67	0.06
Panhandle East [b]	1.03	0.18
North Central [c]	1.87	0.30
West Central [d]	1.65	0.49
Peninsula [e]	1.54	0.12

Watersheds pertaining to each Nutrient Watershed Region (NWR) were based principally on the NOAA coastal, estuarine, and fluvial drainage areas with modifications to the NOAA drainage areas in the West Central and Peninsula Regions that account for unique watershed geologies. For more detailed information on regionalization and which WBIDs pertain to each NWR, *see* the Technical Support Document.

[88] For purposes of this rule, EPA has distinguished South Florida as those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee, hereinafter referred to as the South Florida Region. Numeric criteria applicable to flowing waters in the South Florida Region will be addressed in the second phase of EPA's rulemaking regarding the establishment of estuarine and coastal numeric criteria. (Please refer to Section I.B for a discussion of the water bodies affected by this rule).

[89] 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.

[90] FDEP. 2009. *Draft Technical Support Document: Development of Numeric Nutrient Criteria for Florida's Lakes and Streams.* Florida Department of Environmental Protection, Standards and Assessment Section. Available electronically at: *http://www.dep.state.fl.us/water/wqssp/nutrients/docs/tsd_nutrient_crit.docx.* Accessed October 2010.

[a] Panhandle West region includes: Perdido Bay Watershed, Pensacola Bay Watershed, Choctawhatchee Bay Watershed, St. Andrew Bay Watershed, Apalachicola Bay Watershed.

[b] Panhandle East region includes: Apalachee Bay Watershed, and Econfina/Steinhatchee Coastal Drainage Area.

[c] North Central region includes the Suwannee River Watershed.

[d] West Central region includes: Peace, Myakka, Hillsborough, Alafia, Manatee, Little Manatee River Watersheds, and small, direct Tampa Bay tributary watersheds south of the Hillsborough River Watershed.

[e] Peninsula region includes: Waccasassa Coastal Drainage Area, Withlacoochee Coastal Drainage Area, Crystal/Pithlachascotee Coastal Drainage Area, small, direct Tampa Bay tributary watersheds west of the Hillsborough River Watershed, Sarasota Bay Watershed, small, direct Charlotte Harbor tributary watersheds south of the Peace River Watershed, Caloosahatchee River Watershed, Estero Bay Watershed, Kissimmee River/Lake Okeechobee Drainage Area, Loxahatchee/St. Lucie Watershed, Indian River Watershed, Daytona/St. Augustine Coastal Drainage Area, St. John's River Watershed, Nassau Coastal Drainage Area, and St. Mary's River Watershed.

* For a given waterbody, the annual geometric mean of TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

(2) Background and Analysis

(a) Methodology for Stream Classification

In January 2010, EPA proposed to classify Florida's streams into four regions (referred to in the proposed rule as "Nutrient Watershed Regions") for application of TN and TP criteria. This proposal was based upon the premise that streams within each of these regions (Panhandle, Bone Valley, Peninsula and North Central) reflect similar geographical characteristics, including phosphorus-rich soils, nitrogen/phosphorus concentrations and nitrogen to phosphorus ratios. To classify these four regions, EPA began by considering the watershed boundaries of downstream estuaries and coastal waters in recognition of the hydrology of Florida's flowing waters and the importance of protecting downstream water quality. This is consistent with a watershed approach to water quality management, which EPA encourages to integrate and coordinate efforts within a watershed in order to most effectively and efficiently protect our nation's water resources.[91] EPA then classified Florida's streams based upon a consideration of the natural factors that contribute to variability in nutrient concentrations in streams (*e.g.,* geology, soil composition). In the State of Florida, these natural factors are mainly associated with phosphorus. EPA's proposal reflected a conclusion that these natural factors could best be represented by separating the watersheds in the State into four regions and then using the least-disturbed sites within those regions to differentiate between the expected natural concentrations of TN and TP.

EPA received comments suggesting that the proposed stream regionalization be amended to more accurately account for naturally-high phosphorus soils in the northern Panhandle, west of the proposed North Central region. Specifically, EPA was asked to consider the westward extent of the Hawthorn Group, a phosphorus-rich geological formation that can influence stream phosphorus concentrations. At proposal, EPA had taken the Hawthorn Group into account when it proposed two distinct stream regions to the east and south of the panhandle region: the North Central and the West Central (formerly called the Bone Valley at proposal). Following proposal and in response to these comments, EPA revisited its review of underlying soils and geology in the Panhandle, itself, and the relationship of those geological characteristics to observed patterns in phosphorus concentrations in streams. EPA further considered how well such a revised regionalization explained observed variability in TP concentrations relative to the proposed regionalization. EPA concluded that a revised regional classification subdividing the proposed Panhandle region into a western and eastern section accurately reflected phosphate contributions from the underlying geologic formations that are reflected in the expected instream phosphorus concentrations. As discussed in the August 2010 supplemental notice, EPA has used the revised Panhandle regions for TN criteria to assure consistency and clarity in applicability decisions and implementation. This approach addresses the concerns of commenters that regionalization is an important consideration in developing stream criteria. EPA provided a supplemental notice and solicitation of comment in August 2010 on this potential change to the Panhandle region. In this final rule, EPA has thus taken into account the portion of the Hawthorn Group that lies in the eastern portion of the Panhandle region and has delineated the Panhandle region along watershed boundaries into East and West portions divided by the eastern edge of the Apalachicola River watershed (or alternatively, the western edge of the Suwannee River watershed). For more information regarding the EPA's consideration of alternative approaches for classification, please *see* the TSD and response to comments.

EPA also received comment that the original West Central region (referred to as the Bone Valley in the proposed rule) was too broad and incorporated watersheds that were not influenced by underlying Hawthorn Group geology, especially small, direct coastal drainage watersheds along the western and southern boundaries. EPA reexamined the watershed delineations of the West Central and Peninsula regions based on information in these comments and concluded that the comments were technically correct. EPA also provided a supplemental notice and solicitation of comment on this potential change to the West Central and Peninsula regions. In this final rule, EPA has refined the boundary delineations accordingly. The result for the West Central region was a modified boundary that shifts small, direct Tampa Bay tributary watersheds west of the Hillsborough River Watershed; small, direct Charlotte Harbor tributary watersheds south of the Peace River Watershed; and the entire Sarasota Bay Watershed from the West Central (Bone Valley) to the Peninsula region. EPA believes these adjustments to the West Central and Peninsula stream region boundaries more accurately reflect the watershed boundaries and better reflect natural differences in underlying geological formations and expected stream chemistry.

In summary, EPA is finalizing numeric stream criteria for TN and TP for five separate Nutrient Watershed Regions (NWR): Panhandle West, Panhandle East, North Central, West Central and Peninsula (north of Lake Okeechobee, including the Caloosahatchee River Watershed to the west and the St. Lucie Watershed to the east). For a map of these regions, refer to "Technical Support Document for U.S. EPA's Final Rule for Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters" (Chapter 1: Derivation of EPA's Numeric Criteria for Streams) included in the docket as part of the record for this final rule.

(b) Methodology for Calculating Instream Protective TN and TP Values

In the January 2010 proposal, EPA used a reference condition approach to derive numeric criteria that relied on the identification of biologically healthy sites that were unimpaired by nitrogen or phosphorus. EPA identified these sites from FDEP's streams data set, selecting sites where Stream Condition

[91] U.S. EPA. 2008. *Handbook for Developing Watershed Plans to Restore and Protect Our Waters.* EPA 841–B–08–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Index (SCI) scores were 40 and higher. The SCI is a multi-metric index of benthic macroinvertebrate community composition and taxonomic data developed by FDEP to assess the biological health of Florida's streams.[92] An SCI score > 40 has been determined to be indicative of biologically healthy conditions based on an expert workshop and analyses performed by both FDEP and EPA. Please refer to the EPA's January 2010 proposal and the final TSD accompanying this final rule for more information on the SCI and the selection of the SCI value of 40 as an appropriate threshold to identify biologically healthy sites.

EPA further screened these sites by cross-referencing them with Florida's 2008 CWA section 303(d) list and excluded sites in waterbody identification numbers (WBIDs) with identified nutrient impairments or dissolved oxygen impairments. EPA grouped the remaining sites (hereinafter referred to as "SCI sites") according to the four proposed Nutrient Watershed Regions (Panhandle, North Central, West Central (referred to as Bone Valley at proposal), and Peninsula). For each NWR, EPA compiled data (TN and TP concentrations). EPA then calculated the average concentration at each site using all available samples. The resulting site average concentrations represent the distribution of nitrogen/phosphorus concentrations for each region. EPA found that while these sites were determined to be biologically healthy, the proposed SCI approach does not include information that can be directly related to an evaluation of least anthropogenically-impacted conditions (*e.g.,* a measure of land use surrounding a reference site), which can be used as a factor in identifying a minimally-impacted reference population for criteria development. For these reasons, EPA concluded the 75th percentile of the distribution of site average values was an appropriate threshold to use in the SCI approach for criteria derivation.

EPA requested comment on basing the TN and TP criteria for the Nutrient Watershed Regions on the SCI approach. The Agency also requested comment on an alternative approach that utilizes benchmark sites identified by FDEP. EPA received comments supporting the benchmark reference condition approach and the selection of the 90th percentile (generally) for deriving the TN and TP criteria. The criteria in this final rule are based on a further evaluation and more rigorous screening of the benchmark data set of reference sites using the population of least-disturbed benchmark sites developed by FDEP and further refined by EPA as discussed in the August 2010 supplemental notice. EPA concluded that the revised benchmark approach is an appropriate reference condition approach for deriving stream criteria because it utilizes a quantitative assessment of potential human disturbance through the use of surrounding land cover analysis of stream corridor and watershed land development indices that provide an added dimension to the benchmark approach not considered in EPA's proposed SCI site approach. EPA is finalizing stream criteria for most NWRs based on the benchmark approach with the addition of supplemental data screening steps to ensure that an evaluation of benchmark sites utilizes best available information representing reference conditions related to least-disturbed as well as and biologically healthy streams in the State. For this reason, EPA found the benchmark reference condition approach to be a compelling basis to support numeric criteria for Florida's streams more closely associated with least-disturbed sites. For the West Central region only, EPA is finalizing stream criteria based on SCI sites because the benchmark approach resulted in the identification of only one WBID as being least-disturbed. EPA found the SCI sites provide a more compelling basis to support numeric criteria in that region because more data are available at more sites that have been identified as biologically healthy, which provide a broader representation of nitrogen and phosphorus concentrations within this region.

For this final rule, EPA is using the large amount of high-quality scientific data available on TN and TP concentrations with corresponding information on land use and human disturbance for a wide variety of stream types as part of a reference condition approach to derive numeric criteria for Florida's streams. EPA used available data that are quantitative measures of land use, indicators of human disturbance, and site-specific evaluations of biological condition using a multi-metric biological index to identify a population of least-disturbed benchmark locations (benchmark sites). EPA used associated measurements of TN and TP concentrations from the benchmark sites and SCI sites (in the case of the West Central region) as the basis for deriving the final numeric criteria for streams.

The reference condition approach used in this final rule for streams consist of three steps: (1) Defining the reference population, (2) calculating a distribution of values, and (3) determining appropriate thresholds. For the first step as discussed above, EPA used the least-disturbed benchmark reference condition approach initially developed by FDEP to define the reference condition population, this approach starts with a query of FDEP's data in the STORET [93] (STOrage and RETrieval) and GWIS (Generalized Water Information System) databases and identified sites with data that met quality assurance standards.[94] Sites with data were then evaluated by FDEP to assess the level of human disturbance in the vicinity of the site using the Landscape Development Intensity Index (LDI) [95] to analyze a 100 meter distance of land on both sides of and 10 kilometers upstream of each stream site (*i.e.,* corridor LDI). Sites with stream corridor LDI scores less than or equal to two [96] were considered sites with relatively low potential human disturbance. The group of sites with LDI scores less than or equal to two were further reviewed and inspected by FDEP based on site visits and aerial photography to assess the degree of potential human impact. Based on this review, sites that FDEP determined had potential human impact were removed. Sites with mean nitrate concentrations greater than 0.35 mg/L, a concentration identified by several lines of evidence to result in the growth of excessive algae in laboratory studies and extensive field evaluations of spring and clear stream sites in Florida [97] were also removed. Following proposal and in response to additional comments and information, EPA further evaluated the benchmark sites and screened out additional sites with identified nutrient impairments or dissolved oxygen impairments according to Florida's 2008 CWA section 303(d) list. EPA also removed sites that have available watershed LDI scores greater than three as this reflects a higher level of human disturbance on

[92] The SCI method was developed and calibrated by FDEP. *See* Fore *et al.* 2007. *Development and Testing of Biomonitoring Tools for Macroinvertebrates in Florida Streams (Stream Condition Index and BioRecon).* Final prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

[93] FL STORET can be found at: *http://www.dep.state.fl.us/WATER/STORET/INDEX.HTM.*

[94] Quality assurance review conducted by FDEP and detailed in EPA's accompanying Technical Support Document.

[95] Brown, M.T., and M.B. Vivas. 2005. Landscape Development Intensity Index. *Environmental Monitoring and Assessment* 101: 289–309.

[96] Brown, M.T., and M.B. Vivas. 2005. Landscape Development Intensity Index. *Environmental Monitoring and Assessment* 101: 289–309.

[97] *See* the springs criterion discussion below.

a watershed basis.[98] Finally, EPA removed benchmark sites that have available Stream Condition Index (SCI) scores less than 40. These additional screens provide greater confidence that the remaining sites are both least-disturbed and biologically healthy. The benchmark approach resulted in the identification of only one WBID as least-disturbed within the West Central region. For this reason, EPA is utilizing the SCI sites identified at proposal to define the reference population for the West Central region in this final rule. EPA grouped the remaining sites (hereinafter referred to as "reference sites") according to its Nutrient Watershed Regions (Panhandle West, Panhandle East, North Central, West Central, and Peninsula). For each NWR, EPA compiled data (TN and TP concentrations) from the reference sites.

The second step in deriving instream protection values was to calculate the distribution of nitrogen/phosphorus values of benchmark sites within each region. EPA calculated the geometric mean of the annual geometric mean of nitrogen/phosphorus concentrations for each WBID within which reference sites occurred. EPA provided notice and solicited comment on calculating streams criteria on the basis of WBIDs in the August 2010 supplemental notice. All samples from reference sites within those WBIDs were used to calculate the annual geometric mean. The geometric mean of this annual geometric mean for each WBID is utilized so that each WBID represents one average concentration in the distribution of concentrations for each NWR. Geometric means were used for all averages because concentrations were log-normally distributed.

The third step in deriving instream protection values was to determine appropriate thresholds from these distributions to support balanced natural populations of aquatic flora and fauna. The upper end of the distribution (the 90th percentile) is appropriate if there is confidence that the distribution reflects minimally-impacted reference conditions and can be shown to be supportive of designated uses (*i.e.,* balanced natural populations of aquatic flora and fauna).[99] EPA concluded that the benchmark data set and the resulting benchmark distributions of TN and TP were based on substantial evidence of least-disturbed reference conditions after the additional quality assurance screens applied by EPA. This analysis provides EPA with the confidence that the benchmark sites are least-disturbed sites and with the additional screens applied by the Agency provide a basis for the use of the 90th percentile of values from this population to establish the final rule criteria. It is appropriate to use the 90th percentile for the benchmark distribution because the least-disturbed sites identified in Florida that are used to derive the criteria more closely approximate minimally-impacted conditions.[100] For the West Central region, where reference sites are identified using the SCI approach, there is less confidence that these sites are least-disturbed and represent minimally-impacted conditions. As mentioned above, this is because this approach does not rely on a quantitative assessment of potential human disturbance through the use of surrounding land cover analysis of stream corridor and watershed land development indices. Therefore, EPA is finalizing the stream criteria in the West Central region using the 75th percentile values of the distribution from the SCI sites.[101]

EPA's approach in this final rule results in numeric criteria that are protective of a balanced natural population of aquatic flora and fauna in Florida's streams. EPA has determined, however, that these instream values may not always ensure the attainment and maintenance of WQS in downstream lakes and that more stringent criteria may be necessary to assure compliance with 40 CFR 131.10(b). Therefore, EPA is finalizing an approach in this rule for deriving TN and TP values for streams to ensure the attainment and maintenance of WQS in downstream lakes.[102] This approach is discussed in Section III.C(2)(f).

(c) Duration and Frequency

Aquatic life water quality criteria contain three components: Magnitude, duration, and frequency. For the numeric TN and TP criteria for streams, the derivation of the criterion-magnitude values is described above and these values are provided in the table in Section III.B(1). The duration component of these stream criteria is specified in *footnote a* of Table B–1 as an annual geometric mean. EPA is finalizing the proposed frequency component as a no-more-than-one-in-three-years excursion frequency for the annual geometric mean criteria for streams. These duration and frequency components of the criteria are consistent with the data set used to derive these criteria, which applied distributional statistics to measures of annual geometric mean values from multiple years of record. EPA has determined that this frequency of excursions will not result in unacceptable effects on aquatic life as it will allow the stream ecosystem enough time to recover from occasionally elevated levels of nitrogen/phosphorus in the stream.[103 104 105] These selected duration and frequency components recognize that hydrological variability (*e.g.,* high and low flows) will produce variability in nitrogen and phosphorus concentrations, and that individual measurements may at times be greater than the criteria magnitude concentrations without causing unacceptable effects to aquatic organisms and their uses. Furthermore, the frequency and duration components balance the representation of underlying data and analyses based on the central tendency of many years of data with the need to exercise some caution to ensure that streams have sufficient time to process individual years of elevated nitrogen and phosphorus levels and

[98] The threshold value for watershed LDI is higher than the threshold value for the corridor LDI because human disturbance in the watershed is known to more weakly influence in-stream nitrogen/phosphorus concentrations than human disturbance in the stream corridor (Peterjohn, W.T. and D. L. Correll. 1984. Nutrient dynamics in an agricultural watershed: Observations on the role of a riparian forest. *Ecology* 65: 1466–1475).

[99] USEPA. 2008. *Nutrient Criteria Technical Guidance Manual: Wetlands.* EPA–822–B–08–001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[100] The 90th percentile is selected so that nitrogen/phosphorus concentrations that are above the criterion value have a low probability (< 10%) of being observed in sites that are similar to benchmark sites.

[101] USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

These percentages were initially proposed by FDEP. *See* FDEP. 2009. *Draft Technical Support Document: Development of Numeric Nutrient Criteria for Florida's Lakes and Streams.* Florida Department of Environmental Protection, Standards and Assessment Section. Available electronically at: *http://www.dep.state.fl.us/water/wqssp/nutrients/docs/tsd_nutrient_crit.docx.* Accessed October 2010.

[102] EPA will propose and request comment on the comparable issue for deriving TN and TP values for streams to ensure the attainment and maintenance of WQS in downstream estuaries as part of the coastal and estuarine waters rule on November 14, 2011.

[103] USEPA. 1985. *Guidelines for Deriving Numeric National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses.* EPA PB85–227049. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratories.

[104] Hutchens, J. J., K. Chung, and J. B. Wallace. 1998. Temporal variability of stream macroinvertebrate abundance and biomass following pesticide disturbance. *Journal of the North American Benthological Society* 17:518–534.

[105] Wallace, J.B. D. S.Vogel, and T.F. Cuffney. 1986. Recovery of a headwater stream from an insecticide induced community disturbance. Journal of North American Benthological Society 5: 115–l 26.

avoid the possibility of cumulative and chronic effects (*i.e.,* the no-more-than-one-in-three-year component). More information on this specific topic is provided in EPA's Final Rule TSD for Florida's Inland Waters, Chapter 1: Methodology for Deriving U.S. EPA's Criteria for Streams located in the record for this final rule.

d. Reference Condition Approach

In deriving the final criteria for streams, EPA has relied on a reference condition approach, which has been well documented, peer reviewed, and developed in a number of different contexts.[106] [107] [108] [109] [110] In the case of Florida, this approach is supported by a substantial Florida-specific database of high quality information, sound scientific analysis and extensive technical evaluation.

EPA received comments regarding the scientific defensibility of the reference condition approach, using either the benchmark sites or the SCI sites. Many commenters observed that such approaches do not mechanistically link biological effects to nitrogen/phosphorus levels and therefore assert that EPA cannot scientifically justify numeric criteria without an observed biological effect. EPA views the reference condition approach as scientifically appropriate to derive the necessary numeric criteria in Florida streams. Reference conditions provide the appropriate benchmark against which to determine the nitrogen and phosphorus concentrations present when the designated use is being met. When the natural background concentrations of specific parameters can be defined by identifying reference conditions at anthropogenically-undisturbed sites, then the concentrations at these sites can be considered as sufficient to support the aquatic life expected to occur naturally at that site.[111] Also, setting criteria based on the conditions observed in reference condition sites reflects both the stated goal of the Clean Water Act and EPA's National Nutrient Strategy that calls for States, including Florida, to take protective and preventative steps in managing nitrogen/phosphorus pollution to maintain the chemical, physical and biological integrity of the Nation's waters before adverse biological and/or ecological effects are observed.[112]

The effects of TN and TP on an aquatic ecosystem are well understood and documented. There is a substantial and compelling scientific basis for the conclusion that excess TN and TP will have adverse effects on streams[113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127]. As discussed in Section II above, excess nitrogen/phosphorus in streams, like other aquatic ecosystems, increase vegetative growth (plants and algae), and change the assemblage of plant and algal species present in the system. These changes can affect the organisms that are consumers of algae and plants by altering the balance of food resources available to different trophic levels. For example, excess nitrogen/phosphorus promotes the growth of opportunistic and short-lived plant species that die quickly leaving more dead vegetative material available for consumption by lower tropic levels. Additionally, excess nitrogen/phosphorus can promote the growth of less palatable nuisance algae species that results in less food available for filter feeders. These changes can also alter the habitat structure by covering the stream or river bed with periphyton (attached algae) rather than submerged aquatic plants, or clogging the water column with phytoplankton (floating algae). In addition, excess nitrogen/phosphorus can lead to the production of algal toxins that can be toxic to fish, invertebrates, and humans. Chemical characteristics of the water, such as pH and concentrations of dissolved oxygen (DO), can also be affected by excess nitrogen/phosphorus leading to low DO conditions and hypoxia. Each of these changes can, in turn, lead to other changes in the stream community and, ultimately, to changes in the stream ecology that supports the overall function of the linked aquatic ecosystem.

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

[107] USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[108] Stoddard, J. L., D. P. Larsen, C. P. Hawkins, R. K. Johnson, and R. H. Norris. 2006. Setting expectations for the ecological condition of streams: the concept of reference condition. *Ecological Applications* 16:1267–1276.

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[110] U.S. EPA. 2001. Nutrient Criteria Technical Manual: Estuarine and Coastal Marine Waters. Office of Water, Washington, DC. EPA–822–B–01–003.

[111] Davies, T.T., USEPA. 1997, November 5. Memorandum to Water Management Division Directors, Regions 1–10, and State and Tribal Water Quality Management Program Directors on Establishing Site Specific Aquatic Life Criteria Equal to Natural Background.

