2022 Integrated Water Quality Assessment for Florida: Sections 303(d), 305(b), and 314 Report and Listing Update

Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection

April 2022

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Letter to Floridians

FLORIDA DEPARTMENT OF Environmental Protection

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April 1, 2022

Dear Floridians:

It is with great pleasure that we present to you the 2022 Integrated Water Quality Assessment for Florida. This report meets the Federal Clean Water Act reporting requirements; more importantly, it presents a comprehensive analysis of the quality of our waters. This report would not be possible without the monitoring efforts of organizations throughout the state, including state and local governments, universities, and volunteer groups who agree that our waters are a central part of our state's culture, heritage, and way of life.

In Florida, monitoring efforts at all levels result in substantially more monitoring stations and water quality data than most other states in the nation. These water quality data are used annually for the assessment of waterbody health by means of a comprehensive approach. Hundreds of assessments of individual waterbodies are conducted each year. Additionally, as part of this report, a statewide water quality condition is presented using an unbiased random monitoring design. These efforts allow us to understand the state's water conditions, make decisions that further enhance our waterways, and focus our efforts on addressing problems.

The department implements a wide range of programs to protect and restore Florida's surface waters. At the heart of these efforts, particularly in identifying water quality problems and establishing restoration objectives, is the Division of Environmental Assessment and Restoration. Throughout this report you will find links to resources such as interactive maps that present information on water quality trends and strategies and activities underway to benefit water quality.

Florida's rivers, streams, lakes, estuaries, and coastal waters are spectacularly beautiful. More than that, they are essential natural resources, supplying the water necessary for aquatic life, both large and microscopic; drinking water; recreation; industry; fishing and shellfish harvesting; and agriculture. Protecting these abundant water resources, supporting restoration efforts, and preserving them for the future is your responsibility and ours.

We encourage all those interested in Florida's waterways to read this report, gain a better understanding of Florida's water quality conditions, and engage in local efforts to protect and restore water quality. It has been a pleasure for us to compile this information for your use.

Regards,

Gregory P. DeAngelo, P.E. PMP
Division of Environmental Assessment and Restoration

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List of Acronyms and Abbreviations

µg/L	Micrograms Per Liter
AEQA	Aquatic Ecology and Quality Assurance (Section)
AFFF	Aqueous Film Forming Foam
AGM	Annual Geometric Mean
ATAC	Allocation Technical Advisory Committee
BioRecon	Biological Reconnaissance
BMAP	Basin Management Action Plan
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BPCP	Bacteria Pollution Control Plan
BRL	Banana River Lagoon
CaCO$_3$	Calcium Carbonate
CB	Confidence Bounds
CFU	Colony-Forming Unit
CHAN	Change Analysis
CHNEP	Charlotte Harbor National Estuary Program
CO$_2$	Carbon Dioxide
CWA	Clean Water Act
dbHydro	Database Hydrologic (South Florida Water Management District Database)
DEAR	Division of Environmental Assessment and Restoration
DEP	Florida Department of Environmental Protection
DO	Dissolved Oxygen
DWRA NPS	Division of Water Restoration Assistance Nonpoint Source Section
E. coli	*Escherichia coli*
EPA	U.S. Environmental Protection Agency
ERC	Environmental Regulation Commission
F.A.C.	Florida Administrative Code
FC	Fecal Coliform
FDACS	Florida Department of Agriculture and Consumer Services
FDOH	Florida Department of Health
FIB	Fecal Indicator Bacteria
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FWRA	Florida Watershed Restoration Act
FWRI	Fish and Wildlife Research Institute (FWC)
FY	Fiscal Year
HA	Habitat Assessment
HAB	Harmful Algal Bloom

HDG	Human Disturbance Gradient
HUC	Hydrologic Unit Code
IALB	Invertebrate Aquatic Life Benchmark
IRL	Indian River Lagoon
IWR	Impaired Surface Waters Rule
LVI	Lake Vegetation Index
LVS	Linear Vegetation Survey
MDL	Method Detection Limit
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
mL	Milliliter
MS4	Municipal Separate Storm Sewer System
MST	Microbial Source Tracking
N	Nitrogen
N/A	Not Applicable
NEEPP	Northern Everglades and Estuaries Protection Program
ng/L	Nanograms Per Liter
NHD	National Hydrography Dataset
NNC	Numeric Nutrient Criteria
NO_3	Nitrate
NO_3-NO_2	Nitrate-Nitrite
NOx	Nitric Oxide Gases
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OAWP	Office of Agricultural Water Policy (FDACS)
OFS	Outstanding Florida Spring
OPO_4	Orthophosphate
PCU	Platinum Cobalt Unit
PEC	Probable Effects Concentration
PFAS	Per- and Polyfluoroalkyl Substances
PFCs	Perfluorinated Chemicals
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorosulfonic Acid
ppm	Parts Per Million
PQL	Practical Quantitation Limit
p-value	Probability Value
QA	Quality Assurance
QC	Quality Control
qPCR	Quantitative Polymerase Chain Reaction
RAP	Reasonable Assurance Plan

ROC	Regional Operations Center
RPS	Rapid Periphyton Survey
SBIO	Statewide Biological (Database)
SC	Specific Conductance
SCI	Stream Condition Index
SEAS	Shellfish Environmental Assessment Section (FDACS)
SFWMD	South Florida Water Management District
SFY	State Fiscal Year
SK	Seasonal Kendall
SMP	Strategic Monitoring Plan
SOP	Standard Operating Procedure
SS	Sen Slope
SSAC	Site-Specific Alternative Criterion/Criteria
STORET	Storage and Retrieval (Database)
su	Standard Unit
SWFWMD	Southwest Florida Water Management District
TAN	Total Ammonia Nitrogen
TDS	Total Dissolved Solids
TEC	Threshold Effects Concentration
Temp	Temperature
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TR	Triennial Review
TSI	Trophic State Index
U.S.	United States
USGS	U.S. Geological Survey
WAS	Watershed Assessment Section
WBID	Waterbody Identification (Number)
WET	Watershed Evaluation and TMDL (Section)
WPCS	Watershed Planning and Coordination Section
WIN	Watershed Information Network (Database)
WMD	Water Management District

Executive Summary

Purpose

This report provides an overview of the status and overall condition of Florida's surface water and groundwater quality. It also addresses the 305(b) and 303(d) reporting requirements of the federal Clean Water Act. Section 305(b) requires each state to report every two years to the U.S. Environmental Protection Agency (EPA) on the condition of its surface waters, and Section 303(d) requires each state to report on its impaired waterbodies (those not meeting water quality standards). Using the information from all the states, EPA provides the U.S. Congress with a national inventory of water quality conditions and develops priorities for future federal actions to protect and restore aquatic resources.

Issues of Environmental Interest and Water Quality Initiatives

Chapter 1 discusses current issues of environmental interest and ongoing water quality initiatives, including the following:

- The Florida Department of Environmental Protection (DEP) response to and monitoring of a large wastewater discharge from the Piney Point phosphate facility into Tampa Bay.

- Continued interagency coordination and monitoring of freshwater harmful algal blooms.

- Implementation plans for the Statewide Biennial Assessment of impaired surface waters.

- Technical improvements in DEP's microbial source tracking efforts to

investigate and better identify potential sources of elevated fecal indicator bacteria in waterbodies.

- A follow-up study evaluating potential sources of chemical wastewater tracers, such as sucralose, in 20 selected Florida lakes.

- Technological and methodological advances in meeting the increasing demand for the analysis of per and polyfluoroalkyl substances.

- A follow-up study of neonicotinoid insecticides in eight basins having median imidacloprid values above EPA chronic invertebrate aquatic life benchmarks.

- Revisions to Florida's water quality standards, including proposed revisions to human health–based water quality criteria, the continued progress of the Triennial Review process, and efforts to establish a site-specific alternative criterion for total ammonia nitrogen for specified wetlands in Martin County.

Statewide Probabilistic and Trend Monitoring Results

The Status Monitoring Network uses an EPA-designed probabilistic strategy to estimate, with known confidence, the quality of fresh water in Florida, including rivers, streams, canals, lakes, and groundwater resources. DEP collects standard physical/chemical and biological data in these waters and assesses the water quality health of each resource throughout the state each year. The analyses in this report are based on data collected from 2018 to 2020.

The Trend Monitoring Network consists of 76 flowing surface water stations (e.g., rivers and streams) and 49 groundwater stations (47 wells and 2 springs) located throughout Florida that are sampled either monthly or quarterly. These data are used to identify water quality changes over time (i.e., trends). DEP collects a suite of physical/chemical and biological data similar to that collected for the Status Monitoring Network at these trend stations and runs trend analyses every 4 years. The last trend analyses were reported in the *2020 Integrated Report*, and this report briefly summarizes those results.

Chapter 2 discusses the results from DEP's Status and Trend Monitoring Networks. Analyses of Status and Trend Network data indicate that the main impacts to Florida's groundwater and surface water result from nutrients and fecal indicator bacteria.

Concerning trends in water quality, analyses show that while nutrient loads may be decreasing in flowing surface waters, lakes have a slightly increasing trend for total phosphorus and a more pronounced increase in the response indicator chlorophyll *a*. Groundwater trend analyses, in association with a review of climate data for the periods of record, provide additional insight into these nutrient results. While groundwater showed no change in nutrients, a decrease in pH was observed. For surface water, pH decreased in flowing waters, yet increased in lakes.

A likely driver for the surface water and groundwater pH changes is the documented increase in rainfall over the periods of record.

Designated Use Support in Surface Waters

Chapter 3 summarizes the state's designated use support determinations and results based on surface water quality assessments performed under the Identification of Impaired Surface Waters Rule (IWR), Chapter 62-303, Florida Administrative Code (F.A.C.). **Appendix A** lists the state's water quality classifications. This report summarizes results for those assessments performed through 2020, including the third cycle for Basin Groups 3 through 5 and the fourth cycle for Basin Groups 1 and 2.

Based on the data collected, DEP assessed 4,187 waterbody segments and found 2,148 were impaired. Of these impairments, 1,137 segments required the development of a total maximum daily load (TMDL). The most frequently identified causes of impairment were nutrients, bacteria, and dissolved oxygen.

Appendix B lists over 510 publicly owned, impaired lakes that already have a TMDL, have a TMDL under development, or require a TMDL. **Appendix C** explains DEP's watershed management approach and framework for evaluating surface water quality. **Appendix D** provides more detail on the methodology for evaluating designated use attainment. **Appendix E** outlines the IWR's delisting process.

TMDL Program and Priorities

TMDLs (discussed in **Chapter 4)** must be developed for waterbody segments placed on DEP's Verified List of Impaired Waters. They establish the maximum amount of a pollutant that a waterbody can assimilate without exceeding water quality standards. In Florida, DEP may either adopt nutrient TMDLs based on generally applicable criteria (Rules 62-302.531 and 62-302.532, F.A.C.), or as Hierarchy I numeric nutrient site-specific criteria. DEP develops these criteria when there is evidence that waterbody response (e.g., chlorophyll *a*) differs from that of the waterbodies used to develop the generally applicable numeric criteria.

To date, DEP has adopted a total of 454 TMDLs. Of these, 269 were developed for dissolved oxygen, nutrients, and/or un-ionized ammonia; 179 were developed for bacteria; and 6 were for other parameters such as iron, lead, and turbidity. In addition, DEP adopted a statewide TMDL for mercury, based on fish consumption advisories affecting over 1,400 waterbody segments.

As a TMDL alternative, DEP encourages local stakeholders to develop and implement alternative restoration plans to meet state water quality standards at the earliest practical time. Once an alternative restoration plan is in place, activities and projects follow a completion schedule to ensure progress towards water quality restoration. The iterative nature of the watershed management approach allows DEP to evaluate and track the effectiveness of

management activities over time (i.e., the implementation of basin management action plans [BMAPs], TMDLs, and alternative restoration plans, the extent to which water quality objectives are being met, and whether individual waters are no longer impaired).

BMAP Program

Chapter 5 provides information on adopted BMAPs. A BMAP is a framework for water quality restoration, containing local and state commitments to reduce pollutant loading through current and future projects and strategies. BMAPs contain a comprehensive set of solutions, such as permit limits on wastewater facilities, urban and agricultural best management practices, and conservation programs designed to implement pollutant reductions established by a TMDL. These broad-based plans are developed with local stakeholders and rely on local input and commitment for development and successful implementation. BMAPs are adopted by DEP Secretarial Order and are legally enforceable. DEP's Florida Basin Management Action Plans web site provides more information on BMAP restoration activities, including locations, status, and specifics on restoration projects.

As of May 2021, DEP has adopted 33 BMAPs and is working on updating numerous others statewide. While the majority address nutrient impairments, DEP also has adopted BMAPs that target fecal indicator bacteria contamination. To address these sources, DEP has developed a guidance manual for restoring bacteria-impaired waters.

Introduction

This report provides an overview of the status and overall condition of Florida's surface water and groundwater quality. Under the federal Clean Water Act (CWA), the U.S. Environmental Protection Agency (EPA) and its state partners have developed an integrated assessment to address water quality monitoring strategies, data quality assurance needs, and data interpretation methodologies. Florida uses this Integrated Report process to report on whether water quality standards are being attained, document the availability of data for each waterbody segment, identify water quality trends, and provide management information for setting priorities to protect and restore Florida's aquatic resources. The report must be submitted to EPA every two years and must meet the following requirements:

- Section 305(b) of the CWA requires states and other jurisdictions to submit water quality reports to EPA. These 305(b) reports describe surface water and groundwater quality and trends, the extent to which these waters are attaining their designated uses (such as drinking water and recreation), and any major impacts to these resources.

- Section 303(d) of the CWA also requires states to identify waters that are not supporting their designated uses, submit to EPA a list of these impaired waters (referred to as the 303[d] list), and develop total maximum daily loads (TMDLs) for them. A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet its designated uses.

- Section 314 of the CWA requires states to report on the status and trends of significant publicly owned lakes.

Federal guidance and requirements state that the following information should be provided:

- The extent to which the water quality of the state's waters provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allows for recreational activities in and on the water.

- An estimate of the extent to which CWA control programs have improved or will improve water quality and recommendations for future actions.

- An estimate of the environmental, economic, and social costs and benefits needed to achieve CWA objectives and an estimate of the date for such achievements.

- A description of the nature and extent of nonpoint source pollution and recommendations needed to control each category of nonpoint sources.

- An assessment of the water quality of all publicly owned lakes, including lake trends, pollution control measures, and publicly owned lakes with impaired uses.

The document *Elements of Florida's Water Monitoring and Assessment Programs (*DEP 2016) contains background information on Florida's water resources, monitoring and assessment approach, and water resource management programs.

Chapter 1: Issues of Environmental Interest and Water Quality Initiatives

The Florida Department of Environmental Protection (DEP) works with many different programs and agencies throughout the state to address issues and problems affecting surface water and groundwater quality and quantity. These responsibilities are implemented through a variety of activities, including planning, regulation, watershed management, the assessment and application of water quality standards, nonpoint source pollution management, ambient water quality monitoring, groundwater protection, educational programs, and land management. This chapter describes some major issues of environmental interest and ongoing water quality initiatives being undertaken primarily by DEP.

Monitoring in Response to Piney Point Phosphate Facility Discharge

Between March 30 and April 9, 2021, approximately 215 million gallons of mixed seawater, stormwater, and legacy process water were discharged into Tampa Bay at Port Manatee from the Piney Point phosphate facility. Across DEP divisions, staff began monitoring water quality in this area on March 30, 2021, before the discharge began, and continued sampling through October 2021. The monitoring included sampling to determine changes in salinity, dissolved oxygen (DO), clarity, nutrients, metals, cyanotoxins, radionuclides, and other variables to evaluate any changes compared with baseline water quality in the area. DEP monitored water quality in the bay in coordination with the Tampa Bay Estuary Program, Hillsborough County, Manatee County, and other regional partners. All field measurements and analytical results are available through DEP's interactive water quality dashboard.

Results showed an increase in nutrients and chlorophyll *a* in Tampa Bay in the vicinity of Port Manatee for several weeks after discharge. Concentrations then decreased to expected levels until June, when they increased again in response to a major red tide event in the bay. Regional scientists are analyzing these water quality results in conjunction with regional rainfall data, ocean current data, and data from intensive biological surveys to determine potential linkages between the Piney Point discharge and the red tide event. DEP will remain engaged with regional scientists to monitor the health of Tampa Bay.

Monitoring of Harmful Algal Blooms (HABs)

An HAB is a rapidly forming, dense concentration of algae (such as red tide), diatoms, or cyanobacteria (blue-green algae) that may pose a risk to human health through direct exposure, the ingestion of contaminated drinking water, or the consumption of contaminated fish or shellfish. These organisms pose a potential risk to both freshwater and saltwater aquatic ecosystems. When present in large quantities, their decomposition contributes to oxygen depletion, or hypoxia, which can lead to events such as fish kills, and also reduces the amount of light reaching submerged plants. Even nontoxic blooms can create low oxygen levels in the

water column. In addition, some toxins may be produced that can harm humans, domestic animals, wildlife, and fish.

It is currently impossible to predict when a bloom will occur and whether it will be toxic, making response, monitoring, and communication on a bloom complicated. The U.S. Environmental Protection Agency (EPA) has proposed numeric criteria for cyanobacteria toxins in recreational waters, but DEP has chosen not to adopt them. Blooms can change quickly, making the proposed criteria difficult to use for bloom management decisions. By the time toxin results are available, they may no longer be representative of the current bloom conditions in the waterbody. Additionally, numerous toxins are not included in the numeric criteria, and it is not yet possible to predict what toxins may be present from the bloom appearance or the species present. Therefore, public outreach regarding cyanobacteria blooms uses a precautionary approach that minimizes risk by taking the most conservative action early, rather than waiting for more detailed information. DEP and the Florida Department of Health (FDOH) advise the public to avoid recreational activities in waters if an algal bloom is present, and especially if any cyanotoxins are detected.

Because most freshwater HABs are ephemeral and unpredictable, the state does not have a long-term freshwater HAB monitoring program that routinely samples fixed stations. Instead, DEP, the five water management districts (WMDs), FDOH, Florida Fish and Wildlife Conservation Commission (FWC), and Florida Department of Agriculture and Consumer Services (FDACS) respond to HABs as soon as they are reported or observed. DEP has implemented standard operating procedures (SOPs) for sampling cyanobacteria blooms and standardized forms for recording important information when investigating a bloom.

This coordinated multiagency HAB response effort started in 2016 and has become more efficient and effective every year. Blooms are reported by the public or by resource managers through DEP's online Algal Bloom Reporting Form and DEP's Algal Bloom Reporting Hotline (1–855–305–3903). Coordinating agencies, collectively called the Algal Bloom Response Team, receive notices of bloom reports and respond according to the agreed-upon division of duties. The team also holds weekly or biweekly teleconferences to share updates on bloom reports, ensure appropriate response, and prevent duplication of effort.

In response to a reported bloom, staff from DEP or a partner agency visit the site and collect water samples. DEP laboratory staff quickly identify the bloom species and determine whether the algae have the potential to produce toxins. The laboratory analyzes the water samples for a suite of toxins, including 11 microcystin congeners, nodularin-R, anatoxin-a, cylindrospermopsin, and two saxitoxins. DEP posts information on species composition and toxin level being produced to the DEP Algal Bloom Dashboard. This communication tool provides information on freshwater HABs and allows Algal Bloom Response Team members, other state and federal agencies, local governments, and the public to easily track bloom events,

activities, and results. If cyanotoxins are detected, DEP or a partner sampling agency resamples the site until toxins are no longer detected and communicates this information to the public.

Other water quality samples, including chlorophyll and nutrient samples, are often collected along with the bloom identification sample. The toxin, chlorophyll, and nutrient data are entered into DEP's Watershed Information Network (WIN) Database, and are publicly available.

Because FDOH focuses on protecting public health, it takes a lead role when reported health incidents are associated with a bloom. When blooms affect waters permitted as public bathing beaches or other areas where there is the risk of human exposure, the agency may post the waterbody with warning signs. Typically, local county health departments direct these actions after consultation with FDOH's Aquatic Toxins Program staff. FDOH also follows up on reports of sick or dead pets that may have been exposed to a bloom, since these events may predict potential human health threats.

FWC's Fish and Wildlife Research Institute (FWRI) and FDOH recently updated their *Resource Guide for Public Health Response to Harmful Algal Blooms in Florida* (Abbott et al. 2021), which provides recommendations on developing plans for local public health HAB response. In addition, FDOH's Caspio web tool contains historical bloom response documentation through July 2019, after which the agency began using DEP's Algal Bloom Dashboard as its primary source of bloom response information.

The FWC's Fish Kill Hotline is used for reporting all types of fish kills and can identify when an algal bloom is suspected to be the cause. FWC predominantly documents and, when possible, determines the cause(s) of fish and wildlife deaths. It also maintains a red tide monitoring program that provides weekly updates on red tide conditions in Florida's coastal waters. FWC and FDACS share responsibilities for the management of shellfish-harvesting waters. DEP coordinates with the FWRI HAB research team on estuarine bloom response.

Implementing a Statewide Biennial Assessment of Impaired Surface Waters

DEP is the lead agency in administering Section 303(d) of the federal Clean Water Act (CWA). Under the Identification of Impaired Surface Waters Rule (IWR), Chapter 62-303, Florida Administrative Code (F.A.C.), DEP uses all readily available data to identify surface waterbodies and segments with waterbody identification (WBID) numbers that are not meeting their applicable water quality standards and designated uses.

Historically, DEP's Watershed Assessment Section (WAS) assessed all WBIDs once every five years using a rotating basin approach. (**Chapter 3** contains more details on the IWR and the basin rotation method.) DEP places WBIDs that do not meet water quality standards on either the Verified List of Impaired Waters (Verified List) or the Study List, and then submits these lists as updates to the federal 303(d) list.

On February 25 and March 4, 2020, DEP held two virtual public workshops to present a new approach for assessing Florida's ambient surface waterbodies. Using this approach, called the Statewide Biennial Assessment, WAS will assess all waterbody segments in Florida once every two years, instead of every five years, in repeating cycles. All assessments will have the same data assessment period, the consistent application of water quality criteria, and essentially equal timelines. As a result, DEP will publish an updated, statewide impaired waters list every two years. The initial results of this new approach to assessing Florida's surface waters will be included in the *2024 Integrated Report*. Additional information on the [Statewide Biennial Assessment](#) is available online, including a [*Process Document*](#) (DEP 2021b) and a [*Question and Answer Sheet*](#) (DEP 2021c).

Implementing and Expanding Microbial Source Tracking (MST)

Human and animal waste can enter surface waters through various means. Sources include combined sewer overflows, old or leaking sewer lines, septic system overflow, urban runoff, and feces from livestock, wildlife, and pets. MST is a set of techniques used to investigate and identify potential sources of elevated levels of fecal indicator bacteria (FIB) in a waterbody. Indicator bacteria such as fecal coliform, *Escherichia coli (E. coli),* and Enterococci commonly are found in the feces of humans and warm-blooded animals, but also can grow freely in the environment. Standard microbiological culture–based methods cannot discriminate between enteric bacteria (from the gut of a host animal) and environmental bacteria (free living and not associated with fecal waste or elevated health risks). MST is employed to distinguish between the many sources of fecal contamination, particularly to differentiate human from animal waste.