[112] USEPA. 1998. *National Strategy for the Development of Regional Nutrient Criteria.* EPA 822–R–98–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC; Grubbs, G., USEPA. 2001, November 14. Memorandum to Directors of State Water Programs, Directors of Great Water Body Programs, Directors of Authorized Tribal Water Quality Standards Programs and State and Interstate Water Pollution Control Administrators on Development and Adoption of Nutrient Criteria into Water Quality Standards.; Grumbles, B.H., USEPA. 2007, May 25.Memorandum to Directors of State Water Programs, Directors of Great Water Body Programs, Directors of Authorized Tribal Water Quality Standards Programs and State and Interstate Water Pollution Control Administrators on Nutrient Pollution and Numeric Water Quality Standards.

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[125] Rosemond, A. D., C. M. Pringle, A. Ramirez, and M.J. Paul. 2001. A test of top-down and bottom-up control in a detritus-based food web. *Ecology* 82: 2279–2293

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C. Numeric Criteria for the State of Florida's Lakes

(1) Final Rule

EPA is promulgating numeric criteria for chlorophyll *a,* TN and TP in three classes of Florida's lakes, classified as Class I or III waters under Florida law (Section 62–302.400, F.A.C.):

TABLE C–17—EPA'S NUMERIC CRITERIA FOR FLORIDA LAKES

Lake color [a] and alkalinity	Chl-a (mg/L) [b] *	TN (mg/L)	TP (mg/L)
Colored Lakes [c]	0.020	1.27 [1.27–2.23]	0.05 [0.05–0.16]
Clear Lakes, High Alkalinity [d]	0.020	1.05 [1.05–1.91]	0.03 [0.03–0.09]
Clear Lakes, Low Alkalinity [e]	0.006	0.51 [0.51–0.93]	0.01 [0.01–0.03]

[a] Platinum Cobalt Units (PCU) assessed as true color free from turbidity.
[b] Chlorophyll *a* is defined as corrected chlorophyll, or the concentration of chlorophyll *a* remaining after the chlorophyll degradation product, phaeophytin *a,* has been subtracted from the uncorrected chlorophyll *a* measurement.
[c] Long-term Color > 40 Platinum Cobalt Units (PCU).
[d] Long-term Color ≤ 40 PCU and Alkalinity > 20 mg/L $CaCO_3$.
[e] Long-term Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L $CaCO_3$.
* For a given waterbody, the annual geometric mean of chlorophyll *a,* TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

For each class of water defined by color and alkalinity, the applicable criteria are the values in **bold** for chlorophyll *a,* TN and TP. The criteria framework provides flexibility for FDEP to derive lake-specific, modified TN and TP criteria if the annual geometric mean chlorophyll *a* concentration is less than the criterion for an individual lake in each of the three immediately preceding years. In such a case, the corresponding criteria for TN and/or TP may be modified to reflect maintenance of ambient conditions within the range specified in the parenthetical below each baseline TN and TP criteria printed in bold in Table C–1 above. Modified criteria for TN and/or TP must be based on data from at least the immediately preceding three years [128] in a particular lake. Modified TN and/or TP criteria may not be greater than the higher value specified in the range. Modified TN and/or TP criteria for a lake also may not be above criteria applicable to streams to which a lake discharges in order to ensure the attainment and maintenance of downstream water quality standards.

Utilization of the range flexibility in the numeric lake criteria in this final rule requires that the ambient calculation for modified TN and TP criteria be based on: (1) The immediately preceding three-year record of observation for each parameter,[129] (2) representative sampling during each year (at least one sample in May–September and at least one sample in October–April), and (3) a minimum of 4 samples from each year. Requiring at least three years of data accounts for year-to-year hydrological variability, ensures longer-term stable conditions, and appropriately accounts for anomalous conditions in any given year that could lead to erroneous conclusions regarding the true relationship between nitrogen/phosphorus and chlorophyll *a* levels in a lake. Representative samples from each year minimize the effects of seasonal variations in nitrogen/phosphorus and chlorophyll *a* concentrations. Finally, the minimum sample size of 4 samples per year allows estimates of reliable geometric means while still maintaining a representative sample of lakes. The State shall notify EPA Region 4 and provide the supporting record within 30 days of determination of modified lake criteria.

To ensure attainment of applicable downstream lake criteria, this final rule provides a tiered approach for adjusting instream criteria presented in section III.B.(1) above for those streams that flow into lakes.[130] Where site-specific data on lake characteristics are available, the final rule provides a modeling approach for the calculation of downstream lake protection values that relies upon the use of the BATHTUB model.[131] In circumstances where sufficient site-specific lake data are readily available and either EPA or FDEP determine that another scientifically defensible model is more appropriate (*e.g.,* the Water Quality Analysis Simulation Program, or WASP), the modeling approach accommodates use of a scientifically defensible alternative. In the absence of models, other approaches for ensuring protection of downstream lakes are provided and described further below.

(2) Background and Analysis

(a) Methodology for Lake Classification

In the January 2010 proposal, EPA used color and alkalinity to classify Florida's lakes based on substantial data demonstrating that these characteristics influence the response of lakes to increased nitrogen/phosphorus and the expected background chlorophyll *a* concentration. Many of Florida's lakes contain dissolved organic matter leached from surface vegetation that

[128] The previous three years of data are required as a basis for modifying TN and TP criteria and must meet FDEP's data quality assurance objectives. Additional historical data may be used to augment the three years of data characterizing the lake's annual and inter-annual variability. Only historical data containing data for all three parameters can be used and the data must meet FDEP's data quality assurance objectives.

[129] As noted above, if more than three years of data are available for each parameter, then more data can be used.

[130] Approximately 30% of Florida lakes are fed by streams to which this DPV analysis would apply (Schiffer, Donna M. 1998. *Hydrology of Central Florida Lakes—A Primer.* U.S. Geological Survey in cooperation with SJWMD and SFWMD: Circular 1137).

[131] Kennedy, R.H. 1995. *Application of the BATHTUB model to Selected Southeastern Reservoirs.* Technical Report EL–95–14. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.; Walker, W.W., 1985. *Empirical Methods for Predicting Eutrophication in Impoundments; Report 3, Phase II: Model Refinements.* Technical Report E–81–9. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.; Walker, W.W., 1987. *Empirical Methods for Predicting Eutrophication in Impoundments; Report 4, Phase III: Applications Manual.* Technical Report E–81–9. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

colors the water. More color in a lake limits light penetration within the water column, which in turn limits algal growth. Thus, in lakes with colored water, higher levels of nitrogen/phosphorus may occur without exceeding the chlorophyll *a* criteria concentrations. EPA evaluated relationships among TN, TP, and chlorophyll *a* concentration data, and found that lake color influenced these relationships. More specifically, EPA found the correlations between nitrogen/phosphorus and chlorophyll *a* concentrations to be stronger and less variable when lakes were categorized into two distinct groups based on a color threshold of 40 PCU, with clear lakes demonstrating more algal growth with increased nitrogen/phosphorus, as would be predicted by the increased light penetration. This threshold is consistent with the distinction between clear and colored lakes long observed in Florida.[132]

Within the clear lakes category, color is not the dominant controlling factor in algal growth. For these clear lakes, EPA proposed the use of alkalinity as an additional distinguishing characteristic. Alkalinity and pH increase when water is in contact with carbonate rocks, such as limestone, or limestone-derived soil in the State of Florida. Limestone is also a natural source of phosphorus, and thus, in Florida, lakes that are higher in alkalinity are often associated with naturally elevated TP levels. The alkalinity (measured as $CaCO_3$ concentration) of Florida clear lakes ranges from zero to over 200 mg/L. EPA proposed classifying clear Florida lakes into acidic and alkaline classes based on an alkalinity threshold of 50 mg/L $CaCO_3$, and solicited comment on whether a 20 mg/L $CaCO_3$ threshold would be more appropriate. EPA received comments noting that that the lower alkalinity classification threshold would be more representative of naturally oligotrophic conditions by creating a class of lakes with very low alkalinity and correspondingly low chlorophyll *a* concentrations. After reviewing available lake data, EPA found that clear lakes below 20 mg/L $CaCO_3$ were more similar to one another in terms of naturally expected chlorophyll *a,* TN, and TP concentrations than clear lakes below 50 mg/L $CaCO_3$. Thus, EPA concluded that an alkalinity threshold of 20 mg/L $CaCO_3$ was an appropriate threshold for classifying clear lakes and EPA is finalizing the lower alkalinity threshold in this rule. More information on this specific topic is provided in EPA's Finals TSD for Florida's Inland Waters, Chapter 2: Methodology for Deriving U.S. EPA's Criteria for Lakes located in the record for this final rule.

EPA also proposed the use of specific conductance as a surrogate for alkalinity. EPA received comments that conductivity was not an accurate surrogate measure for alkalinity. EPA evaluated the association between specific conductivity and alkalinity and concluded that alkalinity is a preferred parameter for lake classification because it is a more direct measure of the presence of carbonate rocks, such as limestone that are associated with natural elevated phosphorus levels. Changes in specific conductivity can be attributed to changes in alkalinity, but in many cases may be caused by increases in the concentrations of other compounds that originate from human activities. Thus, EPA has concluded that alkalinity is a more reliable indicator for characterizing natural background conditions for Florida lakes.

A number of comments suggested EPA consider a system that delineates 47 lake regions and a system that classifies lakes as a continuous function of both alkalinity and color. As discussed in more detail in the TSD supporting this final rule, EPA evaluated each of these alternative classification approaches, and found that they did not improve the predictive accuracy of biological responses to nitrogen/phosphorus over EPA's classification, nor result in a practical system that can be implemented by FDEP. For example, in the case of the 47 lake region approach, insufficient data are available to derive numeric criteria across all of the 47 regions and in the case of the continuous function approach there is a reliance on an assumption that TN and TP are always co-limiting that is not always true.[133]

A number of commenters suggested that lake-specific criteria would be more appropriate than the three broad classes that EPA proposed. The substantial data available in the record for this final rule supports the conclusion that many of Florida's lakes share similar physical, chemical, and geological characteristics, which in turn justifies, based on sound scientific evidence, broad classification of Florida lakes. EPA concluded, based on the substantial data and associated analysis explained above, that color and alkalinity are primary distinguishing factors in Florida lakes with respect to nitrogen/phosphorus dynamics and the associated biological response. With respect to consideration of site-specific information that goes beyond the detailed site-specific sampling and monitoring analysis already discussed,[134] the numeric lake criteria in this final rule are established within a flexible regulatory framework that allows adjustment of TN, TP, and/or chlorophyll *a* criteria based on additional lake-specific data. This framework provides an opportunity to derive lake-specific criteria similar to the manner suggested in public comment, where lake-specific data and information are available, while ensuring that numeric criteria are in place to protect all of Florida's lakes. Further site-specific flexibility is provided in this final rule through the derivation of alternative criteria by a Federal Site Specific Adjusted Criteria (SSAC) process discussed in more detail below in Section V.C.

In this final rule, EPA is dividing Florida's lakes into three classes: (1) Colored Lakes >40 Platinum Cobalt Units (PCU), (2) Clear, High Alkalinity Lakes (≤40 PCU with alkalinity >20 mg/L calcium carbonate ($CaCO_3$)), and (3) Clear, Low Alkalinity Lakes (≤40 PCU with alkalinity ≤20 mg/L $CaCO_3$). These two parameters, color and alkalinity, both affect lake productivity and plant biomass, as measured by chlorophyll *a*. For more information regarding these classes, please refer to EPA's Final Rule TSD for Florida's Inland Waters, Chapter 2: Methodology for Deriving U.S. EPA's Criteria for Lakes.

(b) Methodology for Chlorophyll *a* Criteria

EPA proposed the use of chlorophyll *a* concentration as an indicator of a healthy biological condition, supportive of natural balanced populations of aquatic flora and fauna in each of the classes of Florida's lakes. Excess algal growth is associated with degradation in aquatic life, and chlorophyll *a* levels are a measure of algal growth. To derive the proposed chlorophyll *a* concentrations that would be protective of natural balanced populations of aquatic flora and fauna in Florida's lakes, EPA utilized the expected trophic status of the lake, based on internationally accepted lake use classifications.[135]

[132] Shannon, E.E., and P.L. Brezonik. 1972. Limnological characteristics of north and central Florida lakes. Limnology and Oceanography 17(1): 97–110.

[133] Guildford, S. J. and R. E. Hecky. 2000. Total nitrogen, total phosphorus, and nutrient limitation in lakes and oceans: Is there a common relationship? *Limnology and Oceanography* 45: 1213–1223.

[134] Technical Support Document for EPA's Final Rule for Numeric Nutrient Criteria for Nitrogen/Phosphorus Pollution in Florida's Inland Surface Fresh Waters.

[135] OECD. 1982. *Eutrophication of Waters. Monitoring, Assessment and Control.* Organisation

Continued

As discussed in more detail at proposal, lakes can be classified into one of three trophic State categories (*i.e.,* oligotrophic, mesotrophic, eutrophic).[136] EPA concluded at proposal that healthy colored lakes and clear, high alkalinity lakes should maintain a mesotrophic status, because they receive significant natural nitrogen/phosphorus input and still support a healthy diversity of aquatic life in warm, productive climates such as Florida. For these two categories of lakes, EPA proposed a chlorophyll *a* criterion of 0.020 mg/L to support balanced natural populations of aquatic life flora and fauna. At concentrations above 0.020 mg/L chlorophyll *a,* the trophic status of the lake is more likely to become eutrophic and the additional chlorophyll *a* will reduce water clarity, negatively affecting native submerged macrophytes, and the invertebrate and fish communities that depend on them. Commenters suggested that this threshold is overly protective of naturally eutrophic lakes in the State. For those lakes that may currently be naturally eutrophic, this final rule contains a formal SSAC process to revise these criteria for this unique type of lake. For more information on the SSAC process, please refer to Section V.C of this final rule.

In contrast, clear, low alkalinity lakes in Florida do not receive natural nitrogen/phosphorus input from underlying geological formations in the watershed and thus, they support less algal growth and have lower chlorophyll *a* levels than colored or clear, high alkalinity lakes. EPA concluded at proposal that these lakes should maintain an oligotrophic status to support balanced natural populations of aquatic flora and fauna. EPA proposed a chlorophyll *a* criterion of 0.006 mg/L in clear, low alkalinity lakes to support balanced natural populations of aquatic life flora and fauna. At concentrations above 0.006 mg/L chlorophyll *a,* the trophic status of the lake is more likely to become mesotrophic and the additional chlorophyll *a* will reduce water clarity, negatively affecting native submerged macrophytes, and the invertebrate and fish communities that depend on them. Commenters suggested that this chlorophyll *a* concentration may not be appropriate for clear lakes with alkalinity less than 50 mg/L. As explained in more detail above, in this final rule EPA concluded that 20 mg/L is an appropriate threshold between low and high alkalinity lakes. Thus, lakes with alkalinity greater than 20 mg/L will have a chlorophyll *a* criterion that is applicable to clear, high alkalinity lakes. Based on the revision of the alkalinity threshold to 20 mg/L, EPA reviewed the available chlorophyll *a* data for clear, low alkalinity lakes and found that the majority of lakes have chlorophyll *a* concentrations less than 0.006 mg/L reflective of oligotrophic conditions which leads EPA to conclude that this chlorophyll *a* concentration will serve to maintain the trophic status of these lakes.

In this final rule, EPA is promulgating chlorophyll *a* criteria of 0.020 mg/L in colored lakes and clear, high alkalinity lakes and a chlorophyll *a* criterion of 0.006 mg/L in clear, low alkalinity lakes as an indicator of a healthy biological condition, supportive of natural balanced populations of aquatic flora and fauna in these classes of Florida's lakes. For more information regarding these chlorophyll *a* criteria, please refer to EPA's Final Rule TSD for Florida's Inland Waters, Chapter 2: Methodology for Deriving U.S. EPA's Criteria for Lakes.

(c) Methodology for Total Nitrogen (TN) and Total Phosphorus (TP) Criteria in Lakes

EPA proposed TN and TP criteria for each of the classes of lakes described in Section III.C(2)(a) based on the response of chlorophyll *a* to increases in TN and TP for clear and colored lakes in Florida. These responses were quantitatively estimated with linear regressions. Each data point used in estimating the statistical relationships was the geometric mean of samples taken over the course of a year in a particular Florida lake. Statistical analyses of these relationships showed that the chlorophyll *a* responses to changes in TN and TP differed for colored versus clear lakes, as would be expected, because color blocks light penetration in the water column and limits algal growth. These analyses also showed that chlorophyll *a* responds to changes in TN and TP in high and low alkalinity clear lakes similarly, as would be expected, because alkalinity does not affect light penetration. These relationships were used to derive TN and TP criteria that would maintain chlorophyll *a* concentrations at desired levels known to be supportive of balanced natural populations of aquatic flora and fauna as discussed above. These analyses are explained in more detail in EPA's Final Rule TSD for Florida's Inland Waters, Chapter 2: Methodology for Deriving U.S. EPA's Criteria for Lakes included in the record for this final rule.

EPA proposed baseline TN and TP criteria based on the 75th percentile of the predicted distribution of chlorophyll *a* concentrations, given a TN or TP concentration. Commenters suggested alternative approaches for deriving TN and TP criteria, including using either the mean predicted chlorophyll *a* concentration, using the 25th percentile of the predicted distribution of chlorophyll *a* concentrations, and using an additional criterion based on a higher percentile that is associated with a different exceedance frequency. EPA considered these alternative approaches and concluded that calculating the TN and TP criteria as a baseline concentration with an associated concentration range was a more flexible approach than a single value approach manifested as the TN and TP concentration associated with a specific chlorophyll *a* concentration. Thus, the approach included in this final rule takes into account the natural variability observed in different classes of lakes (*i.e.,* colored or clear) in a way that a single value approach based on the regression line or the lower value of the 50th percentile prediction interval does not.

In this final rule, the TN and TP criteria are based on linear regressions (*i.e.,* best-fit lines) predicting the annual geometric mean chlorophyll *a* concentration as a function of the annual geometric mean TN or TP. Baseline TN and TP criteria are calculated as the point at which the 75th percentile of the predicted distribution of chlorophyll *a* concentrations from the regression relationship is equivalent to the chlorophyll *a* criterion for the appropriate lake class. The range of values in the predicted distribution of chlorophyll *a* concentrations arises from small differences in the nitrogen/phosphorus–chlorophyll *a* relationships across different lakes and variability in these relationships between years in the same lake. Hence, TN and TP criteria are based on the 75th percentile that will be protective at the majority of lakes and in the majority of years.

The predicted distribution of chlorophyll *a* concentrations for lakes differs inherently from the distribution of TN and TP concentrations calculated from reference sites for criteria for Florida streams (Section III.B(2)(b)). In the case of the criteria for Florida streams for most NWRs, benchmark sites represent a population of least-

for Economic Development and Co-Operation, Paris, France.

[136] Trophic state describes the nitrogen/phosphorus levels and algal state of an aquatic system: Oligotrophic (low nitrogen/phosphorus and algal productivity), mesotrophic (moderate nitrogen/phosphorus and algal productivity), and eutrophic (high nitrogen/phosphorus and algal productivity).

disturbed sites and the criteria based on the 90th percentile of nitrogen and phosphorus concentrations from these sites are selected to characterize the upper bound of nitrogen/phosphorus concentrations that one would expect from such sites. Criteria for Florida lakes rely on a predictive relationship between nitrogen/phosphorus and chlorophyll *a* concentrations, and the 75th percentile is selected from the distribution of chlorophyll *a* concentrations predicted for *specific* concentrations of TN and TP. As discussed above, basing criteria on this percentile provides a means of accounting for variability in chlorophyll *a* concentrations predicted for a given TN and TP concentration. In short, the percentile for the streams criteria is selected to ensure that nitrogen/phosphorus concentrations in all streams are at least as low as those observed in reference streams, whereas the percentile for the lakes criteria is selected such that concentrations appropriately account for variability in the relationships between nitrogen/phosphorus and chlorophyll *a* concentrations.

(d) Duration and Frequency

Aquatic life water quality criteria include magnitude, duration, and frequency components. For the chlorophyll *a,* TN, and TP criteria for lakes, the criterion-magnitude values, expressed as a concentration, are provided in Table C–1 in bold. The criterion-duration of this magnitude is specified in a footnote to this Table as an annual geometric mean. EPA is finalizing the criterion-frequency as a no-more-than-once-in-three-years excursion frequency of the annual geometric mean criteria for lakes. The duration component of the criteria is based on annual geometric means to be consistent with the data set used to derive these criteria, which applied stressor-response relationships based on annual geometric means for individual years at individual lakes. These selected duration and frequency components recognize that hydrological variability (*e.g.,* high and low flows) will produce variability in nitrogen and phosphorus concentrations, and that individual measurements may at times be greater than the criterion-magnitude concentrations without causing unacceptable effects to aquatic organisms and their uses. Furthermore, they balance the representation of the central tendency of the predicted relationship between TN or TP and chlorophyll *a* based from many years of data with the need to exercise some caution to ensure that lakes have sufficient time to process individual years of elevated nitrogen and phosphorus concentrations and avoid the possibility of cumulative and chronic effects (*i.e.,* the no-more-than-one-in-three-year component). Additionally, because nitrogen/phosphorus pollution is best managed on a watershed basis, this is the same frequency and duration used in the final streams criteria. More information on this specific topic is provided in EPA's Final Rule TSD for Florida's Inland Waters, Chapter 2: Methodology for Deriving U.S. EPA's Criteria for Lakes located in the record for this final rule.

(e) Application of Lake-Specific, Ambient Condition-Based Modified TN and TP Criteria

EPA proposed an accompanying approach that the State could use to adjust TN and TP criteria for a particular lake within a certain range where sufficient data on long-term ambient chlorophyll *a,* TN and TP levels are available to demonstrate that protective chlorophyll *a* criterion for a specific lake will still be maintained and a balance of natural populations of aquatic flora and fauna will be supported. This approach allows for readily available site-specific data to be taken into account in the expression of TN and TP criteria, while still ensuring support of balanced natural populations of aquatic flora and fauna by maintaining the associated chlorophyll *a* level at or below the chlorophyll *a* criterion level. The scientific premise for the lake-specific ambient calculation provision for modified TN and/or TP criteria is that if ambient lake data show that a lake's chlorophyll *a* levels are at or below the established criteria (*i.e.,* magnitude) for at least the last three years and its TN and/or TP levels are within the lower and upper bounds, then those ambient levels of TN and TP represent conditions that will continue to support the specified chlorophyll *a* response level. The lower bound of the range is based on the TN/TP values that correspond to the 75th percentile of the predicted chlorophyll *a* distribution and the upper bound of the range is based on the TN/TP values that correspond to the 25th percentile of the same predicted distribution. The use of the 25th and 75th percentiles accounts for the majority of variability that may occur around the central tendency of the predicted relationship between TN or TP and chlorophyll *a.*

This final rule provides that FDEP must establish and document these modified criteria in a manner that clearly recognizes their status as the applicable criteria for a particular lake. To this end, FDEP must submit a letter to EPA Region 4 formally documenting the use of modified criteria as the applicable criteria for particular lakes. This final rule allows for a one-time adjustment without a requirement that FDEP go through a formal SSAC process. EPA believes that such modified TN and TP criteria do not need to go through the SSAC process because the conditions under which they are applicable are clearly stated in this final rule and data requirements are clearly laid out so that the outcome is clear, consistent, transparent, and reproducible. By providing a specific process for deriving modified criteria within the WQS rule itself, each individual outcome of this process is an effective WQS for CWA purposes and does not need separate adoption by FDEP or approval by EPA. For more information on the SSAC process, please refer to Section V.C of this final rule.