Listing a waterbody as impaired on the 303(d) list when there is no increased risk to human health creates significant economic burdens for the TMDL Program and other programs, as well as for the public and industries that rely on clean waters for recreation and tourism. Identifying the type of contamination and locating its source allow DEP to focus resources on solving the right problem more quickly.

To do that, DEP devised a multipronged approach using the latest technologies available. The DEP Biology Program's Molecular Biology laboratory offers quantitative polymerase chain reaction (qPCR) source marker–based assays for humans, dogs, shorebirds and other birds, and cattle and other ruminants—including EPA-patented qPCR markers for humans, cattle, and dogs. In addition, the laboratory uses a method to distinguish DNA from live versus dead bacteria in a water sample. The DEP Chemistry Program offers the development and validation of methods for chemical tracer detection. DEP is committed to improving the MST toolbox.

DEP will continue to evaluate additional source-specific markers and pathogen detection methods. The Molecular Biology group is working closely with the Basin Management Action Plan (BMAP) Program to standardize the interpretation of qPCR results and establish meaningful thresholds for marker concentration in the context of human health risk. The improved and

consistent interpretation of results will better inform stakeholders on mitigation and restoration strategies.

Conducting a Follow-Up Study of Chemical Wastewater Tracers

DEP's Division of Environmental Assessment and Restoration (DEAR) conducted a *Study of Select Lakes for Wastewater Inputs* (DEP 2021a) to evaluate potential wastewater sources for 20 Florida lakes. These lakes had high concentrations of the wastewater indicator sucralose compared with statewide probabilistic surveys of Florida lakes performed in 2012, 2015, and 2017. In 2020, the selected lakes were resampled for the wastewater indicators sucralose, acesulfame potassium, acetaminophen, carbamazepine, and primidone.

Of the 20 lakes resampled, sucralose was detected in all except one. At least one other wastewater indicator was detected in 13 of the 19 lakes providing sucralose detections. While all wastewater indicator detections were relatively low, 6 lakes (Lake Alice, Lake Ann, Lake Juniper, Lake Sampson, Lake Seminole, and Little Lake Wilson) had sucralose concentrations greater than 1 microgram per liter (µg/L) and detections of at least one other wastewater tracer.

For context, a previous study completed by the DEP Laboratory showed wastewater effluent values for sucralose ranged between 1 and 40 micrograms per liter (µg/L). Lake Juniper, Lake Sampson, and Little Lake Wilson had the highest densities of septic wastewater sources found within a 200-meter buffered area of the lake. These 3 lakes had consistent detections, or combinations, of primidone, carbamazepine, and acesulfame potassium throughout 2020. This finding further reinforces the likely impact of wastewater on the lakes via surface water and groundwater.

Monitoring of Per- and Polyfluoroalkyl Substances (PFAS)

PFAS, a group of synthetic chemicals, have been in use since the 1940s. Continued exposure to certain PFAS may lead to adverse health effects, including an increased cancer risk. The occurrence of these chemicals in the environment and their detection in drinking water have been a concern for many years, particularly in areas where the chemicals are manufactured. EPA was alerted to the issue in 1998, and the agency produced an initial action plan in 2009, Long-Chain Perfluorinated Chemicals (PFCs) Action Plan.

Since then, PFAS contamination has been found to be much more widespread than originally understood. It became a national environmental concern in 2018, evidenced by an increased number of PFAS-related meetings and conferences around the U.S., and by increased local and national press coverage. In February 2019, as a response to the concerns of environmental scientists and the public about these persistent and toxic chemicals, EPA announced a detailed action plan, EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan.

PFAS became a concern in Florida when monitoring indicated there could be groundwater contamination around sites where aqueous film–forming foams (AFFFs) have been used. AFFFs are firefighting foams that contain PFAS as major ingredients. Firefighter training facilities heavily use such foams, and this use may threaten the drinking water of nearby residences. The assessment of Florida's fire college sites for PFAS contamination, particularly for perfluorooctanoic acid (PFOA) and perfluorosulfonic acid (PFOS), began in the second half of 2018. DEP and FDOH are targeting drinking water wells in the vicinity of impacted sites and providing filters for wells with PFOA/PFOS concentrations at or above the health advisory level of a combined total of 70 nanograms per liter (ng/L).

DEP developed and validated PFAS analytical methods for water and soils in late 2018. Since the initial development of these methods, the analyte list has grown from 14 to 36 compounds. Accuracy and precision have been improved by introducing an isotope dilution quantitation methodology. The acquisition of two more state-of-the-art liquid chromatography tandem mass spectrometry instruments and numerous analytical method improvements have increased the DEP laboratory's capacity and shortened turnaround times, necessitated by the increasing demand for PFAS analysis.

Conducting a Follow-Up Study of Neonicotinoid Insecticides

The use of imidacloprid and, to a lesser degree, other neonicotinoid insecticides, is widespread in Florida (and globally). Internationally there is concern that these compounds are harming nontarget organisms, including soil microbes, aquatic invertebrates, and insect pollinators, and also may be impacting biological communities and their associated trophic structures negatively. Sampling conducted by DEAR prior to 2019 found that of over 108 pesticides and pesticide degradants examined statewide in all water resources, imidacloprid produced the most EPA aquatic life benchmark exceedances by far. This is in part because of its high toxicity to insects at ultratrace concentrations and its corresponding extremely low invertebrate aquatic life benchmarks (IALBs) for chronic (10 ng/L) and acute (385 ng/L) exposure.

The results of DEAR's 2015 Surface Water Trend Network monthly statewide sampling showed that imidacloprid is ubiquitous throughout Florida's flowing surface waters. In 24 of the 25 drainage basins sampled, imidacloprid detections ranged from 2 to 660 ng/L. Of the 25 basins sampled, 8 (32%) had median imidacloprid values exceeding the chronic IALB of 10 ng/L (Upper East Coast, Middle St. Johns, Fisheating Creek, Perdido, Indian River Lagoon, Tampa Bay Tributaries, Sarasota–Peace–Myakka, and Caloosahatchee).

From August 2019 to July 2020, DEAR resampled 12 stations representing these 8 basins for the neonicotinoids acetamiprid, clothianidin, dinotefuran, imidacloprid, and thiamethoxam. These stations continued to have median values of imidacloprid above the EPA chronic IALB. Of the additional neonicotinoids sampled, only individual clothianidin values were found at concentrations higher than the IALB. The clothianidin detections came from 3 stations, and none

of these stations' median values was above clothianidin's EPA chronic IALB (50 ng/L). A manuscript documenting these findings is currently undergoing review for publication in the *Journal of Environmental Monitoring and Assessment*.

Revising Florida's Water Quality Standards

DEP has several proposed revisions to water quality standards currently in progress, including the following.

Triennial Review (TR) of Florida's Water Quality Standards

DEP continued progress on the TR by reviewing public comments, meeting with stakeholders, and presenting revisions at an additional virtual public workshop. The proposed revisions include the following:

1. Revision of the freshwater and marine cadmium criteria.

2. Revision of the turbidity criterion to better protect coral reef and hardbottom communities.

3. Adoption of site-specific alternative criteria for DO for seven streams previously listed as impaired because of natural conditions.

4. Incorporation of compliance authorization provisions into Florida's water quality standards.

5. Revision of the document *Implementation of Florida's Numeric Nutrient Standards* (DEP 2013a).

The next step will be to present these changes to the Environmental Regulation Commission (ERC) for adoption, as applicable.

Site-Specific Alternative Criteria (SSAC)

On October 7, 2020, DEP hosted a virtual public workshop to present Florida Power and Light's petition to establish a SSAC for total ammonia nitrogen (TAN) for the Northwest Mitigation Area wetlands and Barley Barber Swamp in Martin County. The proposed SSAC is based on EPA's equation for recalculating the 30-day TAN criterion (i.e., the Criterion Continuous Concentration) because of the absence of unionid mussels and the presence of early life stages of fish. The next step will be to present the SSAC to the ERC for adoption.

Chapter 2: Statewide Probabilistic and Trend Assessments

Background

Initiated in 2000, the DEP probabilistic [Status Monitoring Network](#) (Status Network) provides unbiased, cost-effective sampling and assessment of the state's water resources. Florida has adopted a probabilistic design so that the condition of the state's surface and groundwater resources can be estimated with known statistical confidence. Data produced by the Status Network fulfill CWA 305(b) reporting needs and complement CWA 303(d) reporting.

In addition, DEP has designed a [Trend Monitoring Network](#) (Trend Network) to monitor water quality changes over time in rivers, streams, canals, and aquifers (via wells). To achieve this goal, fixed locations are sampled at fixed intervals (monthly or quarterly). The Trend Network complements the Status Network by providing spatial and temporal information about water resources and potential changes from anthropogenic or natural influences, including extreme events (e.g., droughts and hurricanes).

Taking guidance from the EPA document *[Elements of a State Monitoring and Assessment Program](#)* (2003), DEP developed and annually updates the *[Florida Watershed Monitoring Status and Trend Program Design Document](#)* (2020a), which describes both monitoring networks.

Water Resources Monitored

The Status and/or Trend Monitoring Networks include the following four water resource categories (the *Design Document* contains additional details on each of these resources):

- **Groundwater (confined and unconfined aquifers)**—Groundwater includes those portions of Florida's aquifers with the potential to supply potable water or affect the quality of current potable water supplies. It includes wells classified as F-I, G-I, and G-II in Chapter 62-520, F.A.C., and does not include wells tapping groundwater that lie directly within or beneath a permitted facility's zone of discharge and water influenced by deep well injection.

- **Rivers and streams**—Rivers and streams include linear waterbodies with perennial flow, defined as waters of the state under Chapters 373 and 403, Florida Statutes (F.S.).

- **Canals (excluding drainage and irrigation ditches as defined below)**— Canals include man-made linear waterbodies that are waters of the state. Chapter 312.020, F.A.C., provides the following definitions: A canal is a trench, the bottom of which is normally covered by water, with the upper edges of its two sides normally above water. A channel is a trench, the bottom

of which is normally covered entirely by water, with the upper edges of its sides normally below water. Drainage and irrigation ditches are man-made trenches dug for the purpose of draining water from the land, or for transporting water for use on the land, and are not built for navigational purposes.

- **Lakes (Status Monitoring Network only)—**Lakes include natural bodies of standing water and reservoirs that are waters of the state and are designated as lakes and ponds on the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD). This category does not include many types of artificially created waterbodies, or streams/rivers impounded for agricultural use or private water supply.

DEP does not use the Status or Trend Monitoring Network to monitor estuaries, wetlands, or marine waters.

Summary of Status Network Surface Water Results

Introduction

DEP samples the Status Network to report on surface water resource conditions for the entire state. This section summarizes the statewide results of the combined 2018–20 assessments. Rather than conducting analyses on individual years, three years of data are aggregated to provide increased confidence in statewide water resource assessments and data sufficiency for regional water resource assessments. The Status Network analysis protocols are provided in the document *Data Analysis Protocols for the Status Network* (DEP 2018a).

DEP uses the Status Network to assess the water quality of rivers, streams, canals, large lakes, and small lakes. **Table 2.1** summarizes the miles of rivers, streams, and canals, and the acres and numbers of large and small lakes, for the waters assessed. The measurements for these resources are specific to the Status Network and may vary from those identified in other sections of this report.

From 2018 through 2019, approximately 15 samples were collected annually from each resource, in each of 6 zones. Sampling was reduced in 2020 because of the COVID-19 pandemic response. Notably, the number of samples for streams and small lakes per zone was reduced to 5. The zones correspond to the state's 5 WMD boundaries, with the South Florida Water Management District (SFWMD) divided into eastern and western regions (DEP 2020a, p. 14).

Table 2.1. **Summary of surface water resources assessed by the Status Network's probabilistic monitoring, 2018–20**

Note: The estimates in the table do not include coastal or estuarine waters. These calculations are from the 1:24,000 NHD.

Waterbody Type	Assessed
Rivers	2,613 miles/4,205 kilometers
Streams	15,149 miles/24,380 kilometers
Canals	2,437 miles/3,922 kilometers
Large Lakes	1,730 lakes (949,808 acres/384,374 hectares)
Small Lakes	1,737 lakes (26,929 acres/10,898 hectares)

The indicators selected for surface water reporting include total phosphorus (TP), total nitrogen (TN), DO, chlorophyll *a*, *E. coli* bacteria, pH, and TAN. **Tables 2.2a** through **2.2d** summarize the indicators and their threshold values. The *Design Document* (DEP 2020a) contains a complete list of indicators used in the Status Monitoring Network.

DEP derived the water quality thresholds from the following:

- Rule 62-302.530, F.A.C., Surface Water Criteria.

- Chapter 62-550, F.A.C., Drinking Water Standards.

- *Implementation of Florida's numeric nutrient standards* (DEP 2013a) (incorporated by reference into Chapter 62-302, F.A.C.).

- *Derivation of dissolved oxygen criteria to protect aquatic life in Florida's fresh and marine waters* (DEP). Technical support document (incorporated by reference into Chapter 62-302, F.A.C.).

- Chapter 62-303, F.A.C., Identification of Impaired Surface Waters.

- Rule 62-520.420, F.A.C., Standards for Class F-I, Class G-I, and Class G-II Ground Water.

The diversity of Florida's aquatic ecosystems results in a large natural variation in some water quality parameters. For example, surface waters dominated by groundwater inflows or flows from wetland areas may naturally have lower DO levels, and many streams with high tannins have naturally low pH.

Table 2.2a.   Nutrient indicators used to assess river, stream, and canal resources

mg/L = Milligrams per liter; TP = Total phosphorus; TN = Total nitrogen
[1] The nutrient thresholds for rivers, streams, and canals depend on the nutrient region (**Figure 2.1**).
[2] Not applied as criteria, but rather as a threshold used to estimate the impairment of state waters. These thresholds are used in the analysis of Status Monitoring Network data, based on single samples. The analysis and representation of these data are not intended to infer verified impairment, as defined in Chapter 62-303, F.A.C.
[3] Not applicable; no numeric threshold. The narrative criterion in Paragraph 62-302.530(48)(b), F.A.C., applies.

Nutrient Region[1]	TP Threshold[2] (mg/L)	TN Threshold[2] (mg/L)	Designated Use
Panhandle West	≤ 0.06	≤ 0.67	Aquatic Life
Panhandle East	≤ 0.18	≤ 1.03	Aquatic Life
North Central	≤ 0.30	≤ 1.87	Aquatic Life
Peninsula	≤ 0.12	≤ 1.54	Aquatic Life
West Central	≤ 0.49	≤ 1.65	Aquatic Life
South Florida	N/A[3]	N/A[3]	Aquatic Life
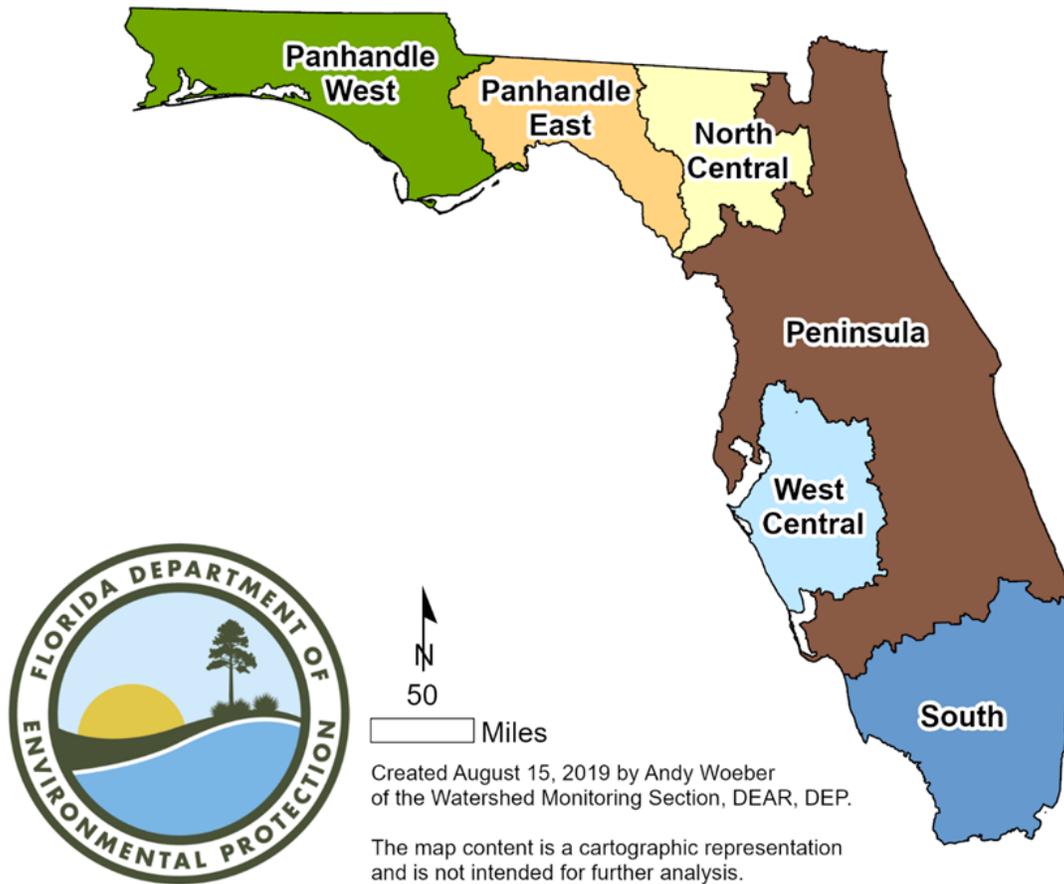
Figure 2.1.   Nutrient regions for river, stream, and canal resources

Table 2.2b.   Nutrient indicators used to assess lake resources

PCU = Platinum cobalt units; $CaCO_3$ = Calcium carbonate; µg/L = Micrograms per liter; mg/L = Milligrams per liter; TP = Total phosphorus; TN = Total nitrogen

[1] Not applied as criteria, but rather as a threshold used to estimate the impairment of state waters. These thresholds are used in the analysis of Status Monitoring Network data, based on single samples. The analysis and representation of these data are not intended to infer verified impairment, as defined in Rule 62-303, F.A.C.

[2] For lakes with color > 40 PCU in the West Central Nutrient Region (**Figure 2.1**), the TP threshold is ≤ 0.49 mg/L.

Lake Color and Alkalinity	Chlorophyll *a* Threshold[1] (µg/L)	TP Threshold[1] (mg/L)	TN Threshold[1] (mg/L)	Designated Use
Color > 40 PCU	≤ 20	≤ 0.16[2]	≤ 2.23	Aquatic Life
Color ≤ 40 PCU and Alkalinity > 20 mg/L CaCO₃	≤ 20	≤ 0.09	≤ 1.91	Aquatic Life
Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L CaCO₃	≤ 6	≤ 0.03	≤ 0.93	Aquatic Life

Table 2.2c.   DO thresholds used to assess surface water resources

DO = Dissolved oxygen

[1] The DO threshold for lakes, rivers, streams, and canals depends on the bioregion (**Figure 2.2**).

[2] Not applied as criteria, but rather as a threshold used to estimate the impairment of state waters. These thresholds are used in the analysis of Status Monitoring Network data, based on single samples. The analysis and representation of these data are not intended to infer verified impairment, as defined in Chapter 62-303, F.A.C.

Bioregion[1]	DO Threshold[2] (% saturation)	Designated Use
Panhandle	≥ 67	Aquatic Life
Big Bend	≥ 34	Aquatic Life
Northeast	≥ 34	Aquatic Life
Peninsula	≥ 38	Aquatic Life
Everglades	≥ 38	Aquatic Life
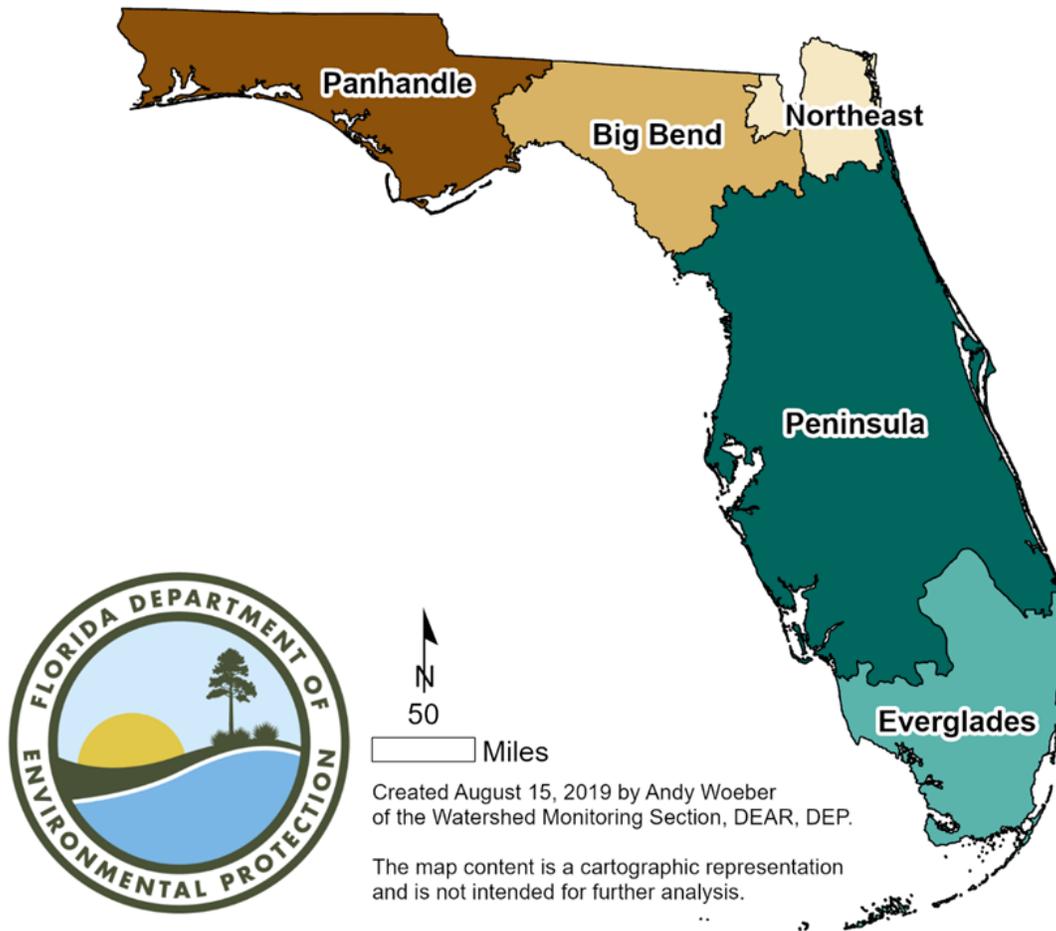
Figure 2.2.   Bioregions for lake, river, and stream resources

Table 2.2d.   Additional indicators for aquatic life and recreation use with water quality thresholds

E. coli = Escherichia coli; μg/L = Micrograms per liter; mL = Milliliters, su = Standard units; TAN = Total ammonia nitrogen
[1] Not criteria, but rather a threshold used to estimate the impairment of state waters. These thresholds are used in the analysis of Status Monitoring Network data, based on single samples. The analysis and representation of these data are not intended to infer verified impairment, as defined in Chapter 62-303, F.A.C. The chlorophyll thresholds apply to rivers, streams, and canals only. **Table 2.2b** lists chlorophyll criteria for lakes**.**

Indicator/Aquatic Life and Recreation Use (Surface Water)	Threshold
Chlorophyll *a*[1]	≤ 20 μg/L
E. coli	≤ 410 colonies/100 mL
pH	≥ 6, ≤ 8.5 su
TAN	See DEP's Ammonia Criteria

Results for Rivers, Streams, Canals, Large Lakes, and Small Lakes

The following pages present the statewide surface water Status Network results for rivers, streams, large lakes, and small lakes. **Figures 2.3** through **2.7** show sample site locations for each surface water resource, and **Tables 2.3b** through **2.3f** list statewide results for each indicator by resource. **Table 2.3a** explains the terms used in the statewide summary tables. These results, as well as regional results for each zone, are also available through an interactive online web application, Status Network Report Card.