Application of the ambient calculation provision has implications for assessment and permitting because the outcome of applying this provision is to establish alternate numeric TN and/or TP values as the applicable lake criteria. For accountability and tracking purposes, the State must document the result of the ambient calculation for any given lake. Once modified criteria are established under this approach, they remain the applicable criteria for the long-term for purposes of implementing the State's water quality program until they are subsequently modified either through the Federal SSAC process or State revision to the applicable WQS, which has been approved by EPA pursuant to CWA section 303(c).

This site-specific lake criteria adjustment provision is subject to the downstream protection requirements more broadly discussed below. Thus in a comparable manner this final rule provides that calculated TN and/or TP values in a lake that discharges to a stream may not exceed criteria applicable to the stream to which a lake discharges.

(f) Downstream Protection of Lakes

In developing the proposed stream criteria, EPA also evaluated their effectiveness for assuring the protection of downstream lake water quality standards pursuant to the provisions of 40 CFR 130.10(b), which requires that WQS must provide for the attainment and maintenance of the WQS of downstream waters.[137] EPA's criteria for

[137] EPA will assess the effectiveness of final stream criteria for assuring the protection of

Continued

lakes are, in some cases, more stringent than the final criteria for streams that flow into the lakes, and thus the instream criteria may not be stringent enough to ensure protection of WQS in certain downstream lakes. As a result, EPA proposed application of the Vollenweider equation to ensure that the TP criteria in streams are protective of downstream lakes, and requested comment on alternative approaches such as the BATHTUB model and whether there should be an allowance for use of other models that are demonstrated to be protective and scientifically defensible.

The proposed use of the Vollenweider model equation to ensure the protection of downstream lakes requires input of two lake-specific characteristics: the fraction of inflow due to stream flow and the hydraulic retention time. EPA provided alternative preset values for percent contribution from stream flow and hydraulic retention time that could be used in those instances where lake-specific input values are not readily available. EPA's January 2010 proposed rule discussed the flexibility for the State to use site-specific inputs to the Vollenweider equation for these two parameters, as long as the State determines that such inputs are appropriate and documents the site-specific values. Some commenters stated that the Vollenweider equation is overly simplistic and does not include the necessary factors to account for physical, hydrologic, chemical, and biological processes necessary to determine protective criteria. Several commenters also suggested the need for TN values to protect downstream lakes that are nitrogen-limited (such as many of the lakes in the phosphorus-rich areas of the State). Comments included a recommendation to use models that can better represent site-specific conditions, such as BATHTUB.

EPA's August 2010 Supplemental Notice of Data Availability and Request for Comment requested additional comment on using the BATHTUB model in place of the Vollenweider equation for deriving both TP and TN criteria to protect downstream lakes, allowing the use of alternative models under certain circumstances, and providing for an alternative approach to protect downstream lakes when limited data are available that would use the lake criteria themselves as criteria for upstream waters flowing into the lake.

downstream estuaries in a separate rulemaking that focuses on estuarine and coastal waters to be proposed by November 14, 2011 and finalized by August 15, 2012.

In the final rule, protection of downstream lakes is accomplished through establishment of a downstream protection value (DPV). The applicable criteria for streams that flow into downstream lakes include both the instream criteria for TN and TP and the DPV, which is a concentration or loading value at the point of entry into a lake that results in attainment of the lake criteria. EPA selected the point of entry into the lake, also referred to as the "pour point," as the location to measure water quality because the lake responds to the input from the pour point and all contributions from the stream network above this point in a watershed affect the water quality at the pour point. When a DPV is exceeded at the pour point, the waters that collectively comprise the network of streams in the watershed above that pour point are considered to not attain the DPV for purposes of section 303(d) of the Clean Water Act. The State may identify these impaired waters as a group rather than individually.

It is appropriate to express the DPV as either a load or concentration (load divided by flow) because both are expressions of the amount of TN and TP that are delivered to the downstream water. In an expression of load, the amount is expressed directly as mass per time (*e.g.,* pounds per year), whereas a concentration expresses the amount in terms of the mass contained in a particular volume of water (*e.g.,* milligrams per liter). Either expression may be used for assessment and source control allocation purposes. Calculating a DPV as a load will require modeling or other technical information, such as a TMDL, that accounts for both the volume of the receiving water and the flow contributed through the pour point. A DPV expressed as a concentration may be based on a model or TMDL or may reflect a TN or TP level that corresponds to a TN, TP, or chlorophyll *a* concentration that protects the lake.

Contributions of TN and/or TP from sources in stream tributaries upstream of the point of entry are accountable to the DPV because the water quality in the stream tributaries must result in attainment of the DPV at the pour point into the lake. The spatial allocation of load within the watershed is an important accounting step to ensure that the DPV is achieved at the point of entry into the lake. How the watershed load is allocated may differ based on watershed characteristics and existing sources (*e.g.,* areas that are more susceptible to physical loss of nitrogen; location of towns, farms, and dischargers), so long as the DPV is met at the point of entry into the downstream lake. Where additional information is available, watershed modeling could be used to develop allocations that reflect hydrologic variability and other water quality considerations. For protection of the downstream lake, what is important is an accounting for nutrient loadings on a watershed scale that results in meeting the DPV at the point of entry into the downstream lake.

The final rule provides that additional DPVs may be established in upstream locations to represent sub-allocations of the total allowable loading or concentration. Such sub-allocations may be useful where there are differences in hydrological conditions and/or sources of TN and/or TP in different parts of the watershed. The rule specifies that DPVs apply to stream tributaries up to the point of reaching a waterbody that is not a stream as defined in the rule (*e.g.,* up to reaching another lake in a "nested" or chain of lakes situation). The rule also includes an option, however, to establish a DPV to account for a larger watershed area in a modeling context. Establishing DPVs that apply to a larger watershed may be useful to address a situation where the water that is furthest downstream in a watershed is also the water that is most sensitive to nitrogen/phosphorus pollution. That situation may require a more equitable distribution, across the larger watershed, of the load that protects the most sensitive waterbody.

Where multiple tributaries enter a lake, the total allowable loading to the lake may be distributed among the tributaries for purposes of DPV calculation in any manner that results in meeting the total allowable loading for the lake, remembering that those tributaries are also subject to the instream protection value established for the tributaries.

Where sufficient data and information are available, DPVs may be established through application of the BATHTUB model. BATHTUB applies empirical models to morphometrically complex lakes and reservoirs. The model performs steady-state water and nutrient balance calculations, uses spatially segmented hydraulic networks, and accounts for advective and diffusive transport of nutrients. When properly calibrated and applied, BATHTUB predicts nutrient-related water quality conditions such as TP, TN, and chlorophyll *a* concentrations, transparency, and hypolimnetic oxygen depletion rates. The model can apply to a variety of lake sizes, shapes and transport characteristics. A high degree of flexibility is available for specifying model segments as well as multiple influent streams. Because water quality conditions are calculated using relationships derived from data specific to each lake, BATHTUB accounts for differences between lakes, such as the rate of internal loading of phosphorus from bottom sediments. The above descriptive information is summarized from available technical references that also describe the model and its applications in greater detail.[138] [139] [140] EPA believes BATHTUB is appropriate for DPV calculations because BATHTUB can represent a number of site-specific variables that may influence nutrient responses and can estimate both TN and TP concentrations at the pour points to protect the receiving lake. BATHTUB has been previously used for lake water quality management purposes, such as the development of TMDLs in States, including Florida. This model was selected because it does not have extensive data requirements, yet it provides for the capability to be calibrated based on observed site-specific lake data and it provides for reliable estimates that will ensure the protection of downstream lakes.

EPA's final rule also specifically authorizes FDEP or EPA to use a model other than BATHTUB when either FDEP or EPA determines that it would be appropriate to use another scientifically defensible modeling approach that results in the protection of downstream lakes. While BATHTUB is a peer-reviewed and versatile model, there are other models that, when appropriately calibrated and applied, can offer additional capability to address complex situations with an even greater degree of site-specificity. Adopted and approved TMDLs may contain sufficient information to support derivation of a DPV when the TMDL is based on relevant data, defensible science, and accurate analysis.

As discussed in more detail in the Agency's August 2010 Supplemental Notice of Data Availability and Request for Comment on this issue, one example of an alternative model that FDEP or EPA might consider using for particularly complex site-specific conditions is the Water Quality Analysis Simulation Program (WASP) model. This model allows users to conduct detailed simulations of water quality responses to natural and manmade pollutant inputs. WASP is a dynamic compartment-modeling program for aquatic systems, including both the water column and the underlying benthos. WASP allows the user to simulate systems in 1, 2, or 3 dimensions, and a variety of pollutant types. The model can represent time varying processes of advection, dispersion, point and diffuse mass loading, and boundary exchange. WASP also can be linked with hydrodynamic and sediment transport models that can provide flows, depths, velocities, temperature, salinity and sediment fluxes. The above summary information as well as additional technical information may be found at *http://www.epa.gov/athens/wwqtsc/html/wasp.html.* Like BATHTUB, WASP has also been previously used for lake water quality management purposes, such as TMDLs, nationally and in the State of Florida. This model is different from BATHTUB because it does have extensive data requirements that allow for the capability to be finely calibrated based on observed site-specific lake data, but is similar to BATHTUB in that it also provides for reliable estimates that will ensure the protection of downstream lakes.

EPA is finalizing a provision in this section of the rule for situations where data are not readily available to derive TN and/or TP DPVs using BATHTUB or another scientifically defensible model. In that situation, the rule describes how DPVs are determined where the downstream lake is attaining the lake criteria and where the downstream lake is either not assessed or is impaired.

Where sufficient information is not available to derive TN and/or TP DPVs using BATHTUB or another scientifically defensible technical model and the lake attains the applicable criteria, the DPVs would be the associated ambient instream levels of TN and/or TP at the point of entry into the lake. As long as the TN and TP concentrations necessary to support a balanced natural population of aquatic flora and fauna in the downstream lake are maintained in the inflow from streams, this approach will provide adequate protection of downstream lakes and would be used as the applicable DPVs in the absence of readily available data to support derivation of TN and TP DPVs using BATHTUB or another scientifically defensible technical model such as WASP.

EPA's final rule provides that when the DPV is based on the ambient condition associated with attainment of criteria in the downstream lake, degradation in water quality from those established levels would be considered impairment, unless the State or EPA revises the DPV using a modeling approach or TMDL to show that higher levels of nutrient contribution from the tributaries would still result in attainment of applicable lake criteria. This provision is not intended to limit growth and/or development in the watershed, nor intended to maintain current conditions regardless of further analysis. Rather this provision is intended to ensure that WQS are not only restored when found to be impaired, but are in fact maintained when found to be attained, consistent with the goals of the Clean Water Act. Higher levels of TN and/or TP may be allowed in such watersheds where it is demonstrated that such higher levels will fully protect the lake's WQS.

Where sufficient information is not available to derive TN and/or TP DPVs using BATHTUB or another scientifically defensible technical model and the lake does not attain the applicable TN, TP, and/or chlorophyll *a* criteria or is un-assessed, lake criteria values for TN and/or TP are to be used as the DPVs. EPA believes that this approach is protective because the TN and TP concentrations entering the lake are unlikely to need to be lower than the criterion concentration necessary to be protective of the lake itself.

(g) Stressor-Response Approach

In deriving the final criteria for lakes, EPA has relied on a stressor-response approach which has been well documented and developed in a number of different contexts.[141] [142] [143] Stressor-response approaches estimate the relationship between nitrogen/phosphorus concentrations and a response measure that is either directly or indirectly related to the designated use (in this case, chlorophyll *a* as a measure of attaining a balanced natural population of aquatic flora and fauna). Then, concentrations that support the

[138] Walker, W.W., 1981. *Empirical Methods for Predicting Eutrophication in Impoundments; Report 1, Phase I: Data Base Development.* Technical Report E–81–9. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

[139] Walker, W.W., 1982. *Empirical Methods for Predicting Eutrophication in Impoundments; Report 2, Phase II: Model Testing.* Technical Report E–81–9. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

[140] Walker, W.W., 1999. *Simplified Procedures for Eutrophication Assessment and Prediction: User Manual;* Instruction Report W–96–2. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

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

[142] USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[143] USEPA. 2008. *Nutrient Criteria Technical Guidance Manual: Wetlands.* EPA–822–B–08–001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

designated use can be derived from the estimated relationship. In the case of Florida, the use of this approach is supported by a substantial Florida-specific database of high quality information, sound scientific analysis and technical evaluation.

The effects of nitrogen/phosphorus pollution are manifested in lakes in a variety of ways and are well-documented.[144] [145] [146] [147] A common effect of nitrogen/phosphorus pollution in lakes is the over-stimulation of algal growth resulting in algal blooms, which can cause changes in algal and animal assemblages due to adverse changes in important water quality parameters necessary to support aquatic life. Algal blooms can decrease water clarity and aesthetics, which in turn can affect the suitability of a lake for primary (*e.g.,* swimming) and secondary (*e.g.,* boating) contact recreation. Algal blooms can adversely affect drinking water supplies by releasing toxins, interfering with disinfection processes, or requiring additional treatment. Algal blooms can adversely affect biological process by decreasing light availability to submerged aquatic vegetation (which serves as habitat for aquatic life), degrading food quality and quantity for other aquatic life, and increasing the rate of oxygen consumption.

D. Numeric Criterion for the State of Florida's Springs

(1) Final Rule

EPA defines "spring" as 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. This definition is drawn from the U.S. Geological Survey, Circular 1137.[148] This definition is not intended to include streams that flow in a defined channel that have some groundwater baseflow component. EPA recognized that groundwater-surface water interactions in Florida are complex and that FDEP will need to make site-specific determinations about whether water is subject to the stream criteria or the springs criterion. EPA is promulgating the numeric criterion for nitrate+nitrite for Florida's springs classified as Class I or III waters under Florida law (Section 62–302.400, F.A.C.):

The applicable nitrate (NO_3^-) + Nitrite (NO_2^-) is 0.35 mg/L as an annual geometric mean, not to be exceeded more than once in a three-year period

(2) Background and Analysis

(a) Derivation of Nitrate + Nitrite Criterion

In its January proposal, EPA proposed a nitrate+nitrite criterion of 0.35 mg/L for springs and clear streams that would support balanced natural populations of aquatic flora and fauna in springs. EPA proposed criteria for nitrate+nitrite because one of most significant factors causing adverse changes in spring ecosystems is the pollution of groundwater, principally with nitrate+nitrite, resulting from human land use changes, cultural practices, and significant population growth.[149] [150]

EPA based its proposed criterion on multiple lines of stressor-response evidence, which included controlled, laboratory-scale experimental data and analysis of field-based data. EPA's first line of evidence is stressor-response data from controlled laboratory experiments, which studied the growth response of algae in springs to different concentrations of nitrate+nitrite. EPA found in its review of comprehensive surveys [151] [152] and a study [153] of 29 Florida springs at over 150 sampling sites, conducted on behalf of FDEP over three years, that two nuisance algal taxa, the cyanobacterium *Lyngbya wollei* and the macroalgae *Vaucheria sp.,* were the most commonly occurring taxa. The authors of the study conducted controlled laboratory experiments, which tested the growth response of *Lyngbya wollei* and *Vaucheria sp.* to different doses of nitrate+nitrite. They found that *Lyngbya wollei* and *Vaucheria sp.* growth rates increased in response to increased doses of nitrate+nitrite and that most of their highest growth rates were reached at and above 0.23 mg/L nitrate+nitrite. EPA interpreted the results from these studies as strong empirical evidence of a stressor-response relationship between nuisance algae and nitrate+nitrite and further indicated specific concentrations above which undesirable growth of nuisance algal may be likely to occur.

In addition to the laboratory-based experimental evidence, EPA reviewed information compiled by FDEP in its assessment of limits to restore springs and protect them from excess algal growth.[154] [155] The second line of evidence was based on data collected from *in-situ* algal monitoring and long-term field surveys in rivers FDEP considered to exhibit similar aquatic conditions to springs (*e.g.,* algal communities, water clarity, and proportion of flow coming from a spring). EPA found additional stressor-response evidence in an analysis [156] based on over 200 algal samples collected from 13 different algal monitoring stations along the Suwannee, Santa Fe, and Withlacoochee Rivers from 1990 to 1998. The analysis examined algal growth response over a range of nitrate+nitrite concentration. Results indicated a sharp increase in

[144] Lee, G.F., W. Rast, R.A. Jones. 1978. Eutrophication of water bodies: Insights for an age-old problem. *Environmental Science and Technology* 12: 900–908.

[145] Carlson R.E. 1977. A trophic state index for lakes. *Limnology and Oceanography* 22:361–369.

[146] Smith, V.H., G.D. Tilman, and J.C. Nekola. 1999. Eutrophication: impacts of excess nutrient inputs on freshwater, marine, and terrestrial ecosystems. *Environmental Pollution* 100: 179–196.

[147] Smith, V.H., S.B. Joye, and R.W. Howarth. 2006. Eutrophication of freshwater and marine ecosystems. *Limnology and Oceanography* 51:351–355.

[148] Schiffer, Donna M. 1998. *Hydrology of Central Florida Lakes—A Primer.* U.S. Geological Survey in cooperation with SJWMD and SFWMD: Circular 1137.

[149] Katz, B.G., H.D. Hornsby, J.F. Bohlke and M.F. Mokray. 1999. *Sources and chronology of nitrate contamination in spring water, Suwannee River Basin, Florida.* Water-Resources Investigations Report 99–4252. U.S. Geological Survey, Tallahassee, FL. Available electronically at: *http://fl.water.usgs.gov/PDF_files/wri99_4252_katz.pdf.*

[150] Brown M.T., K. Chinners Reiss, M.J. Cohen, J.M. Evans, P.W. Inglett, K. Sharma Inglett, K. Ramesh Reddy, T.K. Fraze, C.A. Jacoby, E.J. Phlips, R.L. Knight, S.K. Notestein, R.G. Hamann, and K.A. McKee. 2008. *Summary and Synthesis of the Available Literature on the Effects of Nutrients on Spring Organisms and Systems.* University of Florida, Gainesville, Florida. Available electronically at: *http://www.dep.state.fl.us/springs/reports/files/UF_SpringsNutrients_Report.pdf.* Accessed October 2010.

[151] Pinowska, A., R.J. Stevenson, J.O. Sickman, A. Albertin, and M. Anderson. 2007a. *Integrated interpretation of survey for determining nutrient thresholds for macroalgae in Florida Springs: Macroalgal relationships to water, sediment and macroalgae nutrients, diatom indicators and land use.* Florida Department of Environmental Protection, Tallahassee, FL.

[152] Stevenson, R.J., A. Pinowska, and Y.K. Wang. 2004. *Ecological Condition of Algae and Nutrients in Florida Springs.* Florida Department of Environmental Protection, Tallahassee, FL.

[153] Pinowska, A., R.J. Stevenson, J.O. Sickman, A. Albertin, and M. Anderson. 2007b. *Integrated interpretation of survey and experimental approaches for determining nutrient thresholds for macroalgae in Florida Springs: Laboratory experiments and disturbance study.* Florida Department of Environmental Protection, Tallahassee, FL.

[154] Gao, X. 2008. *Nutrient TMDLs for the Wekiva River (WBIDs 2956, 2956A, and 2956C) and Rock Springs Run (WBID 2967).* Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, FL.

[155] Hallas, J.F. and W. Magley. 2008. *Nutrient and Dissolved Oxygen TMDL for the Suwannee River, Santa Fe River, Manatee Springs (3422R), Fanning Springs (3422S), Branford Spring (3422J), Ruth Spring (3422L), Troy Spring (3422T), Royal Spring (3422U), and Falmouth Spring (3422Z).* Florida Department of Environmental Protection, Bureau of Watershed Management, Tallahassee, FL.

[156] Niu, X.-F. 2007. Appendix B. Change Point Analysis of the Suwannee River Algal Data. *In* Gao, X. 2008. *Nutrient TMDLs for the Wekiva River (WBIDs 2956, 2956A, and 2956C) and Rock Springs Run (WBID 2967).* Florida Department of Environmental Protection, Division of Water Resource Management, Tallahassee, FL.

algal abundance and biomass above 0.4 mg/L nitrate + nitrite.

EPA concluded the two different lines of stressor-response evidence point to a nitrate+nitrite concentration of 0.35 mg/L that would prevent excess algal growth and be supportive of balanced natural populations of aquatic flora and fauna in Florida springs. This concentration is higher than that observed in laboratory-scale experiments that may not be closely representative of reference spring sites in Florida, but lower than the concentration that was associated with changes in the balance of natural populations of aquatic flora and fauna observed in an analysis of field data. EPA believes a nitrate+nitrite criterion set at 0.35 mg/L represents an appropriate and reasonable balance of the scientific evidence.

EPA received a number of comments regarding EPA's proposed criterion for springs, including concerns that the biological responses observed in the field were not representative of all springs in Florida. EPA disagrees with these commenters who suggested that the observed effects in the field are not sufficient evidence to support numeric criteria derivation in springs. The algal taxa, *Lyngbya sp.* and *Vaucheria sp.,* are representative taxa found in Florida springs. In fact, *Lyngbya* and *Vaucheria* are the most commonly observed macroalgae in Florida springs.[157] Thus, the Agency considers the biological responses of these representative taxa observed in the field and in laboratory experiments to be ecologically meaningful and indicative of an adverse biological response to elevated nitrate+nitrite concentrations above 0.35 mg/L.

EPA also received comment that the proposed nitrate+nitrite criterion was inappropriately applied to all clear streams within the State. After considering these comments, EPA concluded that clear streams are more appropriately addressed as part of the regionalized reference approach that is supported by a broader range of stream monitoring data as discussed above. Therefore, EPA has decided not to finalize the springs nitrate+nitrite criterion in clear streams because EPA considers the numeric criteria it is finalizing in this rule for streams in the five NWRs, which includes clear streams, to be adequately protective and scientifically defensible. These systems will also be protected from excess nitrogen from groundwater by the nitrate+nitrite criteria applicable in the springs that flow into them; thus, additional nitrate+nitrite criteria are not needed.

In this final rule, EPA is finalizing nitrate+nitrite criterion for springs with a magnitude of 0.35 mg/L. For more information regarding the springs criterion, please refer to EPA's Final Rule TSD for Florida's Inland Waters, Chapter 3: Methodology for Deriving U.S. EPA's Criteria for Springs located in the record for this final rule.