Table 2.3a.   Explanation of terms used in Tables 2.3b through 2.3f

Term	Explanation
Analyte	Indicators chosen to assess condition of waters of state.
Target Population	Estimate of actual extent of resource from which threshold results were calculated. Excludes % of waters determined to not fit definition of resource type
Number of Samples	Number of samples used for statistical analysis
% Meeting Threshold	% estimate of target population that meets specific indicator's threshold value.
Meeting Threshold 95% Confidence Bounds (CB)	Upper and lower bounds for 95% confidence of % meeting specific indicator's threshold value.
Assessment Period	Duration of probabilistic survey sampling event.
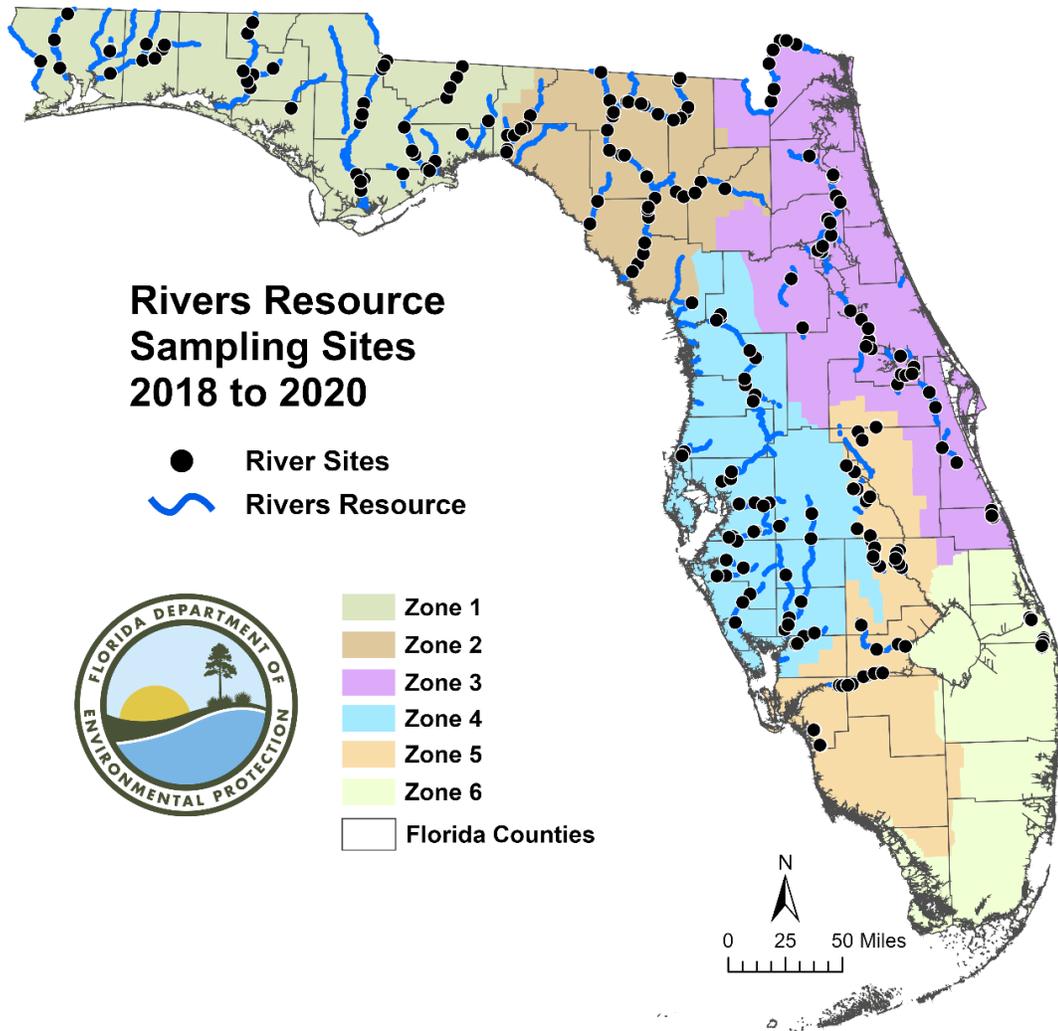
Figure 2.3.   Statewide Status Network river sampling locations

Table 2.3b.   Statewide percentage of rivers meeting threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; *E. coli* = *Escherichia coli*;
DO = Dissolved oxygen
[1] 20/270 failures were below the pH threshold; 1/270 failures were above the pH threshold (**Table 2.2d**).

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	2,613	270	100	100	2018–20
TN	2,613	270	80.3	76.7–83.9	2018–20
TP	2,613	270	90.6	88.2–92.9	2018–20
Chlorophyll *a*	2,613	267	90.3	87.5–93.2	2018–20
E. coli Bacteria	2,613	194	97.1	94.4–99.8	2018–20
DO	2,613	270	95.7	93.1–98.3	2018–20
pH[1]	2,613	270	87.5	84.1–90.9	2018–20
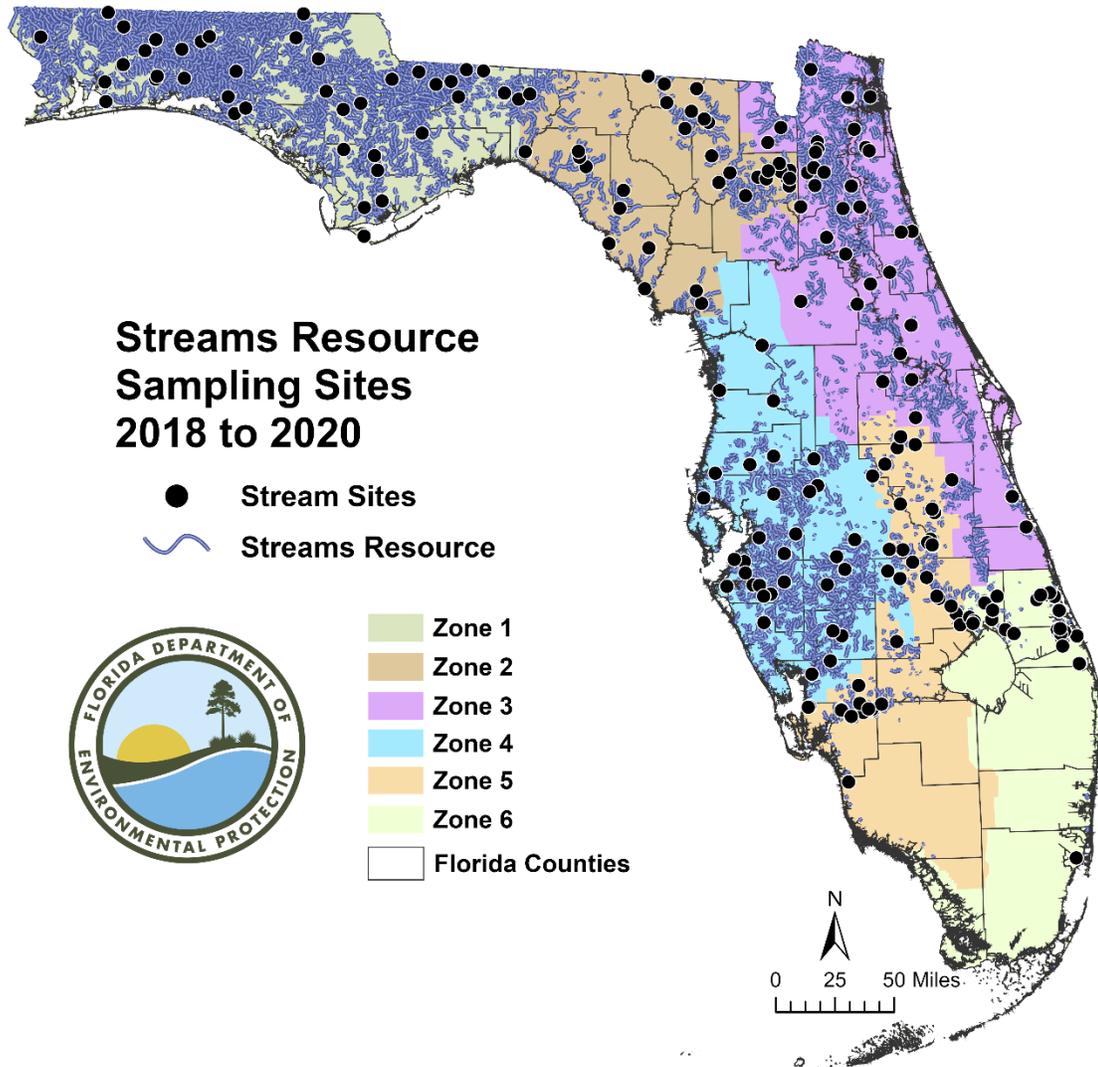
Figure 2.4.   Statewide Status Network stream sampling locations

Table 2.3c.   Statewide percentage of streams meeting threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; *E. coli* = *Escherichia coli*;
DO = Dissolved oxygen
[1] 69/215 failures were below the pH threshold; 0/215 failures were above the pH threshold (**Table 2.2d**).

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	15,149	215	100	99–100	2018–20
TN	15,149	213	72.0	65.5–78.4	2018–20
TP	15,149	213	83.4	78.9–87.9	2018–20
Chlorophyll *a*	15,149	215	94.8	91.4–98.2	2018–20
E. coli **Bacteria**	15,149	214	77.8	71.9–83.7	2018–20
DO	15,149	215	70.7	63.9–77.5	2018–20
pH[1]	15,149	215	48.8	43.1–54.6	2018–20
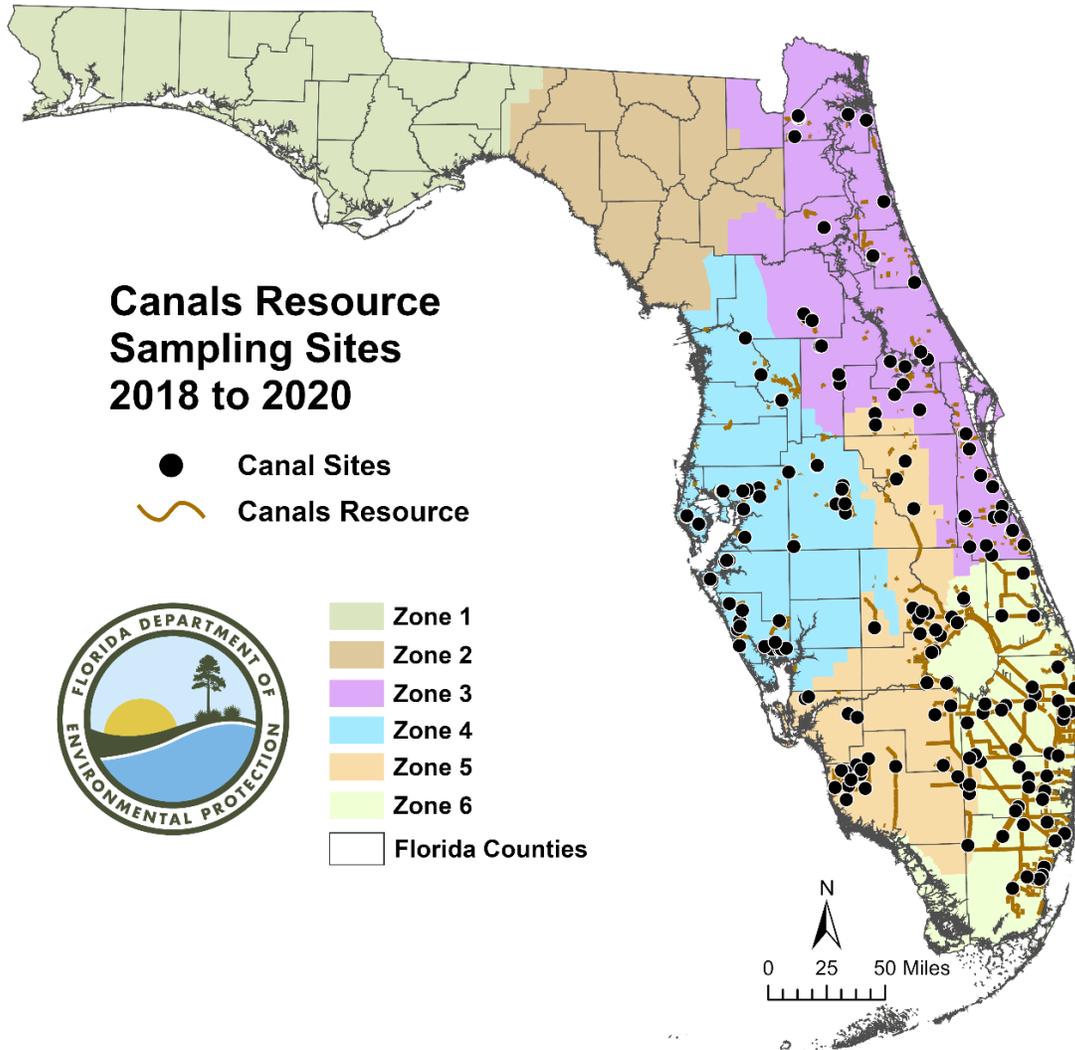
Figure 2.5.   Statewide Status Network canal sampling locations

Table 2.3d.   Statewide percentage of canals meeting threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; *E. coli* = *Escherichia coli*; DO = Dissolved oxygen
[1] Sample size reduced because of nonapplicability of numeric nutrient thresholds in South Nutrient Region (**Table 2.2a**).
[2] 8/179 failures were below the pH threshold; 1/179 failures were above the pH threshold (**Table 2.2d**).

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB[1]	Assessment Period
TAN	2,437	179	100	100	2018–20
TN[1]	2,437	120	77.7	68.2–87.2	2018–20
TP[1]	2,437	120	71.9	62.0–81.9	2018–20
Chlorophyll *a*	2,437	179	86.0	80.7–91.3	2018–20
E. coli Bacteria	2,437	169	91.9	88.8–95.1	2018–20
DO	2,437	179	90.8	86.1–95.6	2018–20
pH[2]	2,437	179	96.7	94.6–98.7	2018–20

Large Lakes Resource Sampling Sites 2018 to 2020

● Large Lake Sites

🝆 Large Lakes Resource

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Florida Counties

N

0   25   50 Miles
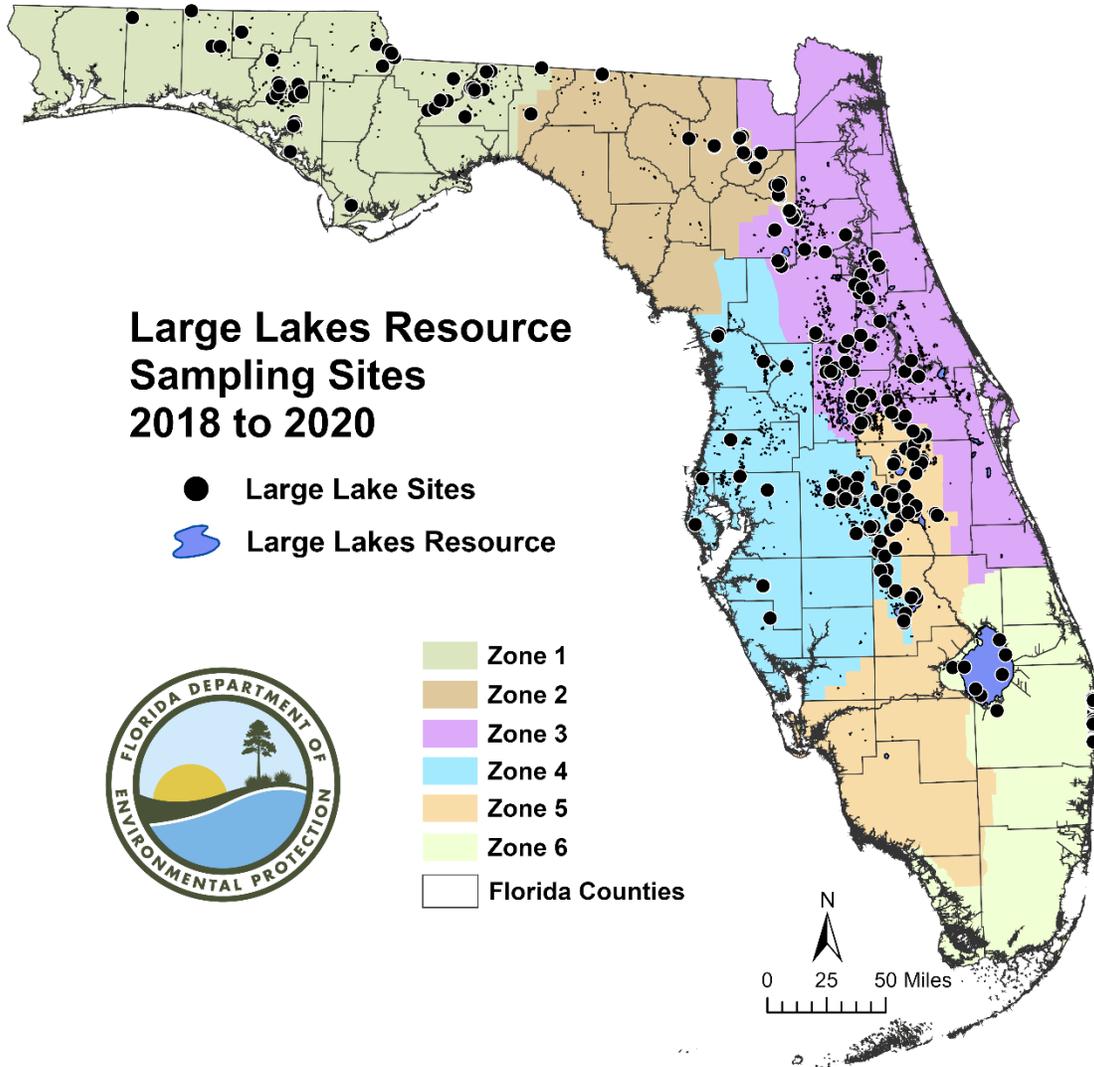
Figure 2.6.   Statewide Status Network large lake sampling locations

Table 2.3e.   Statewide percentage of large lakes meeting threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; *E. coli = Escherichia coli;*
DO = Dissolved oxygen
[1] 45/267 failures were below the pH threshold; 48/267 failures were above the pH threshold (**Table 2.2d**).

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	949,808	267	100	100	2018–20
TN	949,808	266	86.2	77.8–94.7	2018–20
TP	949,808	267	73.3	64.8–81.9	2018–20
Chlorophyll *a*	949,808	266	56.9	45.6–68.2	2018–20
***E. coli* Bacteria**	949,808	257	100	100	2018–20
DO	949,808	267	97.8	96.2–99.3	2018–20
pH[1]	949,808	267	69.9	61.0–78.9	2018–20
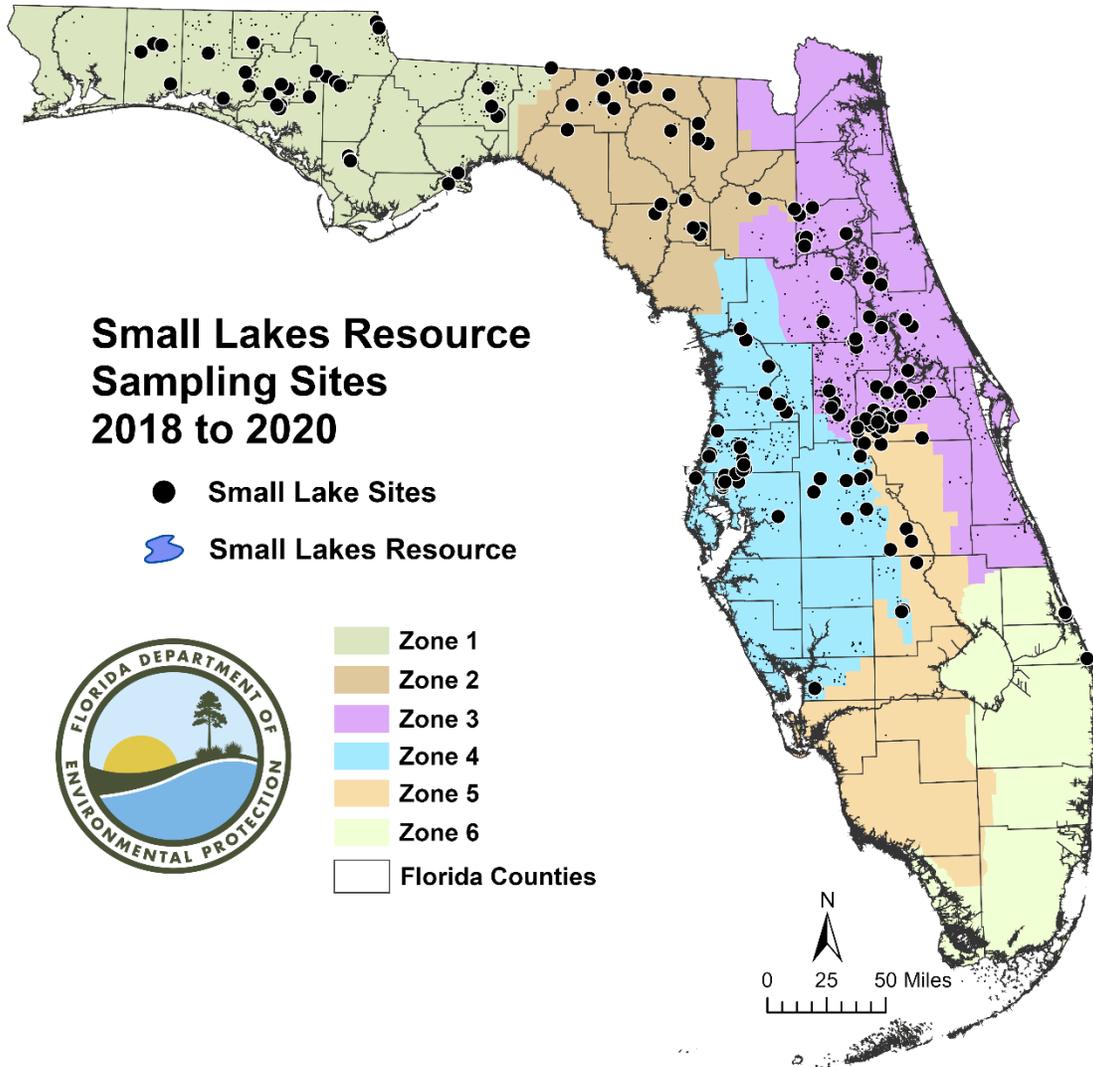
Figure 2.7.   Statewide Status Network small lake sampling locations

Table 2.3f.   Statewide percentage of small lakes meeting threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; *E. coli* = *Escherichia coli*;
DO = Dissolved oxygen
[1] 67/180 failures were below the pH threshold; 7/180 failures were above the pH threshold (**Table 2.2d**).

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	26,929	180	100	100	2018–20
TN	26,929	180	95.4	91.9–99.0	2018–20
TP	26,929	180	96.1	93.8–98.4	2018–20
Chlorophyll *a*	26,929	179	73.0	65.6–80.3	2018–20
E. coli Bacteria	26,929	177	99.9	99.7–100	2018–20
DO	26,929	180	74.8	67.9–81.6	2018–20
pH[1]	26,929	180	63.1	56.3–69.9	2018–20

Sediment Quality Evaluation

BACKGROUND

From the five Status Network surface water resource categories, DEP selected large and small lakes for sediment contaminant evaluation, since lakes integrate runoff within watersheds. In aquatic environments, sediments provide several essential ecological functions but also may be a source of contamination and recycled nutrients. Sediment contaminants such as metals, pesticides, and excess nutrients come from upland runoff and discharges, organic decomposition, and atmospheric deposition. DEP does not have sediment criteria or standards; nor does it have the statutory authority to establish such criteria. Therefore, it is important to use scientifically defensible thresholds (guidelines) to evaluate Florida sediments.

A few state and federal agencies use sediment guidelines to evaluate biological effects from contaminants. DEP freshwater sediment guidelines are based on a weight-of-evidence approach that evaluated studies containing paired sediment chemistry and biological responses from benthic organisms. The results are published in the report *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters* (MacDonald Environmental Sciences and USGS 2003). Rather than using the traditional pass/fail with a single standard, the weight-of-evidence approach created two guidelines for each contaminant: a lower guideline, called the threshold effects concentration (TEC), and a higher guideline, the probable effects concentration (PEC). A value below the TEC indicates a low probability of harm to sediment-dwelling organisms. Conversely, sediment values above the PEC have a high probability of biological harm. **Table 2.4a** lists the PEC for each metal analyzed.

Table 2.4a.   DEP freshwater sediment PEC threshold for metals

mg/kg = Milligrams per kilogram

Metal	PEC (mg/kg)
Arsenic	33.0
Cadmium	5.0
Chromium	110
Copper	150
Silver	2.2
Nickel	49
Lead	130
Mercury	1.1
Zinc	460

SEDIMENT EVALUATION FOR LARGE AND SMALL LAKES

Staff collected sediment samples from a total of 421 lake sites from 2018 to 2020: 169 from small lakes and 252 from large lakes. Samples were analyzed for certain abundant metals (aluminum and iron), a suite of trace metals, and 3 sediment nutrients (nitrogen, phosphorus, and

total carbon) using EPA Method 3052 (total digestion method). **Tables 2.4b** and **2.4c** list the results.

Table 2.4b.   **Statewide percentage of large lakes meeting PEC values, 2018–20**

CB = Confidence bounds

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	949,808	252	99.7	99.2–100	2018–20
Cadmium	949,808	252	100	100	2018–20
Chromium	949,808	252	100	100	2018–20
Copper	949,808	252	98.8	97.8–99.7	2018–20
Silver	949,808	252	99.7	99.2–100	2018–20
Nickel	949,808	252	100	100	2018–20
Lead	949,808	252	99.7	99.2–100	2018–20
Mercury	949,808	252	99.7	99.2–100	2018–20
Zinc	949,808	252	100	100	2018–20
All	**949,808**	**252**	**98.5**	**97.4–99.5**	**2018–20**

Table 2.4c.   **Statewide percentage of small lakes meeting PEC values, 2018–20**

CB = Confidence bounds

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	26,929	169	99.2	97.8–100	2018–20
Cadmium	26,929	169	97.7	95.0–100	2018–20
Chromium	26,929	169	98.2	96.2–100	2018–20
Copper	26,929	169	84.8	78.9–90.7	2018–20
Silver	26,929	169	100	100	2018–20
Nickel	26,929	169	99.9	99.6–100	2018–20
Lead	26,929	169	94.8	91.2–98.5	2018–20
Mercury	26,929	169	100	100	2018–20
Zinc	26,929	169	94.9	91.2–98.7	2018–20
All	**26,929**	**169**	**78.4**	**72.0–84.7**	**2018–20**

Discussion of Rivers, Streams, Canals, Large Lakes, and Small Lakes

The water quality results indicate that, for recreational usage and aquatic life support, Florida's flowing waters and lakes are in relatively good health. However, an inspection of the indicators listed in **Tables 2.3b, 2.3c, 2.3d, 2.3e,** and **2.3f** reveals the following: 72.0% of stream miles, 77.7% of canal miles, and 80.3% of river miles passed the TN threshold; 71.9% of canal miles passed for TP; and 86.0% of canal miles passed for chlorophyll *a*. Passing rates for *E. coli* were

quite high for rivers, canals, large lakes, and small lakes at 97.1%, 91.9%, 100%, and 99.9%, respectively. Streams were lower, with 77.8% of miles passing the *E. coli* threshold. In lakes, the nutrient response indicator, chlorophyll *a*, had the lowest threshold passing percentage for aquatic life support, with 56.9% of the large lake area and 73.0% of the small lake area passing. DEP has developed numerous TMDLs, BMAPs, and alternative restoration plans (ARPs) to address both TN and TP inputs that are the likely cause of chlorophyll *a* impairments (**Chapters 4** and **5**).

Lake results also indicate that sediment quality is generally good for aquatic life support. However, an inspection of the indicators listed in **Tables 2.4b** and **2.4c** shows much lower sediment contamination levels in large lakes compared with small lakes. Copper, lead, and zinc are contaminant concerns in small lake sediments, having the highest PEC exceedances. Not surprisingly, small lakes have worse sediment quality than large lakes, as small lakes are affected more by sedimentation simply because of the higher lake-shore-to-lake-area ratio. Lead and zinc are common stormwater contaminants, especially in urban areas. In peninsular Florida, lakes also often have algae blooms or excessive nuisance vegetation, which in turn prompt the application of copper-based aquatic herbicides by property owners.

Summary of Status Network Groundwater Results

DEP has monitored groundwater quality since 1986 in both confined and unconfined aquifers. The Status Network groundwater monitoring program uses a probabilistic monitoring design to estimate confined and unconfined aquifer water quality across the state. This estimate, by necessity, is based on well and spring sampling representing both aquifer types. These wells and springs include private, public, monitoring, and agricultural irrigation wells. Rather than conducting analyses on individual years, three years of data were aggregated to provide increased confidence in the results of statewide water resource assessments and data sufficiency for regional water resource assessments. The Status Network analysis protocols are provided in the document *Data Analysis Protocols for the Status Network* (DEP 2018a).

Results for Confined and Unconfined Aquifers

The assessment period for this report is January 2018 through December 2020. **Table 2.5** lists the groundwater indicators used in the analyses and their drinking water standards (thresholds). Some of the more important analytes include total coliform bacteria, nitrate-nitrite (NO_3-NO_2), trace metals such as arsenic and lead, and sodium (salinity), all of which are threats to drinking water quality.

Table 2.5. **Status Network physical/other indicators for potable water supply for groundwater with water quality thresholds**

mg/L = Milligrams per liter; µg/L = Micrograms per liter; mL = Milliliter; N = Nitrogen
[1] Counts may be expressed as colony-forming units (CFU) or most probable number, depending on the analytical method used.

Indicator	Threshold for Potable Water Supply (Groundwater)
Fluoride	≤ 4 mg/L
Arsenic	≤ 10 µg/L
Cadmium	≤ 5 µg/L
Chromium	≤ 100 µg/L
Lead	≤ 15 µg/L
Nitrate-Nitrite	≤ 10 mg/L as N
Sodium	≤ 160 mg/L
Fecal Coliform Bacteria	< 2 counts[1]/100 mL
Total Coliform Bacteria	≤ 4 counts[1]/100 mL

Figures 2.8 and **2.9** show the sampling site locations for each groundwater resource (confined aquifers and unconfined aquifers), and **Tables 2.6b** and **2.6c** list the statewide results for each indicator by aquifer resource. **Table 2.6a** explains the terms used in the statewide summary tables. These results and regional results for each zone are available through an interactive online web application, Status Network Report Card.
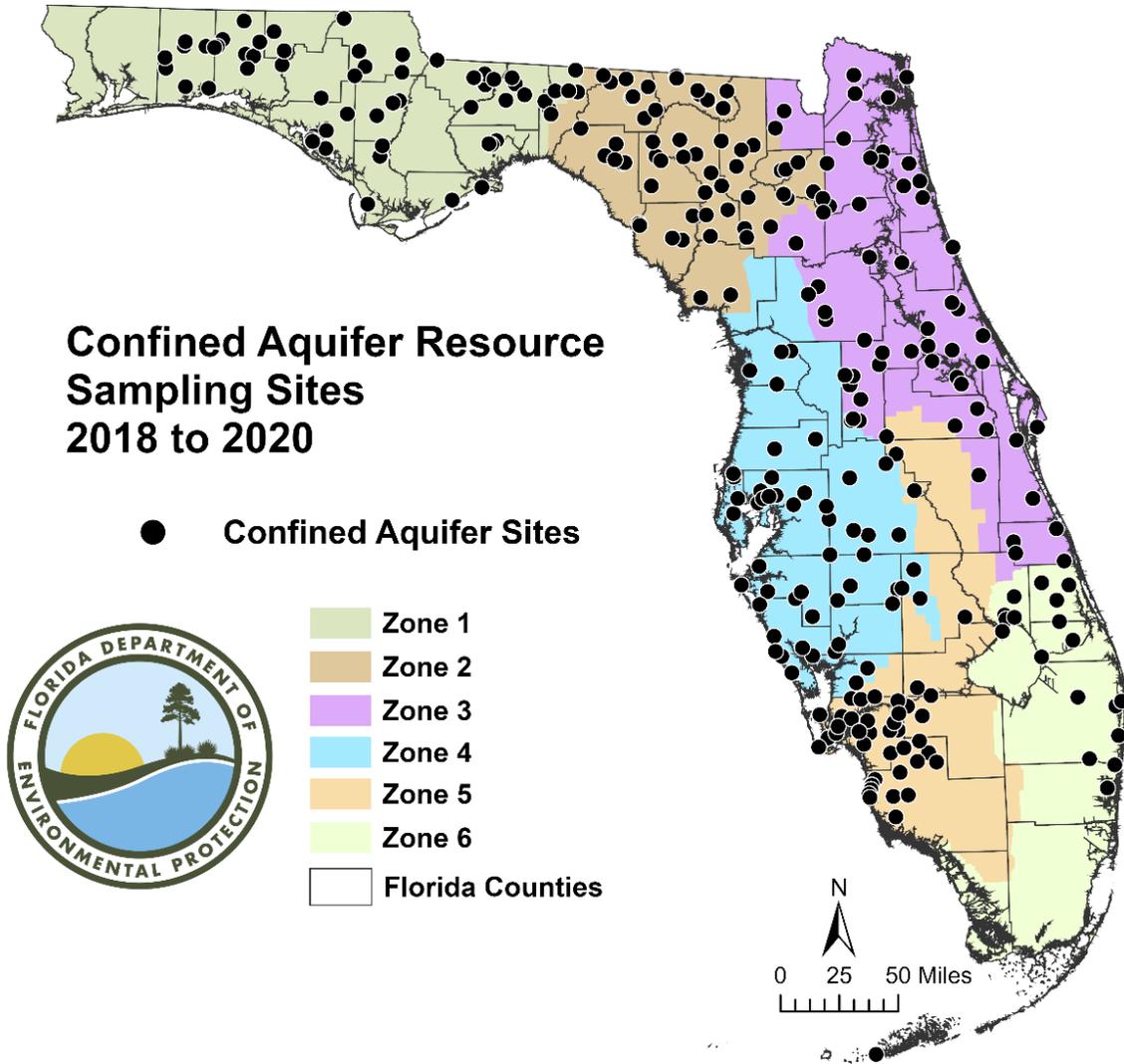
Figure 2.8. **Statewide Status Network confined aquifer well locations**

Unconfined Aquifer Resource Sampling Sites 2018 to 2020

● Unconfined Aquifer Sites

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Florida Counties
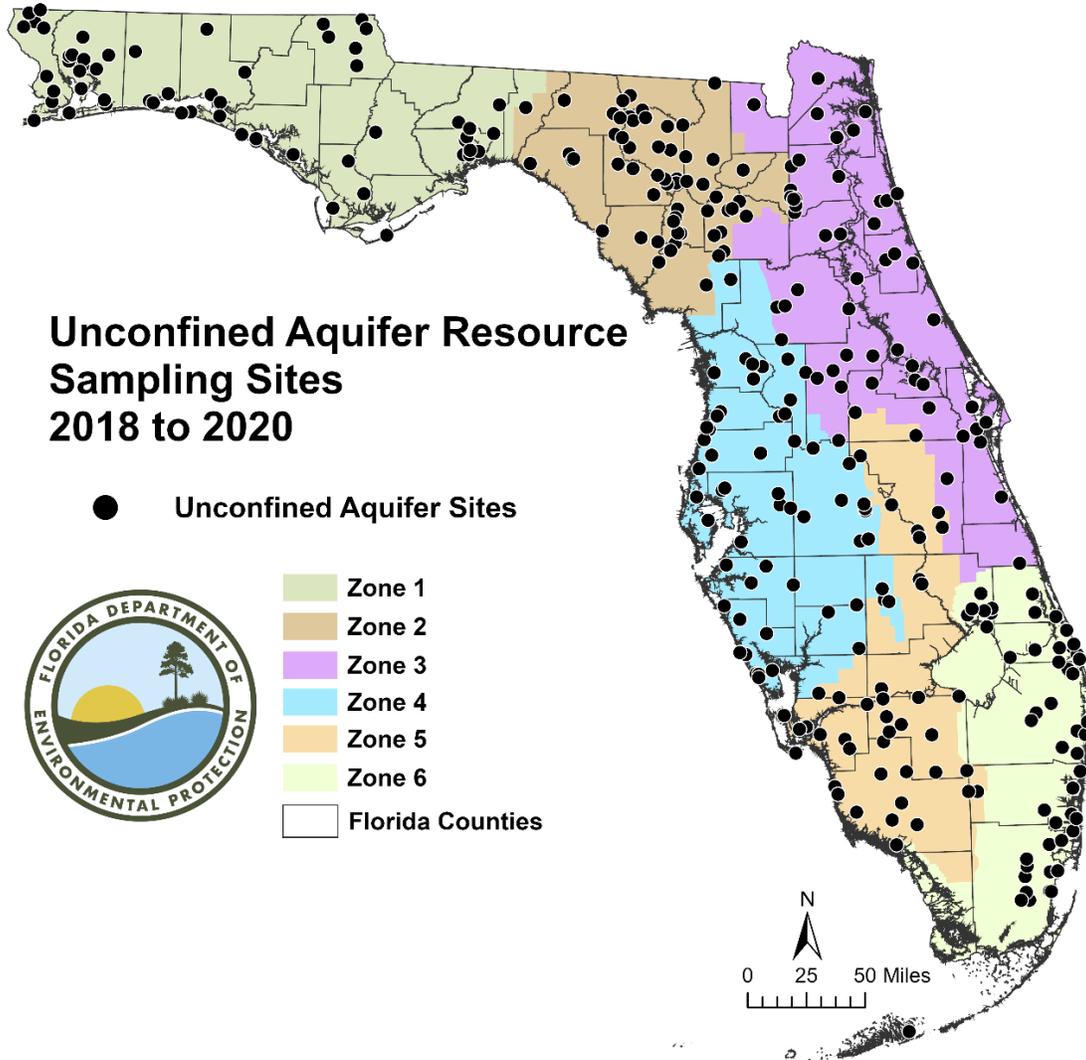
Figure 2.9.   Statewide Status Network unconfined aquifer well locations

Table 2.6a.   Legend for terms used in Tables 2.6b and 2.6c

CB = Confidence bounds

Term	Explanation
Analyte	Indicators chosen to base assessment of condition of waters of state.
Target Population	Total number of wells in list frames from which inferences were calculated. Excludes % of wells that were determined not to fit definition of resource.
Number of Samples	Number of samples used for statistical analysis
% Meeting Threshold	% estimate of target population that meets specific indicator's threshold value.
Meeting Threshold 95% CB	Upper and lower bounds for 95% confidence of % meeting specific indicator's threshold value.
Assessment Period	Duration of probabilistic survey's sampling event.

Table 2.6b.   Statewide percentage of confined aquifer wells expected to meet threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	15,339	351	99.5	99.0–100	2018–20
Cadmium	15,339	351	100	100	2018–20
Chromium	15,339	351	100	100	2018–20
Lead	15,339	351	100	99.9–100	2018–20
Nitrate-Nitrite	15,339	351	99.4	98.8–100	2018–20
Sodium	15,339	351	93.5	91.4–95.5	2018–20
Fluoride	15,339	351	100	100	2018–20
Fecal Coliform Bacteria	15,339	348	99.2	98.6–99.7	2018–20
Total Coliform Bacteria	15,339	347	88.1	83.7–92.5	2018–20

Table 2.6c.   Statewide percentage of unconfined aquifer wells expected to meet threshold values for indicators calculated using probabilistic monitoring design

CB = Confidence bounds

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	22,043	352	96.8	94.2–99.4	2018–20
Cadmium	22,043	352	99.9	99.7–100	2018–20
Chromium	22,043	352	100	100	2018–20
Lead	22,043	352	96.4	93.4–99.4	2018–20
Nitrate-Nitrite	22,043	352	99.2	98.4–100	2018–20
Sodium	22,043	352	98.0	96.7–99.2	2018–20
Fluoride	22,043	352	100	100	2018–20
Fecal Coliform Bacteria	22,043	341	96.8	95.8–97.9	2018–20
Total Coliform Bacteria	22,043	341	85.1	80.7–89.5	2018–20

Discussion of Confined and Unconfined Aquifers

Water quality results indicate that Florida's potable groundwater is in generally good condition, with all drinking water indicators showing greater than 90% passing values, except for total coliform bacteria (< 90%). Florida's groundwater and surface water are highly interconnected. Therefore, groundwater entering surface water systems may trigger failures of aquatic life support indicators, especially DO and the nutrients TN and TP. DEP has developed a number of BMAPs and ARPs to address these issues (**Chapter 5**).

Water Quality Trend Detection

Background

MONOTONIC AND STEP TRENDS

Trend tests can be categorized into those using data collected throughout a single period (monotonic trends) and those comparing data collected in two or more nonoverlapping periods (step trends) (Helsel and Hirsch 2002). DEP used the following methods for trend detection in these categories:

- **Monotonic**—Seasonal Kendall (SK) test for individual station water quality indicator trend detection.

- **Step**—Change Analysis (CHAN) for statewide water quality indicator trend detection.

For all trend analyses run, statistical significance is defined as the probability of rejecting the null hypothesis of no change (probability value [p-value] is < 5%).

SEASONALITY

When testing for trends using time series data, variations added by regularly spaced cycles make it more difficult to detect trends if they exist (Gilbert 1987). Regarding environmental data, Gilbert states that major cycles often are referred to as seasonality. To address this issue, Hirsch and Slack (1984) developed the SK test, which significantly reduces or removes the effect of seasonal cycles. DEP used the SK test to look for trends for each indicator at each surface water and groundwater trend site, performing the analyses with R software (R Core Team 2017) and the kendallSeasonalTrendTest function in the EnvStats R package (Millard 2013).

As with seasonal cyclicity, in flowing surface waters highly variable flow rates make it more difficult to detect trends. Where available, flow rate data from associated USGS gaging stations were collected at the same time as surface water samples. DEP adjusted surface water quality data for flow before conducting the SK trend analyses. In contrast, groundwater flow rates generally are much slower, and DEP did not need to make flow adjustments prior to performing groundwater SK analyses.

If a trend existed for either flow-adjusted or nonflow-adjusted data, DEP determined the corresponding slope by using the Sen Slope (SS) estimator, which measures the median difference among all observations over the time series (Gilbert 1987). The SS estimates the magnitude of change for a water quality indicator over the period of record. Reporting a trend as increasing or decreasing indicates the direction of the slope and does not necessarily indicate impairment or improvement in the analyte being measured. The *[Design Document](#)* (DEP 2020a, Appendix C) contains a detailed explanation of the information goals for the Trend Monitoring Network, including data sufficiency and analytical methods.

DEP's *2020 Integrated Report* (2020b, pp. 53–68) contains the most recent trend results for both Trend (SK) and Status (CHAN) Networks. The following section briefly summarizes and discusses those results.

Summary of Trend Network SK Analysis

SURFACE WATER TRENDS

DEP's Surface Water Trend Network consists of 78 fixed sites sampled monthly (**Figure 2.10**); however, as of October 2021, only 76 stations had sufficient data for analysis. Thirty-seven surface water stations have co-located USGS gage stations allowing for flow adjustments. Using the SK, DEP conducts surface water trend analyses every 4 years for each station.

The most recent analyses included data collected from November 1998 through December 2018. Water quality indicators examined included total nitrate-nitrite, total Kjeldahl nitrogen (TKN), TN, TP, total organic carbon (TOC), temperature (Temp), specific conductance (SC), chlorophyll *a*, Enterococci, *E. coli*, pH, and DO. The DEP laboratory conducted these analyses on raw (total) rather than dissolved constituents.

Surface water trend result graphics are available through an interactive online web application, Surface Water Trend Report Card Map. This application presents a series of statewide indicator maps showing the trends, or lack of them, found at each of the 76 sites for each indicator tested.
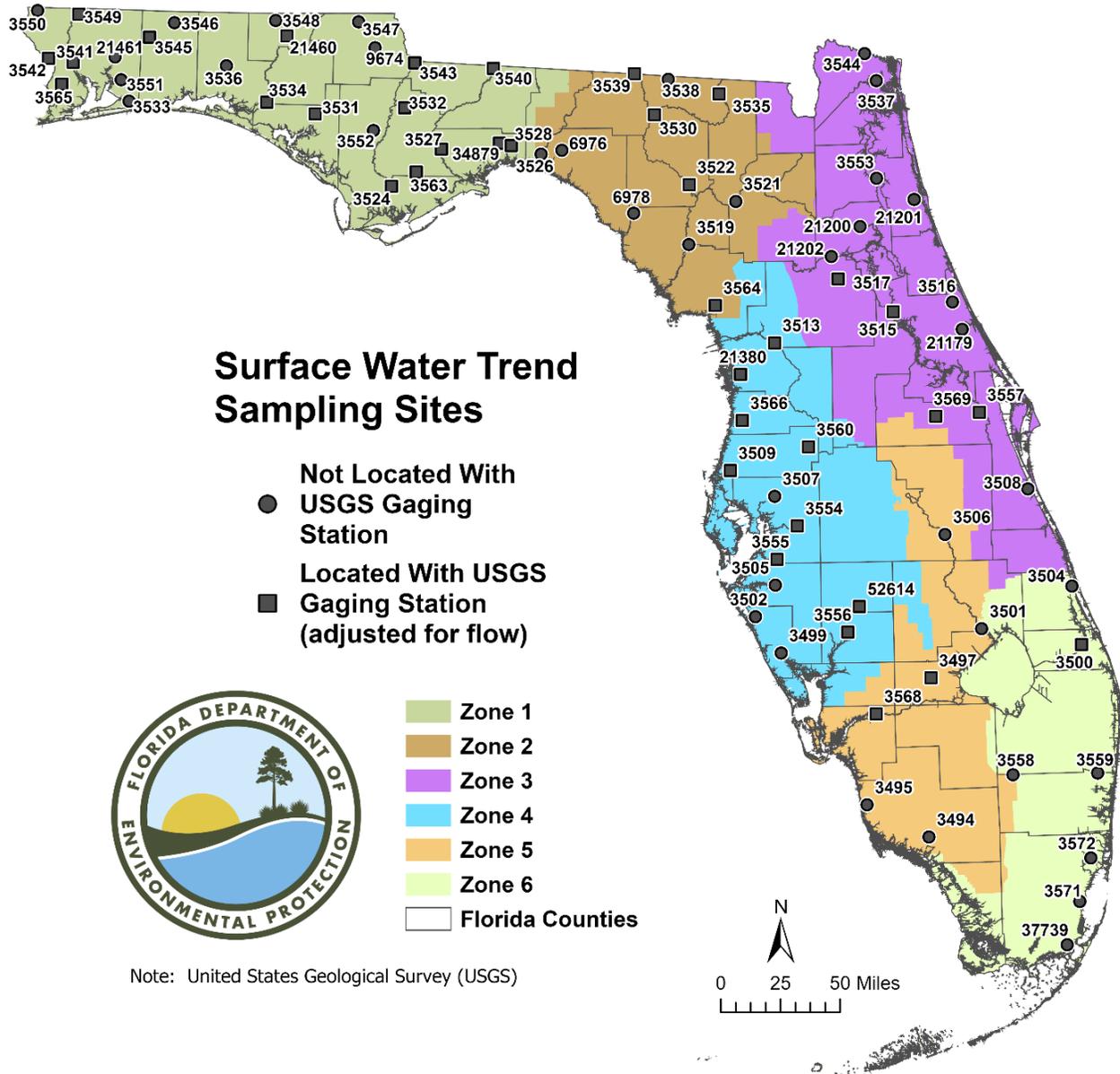
Figure 2.10.   Surface Water Trend Network sampling sites

GROUNDWATER TRENDS

The Groundwater Trend Network currently consists of 49 fixed stations with sufficient data for SK analyses (**Figure 2.11**). Using the SK test, DEP conducts groundwater trend analyses every 4 years for each station.