(b) Duration and Frequency

EPA proposed a nitrate+nitrite criterion duration as an annual geometric mean with a criterion frequency of not to be exceeded more than once in three years. EPA also took comment on alternative durations, such as a monthly geometric mean, and alternative frequencies, such as a not to be exceeded more than 10% of the time. EPA considered that the timescales of the algal responses in the laboratory experiments (*i.e.,* 21 to 28 days) might support a shorter duration over which biological response to nitrate+nitrite could occur. However, EPA found in its review of springs data and information that nitrate concentrations can be variable from month to month, and this intra-annual variability was not necessarily associated with impairment of the designated use. Therefore, to account for intra-annual variability, EPA chose to express the nitrate+nitrite criterion for springs on an annual basis. Comments included a suggestion to express the frequency component of the criterion as "not to be exceeded during a three year period as a three year average." However, EPA is concerned that cumulative effects of exposure may manifest themselves in shorter periods of time than three years. This is because springs tend to be clear which provides the opportunity for fast growing nuisance algal species to quickly utilize the excess nitrogen. When nuisance algae species grow prolifically, they outcompete and replace native submerged aquatic vegetation. Thus, more frequent exceedances of the criterion-magnitude will not support a balanced natural population of aquatic flora and fauna in springs because submerged aquatic vegetation can be lost quickly from the effects of nitrate+nitrite pollution, but can take many years, if not decades, to recover.[158] For these reasons, EPA is finalizing the proposed duration and frequency of an annual geometric mean not to be exceeded more than once in three years.

E. Applicability of Criteria When Final

(1) Final Rule

This final rule is effective 15 months after publication in the **Federal Register**, except for the Federal site-specific alternative criteria (SSAC) provision of section 131.43(e), which is effective 60 days after publication in the **Federal Register**. This rule will apply in addition to any other existing CWA-effective criteria for Class I or Class III waters already adopted and submitted to EPA by the State (and for those adopted and submitted to EPA after May 30, 2000, approved by EPA). FDEP establishes its designated uses through a system of classes and Florida waters are designated into one of several different classes. Class III waters provide for healthy aquatic life and safe recreational use. Class I waters include all the protection of designated uses provided for Class III waters, and also include protection for designated uses related to drinking water supply. *See* Section 62–302.400, F.A.C. Class I and III waters, together with Class II waters that are designated for shellfish propagation or harvesting, comprise the set of Florida waters that are assigned designated uses that include the goals articulated in Section 101(a)(2) of the CWA (*i.e.* protection and propagation of fish, shellfish, and wildlife and recreation in and on the water).[159] Class II waters will be covered under EPA's forthcoming rulemaking efforts for estuarine and coastal waters. EPA is promulgating numeric criteria for lakes and flowing waters, consistent with the terms of the Agency's Consent Decree, that Florida has designated as Class I or Class III.

In terms of final rule language, EPA has removed regulatory provisions at 40 CFR 131.43(c)(2)(iii) and 131.43(c)(4)–(6) because these criteria (criteria for protection of downstream estuarine waters, flowing waters in the South Florida Region, and estuaries and coastal waters) will be included with the Agency's 2011 proposed rulemaking for estuarine and coastal waters. For water bodies designated as Class I and Class III predominately fresh waters, EPA's final numeric criteria will be applicable CWA water quality criteria for purposes of implementing CWA programs, including permitting under the NPDES program, as well as

[157] Stevenson, R.J., A. Pinowska, and Y.K. Wang. 2004. *Ecological Condition of Algae and Nutrients in Florida Springs.* Florida Department of Environmental Protection, Tallahassee, FL.

[158] Duarte, C.M. 1995. Submerged aquatic vegetation in relation to different nutrient regimes. *Ophelia: International Journal of Marine Biology* 41: 87–112.

[159] Because FL classifications are cumulative, Class I waters include protections for aquatic life and recreation, in addition to protecting drinking water supply use.

monitoring, assessments, and listing of impaired waters based on applicable CWA WQS and establishment of TMDLs.

In this final rule, the Agency has also deleted proposed regulatory provisions at 40 CFR 131.43(d)(2)(i)–(iii) on mixing zones, design flow, and listing impaired waters. EPA notes that the final criteria in this rule are subject to Florida's general rules of applicability in the same way and to the same extent as are other State-adopted and/or Federally-promulgated criteria for Florida waters. (*See* 40 CFR 131.43(d)(2)). States have discretion to adopt policies generally affecting the application and implementation of WQS. (*See* 40 CFR 131.13). There are many applications of criteria in Florida's water quality programs. Therefore, EPA believes that it is not necessary for purposes of this final rule to enumerate each of them, nor is it necessary to restate any otherwise applicable requirements. This broad reference to general rules of applicability provides sufficient coverage and has been used without further elaboration in EPA's most recent criteria promulgation applicable to State waters.[160] The Agency is also concerned that addressing some applications in this final regulations and not others may create unnecessary and unintended questions, confusion, and uncertainty about the overall application of Florida's general rules.

(2) Summary of Major Comments

Regarding application of criteria, several commenters asked EPA to provide more detail on how waters would be monitored, whether EPA would use the rotating basin approach that FDEP uses, how EPA would enforce the criteria, and how specific entities would be affected. In response, EPA points out that WQS generally, and EPA's rule specifically, do not specify how to achieve those WQS. As discussed above, the State of Florida will determine how best to meet these Federal numeric criteria in a way that most effectively meets the needs of its citizens and environment. FDEP is the primary agency responsible for implementing CWA programs in the State of Florida. As such, EPA defers to FDEP in administering applicable CWA programs consistent with the CWA and EPA's implementing regulations. EPA has worked closely with the State to address nitrogen/phosphorus pollution problems in Florida. EPA will continue to collaborate with FDEP as the State implements EPA's Federally-promulgated numeric criteria.

[160] *See* 40 CFR 131.41(d)(2).

Several commenters asserted that Florida would not be able to implement EPA's Federally-promulgated numeric criteria without first adopting the criteria into State law. EPA does not believe that, in order to implement EPA's Federally-promulgated numeric criteria, FDEP is required to adopt EPA's rule into State law. EPA's numeric criteria for Florida's lakes and flowing waters will be effective for CWA purposes 15 months after publication of the final criteria in the **Federal Register** and will apply in addition to any other existing CWA-effective criteria for Class I or Class III waters already adopted by the State and submitted to EPA (and for those adopted after May 30, 2000, adopted and submitted by FDEP and approved by EPA). FDEP retains the authority to move forward with its own rulemaking process at any time to establish State numeric criteria and to submit such criteria to EPA for review and approval under section 303(c) of the CWA. If FDEP does not adopt State numeric criteria, the Department retains its current authority to implement Federally promulgated criteria through the State's narrative or "free from" criteria. FDEP's General Counsel has confirmed, in a 2005 letter to EPA that the State's water quality criteria regulations for surface waters, set out at Section 62–302.500, F.A.C., provide authority for the Department to address and implement EPA promulgated criteria in CWA programs.[161]

Several commenters suggested that EPA incorporate water quality targets from adopted and approved TMDLs as site-specific criteria (SSAC) for specific waters in lieu of the more broadly applicable criteria promulgated by EPA. These commenters asserted that the TMDL values better reflect site-specific needs and were already serving as the basis for many pollutant reduction actions, including Basin Management Action Plans (BMAPs). Commenters expressed concern that actions to implement the TMDLs would be curtailed or delayed because of the uncertainty whether additional reductions might be required, and that both the Federal SSAC process (described in Section V.C of this notice) and use attainability analysis (UAA)/variance process would be too burdensome and time-consuming to be effective alternatives. Similarly, some commenters requested that specific restoration projects be exempted from EPA's criteria or that EPA employ a process for delaying application of the criteria where a water is under study.

[161] FDEP. 2005, January 5. "Petition to Withdraw Florida's NPDES Authority of March 19, 2004 Response to EPA Letter of December 8, 2004." Letter from George Munson, General Counsel.

EPA's position is that EPA-established or approved TMDLs may provide sufficient information to support a site-specific alternative criterion, but that such a demonstration should be made after considering and taking into account any new relevant information available, including but not limited to the substantial analysis and data considered and made a part of the record for this final rule. For this reason, EPA considers the Federal SSAC procedure to be the appropriate mechanism for determining whether any specific TMDL target should be adopted as a SSAC. For restoration projects or waters under study, a State-issued variance may also be an appropriate vehicle for regulatory flexibility.

Several commenters requested clarification regarding the effect of EPA's Federally-promulgated numeric criteria on existing TMDLs. A TMDL is established at levels necessary to attain and maintain "applicable narrative and numerical water quality standards." (*See* 40 CFR 130.7(c)(1)). A TMDL addressing a narrative WQS requires translating the narrative WQC into a numeric water quality target (*e.g.,* a concentration). TMDLs are not implemented directly but through other programs such as NPDES permitting and non-point source programs. For example, a NPDES permitting authority must ensure at the time of permit issuance that WQBELs are consistent with the assumptions and requirements of any available wasteload allocation (WLA) for that discharge contained in a TMDL, as well as derive from and comply with all applicable WQS. (*See* 40 CFR 122.44(d)(1)(vii)(A) and (B)).

Some existing TMDLs translate the same portion of Florida's narrative criterion, Subsection 62–302.530(47)(b), F.A.C., as EPA has translated to derive its numeric criteria, *e.g.* no imbalance in natural populations of aquatic flora and fauna. The permitting authority must ensure that any permit issuance or re-issuance include WQBELs that are as stringent as necessary to meet the promulgated numeric criteria, pursuant to CWA section 301(b)(1)(C) and 40 CFR 122.44(d)(1). These existing TMDLs will likely include information that is relevant and helpful in evaluating necessary discharge limitations, such as consideration of other sources of the pollutant and hydrodynamics of the waterbody. EPA recommends that existing TMDLs that are based on translation of Subsection 62–302.520(47)(b), F.A.C. ("no imbalance in natural population of aquatic flora and fauna"), undergo a two-part evaluation. The first step is to assess whether the waterbody is still, in fact, water quality-limited (impaired) using the new numeric WQC. If the waterbody is still water quality-limited, then a second evaluation should be conducted to determine whether the existing TMDL based on the narrative is sufficient to meet the new numeric criterion, and in turn, whether or not it may be appropriate to revise the TMDL. The State may also wish to pursue submitting the TMDL water quality target derived by translating the narrative for determination as a Federal SSAC.

Other existing TMDLs translate another part of Florida's narrative nutrient criterion, Subsection 62–302.530(47)(a) F.A.C. This provision provides that nitrogen/phosphorus pollution shall be limited so as to prevent violation of another Florida WQS. Where a TMDL water quality target was developed as a translation of this part of Florida's narrative nutrient criterion (for example, that amount of nitrogen/phosphorus that would not cause excursions of Florida's dissolved oxygen WQS), the appropriate WQBEL is the more stringent result of applying the TMDL WLA or the promulgated numeric criteria.

It is important to keep in mind that no TMDL will be rescinded or invalidated as a result of this final rule, nor does this final rule have the effect of withdrawing any prior EPA approval of a TMDL in Florida. Neither the CWA nor EPA regulations require TMDLs to be completed or revised within any specific time period after a change in water quality standards occurs. TMDLs are typically reviewed as part of States' ongoing water quality assessment programs. Florida may review TMDLs at its discretion based on the State's priorities, resources, and most recent assessments. NPDES permits are subject to five-year permit cycles, and in certain circumstances are administratively continued beyond five years. In practice, States often prioritize their administrative workload in permits. This prioritization could be coordinated with TMDL review.

EPA-established or approved TMDLs may provide sufficient information to support a site-specific alternative criterion (SSAC). The SSAC path is one that local governments or businesses may want to pursue where they desire assurance that the TMDL will become the applicable numeric criteria in advance of the State's review of the TMDL or where substantial investments in pollution controls are predicated on water quality based effluent limits, and local governments or businesses need long-term planning certainty before making these investments. The demonstrations supporting SSAC requests for TMDLs should reflect any new relevant information that has become available since the TMDL was developed, including but not limited to the substantial analysis and data considered and made a part of the record for this final rule. For this reason, EPA considers the Federal SSAC procedure to be the appropriate mechanism for determining whether any specific TMDL target should replace the otherwise applicable numeric criteria in this final rule. EPA will work cooperatively with entities requesting SSAC to expedite consideration of TMDL targets and associated TN and/or TP levels as Federal SSAC for purposes of this final rule. As explained in the preamble to the final rule, EPA has delayed the effective date of its numeric criteria for 15 months. EPA encourages any entity wishing to have EPA adopt a particular TMDL target as a SSAC to submit such TMDL to EPA for consideration as a SSAC as soon as possible during these 15 months. When submitting such requests to EPA, such entity must copy FDEP so that FDEP may provide any comments it has to EPA. EPA would then review the SSAC application and prepare the SSAC for public notice once this final rule takes effect. Following this process, the TMDL target, if scientifically and technically justified, could replace the otherwise applicable numeric criteria within a very short period of time after this final rule takes effect. Following any such establishment of site-specific numeric criteria, the State of Florida may review and/or revise the TMDL at its discretion based on the changed criteria and the State's priorities, resources, and most recent assessments. EPA is still required to approve any changes to a previously approved TMDL.

EPA is extending the effective date of this rule, with the exception of the site-specific alternative criteria provision for reasons discussed below, for 15 months to allow time for the Agency to work with stakeholders and FDEP on important implementation issues and to help the public and all affected parties better understand the final criteria and the bases for those criteria. EPA solicited comment on the rule's proposed effective date in the preamble to the proposed rule (75 FR 4216 (January 26, 2010)) and received many comments requesting that EPA delay the effective date of the final criteria. A range of commenters suggested delayed effective dates from several months to several years, including linking the effective date of this rule with the forthcoming estuaries and coastal waters rule to allow closer coordination of the related parts of the two rulemakings. EPA does not agree with some commenters that such an extensive delay is necessary. However, EPA does believe, as discussed below, that these criteria present a unique opportunity for substantial nitrogen and phosphorus loadings reductions in the State that would be greatly facilitated and expedited by strongly coordinated and well-informed stakeholder engagement, planning, and support before a rule of this significance and broad scope begins to take effect and be implemented through the State's regulatory programs.

EPA believes that it is critical, before the rule becomes effective, to engage and support, in full partnership with FDEP, the general public, stakeholders, local governments, and sectors of the regulated community across the State in a process of public outreach, education, discussion, and constructive planning. EPA solicited comment on the proposed rule in January 2010 and has carefully considered those comments, which numbered more than 22,000, in developing the final rule. However, the nature of rule development has kept EPA from publicly discussing the contents of the final rule until the rule development process, itself, was complete. An investment in outreach, information, coordination, technical assistance and planning following this action may result in far more effective, expeditious, and ultimately effective implementation of appropriate and badly needed nutrient pollution reduction measures leading to public health and environmental improvements, the goals of this rule. EPA recognizes that in order for FDEP to effectively implement the final criteria for nutrients, it needs to plan how to best address the criteria in State programs such as the permits, waterbody assessment and listing, and TMDL programs. The State may need to develop implementation plans and guidance for affected State regulatory programs, train employees, and educate the public and regulated communities. EPA will work with FDEP as a partner over the next 15 months as FDEP takes the steps necessary to implement the new standards in an orderly manner. Moreover, EPA believes it would be useful and beneficial to have discussions with State and local officials, organizations of interested parties, and with the general public to explain the final rule, the bases for that rule, and respond to implementation questions and concerns.

Several stakeholder groups have provided comments about particular implementation issues that will require time to address before effective implementation of the final rule can be achieved. Florida has a unique local government administration structure that includes county, municipal, and special districts, all which have overlapping authorities with respect to managing water resources. The special districts provide water resource management oversight of flood control and water supply services. These multiple layers of government authorities will require time to coordinate responsibilities. An additional concern for local governments is their budgeting process. Most local governments operate on a fiscal year cycle of October to September; thus they have recently begun a new fiscal year. These local governments engage in multi-year budget planning and have already begun laying the budget foundations for up to five successive years. EPA recognizes that Florida's agricultural community has implemented a variety of best management practices (BMPs) that are effective at reducing nitrogen and phosphorus pollution from farms. However, Florida's agriculture industry is composed of a large number of small farms (about 17,000) that have average annual sales of less than $10,000 each, and most do not receive any form of government assistance.[162] EPA anticipates that the Natural Resource Conservation Service and the University of Florida/Institute of Food and Agricultural Sciences Extension will need time to educate those not currently enrolled in nutrient management and BMP programs to control nutrient runoff.

A delayed effective date of 15 months for the criteria will also provide time for interested parties to pursue site-specific alternative criteria (SSAC) for a given waterbody. EPA's final rule and associated preamble describe the process by which any entity may seek a SSAC. A decision to seek a SSAC could not be made, however, until interested parties know what the applicable criteria would be. The Federal SSAC portion of the rule, § 131.43(e), goes into effect 60 days after publication of this rule to allow this important work to proceed in advance of the effective date for the remaining provisions of the rule. During the 15 months before the criteria become effective, parties may evaluate the final criteria, decide whether they want to seek a SSAC, and, if so, submit their SSAC application materials to EPA, copying FDEP. EPA could then review the application, and if complete, public notice the application and technical support document pursuant to the SSAC provision in the final rule. If, after reviewing public comment, EPA believes that the SSAC application meets the requirements of this rule, EPA could determine that such SSAC apply to the specific waterbody in lieu of the criteria in the final rule, even before the criteria in the final rule become effective due to the earlier effective date of the SSAC provision.

EPA believes that the 15-month period of time between publication in the **Federal Register** and the effective date of the criteria will ultimately result in attainment of the criteria in an overall shorter period of time. As EPA frequently points out in its guidance and training materials, criteria are not "self-implementing", that is, it takes knowledgeable and experienced professionals to effectively and properly employ the criteria in monitoring and assessment programs, permit limit derivation and expression, nonpoint source (NPS) control strategies, and other program applications. Without time to develop procedures, there is the risk of ineffective implementation that will not meet the underlying objective of this action—to restore and protect Florida's waters from harm caused by nitrogen and phosphorus pollution. Well designed and mapped out NPS control strategies, in particular, will be critical to gain stakeholder trust and participation.

EPA wishes to actively engage in partnership with FDEP to support FDEPs implementation of these new standards, for example by considering applications for site-specific alternative criteria. After careful consideration of time requirements for critical steps, along with recognition of important planning and accounting mechanisms such as fiscal years, and local and county meeting and planning cycles, EPA has determined that a 15-month time period is both reasonable and will allow time for important implementation activities to take place. This 15-month period will allow for a four-month education and outreach rollout to cover the major interest sectors and geographic locations throughout the State of Florida; a three-month period of training and guidance concurrent with data synthesis and analysis to support potential SSAC development; a two-month public comment and response period to allow development of effective guidance, training and possible workshops to run concurrent with SSAC submittals; a three-month period for finalizing guidance materials along with development of rollout strategies (*e.g.,* for NPS control) concurrent with notice and comment of SSAC; and finally a 3-month period for statewide education and training on guidance and contingency planning. In short, the 15 months before the criteria become effective will ensure application of programs to achieve criteria in a manner that makes the most efficient use of limited resources and gains the broadest possible support for timely and effective action upon reaching the effective date of the criteria.

IV. Under what conditions will Federal standards be withdrawn?

Under the CWA, Congress gave States primary responsibility for developing and adopting WQS for their navigable waters. (*See* CWA section 303(a)-(c)). Although EPA is promulgating numeric criteria for lakes and springs throughout Florida and flowing waters outside the South Florida Region, Florida continues to have the option to adopt and submit to EPA numeric criteria for the State's Class I and Class III waters consistent with CWA section 303(c) and implementing regulations at 40 CFR part 131.

Pursuant to 40 CFR 131.21(c), EPA's promulgated WQS are applicable WQS for purposes of the CWA until EPA withdraws those Federally-promulgated WQS. Withdrawing the Federal standards for the State of Florida would require rulemaking by EPA pursuant to the requirements of the Administrative Procedure Act (5 U.S.C.551 *et seq.*). EPA would undertake such a rulemaking to withdraw the Federal criteria if and when Florida adopts and EPA approves numeric criteria that fully meet the requirements of section 303(c) of the CWA and EPA's implementing regulations at 40 CFR part 131.

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[162] NASS. 2009a. 2007 Census of agriculture Florida State and county data, Volume 1, Geographic Area Series, Part 9, AC–07–A–9, Updated December 2009, National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, DC. *http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Florida/flv1.pdf* (retrieved July 15, 2010).

NASS. 2009. 2009 State agriculture overview—Florida. U.S. Department of Agriculture, National Agricultural Statistics Service, Washington, DC, *http://www.nass.usda.gov/Statistics_by_State/Ag_Overview/AgOverview_FL.pdf* (retrieved June 17, 2010).

V. Alternative Regulatory Approaches and Implementation Mechanisms

A. Designating Uses

(1) Background and Analysis

Under CWA section 303(c), States shall adopt designated uses after taking "into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish, and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation." Designated uses "shall be such as to protect the public health or welfare, enhance the quality of water and serve the purposes of [the CWA]." (*See* CWA section 303(c)(2)(A)). EPA's regulation at 40 CFR 131.3(f) defines "designated uses" as "those uses specified in water quality standards for each waterbody or segment whether or not they are being attained." A "use" is a particular function of, or activity in, waters of the United States that requires a specific level of water quality to support it. In other words, designated uses are a State's concise statements of its management objectives and expectations for each of the individual surface waters under its jurisdiction.

In the context of designating uses, States often work with stakeholders to identify a collective goal for their waters that the State intends to strive for as it manages water quality. States may evaluate the attainability of these goals and expectations to ensure they have designated appropriate uses. (*See* 40 CFR 131.10(g)). Consistent with CWA sections 101(a)(2) and 303(c)(2)(A), EPA's implementing regulations specify that States adopt designated uses that provide water quality for the protection and propagation of fish, shellfish, and wildlife and for recreation in and on the water, wherever attainable. (*See* 40 CFR 131.10). Where States do not designate those uses, or remove those uses, they must demonstrate that such uses are not attainable consistent with the use attainability analysis (UAA) provisions of 40 CFR 131.10, specifically 131.10(g). States may determine, based on a UAA, that attaining a designated use is not feasible and propose to EPA to change the use to something that is attainable. This action to change a designated use must be completed in accordance with EPA regulations. (*See* 40 CFR 131.10(g) and (h)). In implementing these regulations, EPA allows grouping waters together in a watershed in a single UAA, provided that there is site-specific information to show how each individual water fits into the group in the context of any single UAA and how each individual water meets the applicable requirements of 40 CFR 131.10(g).

EPA's final numeric criteria for lakes and flowing waters apply to those waters designated by FDEP as Class I (Potable Water Supplies) or Class III (Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife). If Florida removes either the Class I and/or Class III designated use for any particular waterbody ultimately affected by this rule, and EPA finds that removal to be consistent with CWA section 303(c) and regulations at 40 CFR part 131, then the Federally-promulgated numeric criteria would not apply to that waterbody because it would no longer be designated Class I or III. Instead, any criteria associated with the newly designated use would apply to that waterbody.

(2) Summary of Major Comments

Many commenters took the opportunity to emphasize the need to adhere to the regulations governing the process of modifying or removing a designated use. Some commenters suggested that the process to change a designated use is extremely difficult. EPA's experience is that UAAs may range from simple to complex, depending on a variety of factors, such as the type of waterbody involved, the size of the segment, the use being changed, the relative degree of change proposed for the designated use, the presence of unique ecological habitats, and the level of public interest/involvement in the designated use decision. EPA agrees that, while a UAA is being conducted, the current designated use and corresponding criteria remain in place. In the case of Florida's Class I and Class III flowing waters and lakes, EPA's promulgated numeric criteria will remain the applicable WQS for CWA purposes, including assessments, listings, TMDL development and the issuance of NPDES permits, unless and until the State adopts revised designated uses (with different associated criteria) that are submitted to and approved by EPA under CWA section 303(c).