The latest analyses included data collected from January 2009 through June 2019, a period of record different from that of the Surface Water Trend Network analyses. As with surface water, DEP's laboratory conducted the groundwater analyses on total rather than dissolved constituents. Water quality indicators examined included Temp, SC, DO, pH, water level, total dissolved solids (TDS), TOC, nitric oxide gases (NOx), TKN, TN, orthophosphate (OPO$_4$), TP, total potassium, total sulfate, total sodium, total chloride, total calcium, total magnesium, and total alkalinity.

Groundwater trend result graphics are available through an interactive online web application, Groundwater Trend Report Card Map. This application presents a series of statewide indicator maps showing the trends, or lack of them, found at each of the 49 stations for each indicator tested.

Groundwater Trend Sampling Sites

- **Groundwater Trend Site**
- *1779* Confined Aquifer Well Station ID
- **2465** Unconfined Aquifer Well Station ID

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Florida Counties
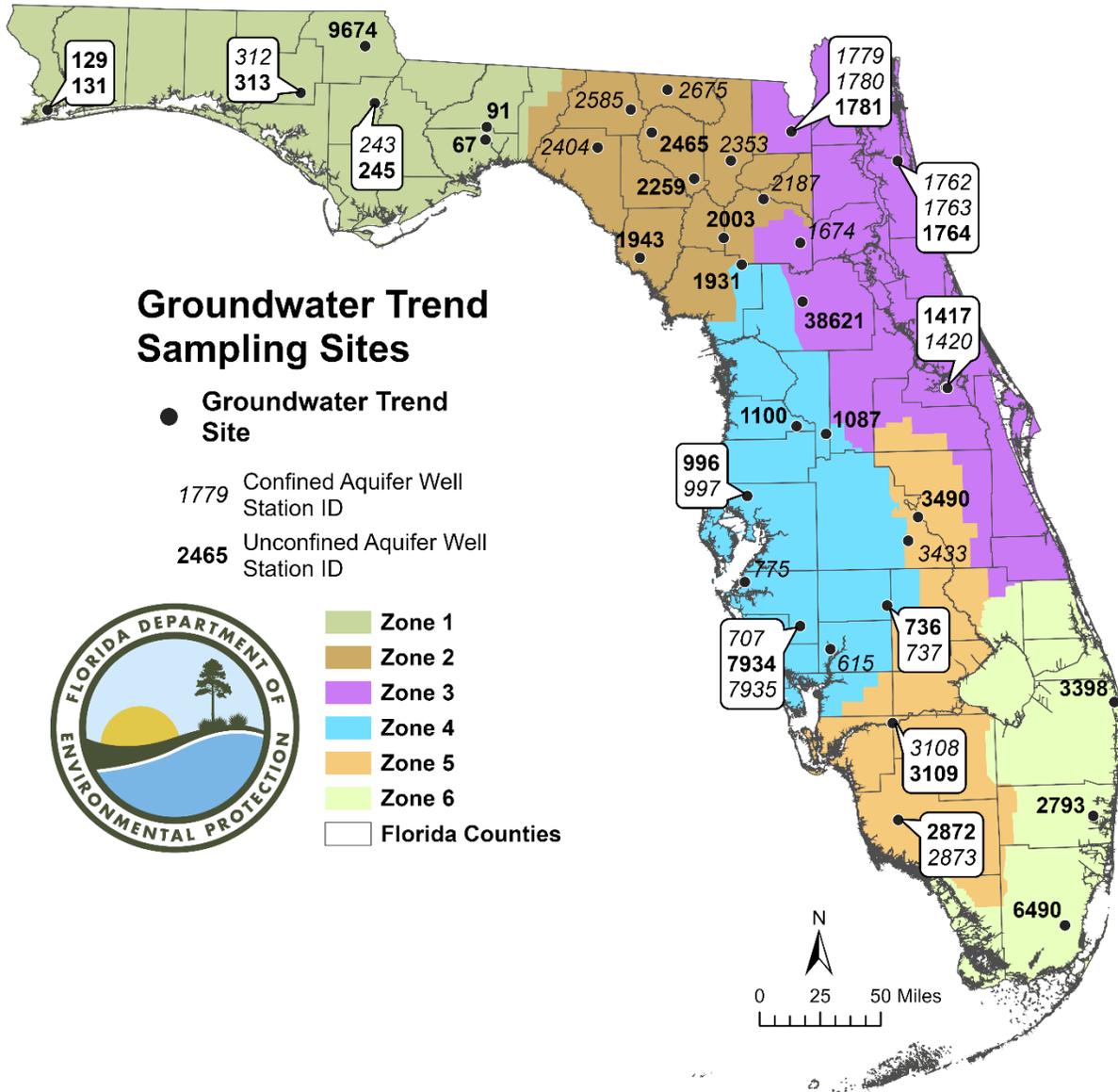
Figure 2.11.   Groundwater Trend Network sampling sites

Summary of Status Network Change Analysis

INTRODUCTION

DEP used the SK test for analyses at individual surface water and groundwater Trend Network sites primarily because it is a nonparametric test (no underlying data distribution assumptions) and addresses serial correlation effects (biases caused by errors associated with a given period carrying over into future periods). For statewide trends, the effects of both serial and spatial

correlation must be addressed. To accommodate these needs, DEP used Status Network monitoring data to compare summarized data from one period (early) with those from another, nonoverlapping period (late). This methodology, called change analysis (CHAN), is described in Kincaid and Olsen (2019). CHAN analyses used the Change Analysis function in R software's (R Core Team 2017) package spsurvey (Kincaid and Olsen 2019). DEP staff wrote individual R scripts for each water resource analyzed. DEP's *2020 Integrated Report* (2020b, pp. 64–69) discusses the results of the Status Network CHAN analyses.

Status Network surface water monitoring data collected from flowing waters and lakes from 2000 to 2003 were compared with data collected from 2015 to 2017, while Status Network confined and unconfined aquifer data collected from 2009 to 2011 were compared with data collected from 2016 to 2018. These periods were selected to generally correspond with the period of record used for the SK test analyses described above.

STATEWIDE SURFACE WATER CHANGE ANALYSES RESULTS AND COMPARISON WITH SK RESULTS

For flowing waters, TP decreased statewide over the periods of record for both CHAN and many SK sites. The nitrogen species indicators presented differing results between the Chan and SK analyses. The indicator TN decreased statewide over the period of record for the CHAN analysis; however, SK showed no statewide change for TN. Additionally, a large number of the surface water trend sites analyzed via SK showed an increase in NOx, while nothing of significance was found for CHAN's NOx analysis (DEP 2020b, Appendix A). Finally, TKN was decreasing in the CHAN analysis and not showing any statewide change via the SK analysis. Possible explanations for these results are discussed in DEP's *2020 Integrated Report* (2020b, pp. 66–69).

STATEWIDE GROUNDWATER CHANGE ANALYSIS

For confined and unconfined aquifers, pH decreased over the period of record for both CHAN and many SK sites. One possible cause for this decrease, documented in **Figure 2.12**, was an increase in rainfall over the period of record. These data indicate significant groundwater recharge occurred from 2009 to 2019. Surface water and rainwater are lower in pH than groundwater. Also, Florida experienced at least two droughts between 1998 and 2009, and then entered a more active hurricane/precipitation period from 2012 through 2018.

Rainfall absorbs carbon dioxide (CO_2) from the atmosphere, forming carbonic acid. Beginning in 2016, the increase in atmospheric CO_2 exceeded 400 parts per million (ppm) (National Oceanic and Atmospheric Administration [NOAA] 2021), leading to an increase in acidified rainfall that likely lowered the pH of both recharge and aquifer waters during the latter stage of CHAN. Possible explanations for these results are discussed in DEP's *2020 Integrated Report* (2020b, pp. 66–69).

Chapter 3: Designated Use Support in Surface Waters

Background

Florida's surface waters are protected for the designated use classifications listed in **Appendix A**. DEP's Watershed Assessment Section (WAS) assesses the health of surface waters through the implementation of the IWR (Chapter 62-303, F.A.C.). The rule contains a legislatively authorized methodology for DEP to assess water quality and determine whether individual surface waters are impaired (i.e., do not attain water quality standards) under ambient conditions. The IWR is used in conjunction with the state's Surface Water Quality Standards (Chapter 62-302, F.A.C.) and Quality Assurance Rule (Chapter 62-160, F.A.C.). The latter governs sample collection and analysis procedures.

The IWR is implemented using DEP's watershed management approach. Under this approach, which is based on a 5-year basin rotation, Florida's 52 hydrologic unit code (HUC) basins (51 HUCs plus the Florida Keys) are distributed among 29 drainage basins, which are then placed in 1 of 5 basin groups located in each of the 6 DEP regulatory districts. There are 4 drainage basins in the Northeast District and 5 drainage basins each in the Northwest, Central, Southwest, South, and Southeast Districts. One drainage basin in each district is assessed each year (except for the Northeast). One complete rotation through each of the 5 basin groups is referred to as a cycle.

This chapter summarizes the results of the assessments performed through 2020, including the third cycle for Basin Groups 3 through 5 and the fourth cycle for Basin Groups 1 and 2. These assessments reflect water quality criteria changes for nutrients and DO (as percent saturation) for Groups 1 through 5, and recreational bacteria and total ammonia for Groups 1, 2, 4, and 5. As noted in **Chapter 1**, DEP is revising part of its watershed management approach to a Statewide Biennial Assessment in which all waterbody segments in Florida will be assessed once every two years, instead of every five years, in repeating cycles. The results from this new approach for assessing Florida's surface waters will be included in the *2024 Integrated Report*.

As part of the assessment process, DEP uses all available data in Florida's Storage and Retrieval (STORET) Database and Watershed Information Network (WIN) Database, the successor to Florida STORET. As of September 2021, WIN contained data from 104 providers, including data collected under the Strategic Monitoring Plan (SMP). The SMP goal is to ensure that segments with WBID numbers have sufficient data to verify whether potentially impaired waters are in fact impaired and, to the extent possible, determine the causative pollutant for waters impaired for DO or biological health. SMP monitoring typically occurs over multiple years and includes the collection of chemical, biological, and physical data. These data are combined with any other data available at the time of the assessment.

Because of limited resources, monitoring is prioritized based on the EPA's Integrated Report assessment categories listed in **Table 3.1a**. Waterbodies in **Table 3.1a** are counted only once using the following hierarchical approach:

- **Category 5**—If there is at least one assessment in Category 5.

- **Category 4e**—If there is at least one assessment in Category 4e, and none in 5.

- **Category 4d**—If there is at least one assessment in Category 4e, and none of the above.

- **Category 4b**—If there is at least one assessment in Category 4b, and none of the above.

- **Category 4a**—If there is at least one assessment in Category 4a, and none of the above.

- **Category 4c**—If there is at least one assessment in Category 4c, and none of the above.

- **Category 2**—If there is at least one assessment in Category 2, and none of the above. This category also includes Category 2t, which was only used in the most recent basin assessment (Group 2, Cycle 4).

- **Category 3c**—If there is at least one assessment in Category 3c, and none of the above.

- **Category 3b**—If there is at least one assessment in Category 3b, and none of the above.

Table 3.1a.   Distribution of assessment results by waterbody type and assessment category (number of WBIDs)

Note: There are no waters in EPA Category 1 (attaining all designated uses) because DEP does not sample for all uses. Category 2 comprises waters attaining all the uses that are sampled for and includes waters in Category 2t for this report.

EPA = U.S. Environmental Protection Agency

The EPA Integrated Report categories are as follows:
1—Attains all designated uses.
2—Attains some designated uses.
3a—No data and information are available to determine if any designated use is attained.
3b—Some data and information are available, but they are insufficient for determining if any designated use is attained.
3c—Meets Planning List criteria and is potentially impaired for one or more designated uses.
4a—Impaired for one or more designated uses and a TMDL has been completed.
4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future.
4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant.
4d—Waterbody indicates nonattainment of water quality standards, but DEP does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess nonattainment of the stream nutrient standard.
4e—Waterbody indicates nonattainment of water quality standards and pollution control mechanisms, or restoration activities are in progress or planned to address nonattainment of water quality standards, but DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5—Water quality standards are not attained and a TMDL is required.

Waterbody Type	EPA Cat. 2	EPA Cat. 3b	EPA Cat. 3c	EPA Cat. 4a	EPA Cat. 4b	EPA Cat. 4c	EPA Cat. 4d	EPA Cat. 4e	EPA Cat. 5	Number of Waterbody Segments Assessed
Beach	294			2					60	**356**
Coastal	93	4			12		1	3	30	**143**
Estuary	149	36	8	27	2	15	34	32	327	**630**
Lake	535	142	79	57	1	59	117	19	182	**1,191**
Spring	4	3	1	32		35		30	22	**127**
Stream	322	272	97	77		143	263	50	516	**1,740**
Total	**1,397**	**457**	**185**	**195**	**15**	**252**	**415**	**134**	**1,137**	**4,187**

303(d) Listed Waters

Only those WBID/analyte combinations placed in EPA Category 5 as a result of IWR assessments are included on the state's Verified List of Impaired Waters adopted by Secretarial Order. For these listings, water quality standards are not being met, and the development of a TMDL (**Chapter 4**) is required. DEP subsequently submits the list of these waters to EPA as the annual update to Florida's 303(d) list.

Although water quality standards are not met for EPA Category 4, these waterbodies are not included on the state's Verified List because a TMDL currently is not required. Nevertheless, for Subcategories 4d or 4e, TMDLs may be required later, and therefore these waterbodies are placed on the303(d) list.

Assessment Results

Lakes are a particular focus of EPA's Integrated Report guidance, under Section 314 of the CWA. **Appendix B** lists 510 publicly owned lakes identified as impaired, for which a TMDL will be needed. Currently, 80 of these lakes are on DEP's priority list for TMDL development through 2022. One hundred fourteen of them already have a TMDL adopted into state rule based on one or more of the parameters causing impairment (excluding those lakes only covered by the statewide TMDL for mercury in fish tissue), and 28 have a TMDL alternative approved or in progress. In addition, all these lakes are covered by a statewide TMDL for mercury in fish tissue.

In Florida, the most frequently identified causes of impairment for rivers and streams, lakes, and estuarine segments include DO, fecal coliform, nutrients, and chlorophyll *a*. Not all basin groups have been assessed using the revised FIB parameters of Enterococci and *E. coli*. **Table 3.1b** lists the 15 most frequently identified impairments by waterbody type.

Table 3.1b.   Fifteen most frequently identified impairments by waterbody type

DO = Dissolved oxygen; TN = Total nitrogen; TP = Total phosphorus; *E. coli* = *Escherichia coli*; SEAS = Shellfish Environmental Assessment Section (FDACS)
Note: Counts exclude assessments in Category 4c.

Identified Cause	Lake	Stream	Coastal	Estuary	Spring	Beach	Total Impairments Identified
DO (% saturation)	58	431	2	137	7		**635**
Fecal Coliform	11	322		119			**452**
Nutrients (TN)	173	115	15	103			**406**
Nutrients (TP)	182	155	1	54	2		**394**
Nutrients (chlorophyll *a*)	186	66	4	126	1		**383**
Biology	126	87					**213**
E. coli		150					**150**
Fecal Coliform (SEAS classification)		3	10	109			**122**
Nutrients (nitrate-nitrite)	1	14	1	1	78		**95**
Enterococci				93			**93**
Iron	6	44	1	41			**92**
Nutrients (macrophytes)		78					**78**
Nutrients (algal mats)		26		2	35		**63**
Bacteria (beach advisories)						62	**62**
Copper	1	4	10	39	1		**55**

Tables 3.2a and **3.2b** and **Figures 3.1a** and **3.1b** present the distribution of the impairment-specific subgroup summary assessments for FIB and nutrients by waterbody type and EPA reporting category, respectively.

Table 3.2a.   Assessment results for FIB by waterbody type and assessment category (number of WBIDs)

Note: There are no waters in EPA Category 1 (attaining all designated uses) because DEP does not sample for all uses. Category 2 comprises waters attaining all the uses that are sampled for.

EPA = U.S. Environmental Protection Agency

The EPA Integrated Report categories are as follows:
1—Attains all designated uses.
2—Attains some designated uses.
3a—No data and information are available to determine if any designated use is attained (not displayed).
3b—Some data and information are available, but they are insufficient for determining if any designated use is attained.
3c—Meets Planning List criteria and is potentially impaired for one or more designated uses.
4a—Impaired for one or more designated uses and a TMDL has been completed.
4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future.
4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant.
4d—Waterbody indicates nonattainment of water quality standards, but DEP does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess nonattainment of the stream nutrient standard.
4e—Waterbody indicates nonattainment of water quality standards and pollution control mechanisms, or restoration activities are in progress or planned to address nonattainment of water quality standards, but DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5—Water quality standards are not attained and a TMDL is required.

Waterbody Type	EPA Cat. 2	EPA Cat. 3b	EPA Cat. 3c	EPA Cat. 4a	EPA Cat. 4b	EPA Cat. 4c	EPA Cat. 4d	EPA Cat. 4e	EPA Cat. 5	Total Number of Assessments
Coastal	84	11							10	**105**
Estuary	152	72	22	21			3	23	229	**522**
Lake	228	555	15						11	**809**
Spring	39	42								**81**
Stream	316	613	84	56		1	9	39	341	**1,459**
Beach	294			2					60	**356**
Total	**1,113**	**1,293**	**121**	**79**	**0**	**1**	**12**	**62**	**651**	**3,332**

Table 3.2b.   Assessment results for nutrients by waterbody type and assessment category (number of WBIDs)

Note: There are no waters in EPA Category 1 (attaining all designated uses) because DEP does not sample for all uses. Category 2 comprises waters attaining all the uses that are sampled for.

EPA = U.S. Environmental Protection Agency

The EPA Integrated Report categories are as follows:
1—Attains all designated uses.
2—Attains some designated uses.
3a—No data and information are available to determine if any designated use is attained (not displayed).
3b—Some data and information are available, but they are insufficient for determining if any designated use is attained.
3c—Meets Planning List criteria and is potentially impaired for one or more designated uses.
4a—Impaired for one or more designated uses and a TMDL has been completed.
4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future.
4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant.
4d—Waterbody indicates nonattainment of water quality standards, but DEP does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess nonattainment of the stream nutrient standard.
4e—Waterbody indicates nonattainment of water quality standards and pollution control mechanisms, or restoration activities are in progress or planned to address nonattainment of water quality standards, but DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5—Water quality standards are not attained and a TMDL is required.