B. Variances

(1) Final Rule

For purposes of this rule, EPA is promulgating criteria that apply to use designations that Florida has already established. EPA believes that the State has sufficient authority to use its currently EPA-approved variance procedures with respect to a temporary modification of its Class I or Class III uses as it pertains to any Federally-promulgated criteria. For this reason, EPA did not propose and is not promulgating an alternative Federal variance procedure.

(2) Background and Analysis

A variance is a temporary modification to the designated use and associated water quality criteria that would otherwise apply to the receiving water.[163] Variances constitute new or revised WQS subject to the substantive requirements applicable to removing a designated use.[164] Thus, a variance is based on the same factors, set out at 40 CFR 131.10(g), that are required to revise a designated use through a UAA. Typically, variances are time-limited (*e.g.,* three to five years), but renewable. Temporarily modifying the designated use for a particular waterbody through a variance process allows a State to limit the applicability of a specific criterion to that water and to identify an alternative designated use and associated criteria to be met during the term of the variance. A variance should be used instead of removal of a use where the State believes the standard can be attained at some point in the future. By maintaining the designated use for all other criteria and dischargers, and by specifying a point in the future when the designated use will be fully applicable in all respects, the State ensures that further progress will be made in improving water quality and attaining the standard. A variance may be written to address a specified geographic area, a specified pollutant or pollutants, and/or a specified pollutant source. All other applicable WQS not specifically modified by the variance would remain applicable (*e.g.,* any other criteria adopted to protect the designated use). State variance procedures, as part of State WQS, must be consistent with the substantive requirements of 40 CFR part 131. Each variance, as a revised WQS, must be submitted to EPA for review pursuant to CWA section 303(c). A variance allows, among other things, NPDES permits to be written such that reasonable progress is made[165] toward attaining the underlying standards for affected waters without violating section 402(a)(l) of the Act, which requires that NPDES permits

[163] Water Quality Standards Regulation, 40 CFR part 131: Advance notice of proposed rulemaking. USEPA FR 63:129 (July 7, 1998). p. 36741–36806.

[164] *In re Bethlehem Steel Corporation,* General Counsel Opinion No. 58. March 29, 1977 (1977 WL 28245 (E.P.A. G.C.)).

[165] USEPA. 1994. *Water Quality Standards Handbook: Second Edition.* EPA–823–B–94–005a. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

must meet the applicable WQS. (*See* CWA section 301(b)(1)(C)).

(3) Summary of Major Comments

In response to comments, EPA agrees that variances could be adopted on a multiple-discharger basis and can be renewed so long as the State and EPA conclude that such variances are consistent with the CWA and implementing regulations. In this regard, EPA allows grouping waters together in a watershed in a single variance application, provided that there is site-specific information to show how each individual water fits into the group in the context of any single variance and how each individual water meets the applicable requirements of 40 CFR 131.10(g). EPA disagrees that Florida law, at 403.201(2), F.S., prohibits the State from issuing variances for waters affected by the Federally-promulgated numeric criteria. Florida law at 403.201(2), F.S., provides that a variance may not be granted that would result in State requirements that are less stringent than a comparable Federal provision or requirement. As discussed above, a variance is a temporary modification to the designated use and thus to the associated water quality criteria that would otherwise apply to the receiving water. EPA's Federal rule, however, does not promulgate or revise any Florida designated uses. EPA's criteria are intended to protect the Class I and Class III designated uses that Florida already has in place. EPA's criteria do not apply where and when the use is something other than Class I or Class III, as would be the case for a variance. Rather, Florida would establish alternative criteria associated with the variance. Any variance would constitute a new or revised WQS subject to EPA review and approval pursuant to section 303(c) of the CWA.

C. Site-Specific Alternative Criteria

(1) Final Rule

EPA believes that there is benefit in establishing a specific procedure in the Federal rule for EPA adoption of Federal site-specific alternative criteria (SSAC) for the numeric chlorophyll *a,* TN, TP, and nitrate+nitrite criteria in this rule. In this rulemaking, EPA is promulgating a procedure whereby the Regional Administrator, Region 4, may establish a SSAC after providing for public comment on the proposed SSAC and the supporting documentation. (*See* 40 CFR 131.43(e)). This procedure allows any entity, including the State, to submit a proposed Federal SSAC directly to EPA for the Agency's review and assessment as to whether an adjustment to the applicable Federal numeric criteria is appropriate and warranted. The Federal SSAC process is separate and distinct from the State's SSAC processes in its WQS.

The Federal SSAC procedure allows EPA to determine that a revised site-specific chlorophyll *a,* TN, TP, or nitrate + nitrite numeric criterion should apply in lieu of the generally applicable criteria promulgated in this final rule where that SSAC is demonstrated to be protective of the applicable designated use(s). The promulgated procedure provides that EPA will solicit public comment on its determination. Because EPA's rule establishes this procedure, implementation of this procedure does not require withdrawal of Federally-promulgated criteria for affected water bodies for the Federal SSAC to be effective for purposes of the CWA. EPA has promulgated similar procedures for EPA granting of variances and SSACs in other Federally-promulgated WQS.[166]

EPA is aware of concerns expressed by some commenters that a waterbody may exceed the numeric criteria in this rule and still meet Florida's designated uses related to recreation, public health, and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. EPA recognizes that there may be certain situations where additional, new, or more specific data related to the local conditions or biology of a particular waterbody may well support an alternate site-specific numeric criteria which may appropriately be more (or less) stringent than the criteria in this final rule in order to ensure maintenance of instream designated uses and protection of downstream waters. EPA believes that the SSAC process is an appropriate mechanism to address such situations and is committed to acting on Federal SSAC applications intended to address such situations as expeditiously as possible.

The process for obtaining a Federal SSAC includes the following steps. First, an entity seeking a SSAC compiles the supporting data, conducts the analyses, develops the expression of the criterion, and prepares the supporting documentation demonstrating that alternative numeric criteria are protective of the applicable designated use. The "entity" may be the State, a city or county, a municipal or industrial discharger, a consulting firm acting on a behalf of a client, 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 131.11. Second, if the entity is not the State, the entity must provide notice of the proposed SSAC to the State, including all supporting documentation so that the State may provide comments on the proposal to EPA. Third, the Regional Administrator will evaluate the technical basis and protectiveness of the proposed SSAC and decide whether to publish a public notice and take comment on the proposed SSAC. The Regional Administrator may decide not to publish a public notice and instead return the proposal to the entity submitting the proposal, with an explanation as to why the proposed SSAC application did not provide sufficient information for EPA to determine whether it meets CWA requirements or not. If EPA solicits public comment on a proposed SSAC, upon review of comments, the Regional Administrator may determine that the Federal SSAC is appropriate to account for site-specific conditions and make that determination publicly available together with an explanation of the basis for the decision. The Regional Administrator may also determine that the Federal SSAC is not appropriate and make that determination publicly available together with an explanation of the basis for the decision.

To successfully develop a Federal SSAC for a given lake, stream, or spring, a thorough analysis is necessary that indicates how designated uses are being supported both in the waterbody itself and in downstream water bodies at concentrations of either TN, TP, chlorophyll *a,* or nitrate+nitrite that are either higher or lower than the Federally-promulgated applicable criteria. This analysis should have supporting documentation that consists of examining both indicators of longer-term response to multiple stressors, such as benthic macroinvertebrate health as determined by Florida's Stream Condition Index (SCI), and indicators of shorter-term response specific to nitrogen/phosphorus pollution, such as periphyton algal thickness or water column chlorophyll *a* concentrations. To pursue a Federal SSAC on a watershed-wide basis, the same types of procedures that EPA used to develop the Federally promulgated applicable criteria can be used with further refinements to the categorization of water bodies. For example, an entity could derive alternative instream protective TP and/or TN values using

[166] *See* 40 CFR 131.33(a)(3), 40 CFR 131.34(c), 40 CFR 131.36(c)(3)(iii), 40 CFR 131.38(c)(2)(v), 40 CFR 131.40(c).

EPA's approach by further sub-delineating the Nutrient Watershed Regions and providing the corresponding data, analysis and documentation to support derivation of an alternative criteria that is protective of the designated use that applies both to the smaller watershed regions as well as to downstream waters. This type of refined reference condition approach is described in EPA guidance manuals [167] and would be consistent with methods used to develop the Federally-promulgated criteria for Florida. In developing either a site-specific or watershed-wide Federal SSAC, it is necessary to ensure that values allowed in an upstream segment as a result of a SSAC provide for the attainment and maintenance of the WQS of downstream waters. It will be important to examine a stream system on a broader basis to ensure that a SSAC established for one segment does not result in adverse effects in nearby segments or downstream waters, such as a downstream lake.

This rule specifically identifies four approaches for developing SSAC. The first two approaches are replicating the approaches EPA used to develop stream and lake criteria, respectively, and applying these methods to a smaller subset of waters. The third approach for developing SSAC is to conduct a biological, chemical, and physical assessment of waterbody conditions. The fourth approach for developing SSAC is a general provision for using another scientifically defensible approach that is protective of the designated use. The first two approaches for developing SSAC replicate EPA's methods in deriving the stream and lake criteria set out in this final rule. To understand the necessary steps in this analysis, interested parties should refer to the complete documentation of these methods in the materials included in the rule docket.

The third approach for developing SSAC is to conduct a biological, chemical, and physical assessment of waterbody conditions. This is a more general approach than the replication approaches and would need additional detail and description of supporting rationale in the documentation submitted to EPA. The components of this approach could include, but not be limited to, evaluation of benthic macroinvertebrate health using the Stream Condition Index (SCI), presence or absence of native flora and fauna, chlorophyll *a* concentrations or periphyton density, average daily dissolved oxygen fluctuation, organic versus inorganic components of total nitrogen, habitat assessment, and hydrologic disturbance. This approach could apply to any waterbody type, with specific components of analysis tailored for the situation. The fourth approach for developing SSAC is a general provision for using another scientifically defensible approach that is protective of the designated use. This provision allows applicants to make a complete demonstration to EPA using methods not otherwise described in the rule or its statement of basis, consistent with 40 CFR 131.11(b)(1)(iii). This approach could potentially include use of mechanistic models or other data and information.

(2) Background and Analysis

A SSAC is an alternative value to criteria set forth in this final rule that would be applied on a watershed, area-wide, or water-body specific basis that meets the regulatory test of protecting the instream designated use, having a basis in sound science, and ensuring the protection and maintenance of downstream WQS. SSAC may be more or less stringent than the otherwise applicable Federal numeric criteria. In either case, because the SSAC must protect the same designated use and must be based on sound science (*i.e.,* meet the requirements of 40 CFR 131.11(a)), there is no need to modify the designated use or conduct a UAA. A SSAC may be appropriate when further scientific data and analyses can bring added precision or accuracy to express the necessary level or concentration of chlorophyll *a,* TN, TP, and/or nitrate+nitrite that protects the designated use for a particular waterbody.

(3) Summary of Major Comments

Many commenters expressed support for the concept of EPA's proposed SSAC procedure, although many also expressed concerns about the viability, requirements, expense, and time associated with the process. In EPA's proposed rule, the SSAC process was to be initiated by the State submitting a request to EPA. Many commenters were confused about the relationship between the Federal SSAC process and the State's Type 1 and Type 2 SSAC processes, and how the processes relate for purposes of the Federal rule. The Federal SSAC process is separate and independent from the State SSAC processes. A Federal SSAC is established by the Regional Administrator of EPA Region 4 after due notice and comment from the public. To resolve this confusion, and to provide a more direct means for entities other than the State to initiate the SSAC process, EPA's final rule provides that any entity may submit a request for a SSAC directly to the Regional Administrator. The final rule adds a requirement that entities submit proposed SSAC and supporting materials to the State at the same time those materials are submitted to EPA to ensure the State has the opportunity to submit comments to EPA.

As several commenters have pointed out, Florida WQS regulations currently do not authorize the State to adopt a SSAC as State WQS except where natural conditions are outside the limits of broadly applicable criteria established by the State (Section 62–302.800, F.A.C.). However, the State may choose to be the entity that submits a SSAC request to EPA under the Federal process described above and set forth at 40 CFR 131.43(e). There is no requirement that the State go through its own State-level Type 1 or Type 2 SSAC process before submitting a proposed SSAC to EPA for consideration under this rule.

Commenters included suggestions for specific approaches for developing SSAC as well as an "expedited" process for determination as a Federal SSAC. EPA agrees that many of the suggested approaches have merit for purposes of developing SSAC, and has adapted many of the suggestions to provide more information on approaches that would meet the general requirements for protective criteria. Many of the comments regarding an "expedited" process suggested a process where SSAC become effective automatically, without need for EPA review and approval. With the exception of State adjustment of lake criteria within a very specific and limited range accompanied by a specified data set and calculation as discussed in Section III.C(2)(e) above, the Agency does not agree with the view that criteria established in this rule can be revised without documentation and public notice and comment process as outlined above.[168] Another commenter asked about the potential to develop a SSAC on a "watershed-scale." EPA does not see any barrier to conducting such an analysis, where it can be demonstrated that the watershed-scale SSAC is protective for all waters in a particular grouping and meets the requirements of 40 CFR 131.11 and 40

[167] USEPA. 2000b. *Nutrient Criteria Technical Guidance Manual: Rivers and Streams.* EPA–822–B–00–002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

[168] EPA's criteria allow for one-time site-specific modifications to the promulgated lake criteria, without requiring those modifications to be submitted as SSAC. *See* 40 CFR 131.43(c)(1)(ii) and Section III.C(2)(e).

CFR 131.10(b). Many commenters expressed the desire to defer the applicability of promulgated criteria prior to developing a SSAC. The Federal SSAC portion of the rule, § 131.43(e), goes into effect 60 days after publication of this rule to allow this important work to proceed in advance of the effective date of 15 months after publication for the remaining provisions of the rule. The SSAC review process will depend in substantial part on the nature of the SSAC proposal itself: Its clarity, substance, documentation, and scientific rigor. Some commenters stated that EPA's requirement that Federal SSAC be scientifically defensible and protective of designated uses is too vague; however, it is the same requirement for criteria in the Federal WQS regulation. (*See* 40 CFR 131.11). EPA will consider the need for further developing supporting technical guidance in the future if it appears at that time that such guidance would help support the process.

D. Compliance Schedules

(1) Final Rule

Florida has adopted a regulation authorizing compliance schedules. That regulation, Subsection 62–620.620(6), F.A.C., is not affected by this final rule. The complete text of the Florida rules concerning compliance schedules is available at *https://www.flrules.org/gateway/RuleNo.asp?ID=62–620.620.* Florida is, therefore, authorized to grant compliance schedules, as appropriate, under its rule for WQBELs based on EPA's numeric criteria.

(2) Background and Analysis

A compliance schedule, or schedule of compliance, refers to "a schedule of remedial measures included in a 'permit,' including an enforceable sequence of interim requirements * * * leading to compliance with the CWA and regulations." (*See* 40 CFR 122.2, CWA section 502(17)). In an NPDES permit, WQBELs are effluent limits based on applicable WQS for a given pollutant in a specific receiving water (*See* NPDES Permit Writers Manual, EPA–833–B–96–003, December, 1996). EPA regulations provide that schedules of compliance may only be included in permits if they are determined to be "appropriate" given the circumstances of the discharge and are to require compliance "as soon as possible" (*See* 40 CFR 122.47).[169]

(3) Summary of Major Comments

EPA generally received favorable comment on its description of compliance schedules. Some commenters asked EPA to consider promulgating its own compliance schedule provisions as part of the final rule. Florida's regulations, however, already include an authorizing provision that allows NPDES permit writers to include compliance schedules in permits, where appropriate. Florida's regulations do not limit the criteria which may be subject to compliance schedules. Therefore, Florida may choose to issue permit compliance schedules for nitrogen/phosphorus pollution, as appropriate. As a result, there is no need for EPA to provide an additional compliance schedule authorizing provision in this final rule. EPA disagrees with commenters who assert that Florida's regulation at Subsection 62–620.620(6), F.A.C., authorizing compliance schedules applies only to industrial and domestic wastewater facilities. Chapter 62–620, F.A.C., sets out permit procedures for wastewater facilities or activities that discharge wastes into waters of the State or which will reasonably be expected to be a source of water pollution. (*See* Subsection 62–620.100(1), F.A.C.). Subsection 62–620.620(6), F.A.C., applies, therefore, more broadly than to just industrial and domestic wastewater facilities. In addition, Chapter 62–4, F.A.C., which sets out procedures on how to obtain a permit from FDEP, provides that permits may include a reasonable time for compliance with new or revised WQS. Subsection 62–4.160(10), F.A.C., does not limit the type of permits that may include such compliance schedules.

E. Proposed Restoration Water Quality Standard

(1) Final Rule

In EPA's January 2010 proposal, the Agency proposed a new WQS regulatory tool for Florida, referred to as "restoration WQS" for impaired waters. This provision was intended to allow Florida to retain full aquatic life protection (uses and criteria) for its water bodies while establishing a transparent phased WQS process that would result in implementation of enforceable measures and requirements to improve water quality over a specified time period to ultimately meet the long-term designated aquatic life use. For reasons discussed below and in EPA's response to comment document, EPA has decided not to promulgate a restoration WQS tool specifically for Florida, as proposed.

(2) Summary of Major Comments

EPA received a significant number of comments on its proposal that provided constructive and useful information for EPA to consider regarding the proposed restoration WQS provision. Such comments ranged from identifying additional needed requirements to concerns that the restoration WQS tool was so burdensome it would not be helpful. EPA evaluated the current, existing flexibility available to Florida to implement this final rule through variances, compliance schedules, permit reissuance cycles, permit reopener provisions, TMDL scheduling, and workload and administrative prioritization. These are all considerations that FDEP presently brings to the administration of its water quality program. EPA also considered the flexibility that this final rule offers through lake criteria adjustment provisions, alternative approaches to deriving downstream lake protection values and the SSAC process discussed above. The Agency concluded that the range of implementation tools available to the State in combination with a number of the provisions contained in this final rule provide adequate flexibility to implement EPA's numeric criteria finalized in this rule. Florida may use any of these existing tools or exercise its authority to propose additional tools in the future that allow implementation flexibility where demonstrated to be appropriate and consistent with the CWA and implementing regulations. Therefore, EPA believes that its decision not to finalize restoration WQS will not adversely affect Florida's ability to implement the Federal numeric criteria.

VI. Economic Analysis

State implementation of this rule may result in new or revised National Pollutant Discharge Elimination System (NPDES) permit conditions for point source dischargers, and requirements for nitrogen/phosphorus pollution treatment controls on other sources (*e.g.,* agriculture, urban runoff, and/or septic systems) through the development of additional Total Maximum Daily Loads (TMDLs) and Basin Management Action Plans (BMAPs). To provide information on the potential incremental costs associated with these related State actions, EPA conducted an analysis to estimate both the additional impaired waters that may be identified as a result of this final rule and the potential State of Florida requirements that may be

[169] Hanlon, Jim, USEPA Office of Wastewater Management. 2007, May 10. Memorandum to Alexis Stauss, Director of Water Division EPA Region 9, on "Compliance Schedules for Water Quality-Based Effluent Limitations on NPDES Permits."

necessary to assure attainment of applicable State water quality designated uses. EPA's analysis is fully described in the document entitled: "*Economic Analysis of Final Water Quality Standards for Nutrients for Lakes and Flowing Waters in Florida,*" which can be found in the docket and record for this final rule.

An economic analysis of a regulation compares a likely scenario absent the regulation (the baseline) to a likely scenario with the regulation. The impacts of the regulation are measured by the resulting differences between these two scenarios (incremental impacts). However, the regulatory effect of this final rule can be interpreted in several ways, which can significantly influence the conditions considered appropriate for representing the baseline. On January 14, 2009 EPA made a determination that numeric nutrient water quality criteria were necessary to meet the requirements of the CWA in the State of Florida. In July 2009 the State of Florida released draft numeric nutrient criteria for lakes and streams.[170] Therefore, when the Agency proposed this rule for lakes and flowing waters in January 2010, EPA evaluated the incremental impacts of the proposed rule in comparison with the provisions of the Florida July 2009 draft criteria. Although the State subsequently did not proceed forward with those numeric criteria provisions, EPA has conducted the same evaluation as part of the economic analysis accompanying this final rule to illustrate the difference between Florida's draft approach and the provisions of this rule. Using this same baseline approach and the refined analysis methodology described below, EPA estimates the potential incremental costs associated with this rule as ranging between $16.4 million/year and $25.3 million/year.

An alternative interpretation of the impact of this final rule is that EPA is promulgating numeric criteria to address deficiencies in the State of Florida's current narrative nutrient criteria (current conditions approach), and the incremental impacts of this rule are those associated with the difference between EPA's numeric criteria and Florida's narrative criteria. Under this scenario, the baseline incorporates requirements associated with current water quality, impaired waters, and TMDLs that exist at the time of the analysis. The incremental impacts of this rule are the costs and benefits associated with additional pollution controls beyond those currently in place or required as a result of Florida's existing narrative criteria. This analysis is principally designed to gain an understanding of the potential costs and benefits associated with implementation of EPA's numeric criteria for lakes and flowing waters above and beyond the costs associated with State implementation of its current narrative nutrient criteria for those waters. For waters that the State of Florida has already identified as impaired, EPA expects that the effect of this final rule will be to shorten the time and reduce the resources necessary for the State of Florida to implement its existing regulatory and nonregulatory framework of tools, limits, measures and BMP guidance to initiate a broader, expedited, more comprehensive, and more effective approach to reducing nutrient loadings necessary to meet the numeric criteria that support current State designated uses. The further effect of this final rule will likely be the assessment and identification of additional waters that are impaired and not meeting the designated use set forth at Section I.B, and new or revised water quality-based effluent limits in NPDES permits. EPA's economic analysis quantifies the costs and cost savings associated with the identification of newly impaired waters and new or revised water quality-based effluent limits, but does not attempt to measure the costs and cost savings associated with addressing waters that are currently listed as impaired under Florida's existing narrative nutrient criteria (these costs are considered part of the baseline).

Although using the State of Florida's draft numeric criteria as a baseline provides one possible measure of the incremental impact associated with this final rule, the current conditions approach can provide valuable information to the State of Florida and the public about other potential costs and benefits that may be realized as a result of this final rule. To provide this additional information, and in part to respond to public comments on the economic analysis at proposal, this economic analysis also measures the incremental costs and benefits of this final rule using current conditions in the State of Florida as the baseline. Using this interpretation of the baseline, EPA estimates the potential incremental costs associated with this final rule as ranging between $135.5 million per year and $206.1 million per year. Although analyses using both baselines are described in EPA's economic analysis document entitled: "*Economic Analysis of Final Water Quality Standards for Nutrients for Lakes and Flowing Waters in Florida,*" the analytical methods and results described below highlight the current conditions baseline in detail.

To develop this analysis, EPA first assessed State control requirements associated with current water quality, impaired waters, and total maximum daily loads (the baseline). EPA then assessed the costs and benefits associated with additional pollution controls beyond those currently in place or required to meet EPA's numeric criteria that support Florida designated uses. To estimate incremental point source costs, EPA gathered publicly available information and data on control technologies currently in place at wastewater treatment plants and other industrial facilities, and used Florida Department of Environmental Protection (FDEP) point source implementation procedures to project the potential additional treatment that the State may require as a result of applying the criteria in this final rule. EPA assessed potential non-point source control costs by using publicly available information and data to determine land uses near waters that would likely be identified as impaired under this rule, and using FDEP and the Florida Department of Agriculture and Consumer Services (FDACS) nonpoint source control procedures, estimated costs to implement agricultural best management practices (BMPs) the State may require in order to attain the new numeric criteria. EPA also estimated the potential costs of additional State control requirements for storm water runoff, and potential costs associated with upgrades of homeowner septic systems. EPA also assessed additional potential government regulatory costs of developing additional total maximum daily loads (TMDLs) for waters identified as impaired under this rule. Finally, EPA qualitatively and quantitatively described and estimated some of the potential benefits of complying with the new water quality standards. Because of the inherent uncertainties associated with the benefits analysis, potential benefits are likely underestimated compared to costs. Although it is difficult to predict with certainty how the State of Florida will implement these new water quality standards, the results of these analyses represent EPA's estimates of costs and benefits of this final rule.

A. Point Source Costs

Point sources of wastewater must have a National Pollution Discharge

[170] Florida Department of Environmental Protection, 2009, "Draft Technical Support Document: Development of Numeric Nutrient Criteria for Florida Lakes and Streams," available electronically at: *http://www.dep.state.fl.us/water/wqssp/nutrients/docs/tsd_nutrient_crit.docx.*

Elimination System (NPDES) permit to discharge into surface waters. EPA identified point sources potentially discharging nitrogen or phosphorus to lakes and flowing waters by evaluating EPA's NPDES Permit Compliance System (PCS) database. EPA identified all the industry codes associated with any permitted discharger with an existing numeric effluent limit or monitoring requirement for nitrogen or phosphorus. This analysis identified 193 point sources as having the potential to discharge nitrogen and/or phosphorus. The following table summarizes the number of point sources with the potential to discharge nitrogen and/or phosphorus.

TABLE VI(A)—POINT-SOURCES POTENTIALLY DISCHARGING NITROGEN AND/OR PHOSPHORUS TO FLORIDA LAKES AND FLOWING WATERS

Discharger category	Major dischargers [a]	Minor dischargers [b]	Total
Municipal Wastewater	43	42	85
Industrial Wastewater	57	51	108
Total	100	93	193

[a] Facilities discharging greater than one million gallons per day and likely to discharge toxic pollutants in toxic amounts.
[b] Facilities discharging less than one million gallons per day and not likely to discharge toxic pollutants in toxic amounts.

1. Municipal Waste Water Treatment Plant (WWTP) Costs

EPA considered the costs of known nitrogen and phosphorus treatment options for municipal WWTPs. Nitrogen and phosphorus removal technologies that are available can reliably attain an annual average total nitrogen (TN) concentration of approximately 3.0 mg/L or less and an annual average total phosphorus (TP) concentration of approximately 0.1 mg/L or less.[171] Wastewater treatment to these concentrations was considered target levels for the purpose of this analysis.

The NPDES permitting authority determines the need for water quality based effluent limits for point sources on the basis of analysis of reasonable potential to exceed water quality criteria. To estimate the potential incremental costs for WWTPs, the likelihood that WWTPs discharging to Florida lakes and flowing waters have reasonable potential to exceed the numeric criteria in this final rule should be evaluated. However, the site-specific data and information required to precisely determine reasonable potential for each facility was not available. Thus, on the basis that most WWTPs are likely to discharge nitrogen and phosphorus at concentrations above applicable criteria, EPA made the conservative assumption that all WWTPs have reasonable potential to exceed the numeric criteria.

For municipal wastewater, EPA estimated costs to reduce effluent concentrations to 3 mg/L or less for TN and 0.1 mg/L or less for TP using advanced biological nutrient removal (BNR). Although reverse osmosis and other treatment technologies may have the potential to reduce nitrogen and phosphorus concentrations even further, EPA believes that implementation of reverse osmosis applied on such a large scale has not been demonstrated as practical or necessary.[172] Such treatment has not been required for WWTPs by the State of Florida in the past, even those WWTPs under TMDLs with nutrient targets comparable to the criteria in this final rule. EPA believes that should state-of-the-art BNR technology together with other readily available physical and chemical treatment demonstrated to be effective in municipal WWTP operations not result in compliance with permit limits associated with meeting the new numeric nutrient criteria, then it is reasonable to assume that entities would first seek out other available means of attaining water quality standards such as reuse, nonpoint source reductions, site-specific alternative criteria, variances, and designated use modifications.

To estimate compliance costs for WWTPs, EPA identified current WWTP treatment performance using information obtained from NPDES permits and/or water quality monitoring reports. EPA assumed that WWTPs under existing TMDLs are currently meeting their wasteload allocation requirements and would not incur additional treatment costs. EPA further assumed that costs to WWTPs discharging to currently impaired waters are not attributable to this final rule because those costs would be incurred absent the rule (under the baseline). However, sufficient location information was not available to insure that all WWTPs discharging to impaired waters were identified. Thus, costs may be overstated to the extent that some WWTPs discharging to currently impaired waters are included in EPA's estimate. The following table summarizes EPA's best estimate of the number of potentially affected municipal WWTPs that may require additional treatment to meet the numeric criteria supporting State designated uses.

TABLE VI(A)(1)(a)—POTENTIAL ADDITIONAL NUTRIENT CONTROLS FOR MUNICIPAL WASTEWATER TREATMENT PLANTS

Discharge type	Number of dischargers				
	Additional reduction in TN and TP [a]	Additional reduction in TN only [b]	Additional reduction in TP only [c]	No incremental controls needed [d]	Total
Major	11	2	9	21	43
Minor	19	1	3	19	42

[171] U.S. EPA, 2008, "Municipal Nutrient Removal Technologies Reference Document. Volume 1—Technical Report," EPA 832–R–08–006.

[172] Treatment using reverse osmosis also requires substantial amounts of energy and creates disposal issues as a result of the large volume of concentrate that is generated.

TABLE VI(A)(1)(a)—POTENTIAL ADDITIONAL NUTRIENT CONTROLS FOR MUNICIPAL WASTEWATER TREATMENT PLANTS—Continued

Discharge type	Number of dischargers				
	Additional reduction in TN and TP [a]	Additional reduction in TN only [b]	Additional reduction in TP only [c]	No incremental controls needed [d]	Total
Total	30	3	12	40	85

[a] Includes dischargers without treatment processes capable of achieving the target levels or existing WLA for TN and TP, or for which the treatment train description is missing or unclear.
[b] Includes dischargers with chemical precipitation only and those with a wasteload allocations under a TMDL for TP only.
[c] Includes dischargers with MLE, four-stage Bardenpho, and BNR specified to achieve less than 3 mg/L and those with WLA under a TMDL for TN only.
[d] Includes dischargers with A^2/O, modified Bardenpho, modified UCT, oxidation ditches, or other BNR coupled with chemical precipitation and those with WLAs under a TMDL for both TN and TP.

An EPA study provides unit cost estimates for biological nutrient removal controls for various TN and TP performance levels.[173] To estimate costs for WWTPs, EPA used the average capital and average operation and maintenance (O&M) unit costs for technologies that achieve an annual average of 3 mg/L or less for TN and/or 0.1 mg/L or less for TP. EPA also estimated a maximum cost for TN and TP reduction by using the highest cost TN and TP removal technology (estimated by finding the maximum of annualized costs for each technology option). Using average and maximum unit costs and multiplying unit costs by flow reported in EPA's PCS database, EPA estimated total capital costs could be approximately $108 million to $219 million and operation and maintenance (O&M) costs could be approximately $12 million per year to $18 million per year. Total annual costs would be approximately $22.3 million per year to $38.1 million per year (capital costs annualized at 7% over 20 years). The following table summarizes estimated costs for municipal WWTPs.

TABLE VI(A)(1)(b)—POTENTIAL INCREMENTAL COSTS FOR MUNICIPAL WASTE WATER TREATMENT PLANTS

Cost component	Capital costs (millions) [a]	O&M costs (millions per year)	Annual costs (millions per year)
Advanced BNR	$108–$219	$12–$18	$22.3–$38.1

[a] Low estimate represents average of unit costs; high estimate represents costs for treatment processes that results in the highest annualized costs (annualized capital at 7% over 20 years plus O&M).

Using Florida's 2009 draft criteria as the baseline, municipal WWTP costs associated with this final rule are zero because treatment technologies needed to achieve Florida's 2009 draft criteria are the same as those needed to achieve the criteria in this final rule, even though the criteria themselves are somewhat different.

After EPA published its proposed criteria for Florida (75 FR 4173), several organizations in Florida developed alternative estimates of compliance costs for WWTPs that were substantially higher than EPA's estimated costs. EPA disagrees with these cost estimates because they included costs for nutrient controls that are beyond what would be required by Florida to meet the new numeric criteria. For example, the Florida Water Environment Association Utility Council (FWEAUC) estimated annual costs for WWTPs would be approximately $2.0 billion per year to $4.4 billion per year.[174] However, FWEAUC included in their analysis facilities that discharge to estuaries or coastal waters, and facilities that utilize deep well injection or generate reuse water which are not covered by this rule. FWEAUC also estimated costs to upgrade WWTPs regardless of the treatment that already exists at the facilities. Finally, FWEAUC assumed that all WWTPs will require expensive microfiltration and reverse osmosis control technology to comply with the new standard. EPA is not aware of any WWTPs in Florida that utilize microfiltration or reverse osmosis, even those discharging to currently impaired waters with TMDLs that have nutrient targets comparable to the criteria in this final rule. Thus, as noted above, EPA does not believe that this type of treatment technology for WWTPs in Florida has been demonstrated as practical or necessary. These differences appear to explain the discrepancy between FWEAUC and EPA estimates.

2. Industrial Point Source Costs

Incremental costs for industrial dischargers are likely to be facility-specific and depend on process operations, existing treatment trains, and composition of waste streams. EPA previously estimated that 108 industrial dischargers may potentially be affected by this rule (Table VI(A)). Of those 108 dischargers, EPA identified 38 of them as under an existing TMDL for nitrogen and/or phosphorus and 14 of them as discharging to waters listed as impaired for nutrients and/or dissolved oxygen. As with WWTPs, EPA assumed that industrial dischargers under an existing TMDL are currently meeting their wasteload allocation requirements and would not incur additional treatment costs, and costs at facilities discharging to currently impaired waters are not attributable to this final rule because those costs would be incurred absent the rule (under the baseline). To estimate the potential costs to the remaining 56 potentially affected

[173] U.S. EPA, 2008.

[174] Florida Water Environment Association Utility Council, 2009, "Numeric Nutrient Criteria Cost Implications for Florida POTWs," available electronically at: *http://www.fweauc.org/PDFs/FWEAUC%20letter%20to%20Crist%20re%20NNC%20Cost%20Implications%20for%20Fla%20POTWs%20with%20attachment.pdf.*

industrial facilities, EPA took a random sample of those facilities from each industry. EPA then analyzed their effluent data obtained from EPA's PCS database and other information in NPDES permits to determine whether or not they have reasonable potential to cause or contribute to an exceedance of the numeric nutrient criteria in this final rule. For those facilities with reasonable potential, EPA further analyzed their effluent data and estimated potential revised water quality based effluent limits (WQBEL) for TN and TP. If the data indicated that the facility would not be in compliance with the revised WQBEL, EPA estimated the additional nutrient controls those facilities would likely implement to allow receiving waters to meet State designated uses and the costs of those controls. EPA then calculated the average flow-based cost of compliance for the sampled facilities in each industrial category, and used the average cost to extrapolate to the potential cost for the total flow associated with all facilities in each category (*see* economic analysis support document for more information). Using this method, EPA estimated the potential costs for industrial dischargers could be approximately $25.4 million per year.

TABLE VI(A)(2)—POTENTIAL INCREMENTAL COSTS FOR INDUSTRIAL DISCHARGERS

Industrial category	Total number of facilities	Number of facilities sampled	Average sample cost ($/mgd/yr) [a]		Total annual costs [b]
Chemicals and Allied Products	9	2	$14,100	$1,116,800	
Electric Services	9	2	0		$0
Food	7	2	123,300		1,390,000
Mining	10	2	160,600	16,442,300	
Other	17	3	0	0	
Pulp and Paper	4	1	117,300	6,466,800	
Total	56	12		25,415,900	

[a] Calculated by dividing total annual sample discharger costs by total sample discharger flow. Note that where flow for a sample discharger is not available, EPA used the average flow for dischargers in that category and discharger type (major or minor).

[b] Represents average sample discharger unit cost multiplied by total flow of dischargers affected by the rule in each industrial category.

Using Florida's 2009 draft criteria as the baseline, industrial discharger costs associated with this final rule is zero because treatment technologies needed to achieve the Florida's 2009 draft criteria are the same as those needed to achieve the criteria in this final rule, even though the criteria themselves are somewhat different.

Several organizations in Florida developed alternative estimates of compliance costs for EPA's proposed rule that were substantially higher than EPA's estimated costs for industrial dischargers. EPA disagrees with these cost estimates because they assumed that facilities will need to install treatment technologies that are much more expensive than those that would likely be required by Florida to meet the numeric criteria. For example, FDEP estimated that the costs for industrial dischargers would be approximately $2.1 billion per year.[175] However, FDEP assumed that every industrial facility would treat their total discharge volume using reverse osmosis which EPA believes is impractical and unnecessary. In addition, FDEP estimated costs for reverse osmosis on the basis of each facility's maximum daily discharge flow instead of its reported design capacity (in some cases the maximum daily flow was more than double the design capacity). Installing treatment technology to handle maximum daily flows would be unnecessary because equalization basins or storage tanks (used to temporarily hold effluent during peak flows) would be a less expensive compliance strategy. Finally, EPA found no indication that industrial facilities in Florida have installed reverse osmosis for the purpose of complying with a nutrient-related TMDL, even those TMDLs with nutrient targets comparable to the criteria in this final rule. These differences appear to explain the discrepancy between FDEP and EPA estimates.

B. Incrementally Impaired Waters

To estimate nonpoint source incremental costs associated with State control requirements that may be necessary to assure attainment of designated uses, EPA first removed from further consideration any waters the State of Florida has already determined to be impaired or has established a TMDL and/or BMAP because these waters were considered part of the baseline for this analysis. EPA next identified Florida waters that may be identified as incrementally impaired using the criteria of this final rule, and then identified the watersheds surrounding those incrementally impaired waters. EPA analyzed FDEP's database of ambient water quality monitoring data and compared monitoring data for each waterbody with EPA's new criteria for TN and TP in lakes and flowing waters, and nitrate+nitrite concentrations in springs. To account for streams that may have downstream protection values (DPVs) as applicable criteria, streams intersecting lakes were assigned the applicable lake criteria. Costs may be overestimated because the method does not distinguish between upstream and downstream intersecting streams. Thus DPVs and additional controls may have been attributed to streams downstream of an impaired lake. EPA compiled the most recent five years of monitoring data, calculated the annual geometric mean for each waterbody identified by a waterbody identification number (WBID), and identified waters as incrementally impaired if they exceeded the applicable criteria in this final rule.

[175] Florida Department of Environmental Protection, 2010, "FDEP Review of EPA's 'Preliminary Estimate of Potential Compliance Costs and Benefits Associated with EPA's Proposed Numeric Nutrient Criteria for Florida'," p. 3.

TABLE VI(B)—SUMMARY OF POTENTIAL INCREMENTALLY IMPAIRED WATERS

Category	Number of water bodies			Total
	Lake	Stream [a]	Spring	
Total in State	1,310	3,901	126	5,337
Not Listed/Covered by TMDL [b]	1,099	3,608	119	4,826
Water Quality Monitoring Data for Nutrients [c]	878	1,273	72	2,223
Sufficient Data Available [d]	655	930	72	1,657
Potentially Exceeding Criteria (incrementally impaired) [e]	148	153	24	325

[a] Includes blackwater.
[b] As reported in TMDL documents and FDEP.
[c] Data within last 5 years meeting data quality requirements.
[d] Annual geometric means based on at least 4 samples with one sample from May to September and one sample from October to April in a given year.
[e] Annual geometric mean exceeding the applicable criteria more than once in a three year period.

C. Non-Point Source Costs

To estimate the potential incremental costs associated with controlling nitrogen/phosphorus pollution from non-point sources, EPA identified land areas near incrementally impaired waters using GIS analysis. EPA first identified all the 10-digit hydrologic units (HUCs) in Florida that contain at least a *de minimus* area of an incrementally impaired WBID (WBIDs were GIS polygons), and excluding those HUCs that contain at least a *de minimus* area of a currently impaired WBID. EPA then identified land uses using GIS analysis of data obtained from the State of Florida.[176]

1. Costs for Urban Runoff

EPA's GIS analysis indicates that urban land (excluding land for industrial uses covered under point sources) accounts for approximately seven percent of the land near incrementally impaired waters. EPA's analysis also indicates that urban runoff is already regulated on approximately one half of this land under EPA's storm water program requiring municipal storm sewer system (MS4) NPDES permits. Florida has a total of 28 large (Phase I) permitted MS4s serving greater than 100,000 people and 131 small (Phase II) permitted MS4s serving less than 100,000 people. MS4 permits generally do not have numeric nutrient limits, but instead rely on implementation of BMPs to control pollutants in storm water to the maximum extent practicable. Even those MS4s in Florida discharging to impaired waters or under a TMDL currently do not have numeric limits for any pollutant.

In addition to EPA's storm water program, several existing State rules are intended to reduce pollution from urban runoff. Florida's Urban Turf Fertilizer rule (administered by FDACS) requires a reduction in the amount of nitrogen and phosphorus that can be applied to lawns and recreational areas. Florida's 1982 storm water rule (Chapter 403 of Florida statues) requires storm water from new development and redevelopment to be treated prior to discharge through the implementation of BMPs. The rule also requires that older systems be managed as needed to restore or maintain the beneficial uses of waters, and that water management districts establish and implement other storm water pollutant load reduction goals. In addition, Chapter 62–40, F.A.C., "Water Resource Implementation Rule," establishes that storm water design criteria adopted by FDEP and the water management districts shall achieve at least 80% reduction of the average annual load of pollutants that cause or contribute to violations of WQS (95% reduction for outstanding natural resource waters). The rule also states that the pollutant loading from older storm water management systems shall be reduced as necessary to restore or maintain the designated uses of waters.

Although urban runoff is currently regulated under the statutes and rules described above, this final rule may indirectly result in changes to MS4 NPDES permit requirements for urban runoff so that Florida waters meet State designated uses. However, the combination of additional pollution controls required will likely depend on the specific nutrient reduction targets, the controls already in place, and the relative amounts of nitrogen/phosphorus pollution contained in urban runoff at each particular location. Because storm water programs are usually implemented using an iterative approach, with the installation of controls followed by monitoring and re-evaluation to determine the need for additional controls, estimating the complete set of pollution controls required to meet a particular water quality target would require site-specific analysis.

Although it is difficult to predict the complete set of potential additional storm water controls that may be required to meet the numeric criteria that supports State designated uses in incrementally impaired waters, EPA estimated potential costs for additional treatment by assessing the amount of urban land that may require additional pollution controls for storm water. FDEP has previously assumed that all urban land developed after adoption of Florida's 1982 storm water rule would be in compliance with this final rule.[177] Using this same assumption, EPA used GIS analysis of land use data obtained from the State of Florida [178] to identify the amount of remaining urban land located near incrementally impaired waters. Using this procedure, EPA estimated that up to 48,100 acres of Phase I MS4 urban land, 30,700 acres of Phase II MS4 urban land, and 30,600 acres of non-MS4 urban land may require additional storm water controls. EPA estimated costs of implementing controls for Phase I MS4 urban land based on a range of acres with 48,100 acres as the upper bound and zero acres as the lower bound because Phase I MS4 urban land already must implement controls to the "maximum extent practicable" and may not require additional controls if existing requirements are already fully implemented.

The cost of storm water pollution controls can vary widely. FDEP has assessed the cost of completed storm water projects throughout the State in dollars per acre treated.[179] Capital costs

[176] Florida Geological Data Library, 2009, "GIS Data: WBIDs," available electronically at: *http://www.fgdl.org/download/index.html.*

[177] Florida Department of Environmental Protection, 2010, "FDEP Review of EPA's 'Preliminary Estimate of Potential Compliance Costs and Benefits Associated with EPA's Proposed Numeric Nutrient Criteria for Florida'," p. 9.

[178] Florida Geological Data Library, 2009.

[179] Florida Department of Environmental Protection, 2010, appendix 3.

range from $62 to $60,300 per acre treated, with a median cost of $6,800 per acre. EPA multiplied FDEP's median capital cost per acre by the number of acres identified as requiring controls to estimate the potential additional storm water control costs that may be needed to meet the numeric criteria in this rule. EPA also used FDEP's estimate of operating and maintenance (O&M) costs as 5% of capital costs, and annualized capital costs using FDEP's discount rate of 7% over 20 years. EPA estimates the total annual cost for additional storm water controls could range between approximately $60.5 and $108.0 million per year. The following table summarizes these estimates.

TABLE VI(C)(1)—POTENTIAL INCREMENTAL URBAN STORM WATER COST SCENARIOS

Land type	Acres needing controls [a]	Capital cost (millions $) [b]	O&M cost (millions $) [c]	Annual cost (millions $) [d]
MS4 Phase I Urban	0–48,100	$0–$329.1	$0–$16.4	$0–$47.5
MS4 Phase II Urban	30,700	$210.0	$10.5	$30.3
Non-MS4 Urban	30,600	$208.8	$10.4	$30.2
Total	61,300–109,400	$418.8–$747.0	$20.9–$37.4	$60.5–$108.0

[a] Phase I MS4s range represents implementation of BMPs to the MEP resulting in compliance with EPA's rule or controls needed on all pre-1982 developed land; Phase II MS4s and urban land outside of MS4s represent controls needed on all pre-1982 developed land that is not low density residential.
[b] Represents acres needing controls multiplied by median unit costs of storm water retrofit costs obtained from FDEP.
[c] Represents 5% of capital costs.
[d] Capital costs annualized at 7% over 20 years plus annual O&M costs.

Using Florida's 2009 draft criteria as the baseline, potential incremental costs for urban storm water are estimated to range from $13.7 million per year to $27.2 million per year.

Several organizations in Florida developed alternative estimates of compliance costs for EPA's proposed rule that were substantially higher than EPA's estimated costs for urban storm water. EPA disagrees with these cost estimates because they utilized incorrect assumptions about the areas that would have to implement controls. For example, FDEP estimated costs for urban storm water controls at $1.97 billion per year.[180] However, FDEP estimated costs for pollution controls on urban land in watersheds that may not be listed as impaired, have already been listed as impaired, or will require controls under existing rules (*e.g.* land currently permitted under EPA's MS4 storm water program). In contrast, EPA estimated costs for urban storm water controls only for urban land with storm water flows to waters that may be listed as impaired as a result of this rule. This difference appears to explain the discrepancy between FDEP and EPA estimates.