WaterbodyType	EPA Cat. 2	EPA Cat.3b	EPA Cat. 3c	EPA Cat. 4a	EPA Cat.4b	EPA Cat. 4c	EPA Cat.4d	EPA Cat. 4e	EPA Cat. 5	Total Number of Assessments
Estuary	301	79	27	53	2			28	97	**587**
Coastal	31	22	3		23			4	12	**95**
Lake	527	353	51	76	1			11	152	**1,171**
Spring	22	18	3	32				30	21	**126**
Stream	846	428	82	45			115	19	118	**1,653**
Total	**1,727**	**900**	**166**	**206**	**26**	**0**	**115**	**92**	**400**	**3,632**
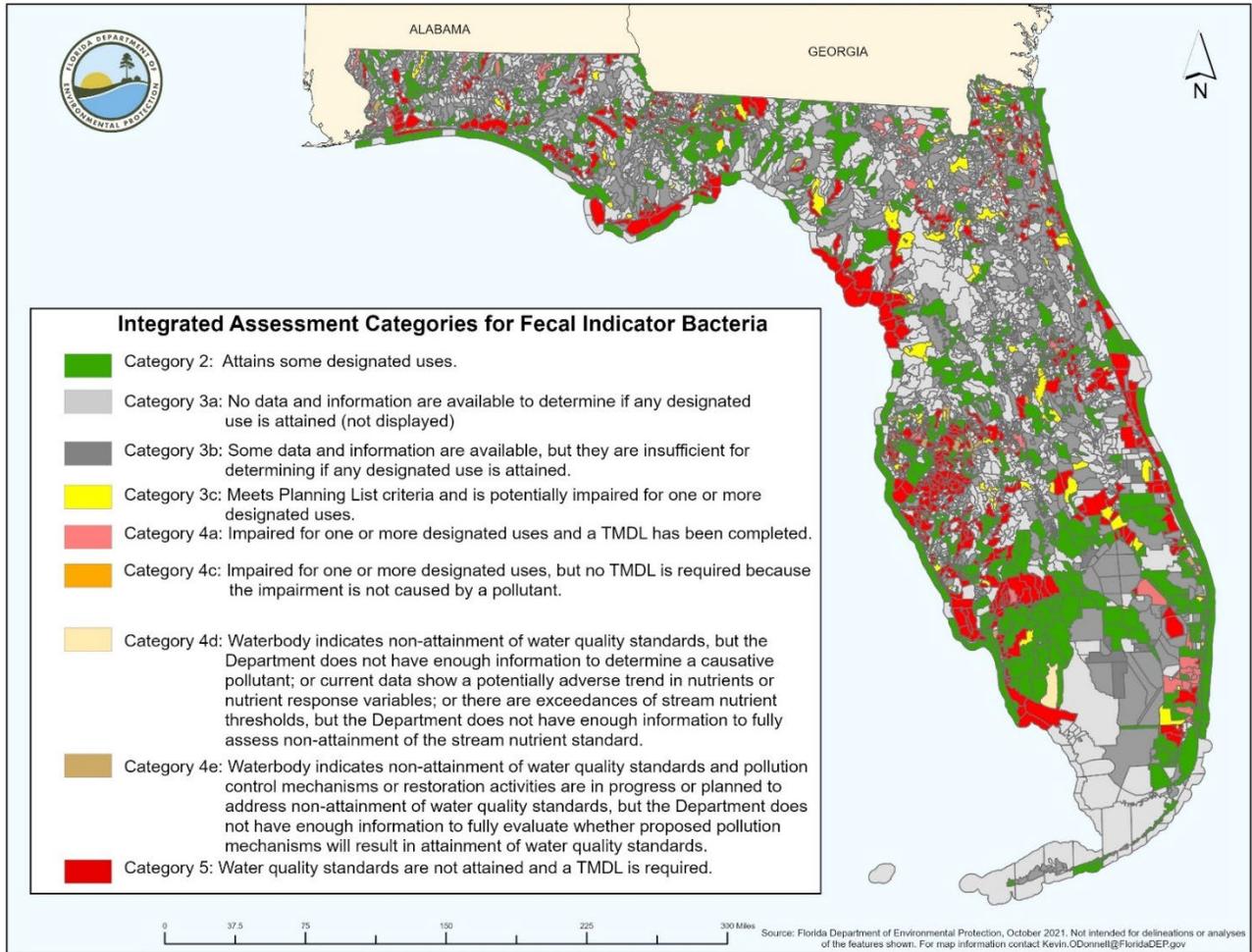
Figure 3.1a.   Results of Florida's surface water quality assessment: EPA assessment categories and DEP subcategories for FIB
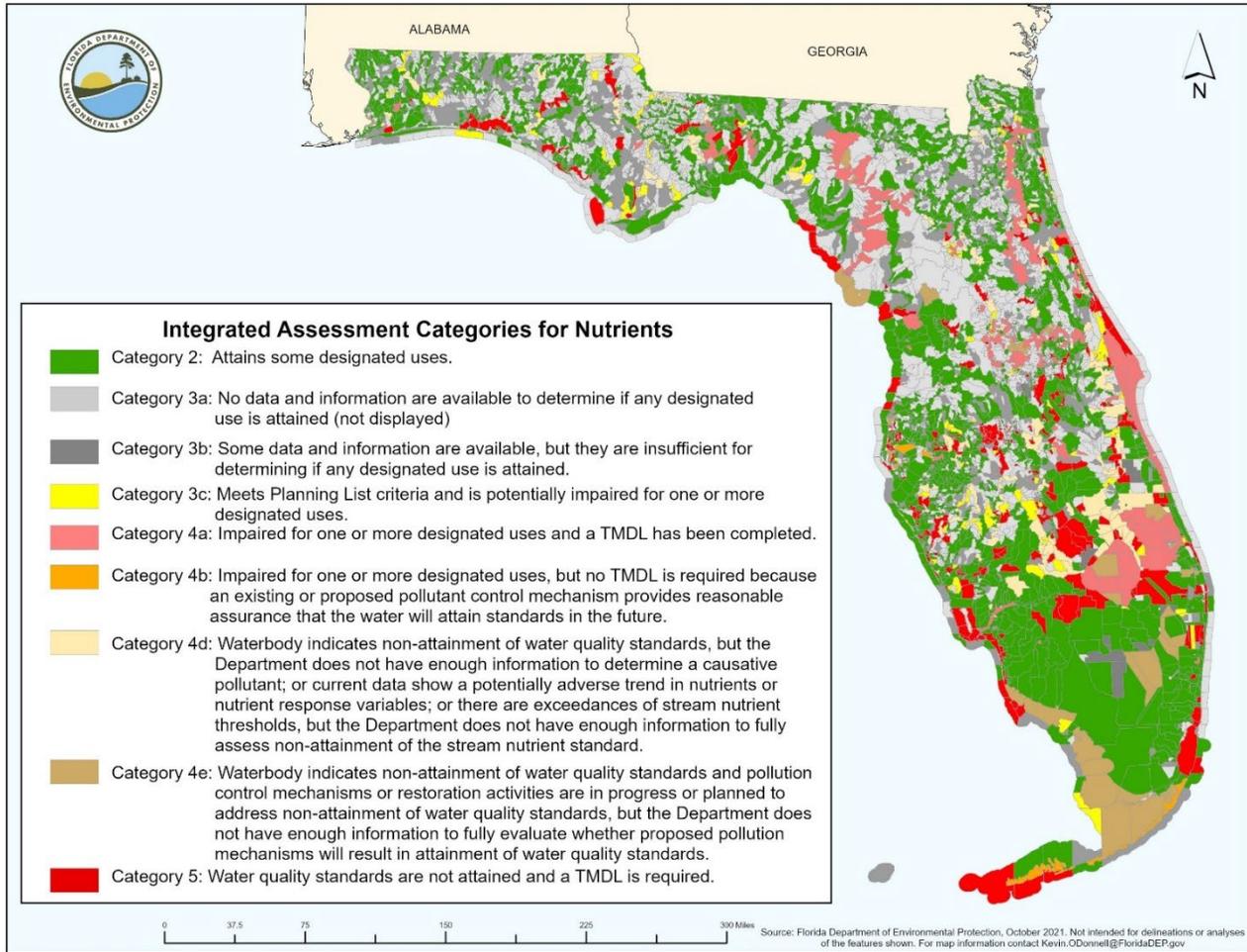
Figure 3.1b. Results of Florida's surface water quality assessment: EPA assessment categories and DEP subcategories for nutrients

Impairment Summary

Tables 3.3a through **3.3d** summarize the number and size of waterbody segments/analyte combinations identified as impaired for which a TMDL may be required (i.e., in Subcategories 4d, 4e, or 5) for a specific parameter. Since a single WBID may be impaired for multiple analytes, the totals presented do not necessarily reflect the total size of waterbodies identified as impaired, but rather the total of all waterbody segment/analyte combinations.

The number of acres identified as impaired for lakes includes and is influenced largely by the assessment results for Lake Okeechobee. Covering an area of 320,331 acres, Lake Okeechobee is the largest lake in the state and is included among the Category 5 waters.

In addition, all fresh waters listed as impaired for mercury in fish tissue prior to 2013 were addressed by a statewide TMDL completed in 2012. These segments have been delisted and placed in EPA Category 4a. As new assessments are carried out, if data indicate additional

impairments in WBIDs not originally included in the TMDL list, the waterbodies are placed on the basin's draft Verified List for review and public comment. DEP then reviews these listings to confirm whether they are or are not caused by the same sources identified in the existing TMDL. If confirmed, the waterbodies are added to the TMDL list and placed in EPA Category 4a.

Table 3.3a.   Miles of rivers/streams impaired by cause

DO = Dissolved oxygen; TP = Total phosphorus; *E. coli = Escherichia coli*; TN = Total nitrogen; SCI = Stream Condition Index;
SC = Specific conductance; SEAS = Shellfish Environmental Assessment Section (FDACS)
[1] Fecal coliform assessed as a monthly geometric mean.

Identified Cause	Waterbody Type	Units	Number of Stream Segments Identified as Impaired	Total Number of Stream Miles
DO (% saturation)	Stream	Miles	409	3,954
Fecal Coliform	Stream	Miles	322	3,131
Nutrients (TP)	Stream	Miles	155	1,495
E. coli	Stream	Miles	150	1,000
Nutrients (TN)	Stream	Miles	115	1,327
Biology (SCI)	Stream	Miles	87	737
Nutrients (macrophytes)	Stream	Miles	78	826
Nutrients (chlorophyll *a*)	Stream	Miles	66	571
Iron	Stream	Miles	44	524
Nutrients (algal mats)	Stream	Miles	26	386
Lead	Stream	Miles	26	303
Fecal Coliform[1]	Stream	Miles	18	113
Nutrients (nitrate-nitrite)	Stream	Miles	14	237
SC	Stream	Miles	9	102
DO	Stream	Miles	6	99
Copper	Stream	Miles	4	18
Silver	Stream	Miles	3	85
Un-ionized Ammonia	Stream	Miles	3	74
Fecal Coliform (SEAS classification)	Stream	Miles	3	54
Chloride	Stream	Miles	3	41
Turbidity	Stream	Miles	1	35
Total Ammonia	Stream	Miles	1	15
Arsenic (in fish tissue)	Stream	Miles	1	10
Nutrients (chlorophyll *a* trend)	Stream	Miles	1	7
Total			1,545	15,143

Table 3.3b.   Acres of lakes impaired by cause

TP = Total phosphorus; TN = Total nitrogen; LVI = Lake Vegetation Index; DO = Dissolved oxygen; SC = Specific conductance

Identified Cause	Waterbody Type	Units	Number of Lake Segments Identified as Impaired	Total Water Area for Lake Segments Identified as Impaired
Nutrients (chlorophyll *a*)	Lake	Acres	186	424,517
Nutrients (TP)	Lake	Acres	182	728,664
Nutrients (TN)	Lake	Acres	173	456,751
Biology (LVI)	Lake	Acres	126	189,298
DO (% saturation)	Lake	Acres	58	32,282
Lead	Lake	Acres	15	7,707
Fecal Coliform	Lake	Acres	11	2,046
Iron	Lake	Acres	6	295,158
Turbidity	Lake	Acres	3	6,383
Pesticides (in fish tissue)	Lake	Acres	1	30,909
pH	Lake	Acres	1	682
Nutrients (other information)	Lake	Acres	1	485
SC	Lake	Acres	1	363
Nutrients (nitrate-nitrite)	Lake	Acres	1	274
Copper	Lake	Acres	1	122
Silver	Lake	Acres	1	11
Total			**767**	**2,175,650**

Table 3.3c.   Acres of estuaries impaired by cause

DO = Dissolved oxygen; SEAS = Shellfish Environmental Assessment Section (FDACS); TN = Total nitrogen; TP = Total phosphorus
[1] Fecal coliform assessed as a median value.
[2] Fecal coliform assessed as a monthly geometric mean.

Identified Cause	Waterbody Type	Units	Number of Estuary Segments Identified as Impaired	Total Water Area for Estuary Segments Identified as Impaired
DO (% saturation)	Estuary	Square Miles	136	67,032
Nutrients (chlorophyll *a*)	Estuary	Square Miles	126	561,901
Fecal Coliform	Estuary	Square Miles	119	94,009
Fecal Coliform (SEAS classification)	Estuary	Square Miles	109	808,959
Nutrients (TN)	Estuary	Square Miles	103	725,759
Enterococci	Estuary	Square Miles	93	30,184
Nutrients (TP)	Estuary	Square Miles	54	289,932
Fecal Coliform[1]	Estuary	Square Miles	41	217,817
Iron	Estuary	Square Miles	41	106,815
Copper	Estuary	Square Miles	39	27,770
Nutrients (other information)	Estuary	Square Miles	13	155,952
Fecal Coliform[2]	Estuary	Square Miles	4	837
pH	Estuary	Square Miles	2	26,278
Thallium	Estuary	Square Miles	2	5,541
Nutrients (algal mats)	Estuary	Square Miles	2	976
Lead	Estuary	Square Miles	2	15
Nutrients (nitrate-nitrite)	Estuary	Square Miles	1	1,436
Dioxin (in fish tissue)	Estuary	Square Miles	1	0.4
Total			**888**	**3,121,215**

Table 3.3d.   Miles of coastal waters impaired by cause

TN = Total phosphorus; SEAS = Shellfish Environmental Assessment Section (FDACS); DO = Dissolved oxygen = TP = Total phosphorus
[1] Fecal coliform assessed as a median value.

Identified Cause	Waterbody Type	Units	Number of Coastal Segments Identified as Impaired	Total Water Size for Coastal Segments Identified as Impaired
Nutrients (other information)	Coastal	Miles	23	333
Nutrients (TN)	Coastal	Miles	15	341
Fecal Coliform (SEAS classification)	Coastal	Miles	10	312
Copper	Coastal	Miles	10	181
Nutrients (chlorophyll *a*)	Coastal	Miles	4	168
Fecal Coliform[1]	Coastal	Miles	3	85
DO (% saturation)	Coastal	Miles	2	45
Nutrients (TP)	Coastal	Miles	1	42
Iron	Coastal	Miles	1	31
Nutrients (Nitrate-Nitrite)	Coastal	Miles	1	31
Total			**70**	**1,570**

Biological Assessment

Under the IWR, biological assessments can provide the basis for impairment determinations, or can support assessment determinations made for other parameters (as is the case for some waterbodies with naturally low DO concentrations where it may be possible to demonstrate that aquatic life use is fully supported by using biological information). **Appendices C** and **D** contain more information on biological assessment methodologies.

Biological assessment tools consist of the Stream Condition Index (SCI), Rapid Periphyton Survey (RPS), Linear Vegetation Survey (LVS) for rivers and streams, and Lake Vegetation Index (LVI) for lakes. **Table 3.4** lists the distribution of biological assessment results based on the type of bioassessment (SCI and LVI).

Of the biological data examined for the Group 3, Cycle 3 to Group 2, Cycle 4 assessment period, 676 waterbodies have sufficient data to demonstrate a healthy biological community. Two hundred thirteen waterbodies fail to meet biological integrity standards and are listed in Categories 4 or 5. Another 507 waterbodies have either insufficient data or inconclusive results to determine attainment and are placed in Categories 3b or 3c.

Table 3.4.   Distribution of biological assessment results by bioassessment method

Note: There are no waters in EPA Category 1 (attaining all designated uses) because DEP does not sample for all uses. Category 2 comprises waters attaining all the uses that are sampled for.

EPA = U.S. Environmental Protection Agency; SCI = Stream Condition Index; LVI = Lake Vegetation Index

The EPA Integrated Report categories are as follows:
1—Attains all designated uses.
2—Attains some designated uses.
3a—No data and information are available to determine if any designated use is attained (not displayed).
3b—Some data and information are available, but they are insufficient for determining if any designated use is attained.
3c—Meets Planning List criteria and is potentially impaired for one or more designated uses.
4a—Impaired for one or more designated uses and a TMDL has been completed.
4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future.
4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant.
4d— Waterbody indicates nonattainment of water quality standards, but DEP does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess nonattainment of the stream nutrient standard.
4e—Waterbody indicates nonattainment of water quality standards and pollution control mechanisms, or restoration activities are in progress or planned to address nonattainment of water quality standards, but DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5—Water quality standards are not attained and a TMDL is required.

WaterbodyType	EPA Cat. 2	EPA Cat.3b	EPA Cat. 3c	EPA Cat. 4a	EPA Cat.4b	EPA Cat. 4c	EPA Cat.4d	EPA Cat. 4e	EPA Cat. 5	Total Number of Assessments
SCI 2012	477	129	145	2			68	3	14	**838**
LVI 2012	199	133	100	7			82	12	25	**558**
Total	**676**	**262**	**245**	**9**	**0**	**0**	**150**	**15**	**39**	**1,396**

Delisting

The flow chart in **Appendix E** illustrates the delisting process.

Drinking Water Use Support

While earlier sections of this chapter summarized all assessment results, this section focuses on assessment results for waterbodies designated as Class I (potable water supply). Of Florida's public drinking water systems, 13% receive some or all of their water from a surface water source.

For Class I waters, the nonattainment of criteria unrelated to drinking water use does not necessarily affect a waterbody's suitability as a potable water supply. In fact, those Class I impairments identified in the IWR assessments have been for uses other than providing safe drinking water. **Table 3.5** lists the status of rivers/streams, lakes/reservoirs, and springs designated for drinking water use in each of EPA's 5 reporting categories. Lake Okeechobee is a Class I waterbody and comprises 320,331 acres of the 337,520 total acres of Class I lakes.

Table 3.5. Waterbodies designated for drinking water use by assessment category (results for assessments including criteria for all use support)

* These impairments are not related to criteria specifically designed to protect drinking water supplies.

EPA = U.S. Environmental Protection Agency

The EPA Integrated Report categories are as follows:
1—Attains all designated uses.
2—Attains some designated uses.
3a—No data and information are available to determine if any designated use is attained.
3b—Some data and information are available, but they are insufficient for determining if any designated use is attained.
3c—Meets Planning List criteria and is potentially impaired for one or more designated uses.
4a—Impaired for one or more designated uses and a TMDL has been completed.
4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future.
4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant.
4d— Waterbody indicates non-attainment of water quality standards, but DEP does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess nonattainment of the stream nutrient standard.
4e—Waterbody indicates nonattainment of water quality standards and pollution control mechanisms, or restoration activities are in progress or planned to address nonattainment of water quality standards, but DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5—Water quality standards are not attained and a TMDL is required.

Rivers/Streams

Waterbody Type	Assessment Category	Assessment Status	Number of WBIDs
Rivers/Streams	2	Not Impaired	14
Rivers/Streams	3a	No Data	20
Rivers/Streams	3b	Insufficient Data	11
Rivers/Streams	3c	Planning List	2
Rivers/Streams	4a	TMDL Complete	1
Rivers/Streams	4b	Reasonable Assurance	0
Rivers/Streams	4c	Natural Condition	3
Rivers/Streams	4d	No Causative Pollutant	12
Rivers/Streams	4e	Ongoing Restoration	3
Rivers/Streams	5*	Impaired	22

Lakes/Reservoirs

Waterbody Type	Assessment Category	Assessment Status	Number of WBIDs
Lakes/Reservoirs	2	Not Impaired	4
Lakes/Reservoirs	3a	No Data	2
Lakes/Reservoirs	3b	Insufficient Data	0
Lakes/Reservoirs	3c	Planning List	1
Lakes/Reservoirs	4a	TMDL Complete	4
Lakes/Reservoirs	4b	Reasonable Assurance	0
Lakes/Reservoirs	4c	Natural Condition	0
Lakes/Reservoirs	4d	No Causative Pollutant	4
Lakes/Reservoirs	4e	Ongoing Restoration	0
Lakes/Reservoirs	5*	Impaired	11

Springs

Waterbody Type	Assessment Category	Assessment Status	Number of WBIDs
Springs	2	Not Impaired	0
Springs	3a	No Data	0
Springs	3b	Insufficient Data	0
Springs	3c	Planning List	0
Springs	4a	TMDL Complete	0
Springs	4b	Reasonable Assurance	0
Springs	4c	Natural Condition	4
Springs	4d	No Causative Pollutant	0
Springs	4e	Ongoing Restoration	0
Springs	5*	Impaired	0

Overlap of Source Water Areas and Impaired Surface Waters

In 2021, there were 5,069 public drinking water systems statewide, 18 of which obtain their supplies from surface water. An additional 76 systems wholly or partially purchase water from these 18 systems.

DEP compared the adopted Verified List of Impaired Waters with the coverage of the assessment areas generated for the Source Water Assessment and Protection Program. The modeled source water assessment area coverage for community drinking water systems used a 3-day travel time to the intake within surface waters and their 100-year floodplains. **Table 3.6** lists the river/stream miles (including springs) and square miles of lakes/reservoirs that overlap source water areas for community water systems impaired for fecal coliform, *E. coli*, or Enterococci.

Table 3.6.   Summary of river/stream miles and lake/reservoir acres identified as impaired for fecal coliform, *E. coli*, or Enterococci overlapping source water areas of community water systems

Surface Water Type	Length or Area of Impaired Surface Waters Overlapping Source Water Areas in Basin Groups 1–5
Streams/Rivers	943 miles
Lakes/Reservoirs	1,741 acres

Chapter 4: TMDLs, Prioritization, and Alternative Restoration Plans (ARPs)

DEP must develop TMDLs for waterbody segments added to DEP's Verified List of Impaired Waters, as required by the CWA and Florida Watershed Restoration Act (FWRA) (Chapter 403.067, F.S.). A TMDL establishes the maximum amount of a pollutant that a waterbody can receive without causing water quality standard exceedances. As such, TMDL development is an important step toward restoring the state's waters to their designated uses. BMAPs (discussed in **Chapter 5**) and permits issued for point sources all use TMDLs as the basis for their water quality goals.

In Florida, DEP may either adopt nutrient TMDLs based on the generally applicable criteria in Rules 62-302.531 and 62-302.532, F.A.C., or as site-specific Hierarchy I numeric nutrient criteria (NNC) defined in the report *Implementation of Florida's Numeric Nutrient Standards* (2013a). DEP develops site-specific Hierarchy I NNC when there is evidence that a waterbody's response (e.g., chlorophyll) is different from that of the waterbodies used to develop the generally applicable NNC. DEP's TMDL Program web page contains more detailed information on this program.

In 2014, DEP provided EPA with a priority framework document addressing how its 303(d) and TMDL Programs implement Section 303(d) of the CWA (DEP 2014). The report focused on Florida's transition away from a pace-driven TMDL development schedule and towards a recovery potential screening approach. In 2015, DEP updated the approach by (1) explaining the significant changes to the its priority-setting process since summer 2014, and (2) expanding the planning horizon for TMDL development through 2022, in keeping with the 303(d) long-term vision.

Two scheduled "check-in" periods were built into the 2014 priority framework. DEP considered public comments, new sampling data, new database runs, and new verified impairments during each of these check-ins (**Table 4.1**). During the first check-in period from October 2018 through May 2019, DEP caught up with developing any TMDLs left on the list and reprioritized the second half of the plan. The update aligned with Governor Ron DeSantis's signed Executive Order 19-12 (Achieving More Now for Florida's Environment), implementing major reforms to ensure the protection of Florida's environment and water quality. More information and a story map on the current prioritization can be found on the Site-Specific TMDL Prioritization web page. The current list of waters prioritized for TMDLs is available online. It includes the waterbodies and the types of TMDLs that will be developed between now and 2022.

Table 4.1. **Overall timeline for long-term vision priorities (Fiscal Year [FY] 2016–22)**

State Fiscal Year (SFY)	Federal FY	Calendar Quarter	Comments
SFY 15–16	FY 15	July to Sept 2015	Establish plan
SFY 15–16	FY 16	Oct to Dec 2015	Beginning of plan
SFY 15–16	FY 16	Jan to Mar 2016	
SFY 15–16	FY 16	Apr to Jun 2016	
SFY 16–17	FY 16	July to Sept 2016	Annual planning
SFY 16–17	FY 17	Oct to Dec 2016	
SFY 16–17	FY 17	Jan to Mar 2017	
SFY 16–17	FY 17	Apr to Jun 2017	
SFY 17–18	FY 17	July to Sept 2017	Annual planning
SFY 17–18	FY 18	Oct to Dec 2017	
SFY 17–18	FY 18	Jan to Mar 2018	
SFY 17–18	FY 18	Apr to Jun 2018	
SFY 18–19	FY 18	July to Sept 2018	Annual planning
SFY 18–19	FY 19	Oct to Dec 2018	**Check-in period 1 (reprioritize)**
SFY 18–19	FY 19	Jan to Mar 2019	
SFY 18–19	FY 19	Apr to Jun 2019	
SFY 19–20	FY 19	July to Sept 2019	Annual planning
SFY 19–20	FY 20	Oct to Dec 2019	
SFY 19–20	FY 20	Jan to Mar 2020	
SFY 19–20	FY 20	Apr to Jun 2020	
SFY 20–21	FY 20	July to Sept 2020	Annual planning
SFY 20–21	FY 21	Oct to Dec 2020	
SFY 20–21	FY 21	Jan to Mar 2021	
SFY 20–21	FY 21	Apr to Jun 2021	
SFY 21–22	FY 21	July to Sept 2021	Annual planning
SFY 21–22	FY 22	Oct to Dec 2021	
SFY 21–22	FY 22	Jan to Mar 2022	
SFY 21–22	FY 22	Apr to Jun 2022	**Check-in period 2 (reprioritize)**
SFY 22–23	FY 22	July to Sept 2022	
SFY 22–23	FY 23	Oct to Dec 2022	New plan begins

To date, DEP has adopted a total of 454 TMDLs. Of these, 269 were developed for DO, nutrients, and/or un-ionized ammonia; 179 were developed for bacteria; and 6 were for other parameters such as iron, lead, or turbidity. In addition, DEP adopted a statewide TMDL for mercury, based on fish consumption advisories affecting over 1,400 waterbody segments. These TMDLs represent areas in all basin groups and cover many of the largest watersheds in the state (e.g., St. Johns River, St. Lucie Estuary). DEP has many more TMDLs in various stages of development.