2. Agricultural Costs

EPA's GIS analysis of land use indicates that agriculture accounts for about 19 percent of the land near incrementally impaired waters. Agricultural runoff can be a source of phosphorus and nitrogen to lakes and streams through the application of fertilizer to crops and pastures and from animal wastes. Some agricultural practices may also contribute nitrogen and phosphorus to groundwater aquifers that supply springs. For waters impaired by nitrogen/phosphorus pollution, the 1999 Florida Watershed Restoration Act established that agricultural BMPs should be the primary instrument to implement TMDLs. Thus, additional waters identified by the State as impaired under this rule may result in State requirements or provisions to reduce the discharge of nitrogen and/or phosphorus to incrementally impaired waters through the implementation of BMPs.

EPA estimated the potential costs of additional agricultural BMPs by evaluating land use data obtained from Florida's five water management districts. BMP programs designed for each type of agricultural operation and their costs were taken from a study of agricultural BMPs to help meet TMDL targets in the Caloosahatchee River, St. Lucie River, and Lake Okeechobee watersheds.[181] Three types of BMP programs were identified in this study. The first program, called the "Owner Implemented BMP Program," consists of a set of BMPs that land owners might implement without additional incentives. The second program, called the "Typical BMP Program," is the set of BMPs that land owners might implement under a reasonably funded cost share program or a modest BMP strategy approach. The third program, called the "Alternative Program," is a more expensive program designed to supplement the "Owner Implemented Program" and "Typical Program" if additional reductions are necessary.

The BMPs in the "Owner Implemented Program" and "Typical Program" are similar to the BMPs adopted by FDACS. EPA has found no indication that the "Alternative BMP Program," which includes storm water chemical treatment, has been required in historically nutrient impaired watersheds with significant contributions from agriculture for which TMDLs have been developed (*e.g.* Lake Okeechobee). Therefore, for purposes of this analysis, EPA believes it is reasonable to assume that nutrient controls for agricultural sources are best represented by the "Owner Implemented Program" and "Typical Program" described in the study used here.[182] EPA estimated potential incremental costs of BMPs by multiplying the number of acres in each agricultural category by the sum of unit costs for the "Owner Implemented Program" and "Typical Program." The following table summarizes the potential incremental costs of BMPs on agricultural lands near incrementally impaired lakes and streams for each agricultural category.

[180] Florida Department of Environmental Protection, 2010, p. 3.

[181] Soil and Water Engineering Technology, 2008, "Nutrient Loading Rates, Reduction Factors and Implementation Costs Associated with BMPs and Technologies," (report prepared for South Florida Water Management District).

[182] Soil and Water Engineering Technology, 2008.

TABLE VI(C)(2)(a)—POTENTIAL INCREMENTAL BMP COSTS FOR LAKES AND STREAMS

Agricultural category	Area (acres)[a]	"Owner implemented program" plus "typical program" unit costs ($/ac/yr)[e]	Total "owner implemented program" and "typical program" costs ($/yr)
Animal Feeding	1,814–1,846	18.56	33,671–34,260
Citrus	15,482–27,343	156.80	2,427,652–4,287,343
Cow Calf Production (Improved Pastures)	153,978–168,665	15.84	2,439,007–2,671,656
Cow Calf Production (Unimproved Pastures)	49,054–51,057	4.22	207,203–215,663
Cow Calf Production (Rangeland and Wooded)	74,449–75,790	4.22	314,474–320,136
Row Crop	7,846–9,808	70.40	552,352–690,453
Cropland and Pastureland (general).[b]	152,976–160,814	27.26	4,169,512–4,383,135
Sod/Turf Grass	2,007	35.20	70,631
Ornamental Nursery	840	70.00	58,783
Dairies	583–621	334.40	194,803–207,777
Horse Farms	1,632	15.84	25,857
Field Crop (Hayland) Production	194,181–215,168	18.56	3,603,996–3,993,521
Other Areas[c]	54,499–67,364	18.56	1,011,500–1,250,281
Total[d]	709,340–782,954		15,109,436–18,209,496

[a] Based on GIS analysis of land use data from five water management districts (for entire State) and FDACS BMP program NOI GIS data layer. Low end reflects acres in incrementally impaired HUCs (that are not included in HUCs for baseline impairment) that are not enrolled in BMPs under FDACS; high end reflects all acres in incrementally impaired HUCs, regardless of FDACS BMP enrollment.

[b] "Owner program" and "Typical Program" BMP unit costs based on average costs for improved pastures, unimproved/wooded pasture, row crops, and field crops.

[c] Includes FLUCCS Level 3 codes 2160, 2200, 2230, 2400, 2410, 2500, 2540, and 2550.

[d] Excludes land not in production.

[e] Soil and Water Engineering Technology, 2008, Nutrient Loading Rates, Reduction Factors and Implementation Costs Associated with BMPs and Technologies, Report prepared for South Florida Water Management District.

In addition to estimating potential costs associated with agricultural BMPs to reduce nitrogen/phosphorus pollution to lakes and streams as described above, EPA estimated potential costs associated with BMPs to protect groundwater aquifers that supply water to springs. Fertilizer application and other agricultural practices can significantly increase nutrient loadings to springs, especially those springs supplied by relatively large groundwater aquifers. EPA evaluated the potential incremental costs to meet the numeric criteria in this final rule for springs by assuming that all applicable agricultural operations may be identified for implementation of nutrient management. Nutrient management reduces over application of fertilizers by determining realistic yield expectations, the nitrogen requirements necessary to obtain those yields, and adjusting application methods and timing to minimize nitrogen pollution.

Nutrient management is a cost-effective way to reduce groundwater nitrogen, and may even result in cost savings to some farmers by reducing unnecessary fertilizer application. Therefore, for the purpose of this analysis, EPA assumed that all agricultural operations applying fertilizer to land would implement a nutrient management program, even those operations that are not associated with incrementally impaired waters. To estimate the potential costs of nutrient management, EPA estimated the amount of agricultural land where nutrient management could be applicable. EPA identified general agriculture [183] and specialty crops [184] as agricultural categories appropriate for nutrient management. EPA then used GIS analysis of land use data obtained from the State of Florida [185] to identify the land areas categorized as general agriculture or specialty crops. Approximately 4.9 million acres of agricultural land was identified as general agriculture and 1 million acres was identified as specialty crops. EPA further analyzed this agricultural land to identify the land near waters already listed as impaired for nutrients or under a TMDL. Similar to point sources, EPA assumed that nonpoint sources under an existing TMDL are currently meeting their load allocation requirements and would not incur additional costs, and costs to nonpoint sources associated with waters that are currently listed as impaired for nutrients are not attributable to this final rule because those costs would be incurred absent the rule (under the baseline). EPA also removed from this analysis land associated with incrementally impaired waters to avoid double counting the costs of BMPs that were already estimated to protect lakes and streams as described above. As a result of this analysis, approximately 1 million acres of general agriculture and 0.12 million acres of specialty crops was identified as land that may need to implement a nutrient management program to meet the numeric criteria for Florida springs in this final rule. Using unit costs of $10 per acre for general agriculture and $20 per acre for specialty crops obtained from Florida's Environmental Quality Incentive Program,[186] EPA estimated the annual cost of nutrient management could be approximately $4.7 million per year. The following table summarizes the estimated potential incremental costs of BMPs on agricultural lands to protect State designated uses of springs on the basis of the criteria in this final rule.

[183] Cropland and pastureland, cow calf production (improved pastures), cropland and pastureland (general), dairies, horse farms, and field crop (hayland) production.

[184] Citrus, row crops, sod/turf grass, and ornamental nursery.

[185] Florida Geological Data Library, 2009.

[186] Florida Environmental Quality Incentive Program, 2009, "FY 2009 Statewide Payment Schedules," available electronically at: *ftp://ftp-fc.sc.egov.usda.gov/FL/eqip/EQIP_FY2009PaySched_STATEWIDE_FINAL.pdf.*

TABLE VI(C)(2)(b)—POTENTIAL INCREMENTAL BMP COSTS FOR SPRINGS

Nutrient management program type	Total acres in Florida [a]	Acres identified for nutrient management [b]	Unit cost ($/acre)	Total cost	Annual cost ($/year) [c]
General Agriculture	4,885,643	1,003,973	$10	$10,039,729	$3,825,656
Specialty Crop	1,057,107	120,558	20	2,411,163	918,778
Total	5,942,750	1,124,531		12,450,892	4,744,433

[a] Excludes unimproved and woodland pastures, abandoned groves, aquaculture, tropical fish farms, open rural lands, and fallow cropland.
[b] Calculated by subtracting agricultural land near incrementally impaired waters needing controls and agricultural land types participating in FDACS BMP program (assuming all Tri-county agricultural area land is regular nutrient management land) from total land use area in Florida.
[c] Costs annualized at 7% over 3 years on basis of 3 year useful life.

The following table summarizes the total estimated potential incremental costs of BMPs on agricultural lands to meet the numeric criteria.

TABLE VI(C)(2)(C)—POTENTIAL ANNUAL INCREMENTAL COMPLIANCE COSTS FOR AGRICULTURE

Waterbody type	Applicable acres	Annual costs
Lakes and Streams	709,340–782,954	$15,109,400–$18,209,500
Springs	1,124,531	$4,744,400
Total	1,833,871–1,907,485	$19,853,900–$22,953,900

Using Florida's 2009 draft criteria as the baseline, potential incremental costs to agriculture are estimated to range from − $2.4 million per year (a negative cost represents a cost savings) to $2.1 million per year.

Several organizations in Florida developed alternative estimates of compliance costs for EPA's proposed rule that were substantially higher than EPA's estimated costs for agriculture. EPA disagrees with these cost estimates because they use incorrect assumptions that overestimate costs. For example, the FDACS estimated that costs for agriculture would be approximately $0.9 billion to $1.6 billion per year.[187] However, FDACS estimated BMP costs for all 13.6 million acres of agricultural land in the State of Florida. This land includes watersheds where waters are not expected to become listed as impaired due to this final rule (including coastal and estuarine watersheds), have already been listed as impaired, or will require controls under existing rules (*e.g.* animal feeding operations) and thus are not potentially affected by the rule. A portion of the agricultural land used by FDACS to estimate costs includes 4.8 million acres of forest, 98.1% of which the State of Florida has claimed current BMPs effectively protect surface waters[188] and thus EPA assumes will not require further controls. FDACS also estimated costs using the highest cost Alternative BMP program. The Alternative BMP Program, which includes storm water chemical treatment, is not yet required in historically nutrient-impaired watersheds with significant contributions from agriculture. Thus, it is uncertain whether such controls would be necessary or required to meet the new numeric criteria which are intended to implement Florida's existing narrative criteria. In contrast, EPA estimated costs for BMPs that are likely to be necessary, and only on the agricultural land identified as incrementally impaired under this final rule (although costs could be higher in some cases if further reductions are found to be necessary). These differences appear to explain the discrepancy between FDACS and EPA estimates.

The alternative BMP program, which includes storm water chemical treatment, is not yet required in the study basins which have significant contributions from agriculture. Thus, for this analysis, EPA assumed that nutrient controls for agricultural sources are best represented by the owner/typical programs.

3. Septic System Costs

Some nutrient reductions from septic systems may be necessary for incrementally impaired waters to meet the numeric nutrient criteria in this final rule. Several nutrient-related TMDLs in Florida identify septic systems as a significant source of nitrogen/phosphorus pollution. Although properly operated and maintained systems can provide treatment equivalent to secondary wastewater treatment,[189] even properly functioning septic systems can be expected to contribute to nitrogen/phosphorus pollution at some locations.[190] Some of the ways to address pollution from septic systems may include greater use of inspection programs and repair of failing systems, upgrading existing systems to advanced nutrient removal, installation of decentralized cluster systems where responsible management entities would ensure reliable operation and maintenance, and connecting households and businesses to wastewater treatment plants. On the basis of current practice in the State of

[187] Florida Department of Agriculture and Consumer Services, 2010, "Consolidated Comments on Proposed EPA Numeric Nutrient Criteria for Florida's Lakes and Flowing Waters," p. 1, available electronically at: *http://www.floridaagwaterpolicy.com/PDF/FINAL_FDACS_Consolidated_Comments_on_Docket_ID_No_EPA_HQ_OW_2009_0596.pdf.*

[188] Florida Division of Forestry, Department of Agriculture and Consumer Services, 2010, "Silviculture Best Management Practices: 2009 Implementation Survey Report," available electronically at: *http://www.fl-dof.com/publications/2009_BMP_survey_report.pdf.*

[189] Petrus, K., 2003, "Total Maximum Daily Load for the Palatlakaha River to Address Dissolved Oxygen Impairment, Lake County, Florida," (Florida Department of Environmental Protection), available electronically at: *http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp1/palatlakaha_river_do_tmdl.pdf.*

[190] Florida Department of Environmental Protection, 2006, "TMDL Report. Nutrient and Unionized Ammonia TMDLs for Lake Jesup, WBIDs 2981 and 2981A," available electronically at: *http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp2/lake-jessup-nutr_ammonia-tmdl.pdf.*

Florida, EPA assumed that the most likely strategy to reduce nutrients loads from septic systems would be to upgrade existing conventional septic systems to advanced nutrient removal systems.

Septic systems in close proximity to surface waters are more likely to contribute nutrient loads to waters than distant septic systems. Florida Administrative Code provides that in most cases septic systems should be located at least 75 feet from surface waters (F.A.C. 64E–6.005(3)). In addition, many of Florida's existing nutrient-related TMDLs identify nearby failing septic systems as contributing to nutrient impairments in surface waters.

For this economic analysis, EPA assumed that some septic systems located near incrementally impaired lakes and streams may be required to upgrade to advance nutrient removal systems. However, the distance that septic systems can be safely located relative to these surface waters depends on a variety of site-specific factors. Because of this uncertainty, EPA conservatively assumed that septic systems located within 500 feet of any lake or stream in watersheds associated with incrementally impaired lakes or streams [191] may be identified for upgrade from conventional to advanced nutrient removal systems.

EPA identified the number of septic systems within 500 feet of any lake or stream in watersheds associated with incrementally impaired lakes and streams using GIS analysis on data obtained from the Florida Department of Health [192] that provides the location of active septic systems in the State. This analysis yielded 8,224 active septic systems that may potentially need to be upgraded from conventional to advanced nutrient removal systems to meet the numeric nutrient criteria in this final rule.

EPA evaluated the cost of upgrading existing septic systems to advanced nutrient removal systems. Upgrade costs range from $2,000 to $6,500 per system. For O&M costs, EPA relied on a study that compared the annual costs associated with various septic system treatment technologies including conventional onsite sewage treatment and disposal system and fixed film activated sludge systems.[193] This study estimated the incremental O&M costs for an advanced system to be $650 per year. Thus, based on annual O&M costs of $650 and annualizing capital costs at 7% over 20 years, annual costs could range from approximately $800 to $1,300 for each upgrade. EPA estimated the total annual costs of upgrading septic systems by multiplying this range of unit costs with the number of systems identified for upgrade. Using this method, total annual costs for upgrading septic systems to meet State designated uses could range from $6.6 million per year to $10.7 million per year.

Using Florida's 2009 draft criteria as the baseline, potential incremental costs to upgrade septic systems are estimated to range from $1.3 million per year to 2.2 million per year.

Several organizations in Florida developed alternative estimates of compliance costs for septic systems in EPA's proposed rule that were substantially higher than EPA's estimated costs. EPA disagrees with these cost estimates because they used incorrect assumptions that overestimate costs. For example, FDEP estimated that the costs related to septic systems would be approximately $0.9 billion per year to 2.9 billion per year.[194] However, FDEP assumed that 1,687,500 septic systems would require complete replacement (calculated as the proportion of all septic systems in the State of Florida on lots less than 3 acres assumed to discharge to fresh waters because all urban storm water discharges to freshwaters in that proportion). In contrast, EPA estimated costs to upgrade 8,224 septic systems to advanced nutrient removal systems that GIS analysis identified as located within 500 feet of any water within an incrementally impaired watershed.

D. Governmental Costs

This final rule may result in the identification of additional impaired waters that would require the development of additional TMDLs. As the principal State regulatory agency implementing water quality standard, the State of Florida may incur costs related to developing additional TMDLs. EPA's analysis identified 325 incrementally impaired waters potentially associated with this final rule. Because current TMDLs in Florida include an average of approximately two water bodies each, EPA estimates that the State of Florida may need to develop and adopt approximately 163 additional TMDLs. A 2001 EPA study found that the cost of developing a TMDL could range between $6,000 and $154,000, with an average cost of approximately $28,000.[195] [196] The low end of the range reflects the typical cost associated with TMDLs that are the easiest to develop and/or have the benefit of previous TMDL development for other pollutants. Because most of the incrementally impaired waters in EPA's analysis exceeded the criteria for both nitrogen and phosphorus, EPA assumed that TMDLs would need to be developed for both nitrogen and phosphorus. Under this assumption, EPA estimated the average TMDL cost to be approximately $47,000 ($28,000 on average for one pollutant, plus $6,000 on average for the other pollutant, and adjusting for inflation). For 163 TMDLs, total costs could be approximately $7.7 million. FDEP currently operates its TMDL schedule on a five-phase cycle that rotates through the five basins over five years. Under this schedule, completion of TMDLs for high priority waters will take 9 years; it will take an additional 5 years to complete the process for medium priority waters. Thus, assuming all the incremental impairments are high priority and FDEP develops the new TMDLs over a 9-year period, annual costs could be approximately $851,000 per year. Using Florida's 2009 draft criteria as the baseline, potential incremental costs to develop additional TMDLs could be approximately $261,000 per year.

Should the State of Florida submit current TMDL targets as Federal site specific alternative criteria (SSAC) for EPA review and approval, EPA believes it is reasonable to assume that information used in the development of the TMDLs will substantially reduce the time and effort needed to provide a scientifically defensible justification for such applications. Thus, EPA assumed that incremental costs associated with SSAC, if any, would be minimal.

Similarly, State and local agencies regularly monitor TN and TP in ambient waters. These data are the basis for the extensive IWR database the State of Florida maintains and which provided baseline water quality data for EPA's analyses. Because Florida is currently

[191] In this analysis EPA considered septic systems within 500 feet of any lake or stream in an incrementally impaired watershed rather than only within 500 feet of an incrementally impaired lake or stream to account for the possibility of some downstream transport of nutrients from nearby streams that may not themselves be classified as incrementally impaired.

[192] Florida Department of Health, 2010, "Bureau of Onsite Sewage GIS Data Files," available electronically at: *http://www.doh.state.fl.us/Environment/programs/EhGis/EhGisDownload.htm.*

[193] Chang, N., M. Wanielista, A. Daranpob, F. Hossain, Z. Xuan, J. Miao, S. Liu, Z. Marimon, and S. Debusk, 2010, "Onsite Sewage Treatment and Disposal Systems Evaluation for Nutrient Removal," (Stormwater Management Academy, University of Central Florida).

[194] Florida Department of Environmental Protection, 2010, p. 3.

[195] U.S. EPA, 2001, "The National Costs of the Total Maximum Daily Load Program (Draft Report)," (EPA–841–D–01–003).

[196] EPA did not adjust these estimates to account for potential reductions in resources required to develop TMDLs as a result of this final rule.

monitoring TN, TP, and chlorophyll *a* concentrations in many waters, EPA assumed that this final rule is unlikely to have a significant impact on costs related to water quality monitoring activities.

E. Benefits

Elevated concentrations of nutrients in surface waters can result in adverse ecological effects and negative economic impacts. Excess nutrients in water can cause eutrophication, which can lead to harmful (sometimes toxic) algal blooms, loss of rooted plants, and decreased dissolved oxygen, which can lead to adverse impacts on aquatic life, fishing, swimming, wildlife watching, camping, and drinking water. Excess nutrients can also cause nuisance surface scum, reduced food for herbivorous wildlife, fish kills, alterations in fish communities, and unsightly shorelines that can decrease property values. This final rule will help reduce nitrogen and phosphorus concentrations in lakes and flowing waters in Florida, and help improve ecological function and prevent further degradation that can result in substantial economic benefits to Florida citizens. EPA's economic analysis document entitled: *Economic Analysis of Final Water Quality Standards for Nutrients for Lakes and Flowing Waters in Florida* describes many of the potential benefits associated with meeting the water quality standards for nitrogen/phosphorus pollution in this rule.

Florida waters have historically provided an abundance of recreational opportunities that are a vital part of the State's economy. In 2007, over 4.3 million residents and over 5.8 million visitors participated in recreational activities related to freshwater beaches in Florida.[197] Of these residents and visitors, over 2.7 million residents and approximately 1 million visitors used freshwater boat ramps, over 3 million residents and over 900,000 visitors participated in freshwater non-boat fishing, and over 2.6 million residents and almost 1 million visitors participated in canoeing and kayaking. Florida also ranks first in the nation in boat registrations with 973,859 recreational boats registered across the State.

Tourism comprises one of the largest sectors of the Florida economy. In 2000, there were over 80.9 million visitors to the State of Florida, accounting for an estimated $65 billion in tourism spending.[198] In 2008, tourism spending resulted in approximately $3.9 billion in State sales tax revenues and contributed to the direct employment of more than 1 million Florida residents.[199] Florida has ranked first in the nation for the number of in-State anglers, angler expenditures, angler-supported jobs, and State and local tax revenues derived from freshwater fishing.[200] In 2006, total fishing-related expenditures by residents and nonresidents were more than $4.3 billion.[201] In addition, Florida's freshwater springs are an important inter- and intra-State tourist attraction.[202] In 2002, Blue Springs State Park estimated over 300,000 visitors per year.

Nitrogen/phosphorus pollution has contributed to severe water quality degradation of Florida waters. In 2010, the State of Florida reported approximately 1,918 miles of rivers and streams, and 378,435 acres of lakes that were known to be impaired by nitrogen/phosphorus pollution (the actual number of waters impaired for nutrients may be higher because many waters were not assessed).[203] As water quality declines, water resources have less recreational value. Waters impaired by nitrogen/phosphorus pollution may become unsuitable for swimming and fishing, and in some cases even unsuitable for boating. Nutrient-impaired waters also are less likely to support native plant and animal species, further lowering their value as tourist destinations.[204] Drinking water supplies may also be more expensive to treat as a result of nutrient impairments. Also, Florida citizens that depend on individual wells for their drinking water may need to consider whether on-site treatment is necessary to reduce elevated nitrate+nitrite levels. Freshwater springs are particularly at risk due to nitrate+nitrite.[205] [206] Silver Springs, the largest of Florida's springs, has experienced reduced ecosystem health and productivity over the past half century, due largely to nitrate+nitrite.[207] Nutrient impairment, characterized by algal blooms, reduced numbers of native species, and lower water quality, in turn leads to reduced demand and lower values for these resources.