TMDL Priorities

The second check-in period will begin in January 2022, and will conclude by July 1, 2022. DEP is working with EPA Region 4 to develop and implement a new TMDL prioritization for the 10 years from 2022 through 2032 consistent with EPA's still evolving framework, tentatively termed the "CWA Section 303(d) Program Framework." The new prioritization is expected to continue moving toward a recovery potential approach.

DEP's goals will be to select a set of waterbodies where TMDLs are the best tool to guide ecosystem restoration and support community objectives for those waters. Key prioritization factors under consideration are waterbody type (e.g., estuary, lake, stream), the parameter causing impairment, the magnitude and/or frequency of a water quality criterion exceedance, ecological significance (e.g., Outstanding Florida Waters, Aquatic Preserves, parks), environmental justice, and opportunities for stakeholder-led TMDL alternatives (i.e., reasonable assurance plans [RAPs] and pollutant reduction plans). The new TMDL prioritization will be developed with public input and involvement, including public workshops with comment periods.

The 2022–32 TMDL prioritization (Prioritization 2.0) is expected to maintain the focus on nutrient impairments; however, DEP also intends to initiate a new consolidated TMDL approach to assess FIB impairments beginning in 2022. Under this approach, individual TMDLs will be calculated for all FIB verified impaired waters, and all resultant TMDLs will be presented in a single consolidated document, allowing stakeholders to find information on bacteria-impaired waterbodies more easily. It also will use limited state resources more efficiently and speed up the restoration of bacteria-impaired waters.

DEP intends to pilot the new consolidated approach in the Everglades West Coast Basin. This project will give stakeholders an opportunity to become familiar with the new approach, provide comments, and identify needed process improvements before statewide implementation. DEP anticipates completing rulemaking for the pilot TMDL in summer 2022. Following the pilot project and beginning in 2023, DEP will revise the consolidated FIB TMDL report every two years following the Statewide Biennial Assessment of impaired waters (**Chapter 1**). The revised consolidated report will provide TMDLs for all newly identified bacteria-impaired waterbodies.

DEP also will hold public workshops, update the rule language in Chapter 62-304, F.A.C., and submit any new TMDLs to EPA for approval on the same two-year cycle.

Bridge Priorities

DEP will continue to develop, propose, and adopt TMDLs during the 2022–23 period as it closes out the previous prioritization and completes Prioritization 2.0. Florida's bridge priorities will include the pilot FIB TMDLs for the Everglades West Coast Basin, the initiation of TMDL development for all bacteria-impaired waters identified as verified impaired in the 2022 Statewide Biennial Assessment, and nutrient TMDLs for verified impaired lakes in the Kissimmee River and Middle St. Johns River Basins.

ARPs

DEP encourages local stakeholders to develop [alternative restoration plans](#) and undertake water quality restoration activities at the earliest practical time. Early restoration activity implementation is more cost-effective and may allow DEP to forgo certain regulatory steps (most notably, the development of TMDLs and BMAPs), thus focusing limited local and state resources directly on actions that will improve water quality.

Background

In 2013, as part of its [*Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*](#), EPA created an optional subassessment category called 5-alt. One goal for this new category was for states to "use alternative approaches," in addition to TMDLs. When suitable, [EPA's alternative restoration plan](#) approach allows states to tailor corrective actions to waterbody-specific circumstances more effectively. Florida uses Assessment Subcategories 4b and 4e to track ARPs.

The processes of identifying impairment, adopting a TMDL, and implementing a BMAP can be lengthy. ARPs streamline these processes. DEP prefers ARP development over the conventional regulatory approach because the plans can address water quality impairment more expeditiously. Under the IWR, DEP can forgo or delay placing a waterbody on the Verified List and subsequently establishing a TMDL, if there is documented reasonable assurance that pollution control mechanisms are addressing the impairment effectively. Local stakeholders are responsible for providing reasonable assurance documentation to DEP. Stakeholders gather the information voluntarily. Failure to provide this documentation results in DEP's placing the waterbody on the Verified List of Impaired Waters.

Assessment Categories Used for Restoration Plans

The IWR authorizes two types of restoration plans to avoid placing a waterbody on the Verified List. The optimal time to propose or submit one of these plans is during the assessment cycle, prior to TMDL initiation. The first type, waterbodies with restoration plans meeting the

requirements of Rules 62-303.600(1) and (2), F.A.C. (i.e., waterbodies with 4b plans or RAPs), are not placed on the Verified List or the 303(d) list under the following provisions:

62-303.600 Evaluation of Pollution Control Mechanisms.

(1) Upon determining that a waterbody is impaired or determining there is an increasing trend in nutrients with a reasonable expectation that the waterbody will become impaired within 5 years, [DEP] shall evaluate whether existing or proposed technology-based effluent limitations and other pollution control programs under local, state, or federal authority are sufficient to result in the attainment of applicable water quality standards.

(2) If, after evaluation of the pollution control mechanisms set forth in subsection (1), the water segment is expected to attain water quality standards in the future and is expected to make reasonable progress towards attainment of water quality standards by the time the next section 303(d) list for the basin is scheduled to be submitted to EPA, the segment shall not be listed on the Verified List. [DEP]'s decision shall be based on a plan that provides reasonable assurance that any proposed pollution control mechanisms and expected improvements in water quality in the water segment will attain applicable water quality standards.

(3) For water segments with planned or ongoing restoration activities that will address the nonattainment of water quality standards, stakeholders may submit information to [DEP] demonstrating pollutant reduction mechanisms to address the nonattainment.

The second type comprises waterbodies with restoration plans only meeting the requirements of Rule 62-303.390, F.A.C. (4e restoration plans). These are placed on the Study List and the 303(d) list under the following provisions of Paragraph 62-303.390(2)(d), F.A.C.:

A Class I, II, or III water shall be placed on the study list if a waterbody segment where pollution control mechanisms are in place or planned that meet the requirements of subsections 62-303.600(1) and (3), F.A.C., except that there is uncertainty when water quality standards will be attained and the waterbody segment requires additional study.

The difference between a 4b RAP and a 4e restoration alternative depends on the level of certainty when water quality standards will be met in the future. For 4b plans, there should be reasonable assurance that pollution control mechanisms will result in the attainment of water quality standards by an agreed-on timeline outlined in the approved document. As such, the establishment of a TMDL is unnecessary.

For 4e restoration alternatives, the documentation should provide information on recently completed, ongoing, or planned restoration activities, although detailed information regarding these activities may not be fully known at the time of 4e development. General information such as scope and size, funding, estimated start and completion dates, and estimated pollutant reduction benefits helps meet DEP's assurance documentation requirements during the acceptance process. Waterbodies with accepted 4e documents are still included on the 303(d) list, but placement on the Verified List is postponed, allowing for the implementation of the proposed 4e activities and evaluation of progress towards restoration.

If at any time DEP determines that reasonable assurance or reasonable progress is not being met for either of these plan types, the Verified List will be amended accordingly. Additional reasonable progress must be made each time a waterbody is considered for 4b or 4e listing under Chapter 62-303, F.A.C.

While these alternative plans are not BMAPs, they provide a streamlined, effective tool available to DEP and stakeholders to improve water quality and begin the restoration process without relying on TMDL development.

Documenting Reasonable Progress

The determination of whether reasonable progress is being made towards water quality standard attainment is site and pollutant specific. Documentation must support specific progress towards the restoration of water quality criteria according to the plan's reporting schedule. The document *Guidance on Developing Alternative Restoration Plans* (DEP 2021d) is available on DEP's Watershed Assessment Section web page. Because it usually takes many years to fully restore an impaired waterbody, interim water quality targets may be needed to measure reasonable progress.

Examples of reasonable progress and interim targets include, but are not limited to, the following:

1. A written commitment to implement pollutant controls to reduce loadings within a specified period from stakeholders representing at least 50% of the excess anthropogenic load of the pollutant(s) of concern.

2. Evidence of the percentage reduction (or alternatively, a percentage reduction consistent with meeting the water quality target by the specified date) in the annual anthropogenic loading of the pollutant(s) of concern since the baseline period or the last reporting period, whichever is later.

3. Evidence of the percentage decrease (or alternatively, a percentage decrease consistent with meeting the water quality target by the specified date) in the annual average concentration of the pollutant(s) of concern since the baseline

period or the last reporting period, whichever is later.

4. Bioassessment results (or other biological improvements, such as increased seagrass coverage) showing improvement in the health of a waterbody's biological community, as measured by bioassessment procedures similar to those used to determine impairment and conducted under similar conditions.

5. The adoption of a local ordinance that specifically provides water quality goals, restricts growth or loads tied to the pollutant(s) of concern, and contains an enforcement option if the proposed management measure (or measures) is not implemented as required.

Tracking Improvements Through Time

Once an ARP is in place, activities and projects are completed on a schedule to ensure progress towards water quality restoration. DEP evaluates monitoring data during each basin assessment to determine progress towards meeting water quality standards. The iterative nature of this approach allows DEP to track the effectiveness of management activities over time (i.e., the implementation of BMAPs, TMDLs, and ARPs; the extent to which water quality objectives are being met; and whether individual waterbodies are no longer impaired). After determining that a waterbody is attaining water quality standards, DEP uses Assessment Subcategories 2b or 2e (**Table C.5)** to show attainment. DEP's Statewide Alternative Restoration Plan Status web page allows users to view specific plan types, parameters, and waterbodies, and to explore plans by geographic area.

Chapter 5: BMAP Program

Florida's primary mechanism for implementing TMDLs adopted through Section 403.067, F.S., is the BMAP, which is a framework to promote projects and management strategies to restore water quality by reducing pollutant loading. DEP's Basin Management Action Plans web page contains additional details. BMAPs cannot be completed without significant input from all stakeholders, collaboration with local entities, and stakeholder commitment to implement restoration projects. Although each BMAP is unique to and developed for a specific basin, at a minimum all BMAPs include restoration projects and management strategies, implementation schedules and milestones, allocations or reduction requirements, funding strategies, tracking mechanisms, and extensive water quality monitoring networks.

During its 2020 session, the Florida Legislature passed the Clean Waterways Act (Chapter 2020-150, Laws of Florida), which requires DEP to report on water quality monitoring in the area of each nutrient BMAP. The document *Report to the Florida Legislature: Basin Management Action Plan Monitoring* (DEP 2021e) describes current monitoring, identifies monitoring gaps, proposes changes to fill those gaps, and estimates the costs of the improvements.

BMAP implementation uses an adaptive management approach that continuously solicits cooperation and agreement from stakeholders on pollutant reduction assignments. The foundation of all BMAPs comprises the water quality restoration projects that state and local entities commit to developing and completing. DEP, in cooperation with local stakeholders, annually reviews, updates, and assesses these projects to ensure progression towards established milestones. During the collaborative review process, stakeholders may update and revise projects, and DEP may require additional restoration projects. Because BMAPs are adopted by Secretarial Order, they are enforceable, with DEP having the statutory authority to take enforcement actions if necessary.

To date, DEP has adopted 33 BMAPs and is working on updating numerous BMAPs statewide. **Table 5.1** summarizes the status of all BMAPs. While the majority address nutrient impairments, DEP also has adopted BMAPs that target FIB contamination. To address these sources, DEP developed a guidance manual, *Restoring Bacteria-Impaired Waters* (DEP 2018b). Based on stakeholder collaboration experiences around the state, the manual provides local stakeholders with useful information on identifying FIB sources in their watersheds and examples of management actions to address these sources.

In January 2016, the Florida Legislature adopted statutes directing DEP to develop or update BMAPs for impaired Outstanding Florida Springs (OFS) and impaired waters that are part of the Northern Everglades and Estuaries Protection Program (NEEPP). Revisions to Chapter 373, F.S., outlined specific updates and actions for OFS and NEEPP BMAPs. Revisions to Chapter

403, F.S., outlined specific updates and actions for all BMAPs, along with the schedules for those updates and actions. DEP conducted well over 100 stakeholder meetings, technical workshops, and noticed public meetings in the preparation for the revised BMAPs.

In June 2018, DEP adopted 13 OFS BMAPs that became effective on January 4, 2019. Challenges to 5 individual BMAPs (Santa Fe River, Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River, Suwannee River, Volusia Blue Spring, and Wekiwa and Rock Springs) delayed their implementation dates until May 18, 2021. In addition, DEP reviewed and updated the 3 Indian River Lagoon (IRL) BMAPs (Banana River Lagoon [BRL], North IRL, and Central IRL). These were adopted by DEP's Secretary in February 2021, except for Central IRL, which did not become effective until October 2021.

Beyond the requirements to update BMAPs, the 2016 legislation also directed DEP to develop a Florida Statewide Annual Report for all BMAPs. DEP prepares and submits this interactive, online report to the Governor and Legislature annually by July 1.

Table 5.1.   Summary of BMAPs

TN = Total nitrogen; TP = Total phosphorus; FC = Fecal coliform; DO = Dissolved oxygen; BOD = Biochemical oxygen demand; NO_3 = Nitrate; OPO_4 = Orthophosphate

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
Upper Oklawaha River Basin	Adopted August 2007; Phase 2 Adopted July 2014; Amended July 2019	TP	The BMAP, adopted in 2007, was updated in 2014 (Phase 2). Phase 2 was revised and amended in July 2019 to add information on sources and allocations.
Orange Creek	Adopted May 2008; Phase 2 Adopted July 2014; Amended July 2019	TN/TP/FC	The BMAP, adopted in 2008, was updated in 2014 (Phase 2). Phase 2 was revised and amended in July 2019 to add information on sources and allocations.
Long Branch	Adopted May 2008	FC/DO	The BMAP, adopted in 2008, currently is being reviewed for any necessary updates as restoration efforts continue.
Lower St. Johns River Basin Main Stem	Adopted October 2008	TN/TP	The BMAP, adopted in 2008, currently is being reviewed for any necessary updates as restoration efforts continue.
Hillsborough River	Adopted September 2009	FC	The BMAP, adopted in 2009, currently is being reviewed for any necessary updates as source identification efforts continue.
Lower St. Johns River Basin Tributaries I	Adopted December 2009	FC	The BMAP, adopted in 2011, currently is being reviewed for any necessary updates as source identification efforts continue.
Lake Jesup	Adopted May 2010; Amended July 2019	TN/TP/ Un-ionized ammonia	The BMAP, adopted in 2010, was revised and amended in July 2019 to add information on sources and allocations.
Lower St. Johns River Basin Tributaries II	Adopted August 2010	FC	The BMAP, adopted in 2010, currently is being reviewed for any necessary updates as source identification efforts continue.

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
Bayou Chico (Pensacola Basin)	Adopted October 2011	FC	The BMAP, adopted in 2011, currently is being reviewed for any necessary updates as source identification efforts continue.
Santa Fe River Basin	Adopted May 2021	NO$_3$/DO	The BMAP was updated and adopted in June 2018 to meet the new requirements outlined in the Florida Springs and Aquifer Protection Act. As the result of an administrative challenge, adoption was delayed until 2021.
Lake Harney, Lake Monroe, Middle St. Johns River, and Smith Canal	Adopted August 2012	TN/TP	The BMAP, adopted in 2012, currently is being reviewed for any necessary updates.
Caloosahatchee Estuary Basin	Adopted November 2012; Updated January 2020	TN	The NEEPP BMAP, adopted in 2012, covers the Tidal Caloosahatchee Watershed. A formal 5-Year Review of the BMAP was submitted to the Florida Legislature and Governor in November 2017 and updated to meet the new requirements outlined in Executive Order 19-12 in January 2020.
Everglades West Coast	Adopted November 2012	TN/DO	The BMAP, adopted in 2012, covers the impaired waterbodies Hendry Creek and Imperial River. It is being reviewed to identify whether any updates are necessary as the end of the first phase of implementation nears.
Banana River Lagoon (BRL)	Adopted February 2013; Updated February 2021	TN/TP	The BMAP was adopted in 2013, in conjunction with the Central and North IRL BMAPs. All three BMAPs are being reviewed to identify whether any updates are necessary as the end of the first phase of implementation nears.
Central IRL	Adopted February 2013; Updated February 2021 (update effective October 2021)	TN/TP	The BMAP was adopted in 2013, in conjunction with the North IRL and BRL BMAPs. All three BMAPs are being reviewed to identify whether any updates are necessary as the end of the first phase of implementation nears.
North IRL	Adopted February 2013; Updated February 2021	TN/TP	The BMAP was adopted in 2013, in conjunction with the Central IRL and BRL BMAPs. All three BMAPs are being reviewed to identify whether any updates are necessary as the end of the first phase of implementation nears.
St. Lucie River and Estuary Basin	Adopted June 2013; Updated January 2020	TN/TP/BOD	The NEEPP BMAP, adopted in 2013, covers the watershed contributing to the St. Lucie Estuary. A formal 5-Year Review of the BMAP was submitted to the Florida Legislature and Governor in June 2018. The BMAP was updated to meet the new requirements outlined in Executive Order 19-12 in January 2020.
Alafia River Basin	Adopted March 2014	FC/TN/TP/DO	The BMAP, adopted in 2014 and in its third year of implementation, is currently being reviewed for any necessary updates.
Manatee River Basin	Adopted March 2014	FC/TN/TP/DO	The BMAP, adopted in 2014 and in its third year of implementation, is currently being reviewed for any necessary updates.

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
DeLeon Spring	Adopted June 2018	NO₃	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.
Gemini Springs	Adopted June 2018	NO₃	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.
Lake Okeechobee Basin	Adopted December 2014; Updated January2020	TP	The NEEPP BMAP, adopted in 2014, covers the nine subwatersheds comprising the Lake Okeechobee Basin. In January 2020, the BMAP was updated to meet new requirements outlined in Executive Order 19-12.
Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River	Adopted May 2021	NO₃	The BMAP was updated and adopted in June 2018 to meet the new requirements of the Florida Springs and Aquifer Protection Act of 2016. As the result of an administrative challenge, adoption was delayed until 2021.
Upper Wakulla River and Wakulla Springs	Adopted June 2018	NO₃	The BMAP, revised to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.
Wekiva River, Rock Springs Run,and Little Wekiva Canal	Adopted October 2015	NO₃/TP/DO	The BMAP addresses the surface water contributing area for Wekiva River, Rock Springs Run, and Little Wekiva Canal. The BMAP for surface water will remain in place for those areas that are not included in the Wekiwa Spring and Rock Springs contributing area and for any direct discharge activities into surface waters.
Jackson Blue Spring	Adopted June 2018	NO₃	The BMAP, which was revised to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.
Volusia Blue Springs	Adopted May 2021	NO₃	The BMAP was developed and adopted in June 2018 to meet the new requirements of the Florida Springs and Aquifer Protection Act of 2016. As the result of an administrative challenge, adoption was delayed until 2021.
Kings Bay/Crystal River	Adopted June 2018	TN/TP/NO₃/OPO₄	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.
Weeki Wachee Spring and Spring Run	Adopted June 2018	NO₃	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 30, 2018.
Middle and Lower Suwannee River Basin	Adopted May 2021	TN	The BMAP. updated and adopted in June 2018 to meet the new requirements of theFlorida Springs and Aquifer Protection Act of 2016, is currently under administrative challenge.
Homosassa and Chassahowitzka Springs Groups	Adopted June 2018	TN/NO₃	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
Wekiwa and Rock Springs	Adopted May 2021	NO$_3$/TP	The BMAP was updated and adopted in June 2018 to meet the new requirements of theFlorida Springs and Aquifer Protection Act of 2016. As the result of an administrative challenge, adoption was delayed until 2021.
Wacissa River and Wacissa Spring Group	Adopted June 2018	NO$_3$	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018.

Groundwater Monitoring and Assessment

Florida's surface waters depend on groundwater contributions. For example, in many areas surface water flows into groundwater through sinkholes or reversing springs. Spring-fed stream systems can depend almost entirely on groundwater discharge. Canals also can contain mostly groundwater. Streams and lakes may receive over half of their total inflows via groundwater seepage. Many natural estuaries rely on groundwater seepage as a significant source of fresh water. In areas where the Floridan aquifer system is near the surface, and in the southern parts of the state where porous limestone is present near the surface, conduit systems in carbonate aquifers efficiently deliver groundwater to streams and canals at high rates. In other areas of the state, groundwater discharge occurs as seepage from the surficial aquifer system.

Excessive nutrient enrichment causes the impairment of many surface waters, including springs. Nitrogen and phosphorus are the two major nutrient groups monitored. Both are essential to plant life, including the growth of algae.

Nitrogen

Nitrogen forms the backbone of several ions, including nitrate and nitrite. These ions are found extensively in the environment. The nitrate ion occurs in the highest concentrations in groundwater and springs. While nitrate and nitrite are frequently analyzed and reported together as one concentration (nitrate-nitrite nitrogen), the nitrite contribution in environmental water quality samples is almost always significantly less, generally by an order of magnitude. The majority of nitrate in groundwater and springs comes from anthropogenic sources such as inorganic fertilizer, domestic wastewater, and animal waste. Elevated nitrogen concentrations are of the greatest concern in clear surface water systems, such as springs and some rivers and estuaries, where the overgrowth of phytoplankton in the water column and attached algae can cause biological imbalances.

Phosphorus

Phosphorus, the other essential nutrient governing algal growth in aquatic systems, can originate from natural or anthropogenic sources. In many parts of the state, naturally occurring phosphorus is a significant source of phosphate in both surface water and groundwater. Anthropogenic

sources of phosphorus include fertilizer, animal waste, human wastewater and biosolids, and industrial wastewater effluent. Because phosphorus originates from multiple sources, it is difficult to discern whether the phosphorus found in groundwater and springs occurs naturally or comes from human activities.

Nutrient Criteria

The generally applicable surface water standard adopted by DEP for spring vents is 0.35 mg/L nitrate-nitrite (NO_3-NO_2) as an annual geometric mean (AGM), not to be exceeded more than once in any three-calendar-year period (Paragraph 62-302.530(47)(b), F.A.C.). Based on spring-specific evidence, nitrate water quality target concentrations in some OFS have been established as site-specific (Hierarchy 1) interpretations of the narrative nutrient criterion. In addition, DEP has adopted site-specific targets for phosphorus in springs to address imbalances in aquatic flora and ecological functions in the aquatic community. The NNC Tracker Map provides more information on the allowable surface limits on nutrients (nitrogen, phosphorus, and floral response) in Florida's waters.

The OFS BMAPs include corrective actions and restoration projects needed to maintain or improve groundwater quality across the state. They also include monitoring plans for collecting data to better understand how aquifer and spring systems function (the document *Report to the Florida Legislature: Basin Management Action Plan Monitoring* [DEP 2021e] contains additional details).