Some of the benefits of reducing nitrogen and phosphorus concentrations can be monetized, at least in part, by translating these changes into an indicator of overall water quality (water quality index) and valuing these improvements in terms of willingness to pay (WTP) for the types of uses that are supported by different water quality levels. For this analysis, EPA used a Water Quality Index (WQI) approach to link specific pollutant levels with suitability for particular recreational uses. Using Florida water quality data, available information on WTP, and an analytical approach described in EPA's accompanying economic assessment report and supporting references, EPA estimated potential changes that would result from implementation of this final rule and their value to a distribution of full-time and part-time Florida residents. This approach recognizes that there are differences in WTP among a population and values for households. Using the mid-point WTP and current conditions as the baseline, total monetized benefits are estimated to be approximately $21.7 million per year for improvements to flowing waters and $6.6 million per year for improvements to lakes for a total of $28.2 million per year. Although these monetized benefits estimates do not account for all potential economic benefits, they help to partially demonstrate the economic importance of restoring and protecting Florida waters from the impacts of nitrogen/phosphorus pollution.

[197] Florida Department of Environment, 2008, "State Comprehensive Outdoor Recreation Plan (SCORP)," available electronically at: *http://www.dep.state.fl.us/parks/planning/default.htm.*

[198] VISIT Florida, 2010, available electronically at: *http://media.visitflorida.org/research.php.*

[199] VISIT Florida, 2010.

[200] Bonn, Mark A. and Frederick W. Bell., 2003, Economic Impact of Selected Florida Springs on Surrounding Local Areas. For Florida Department of Environmental Protection. Available electronically at: *http://www.dep.state.fl.us/springs/reports/files/EconomicImpactStudy.doc.*

[201] 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Florida. U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. Available electronically at: *http://myfwc.com/docs/Freshwater/2006_Florida_NationalSurvey.pdf.*

[202] Florida Department of Environmental Protection, 2008.

[203] Florida Department of Environmental Protection, 2010, "Integrated Water Quality Assessment for Florida: 2010 305(b) and 303(d) List Update," available electronically at: *http://www.dep.state.fl.us/water/docs/2010_Integrated_Report.pdf.*

[204] Zheng, Lei and Michael J. Paul., 2006, *Effects of Eutrophication on Stream Ecosystems.* Available electronically at: *http://n-steps.tetratech-ffx.com/PDF&otherFiles/literature_review/Eutrophication%20effects%20on%20streams.pdf.*

[205] Florida Department of Environment, "Deep Trouble: Getting to the Source of Threats to Springs," accessed on October 1, 2010 at: *http://www.floridasprings.org/protection/threats/.*

[206] Munch, D.A., D.J. Toth, C. Huang, J.B. Davis, C.M. Fortich, W.L. Osburn, E.J. Phlips, E.L. Quinlan, M.S. Allen, M.J. Woods, P. Cooney, R.L. Knight, R.A. Clarke and S.L. Knight., 2006, "Fifty-year retrospective study of the ecology of Silver Springs, Florida," (SJ2007–SP4).

[207] Florida Department of Environment, 2008, Summary and Synthesis of the Available Literature on the Effects of Nutrients on Spring Organisms and Systems," available at: *http://www.dep.state.fl.us/springs/reports/files/UF_SpringsNutrients_Report.pdf.*

F. Summary

The following table summarizes EPA's estimates of potential incremental costs and benefits associated with additional State requirements to meet the numeric criteria that supports State designated uses. Because of uncertainties in the pollution controls ultimately implemented by the State of Florida, actual costs may vary depending on the procedures for assessing waters for compliance and the site-specific source reductions needed to meet the new numeric criteria.

TABLE VI(F)(a)—SUMMARY OF POTENTIAL ANNUAL COSTS

[millions of 2010 dollars per year]

Source sector	Annual costs
Municipal Waste Water Treatment Plants.	$22.3–$38.1
Industrial Dischargers	$25.4
Urban Storm Water	$60.5–$108.0
Agriculture	$19.9–$23.0
Septic Systems	$6.6–$10.7
Government/Program Implementation.	$0.9
Total	$135.5–$206.1

VII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action." Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. This final rule does not establish any requirements directly applicable to regulated entities or other sources of nitrogen/phosphorus pollution. Moreover, existing narrative water quality criteria in State law already require that nutrients not be present in waters in concentrations that cause an imbalance in natural populations of flora and fauna in lakes and flowing waters in Florida.

B. Paperwork Reduction Act

This action does not impose an information collection burden under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* Burden is defined at 5 CFR 1320.3(b). It does not include any information collection, reporting, or record-keeping requirements.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of this action on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Under the CWA WQS program, States must adopt WQS for their waters and must submit those WQS to EPA for approval; if the Agency disapproves a State standard and the State does not adopt appropriate revisions to address EPA's disapproval, EPA must promulgate standards consistent with the statutory requirements. EPA also has the authority to promulgate WQS in any case where the Administrator determines that a new or revised standard is necessary to meet the requirements of the Act. These State standards (or EPA-promulgated standards) are implemented through various water quality control programs including the NPDES program, which limits discharges to navigable waters except in compliance with an NPDES permit. The CWA requires that all NPDES permits include any limits on discharges that are necessary to meet applicable WQS.

Thus, under the CWA, EPA's promulgation of WQS establishes standards that the State implements through the NPDES permit process. The State has discretion in developing discharge limits, as needed to meet the standards. This final rule, as explained earlier, does not itself establish any requirements that are applicable to small entities. As a result of this action, the State of Florida will need to ensure that permits it issues include any limitations on discharges necessary to comply with the standards established in the final rule. In doing so, the State will have a number of choices associated with permit writing. While Florida's implementation of the rule may ultimately result in new or revised permit conditions for some dischargers, including small entities, EPA's action, by itself, does not impose any of these requirements on small entities; that is, these requirements are not self-implementing. Thus, I certify that this rule will not have a significant economic impact on a substantial number of small entities.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and Tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

This final rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or Tribal governments or the private sector. The State may use these resulting water quality criteria in implementing its water quality control programs. This final rule does not regulate or affect any entity and, therefore, is not subject to the requirements of sections 202 and 205 of UMRA.

EPA determined that this final rule contains no regulatory requirements that might significantly or uniquely affect small governments. Moreover, WQS, including those promulgated here, apply broadly to dischargers and are not uniquely applicable to small governments. Thus, this final rule is not subject to the requirements of section 203 of UMRA.

E. Executive Order 13132 (Federalism)

This action does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. EPA's authority and responsibility to promulgate Federal WQS when State standards do not meet the requirements of the CWA is well established and has been used on various occasions in the past. The final rule will not substantially affect the relationship between EPA and the States and territories, or the distribution of power or responsibilities between EPA and the various levels of government. The final rule will not alter Florida's considerable discretion in implementing these WQS. Further, this final rule will not preclude Florida from adopting WQS that EPA concludes meet the requirements of the CWA, after promulgation of the final rule, which would eliminate the need for these Federal standards and lead EPA to withdraw them. Thus, Executive Order 13132 does not apply to this final rule.

Although section 6 of Executive Order 13132 does not apply to this action, EPA had extensive communication with the State of Florida to discuss EPA's concerns with the State's water quality criteria and the Federal rulemaking process.

F. Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments)

Subject to the Executive Order 13175 (65 FR 67249, November 9, 2000) EPA may not issue a regulation that has Tribal implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by Tribal governments, or EPA consults with Tribal officials early in the process of developing the proposed regulation and develops a Tribal summary impact statement. EPA has concluded that this action may have Tribal implications. However, the rule will neither impose substantial direct compliance costs on Tribal governments, nor preempt Tribal law.

In the State of Florida, there are two Indian Tribes, the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida, with lakes and flowing waters. Both Tribes have been approved for treatment in the same manner as a State (TAS) status for CWA sections 303 and 401 and have Federally-approved WQS in their respective jurisdictions. These Tribes are not subject to this final rule. However, this rule may impact the Tribes because the numeric criteria for Florida will apply to waters adjacent to the Tribal waters. EPA met with the Seminole Tribe on January 19, 2010 and requested an opportunity to meet with the Miccosukee Tribe to discuss EPA's proposed rule, although a meeting was never requested by the Tribe.

G. Executive Order 13045 (Protection of Children From Environmental Health and Safety Risks)

This action is not subject to EO 13045 (62 FR 19885, April 23, 1997) because it is not economically significant as defined in EO 12866, and because the Agency's promulgation of this rule will result in the reduction of environmental health and safety risks that could present a disproportionate risk to children.

H. Executive Order 13211 (Actions That Significantly Affect Energy Supply, Distribution, or Use)

This rule is not a "significant energy action" as defined in Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355 (May 22, 2001)), because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

I. National Technology Transfer Advancement Act of 1995

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rulemaking does not involve technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards.

J. Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations)

Executive Order (EO) 12898 (Feb. 16, 1994) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this final rule does not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it will afford a greater level of protection to both human health and the environment if these numeric criteria are promulgated for Class I and Class III waters in the State of Florida.

K. Congressional Review Act

The Congressional Review Act 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A "major rule" cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a "major rule" as defined by 5 U.S.C. 804(2). This rule is effective March 6, 2012, except for 40 CFR 131.43(e), which is effective February 4, 2011.

List of Subjects in 40 CFR Part 131

Environmental protection, Water quality standards, Nitrogen/phosphorus pollution, Nutrients, Florida.

Dated: November 14, 2010.

Lisa P. Jackson,

Administrator.

■ For the reasons set out in the preamble, 40 CFR part 131 is amended as follows:

PART 131—WATER QUALITY STANDARDS

■ 1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—[Amended]

■ 2. Section 131.43 is added effective February 4, 2011 to read as follows:

§ 131.43 Florida.

(a)–(d) [Reserved]

(e) *Site-specific alternative criteria.* (1) The Regional Administrator may determine that site-specific alternative criteria shall apply to specific surface waters in lieu of the criteria established for Florida waters in this section, including criteria for lakes, criteria for streams, and criteria for springs. Any such determination shall be made consistent with § 131.11.

(2) To receive consideration from the Regional Administrator for a determination of site-specific alternative criteria, an entity shall submit a request that includes proposed alternative numeric criteria and supporting rationale suitable to meet the needs for a technical support document pursuant to paragraph (e)(3) of this section. The entity shall provide the State a copy of all materials submitted to EPA, at the time of submittal to EPA, to facilitate the State providing comments to EPA. Site-specific alternative criteria may be based on one or more of the following approaches.

(i) Replicate the process for developing the stream criteria in this section.

(ii) Replicate the process for developing the lake criteria in this section.

(iii) Conduct a biological, chemical, and physical assessment of waterbody conditions.

(iv) Use another scientifically defensible approach protective of the designated use.

(3) For any determination made under paragraph (e)(1) of this section, the Regional Administrator shall, prior to making such a determination, provide for public notice and comment on a proposed determination. For any such proposed determination, the Regional Administrator shall prepare and make available to the public a technical support document addressing the specific surface waters affected and the justification for each proposed determination. This document shall be made available to the public no later than the date of public notice issuance.

(4) The Regional Administrator shall maintain and make available to the public an updated list of determinations made pursuant to paragraph (e)(1) of this section as well as the technical support documents for each determination.

(5) Nothing in this paragraph (e) shall limit the Administrator's authority to modify the criteria established for Florida waters in this section, including criteria for lakes, criteria for streams, and criteria for springs.

■ 3. Section 131.43 is revised effective March 6, 2012 to read as follows:

§ 131.43 Florida.

(a) *Scope.* This section promulgates numeric criteria for nitrogen/phosphorus pollution for Class I and Class III waters in the State of Florida. This section also contains provisions for site-specific alternative criteria.

(b) *Definitions.*—(1) *Canal* means a trench, the bottom of which is normally covered by water with the upper edges of its two sides normally above water.

(2) *Clear, high-alkalinity lake* means a lake with long-term color less than or equal to 40 Platinum Cobalt Units (PCU) and Alkalinity greater than 20 mg/L $CaCO_3$.

(3) *Clear, low-alkalinity lake* means a lake with long-term color less than or equal to 40 PCU and alkalinity less than or equal to 20 mg/L $CaCO_3$.

(4) *Colored lake* means a lake with long-term color greater than 40 PCU.

(5) *Lake* means a slow-moving or standing body of freshwater that occupies an inland basin that is not a stream, spring, or wetland.

(6) *Lakes and flowing waters* means inland surface waters that have been classified as Class I (Potable Water Supplies) or Class III (Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife) water bodies pursuant to Rule 62–302.400, F.A.C., excluding wetlands, and are predominantly fresh waters.

(7) *Nutrient watershed region* means an area of the State, corresponding to drainage basins and differing geological conditions affecting nutrient levels, as delineated in Table 2.

(8) *Predominantly fresh waters* means surface waters in which the chloride concentration at the surface is less than 1,500 milligrams per liter.

(9) *South Florida Region* means those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee.

(10) *Spring* means 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.

(11) *State* means the State of Florida, whose transactions with the U.S. EPA in matters related to 40 CFR 131.43 are administered by the Secretary, or officials delegated such responsibility, of the Florida Department of Environmental Protection (FDEP), or successor agencies.

(12) *Stream* means a free-flowing, predominantly fresh surface water in a defined channel, and includes rivers, creeks, branches, canals, freshwater sloughs, and other similar water bodies.

(13) *Surface water* means water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the Earth's surface.

(c) *Criteria for Florida waters*—(1) *Criteria for lakes.* (i) The applicable criteria for chlorophyll *a,* total nitrogen (TN), and total phosphorus (TP) for lakes within each respective lake class are shown on Table 1.

TABLE 1

A	B	C	
Lake Color [a] and Alkalinity	Chl-a (mg/L) [b,*]	TN (mg/L)	TP (mg/L)
Colored Lakes [c]	0.020	1.27 [1.27–2.23]	0.05 [0.05–0.16]

TABLE 1—Continued

A	B	C	
Lake Color[a] and Alkalinity	Chl-a (mg/L)[b,*]	TN (mg/L)	TP (mg/L)
Clear Lakes, High Alkalinity[d]	0.020	1.05 [1.05–1.91]	0.03 [0.03–0.09]
Clear Lakes, Low Alkalinity[e]	0.006	0.51 [0.51–0.93]	0.01 [0.01–0.03]

[a] Platinum Cobalt Units (PCU) assessed as true color free from turbidity.
[b] Chlorophyll *a* is defined as corrected chlorophyll, or the concentration of chlorophyll *a* remaining after the chlorophyll degradation product, phaeophytin *a,* has been subtracted from the uncorrected chlorophyll *a* measurement.
[c] Long-term Color > 40 Platinum Cobalt Units (PCU)
[d] Long-term Color ≤ 40 PCU and Alkalinity > 20 mg/L $CaCO_3$
[e] Long-term Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L $CaCO_3$
* For a given waterbody, the annual geometric mean of chlorophyll *a,* TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

(ii) Baseline criteria apply unless the State determines that modified criteria within the range indicated in Table 1 apply to a specific lake. Once established, modified criteria are the applicable criteria for all CWA purposes. The State may use this procedure one time for a specific lake in lieu of the site-specific alternative criteria procedure described in paragraph (e) of this section.

(A) The State may calculate modified criteria for TN and/or TP where the chlorophyll *a* criterion-magnitude as an annual geometric mean has not been exceeded and sufficient ambient monitoring data exist for chlorophyll *a* and TN and/or TP for at least the three immediately preceding years. Sufficient data include at least four measurements per year, with at least one measurement between May and September and one measurement between October and April each year.

(B) Modified criteria are calculated using data from years in which sufficient data are available to reflect maintenance of ambient conditions. Modified TN and/or TP criteria may not be greater than the higher value specified in the range of values in column C of Table 1 in paragraph (c)(1)(i) of this section. Modified TP and TN criteria may not exceed criteria applicable to streams to which a lake discharges.

(C) The State shall notify the public and maintain a record of these modified lake criteria, as well as a record supporting their derivation. The State shall notify EPA Region 4 and provide the supporting record within 30 days of determination of modified lake criteria.

(2) *Criteria for streams.* (i) The applicable instream protection value (IPV) criteria for total nitrogen (TN) and total phosphorus (TP) for streams within each respective nutrient watershed region are shown on Table 2.

TABLE 2

Nutrient watershed region	Instream protection value criteria	
	TN (mg/L)*	TP (mg/L)*
Panhandle West[a]	0.67	0.06
Panhandle East[b]	1.03	0.18
North Central[c]	1.87	0.30
West Central[d]	1.65	0.49
Peninsula[e]	1.54	0.12

Watersheds pertaining to each Nutrient Watershed Region (NWR) were based principally on the NOAA coastal, estuarine, and fluvial drainage areas with modifications to the NOAA drainage areas in the West Central and Peninsula Regions that account for unique watershed geologies. For more detailed information on regionalization and which WBIDs pertain to each NWR, *see* the Technical Support Document.

[a] Panhandle West region includes: Perdido Bay Watershed, Pensacola Bay Watershed, Choctawhatchee Bay Watershed, St. Andrew Bay Watershed, and Apalachicola Bay Watershed.

[b] Panhandle East region includes: Apalachee Bay Watershed, and Econfina/Steinhatchee Coastal Drainage Area.

[c] North Central region includes the Suwannee River Watershed.

[d] West Central region includes: Peace, Myakka, Hillsborough, Alafia, Manatee, Little Manatee River Watersheds, and small, direct Tampa Bay tributary watersheds south of the Hillsborough River Watershed.

[e] Peninsula region includes: Waccasassa Coastal Drainage Area, Withlacoochee Coastal Drainage Area, Crystal/Pithlachascotee Coastal Drainage Area, small, direct Tampa Bay tributary watersheds west of the Hillsborough River Watershed, Sarasota Bay Watershed, small, direct Charlotte Harbor tributary watersheds south of the Peace River Watershed, Caloosahatchee River Watershed, Estero Bay Watershed, Kissimmee River/Lake Okeechobee Drainage Area, Loxahatchee/St. Lucie Watershed, Indian River Watershed, Daytona/St. Augustine Coastal Drainage Area, St. John's River Watershed, Nassau Coastal Drainage Area, and St. Mary's River Watershed.

* For a given waterbody, the annual geometric mean of TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

(ii) *Criteria for protection of downstream lakes.* (A) The applicable criteria for streams that flow into downstream lakes include both the instream criteria for total phosphorus (TP) and total nitrogen (TN) in Table 2 in paragraph (c)(2)(i) and the downstream protection value (DPV) for TP and TN derived pursuant to the provisions of this paragraph. A DPV for stream tributaries (up to the point of reaching water bodies that are not streams as defined by this rule) that flow into a downstream lake is either the allowable concentration or the allowable loading of TN and/or TP applied at the point of entry into the lake. The applicable DPV for any stream shall be determined pursuant to paragraphs (c)(2)(ii)(B), (C), or (D) of this section. Contributions from stream tributaries upstream of the point of entry location must result in attainment of the DPV at the point of entry into the lake. If the DPV is not attained at the point of entry into the lake, then the collective set of streams in the upstream watershed does not attain the DPV, which is an applicable water quality criterion for the water segments in the upstream watershed. The State or EPA may establish additional DPVs at upstream tributary locations that are consistent with attaining the DPV at the point of entry into the lake. The State or EPA also have discretion to establish DPVs to account for a larger watershed area (*i.e.,* include waters beyond the point of reaching water bodies that are not streams as defined by this rule).

(B) In instances where available data and/or resources provide for use of a scientifically defensible and protective lake-specific application of the

BATHTUB model, the State or EPA may derive the DPV for TN and/or TP from use of a lake-specific application of BATHTUB. The State and EPA are authorized to use a scientifically defensible technical model other than BATHTUB upon demonstration that use of another scientifically defensible technical model would protect the lake's designated uses and meet all applicable criteria for the lake. The State or EPA may designate the wasteload and/or load allocations from a TMDL established or approved by EPA as DPV(s) if the allocations from the TMDL will protect the lake's designated uses and meet all applicable criteria for the lake.

(C) When the State or EPA has not derived a DPV for a stream pursuant to paragraph (c)(2)(ii)(B) of this section, and where the downstream lake attains the applicable chlorophyll *a* criterion and the applicable TP and/or TN criteria, then the DPV for TN and/or TP is the associated ambient instream levels of TN and/or TP at the point of entry to the lake. Degradation in water quality from the DPV pursuant to this paragraph is to be considered nonattainment of the DPV, unless the DPV is adjusted pursuant to paragraph (c)(2)(ii)(B) of this section.

(D) When the State or EPA has not derived a DPV pursuant to paragraph (c)(2)(ii)(B) of this section, and where the downstream lake does not attain applicable chlorophyll *a* criterion or the applicable TN and/or TP criteria, or has not been assessed, then the DPV for TN and/or TP is the applicable TN and/or TP criteria for the downstream lake.

(E) The State and EPA shall maintain a record of DPVs they derive based on the methods described in paragraphs (c)(2)(ii)(B) and (C) of this section, as well as a record supporting their derivation, and make such records available to the public. The State and EPA shall notify one another and provide a supporting record within 30 days of derivation of DPVs pursuant to paragraphs (c)(2)(ii)(B) or (C) of this section.

(3) *Criteria for springs.* The applicable nitrate+nitrite criterion is 0.35 mg/L as an annual geometric mean, not to be exceeded more than once in a three-year period.

(d) *Applicability.* (1) The criteria in paragraphs (c)(1) through (3) of this section apply to lakes and flowing waters, excluding flowing waters in the South Florida Region, and apply concurrently with other applicable water quality criteria, except when:

(i) State water quality standards contain criteria that are more stringent for a particular parameter and use;

(ii) The Regional Administrator determines that site-specific alternative criteria apply pursuant to the procedures in paragraph (e) of this section; or

(iii) The State adopts and EPA approves a water quality standards variance to the Class I or Class III designated use pursuant to § 131.13 that meets the applicable provisions of State law and the applicable Federal regulations at § 131.10.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are the other Federally-adopted and State-adopted numeric criteria when applied to the same use classifications.

(e) *Site-specific alternative criteria.* (1) The Regional Administrator may determine that site-specific alternative criteria shall apply to specific surface waters in lieu of the criteria established in paragraph (c) of this section. Any such determination shall be made consistent with § 131.11.

(2) To receive consideration from the Regional Administrator for a determination of site-specific alternative criteria, an entity shall submit a request that includes proposed alternative numeric criteria and supporting rationale suitable to meet the needs for a technical support document pursuant to paragraph (e)(3) of this section. The entity shall provide the State a copy of all materials submitted to EPA, at the time of submittal to EPA, to facilitate the State providing comments to EPA. Site-specific alternative criteria may be based on one or more of the following approaches.

(i) Replicate the process for developing the stream criteria in paragraph (c)(2)(i) of this section.

(ii) Replicate the process for developing the lake criteria in paragraph (c)(1) of this section.

(iii) Conduct a biological, chemical, and physical assessment of waterbody conditions.

(iv) Use another scientifically defensible approach protective of the designated use.

(3) For any determination made under paragraph (e)(1) of this section, the Regional Administrator shall, prior to making such a determination, provide for public notice and comment on a proposed determination. For any such proposed determination, the Regional Administrator shall prepare and make available to the public a technical support document addressing the specific surface waters affected and the justification for each proposed determination. This document shall be made available to the public no later than the date of public notice issuance.

(4) The Regional Administrator shall maintain and make available to the public an updated list of determinations made pursuant to paragraph (e)(1) of this section as well as the technical support documents for each determination.

(5) Nothing in this paragraph (e) shall limit the Administrator's authority to modify the criteria in paragraph (c) of this section through rulemaking.

(f) *Effective date.* This section is effective March 6, 2012, except for § 131.43(e), which is effective February 4, 2011.

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