Table 5.2 lists the water quality restoration targets for nitrate and, where applicable, phosphorus, as well as recent results for both water quality parameters in the OFS WBIDs.

Table 5.2.   Average concentrations (nitrate and TP) and TMDL targets for OFS WBIDs

mg/L = Milligrams per liter
*Target is for orthophosphate.
+Target is for TP.

OFS	WBID	Average Concentration (2019–21) Nitrate (mg/L)	Average Concentration (2019–21) TP (mg/L)	TMDL Target Nitrate (mg/L)	TMDL Target Phosphorus (mg/L)
Alexander Spring	2918Z	0.041	0.056		
Chassahowitzka Main Spring	1348Z	0.530	0.203	0.23	
Columbia Spring	3605T	0.444	0.110		
Crystal River (including Kings Bay Spring Group)	1341	0.201	0.034	0.23	0.028*
Deleon Spring	2921A	0.647	0.065	0.35	
Devil's Ear Spring	3605S	1.853	0.048	0.35	
Falmouth Spring	3422Z	1.313	0.059	0.35	
Fanning Springs	3422S	6.247	0.071	0.35	
Gainer Spring Group	553W	0.203	0.013		
Gemini Springs	2893	1.332	0.076	0.35	
Homosassa Springs Group	1345G	0.754	0.025	0.23	
Hornsby Spring	3653Z	0.656	0.085	0.35	
Ichetucknee Spring Group	3519Z	0.785	0.029	0.35	
Jackson Blue Spring	180Z	3.617	0.020	0.35	
Lafayette Blue Spring	3528Z	3.274	0.068	0.35	
Madison Blue Spring	3315Z	1.841	0.054	0.35	
Manatee Spring	3422R	2.370	0.030	0.35	
Peacock Springs	3483	3.199	0.052	0.35	
Poe Spring	3605W	0.296	0.081		
Rainbow Spring Group	1320A	2.261	0.072	0.35	
Rock Springs Run	2967	0.900	0.095	0.286	0.065+
Silver Glen Springs	28934	0.051	0.049		
Silver Springs	2772A	1.19		0.35	
Treehouse Spring	3605Q	0.506	0.102		
Troy Spring	3422T	1.817	0.056	0.35	
Volusia Blue Spring	28933	0.705	0.078	0.35	
Wacissa Spring Group	3424Z	0.452	0.038	0.24	
Wakulla Spring	1006X	0.344	0.023	0.35	
Weeki Wachee Spring Group	1382B	0.920	0.008	0.28	
Wekiwa Spring	2956C	1.238	0.125	0.286	0.065+

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Appendices

Appendix A: Water Quality Classifications

Rule 62-302.400, F.A.C., Classification of Surface Waters, Usage, Reclassification, Classified Waters.

(1) All surface waters of the State have been classified according to designated uses as follows:

Class I	**Potable water supplies**
Class I-Treated	**Treated potable water supplies**
Class II	**Shellfish propagation or harvesting**
Class III	**Fish consumption; recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife**
Class III-Limited	**Fish consumption; recreation or limited recreation; and/or propagation and maintenance of a limited population of fish and wildlife**
Class IV	**Agricultural water supplies**
Class V	**Navigation, utility and industrial use**

(2) Classification of a waterbody according to a particular designated use or uses does not preclude use of the water for other purposes.

Water quality classifications are arranged in order of the degree of protection required, with Class I waters having generally the most stringent water quality criteria and Class V waters the least. However, Class I, II, and III surface waters share water quality criteria established to protect fish consumption, recreation, and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. All waters of the state are considered to be Class III, except for those specifically identified in Rule 62-302.600, F.A.C., and must meet the "Minimum Criteria for Surface Waters," identified in Rule 62-302.500, F.A.C.

Waters listed as Class I-Treated have not been submitted to or approved by EPA and will remain Class III until the agency approves the reclassification.

Class III-Limited surface waters also share most of the same water quality criteria as Class I, II, and III surface waters. The designated use for Class III-Limited surface waters is intended primarily for some wholly artificial and altered waters, in acknowledgment that many of these waters have physical or habitat limitations that preclude support of the same type of aquatic ecosystem as a natural stream or lake.

Appendix B: Section 314 (CWA) Impaired Lakes in Florida, Group 1–5 Basins

Lake Trends for Nutrients

Although assessments performed to identify impaired lake segments evaluate current nutrient status, the IWR incorporates additional methodologies to evaluate lake nutrient enrichment trends over time. The nutrient criteria in effect when the assessments in this report were performed are based on numeric criteria for chlorophyll *a*, TN, and TP. These criteria rely on the direct evaluation of trends in the nutrient parameters (i.e., TN and TP), as well as trends in the nutrient response variable (chlorophyll *a*), for identifying nutrient trends over time. Paragraph 62-303.352(1)(c), F.A.C., provides details of the current methodology to identify both long- and short-term trends indicative of declining lake water quality.

The results presented in this report (**Table B.1**) were developed using the NNC (DEP 2013a), as well as both long- and short-term trends, as follows:

- For Planning List assessments, there is a statistically significant increasing trend in the AGM at the 95% confidence level in TN, TP, or chlorophyll *a* over a 10-year period using a Mann's one-sided, upper-tail test for trend, as described in *Nonparametric Statistical Methods* by M. Hollander and D. Wolfe (1999), pp. 376 and 724, which were incorporated by reference in Rule 62-303.351, F.A.C.

- For Study List Assessments. there is a statistically significant increasing trend in the AGM at the 95% confidence level in TN, TP, or chlorophyll *a* over a 7.5-year period using a Mann's one-sided, upper-tail test for trend, as described in *Nonparametric Statistical Methods* (Hollander and Wolfe 1999), pp. 376 and 724, which were incorporated by reference in Rule 62-303.351, F.A.C.

- If the waterbody was placed on the Study List for an adverse trend in nutrient response variables pursuant to Paragraph 62-303.390(2)(a), F.A.C., DEP shall analyze the potential risk of nonattainment of the narrative nutrient criteria in Paragraph 62-302.530(47)(b), F.A.C. This analysis shall take into consideration the current concentrations of nutrient response variables, the slope of the trend, and the potential sources of nutrients (natural and anthropogenic). If there is a reasonable expectation that the waterbody will become impaired within five years, DEP shall place the waterbody on the Verified List to develop a TMDL that establishes a numeric interpretation pursuant to Paragraph 62-302.531(2)(a), F.A.C.

Since the IWR methodology focuses on the identification of impaired waters of the state, DEP's trend evaluation uses a one-sided statistical test. This means the methodology is not designed to identify water quality improvement trends over time. However, water quality improvement for a lake segment may be suggested if the AGM from the 10-year assessment period indicates impairment, and the AGM from the 7.5-year assessment period does not show an increasing trend.

Table B.1.   Impaired lakes of Florida

WAS = Watershed Assessment Section; ARP = Alternative restoration plan; TN = Total nitrogen; TP = Total phosphorus; DO = Dissolved oxygen; TSI = Trophic State Index
Note: The most up-to-date Verified List of Impaired Waters, by basin group, is available on DEP's WAS web site. The table lists waterbodies that are impaired and on the Verified List, that are impaired and have an ARP, or that are impaired and have a TMDL.

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	10EA	Pensacola	Woodbine Springs Lake	Mercury (in fish tissue)
1	1165A	Ochlockonee–St. Marks	Otter Lake	Mercury (in fish tissue)
1	1176A	Ochlockonee–St. Marks	Lake Ellen	Mercury (in fish tissue)
1	1297X	Ochlockonee–St. Marks	Lake Talquin (West)	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1297Y	Ochlockonee–St. Marks	Lake Talquin (Center)	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1297Z	Ochlockonee–St. Marks	Lake Talquin (East)	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1329B	Withlacoochee	Lake Rousseau	Mercury (in fish tissue)
4	1329H	Withlacoochee	Lake Lindsey	DO (% saturation)
4	1329L	Withlacoochee	Tank Lake	DO (% saturation)
4	1329T	Withlacoochee	Blue Sink (Blue Sink Lake)	DO (% saturation), Nutrients (TP)
4	1329W	Withlacoochee	Bystre Lake	Nutrients (TP)
4	1340A	Withlacoochee	Davis Lake	DO (% saturation)
4	1340C	Withlacoochee	Magnolia Lake	DO (% saturation)
4	1340D	Withlacoochee	Hampton Lake	DO (% saturation)
4	1340H	Withlacoochee	Hernando Lake	Mercury (in fish tissue)
4	1340K	Withlacoochee	Cato Lake	DO (% saturation)
4	1340L	Withlacoochee	Cooter Lake	Biology, DO (% saturation)
4	1340N	Withlacoochee	Henderson Lake	Mercury (in fish tissue)
4	1340P	Withlacoochee	Spivey Lake	DO (% saturation)
4	1340Q	Withlacoochee	Tussock Lake	DO (% saturation)
4	1340R	Withlacoochee	Tsala Apopka Lake (Floral City Arm)	Mercury (in fish tissue)
4	1340V	Withlacoochee	Bradley Lake	DO (% saturation)
4	1342Y	Withlacoochee	Cherry Lake	Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	1347	Withlacoochee	Lake Okahumpka	Biology, Mercury (in fish tissue)
4	1349A	Withlacoochee	Lake Deaton	Mercury (in fish tissue)
4	1351B	Withlacoochee	Lake Panasoffkee	Mercury (in fish tissue)
5	1392B	Springs Coast	Lake Hancock	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1402C	Tampa Bay Tributaries	Burrell Lake	Mercury (in fish tissue)
4	1403	Withlacoochee	Clear Lake	Biology
5	1409A	Springs Coast	Moon Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1424	Tampa Bay Tributaries	Lake Pasadena	Mercury (in fish tissue)
5	1432A	Springs Coast	Lake Worrell	DO (% saturation)
2	1443H	Tampa Bay Tributaries	Hillsborough Reservoir	DO (% saturation), Mercury (in fish tissue)
3	1449A	Sarasota Bay–Peace–Myakka	Lake Deeson	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1451D	Tampa Bay Tributaries	Lake Padgett	Biology
2	1451V	Tampa Bay Tributaries	Lake Floyd	Biology
1	1463D	Tampa Bay	Lake Harvey	Biology
1	1463E	Tampa Bay	Lake Helen	Biology
1	1463H	Tampa Bay	Lake Allen	Biology
1	1463K	Tampa Bay	Lake Virginia	Biology
1	1463L	Tampa Bay	Lake Thomas	Mercury (in fish tissue)
1	1463M	Tampa Bay	Little Lake Wilson	Fecal Coliform, Nutrients (chlorophyll *a*)
1	1463P	Tampa Bay	Lake Linda	Biology
1	1464A	Tampa Bay	Black Lake	DO (% saturation), Nutrients (chlorophyll *a*)
1	1464V	Tampa Bay	Lake Hiawatha	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1464W	Tampa Bay	Lake Ann (Parker)	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1464X	Tampa Bay	Lake Seminole	Biology
1	1464Y	Tampa Bay	Lake Geneva	Biology
4	1466	Withlacoochee	Lake Agnes	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1467	Withlacoochee	Mud Lake	Biology
4	1472B	Kissimmee River	Lake Hatchineha	Biology, Mercury (in fish tissue)
1	1473W	Tampa Bay	Lake Juanita	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1474A	Tampa Bay	Lake Wastena	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1474W	Tampa Bay	Lake Dead Lady	Nutrients (chlorophyll *a*)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	1478G	Tampa Bay	Little Deer Lake	Biology
1	1478H	Tampa Bay	Lake Reinheimer	DO (% saturation)
4	1480	Kissimmee River	Lake Marion	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1484B	Withlacoochee	Lake Juliana	Biology, Nutrients (chlorophyll *a*), Nutrients (TN)
1	1486A	Tampa Bay	Lake Tarpon	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*)
3	1488B	Sarasota Bay–Peace–Myakka	Lake Rochelle	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1488C	Sarasota Bay–Peace–Myakka	Lake Haines	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1488D	Sarasota Bay–Peace–Myakka	Lake Alfred	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1488U	Sarasota Bay–Peace–Myakka	Lake Conine	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1491B	Tampa Bay Tributaries	Galloway Lake	DO (% saturation), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1493D	Tampa Bay	Williams Lake	Biology, Nutrients (TN)
3	1497A	Sarasota Bay–Peace–Myakka	Crystal Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1497B	Sarasota Bay–Peace–Myakka	Lake Parker	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1497D1	Sarasota Bay–Peace–Myakka	Lake Crago	Nutrients (chlorophyll *a*), Nutrients (TP)
3	1497E	Sarasota Bay–Peace–Myakka	Lake Bonny	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1497G	Sarasota Bay–Peace–Myakka	Lake Mirror	Nutrients (chlorophyll *a*), Nutrients (TP)
3	1497H	Sarasota Bay–Peace–Myakka	Lake Morton	Nutrients (chlorophyll *a*), Nutrients (TP)
3	1497J	Sarasota Bay–Peace–Myakka	Saddle Creek Lakes	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1498Z	Tampa Bay	Dosson Lake	Biology
3	15002	Sarasota Bay–Peace–Myakka	Middle Lake Hamilton	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1501	Sarasota Bay–Peace–Myakka	Lake Lena	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1501B	Sarasota Bay–Peace–Myakka	Lake Ariana	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1501V	Sarasota Bay–Peace–Myakka	Spirit Lake	Nutrients (TN)
3	1501W	Sarasota Bay–Peace–Myakka	Sears Lake	Nutrients (TP)
1	1502A	Tampa Bay	Lake Estes	Biology
1	1502C	Tampa Bay	Chapman Lake	Biology, Nutrients (chlorophyll *a*)
3	15041	Sarasota Bay–Peace–Myakka	Lake Hamilton	Nutrients (chlorophyll *a*), Nutrients (TN)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	1506A	Tampa Bay Tributaries	Meadow View Lake	Nutrients (chlorophyll *a*), Nutrients (TP)
3	15101	Sarasota Bay–Peace–Myakka	Lake Eva	Nutrients (chlorophyll *a*), Nutrients (TN)
1	1513C	Tampa Bay	Lake Raleigh	Biology
1	1515	Tampa Bay	Horse Lake	Biology
1	1516E	Tampa Bay	Lake Ellen	Biology
1	1516G	Tampa Bay	Bird Lake	Biology
1	1519C	Tampa Bay	Lake Armistead	Biology
3	1521	Sarasota Bay–Peace–Myakka	Lake Lulu	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521B	Sarasota Bay–Peace–Myakka	Lake Eloise	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521D	Sarasota Bay–Peace–Myakka	Lake Shipp	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521E	Sarasota Bay–Peace–Myakka	Lake May	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1521F	Sarasota Bay–Peace–Myakka	Lake Howard	Biology, Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521G	Sarasota Bay–Peace–Myakka	Lake Mirror	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521G1	Sarasota Bay–Peace–Myakka	Spring Lake	Biology
3	1521H	Sarasota Bay–Peace–Myakka	Lake Cannon	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521I	Sarasota Bay–Peace–Myakka	Lake Hartridge	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1521J	Sarasota Bay–Peace–Myakka	Lake Idylwild	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521K	Sarasota Bay–Peace–Myakka	Lake Jessie	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521L	Sarasota Bay–Peace–Myakka	Lake Marianna	Nutrients (chlorophyll *a*), Nutrients (TN)
3	1521P	Sarasota Bay–Peace–Myakka	Deer Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1521Q	Sarasota Bay–Peace–Myakka	Lake Blue	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1522B	Tampa Bay Tributaries	Lake Thonotosassa	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1523C	Tampa Bay Tributaries	Cedar Lake (East)	DO (% saturation)
2	1523D	Tampa Bay Tributaries	Lake Eckles	Biology
1	1529A	Tampa Bay	Saint George Lake	Biology
1	1530A	Tampa Bay	Moccasin Creek	Fecal Coliform, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1532A	Kissimmee River	Lake Pierce	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	1537	Tampa Bay Tributaries	Lake Wire	Lead
2	1537A	Tampa Bay Tributaries	Lake Bonnet	Biology, Lead, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1539C	Sarasota Bay–Peace–Myakka	Lake Annie	Nutrients (TN)
3	1539D	Sarasota Bay–Peace–Myakka	Lake Otis	Nutrients (chlorophyll *a*), Nutrients (TN)
2	1543	Tampa Bay Tributaries	Lake Hunter	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1547A	Tampa Bay Tributaries	Lake Valrico	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	1547B	Tampa Bay Tributaries	Long Pond	Biology
2	1547C	Tampa Bay Tributaries	Lake Weeks	Biology
2	1547D	Tampa Bay Tributaries	Lake Hooker	Biology
3	1549B	Sarasota Bay–Peace–Myakka	Banana Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1549B1	Sarasota Bay–Peace–Myakka	Lake Stahl	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1549B2	Sarasota Bay–Peace–Myakka	Little Banana Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1549C	Sarasota Bay–Peace–Myakka	Lake Bentley	Nutrients (chlorophyll *a*)
3	1549D	Sarasota Bay–Peace–Myakka	Lake Horney	Nutrients (TP)
3	1549E	Sarasota Bay–Peace–Myakka	Lake John	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1549F	Sarasota Bay–Peace–Myakka	Lake Somerset	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1549X	Sarasota Bay–Peace–Myakka	Hollingsworth Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1573A	Kissimmee River	Tiger Lake	Mercury (in fish tissue), Nutrients (TP)
4	1573C	Kissimmee River	Lake Rosalie	Biology
4	1573E	Kissimmee River	Lake Weohyakapka	Mercury (in fish tissue)
1	1574A	Tampa Bay	Alligator Lake	Biology, Nutrients (TP)
1	1576A	Tampa Bay	Mango Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
1	1579A	Tampa Bay	Bellows Lake (East Lake)	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Nutrients (TSI)
3	1588A	Sarasota Bay–Peace–Myakka	Lake Mcleod	Mercury (in fish tissue), Nutrients (chlorophyll *a*)
3	1590B	Sarasota Bay–Peace–Myakka	Lake Ashton (Lake Myrtle)	Mercury (in fish tissue)
1	1603C	Tampa Bay	Beckett Lake	Biology, DO (% saturation)
1	1603E	Tampa Bay	Harbor Lake	Biology

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	1605B	Tampa Bay	Gornto Lake	Biology
2	1610	Tampa Bay Tributaries	Carter Road Park Lakes	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1613A	Sarasota Bay–Peace–Myakka	Lake Blue (South)	Nutrients (TN)
3	1617A	Sarasota Bay–Peace–Myakka	Lake Effie	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
5	1618	Springs Coast	Lake Seminole	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), pH
4	1619A	Kissimmee River	Lake Wales	Nutrients (chlorophyll *a*), Nutrients (TN)
4	1619D	Kissimmee River	Lake Moody	Nutrients (chlorophyll *a*)
4	1619E	Kissimmee River	Lake Amoret	DO (% saturation)
2	1621G1	Tampa Bay Tributaries	Branwood Dr Pond	Biology
3	1623L	Sarasota Bay–Peace–Myakka	Lake Hancock	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1623M	Sarasota Bay–Peace–Myakka	Eagle Lake	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1623T	Sarasota Bay–Peace–Myakka	Engle Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1623X	Sarasota Bay–Peace–Myakka	Reclaimed Mine Cut Lake	Nutrients (TN), Nutrients (TP)
3	1623Z	Sarasota Bay–Peace–Myakka	Fort Meade Lakes	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
5	1650	Springs Coast	Walsingham Reservoir	Mercury (in fish tissue)
4	1663	Kissimmee River	Crooked Lake	Mercury (in fish tissue)
3	1677C	Sarasota Bay–Peace–Myakka	Lake Buffum	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1685A	Kissimmee River	Lake Arbuckle	Mercury (in fish tissue)
4	1685D	Kissimmee River	Reedy Lake	Nutrients (chlorophyll *a*), Nutrients (TN)
4	1685E	Kissimmee River	Lake Ida	Nutrients (TN)
1	1700A	Tampa Bay	Crescent Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
4	1706	Kissimmee River	Lake Clinch	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1730	Kissimmee River	Hickory Lake	Nutrients (chlorophyll *a*), Nutrients (TN)
4	1730B	Kissimmee River	Livingston Lake	Mercury (in fish tissue), Nutrients (TP)
4	1730D	Kissimmee River	Lake Adelaide	Nutrients (chlorophyll *a*), Nutrients (TN)
1	1731A	Tampa Bay	Lake Maggiore	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Specific Conductance
4	1761H	Kissimmee River	Lake Lucas	DO (% saturation)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	179A	Pensacola	Bear Lake	Mercury (in fish tissue)
2	1807B	Tampa Bay Tributaries	Lake Manatee Reservoir	Biology, Fecal Coliform, Mercury (in fish tissue)
2	180A	Apalachicola–Chipola	Merritts Mill Pond	Nutrients (nitrate-nitrite), Nutrients (TN)
4	1813A	Kissimmee River	Dinner Lake	Mercury (in fish tissue)
4	1813B	Kissimmee River	Lake Lotela	Mercury (in fish tissue)
4	1813L	Kissimmee River	Lake Glenada	Nutrients (chlorophyll *a*)
4	1842	Kissimmee River	Lake Sebring	Mercury (in fish tissue)
4	1856B	Kissimmee River	Lake Istokpoga	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1860B	Kissimmee River	Lake Josephine	Mercury (in fish tissue)
4	1860D	Kissimmee River	Lake Jackson	Biology, Mercury (in fish tissue)
4	1891A	Kissimmee River	Red Beach Lake	Mercury (in fish tissue)
4	1906	Kissimmee River	Lake Charlotte	Biology, Mercury (in fish tissue)
4	1932A	Kissimmee River	Lake Grassy	Mercury (in fish tissue)
4	1932B	Kissimmee River	Clay Lake	Mercury (in fish tissue)
4	1932E	Kissimmee River	Lake Huntley	Mercury (in fish tissue)
4	1932G	Kissimmee River	Lake Apthorpe	Mercury (in fish tissue)
4	1932M	Kissimmee River	Blue Lake	Biology
4	1938A	Kissimmee River	Lake June in Winter	Mercury (in fish tissue)
4	1938C	Kissimmee River	Lake Placid	Mercury (in fish tissue), Nutrients (chlorophyll *a*)
4	1938D	Kissimmee River	Lake Carrie	Biology
4	1938E	Kissimmee River	Persimmon Lake	Nutrients (chlorophyll *a*), Nutrients (TN)
4	1938F	Kissimmee River	Red Water Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1938H	Kissimmee River	Lake Annie	Mercury (in fish tissue)
4	1938I	Kissimmee River	Lake Lachard	Biology
3	1981	Sarasota Bay–Peace–Myakka	Lake Myakka (Lower Segment)	Mercury (in fish tissue)
3	1981C	Sarasota Bay–Peace–Myakka	Lake Myakka (Upper Segment)	Mercury (in fish tissue), Nutrients (TP)
3	2041B	Sarasota Bay–Peace–Myakka	Shell Creek Reservoir (Hamilton Reservoir)	DO (% saturation)
2	2074A	Charlotte Harbor	Alligator Lake	Mercury (in fish tissue)
2	2092H	Charlotte Harbor	The Dunes Community Stormwater Lakes	DO (% saturation), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	2105A	Nassau–St. Marys	Hampton Lake	DO (% saturation)
3	210A	Choctawhatchee–St. Andrew	Double Pond	Mercury (in fish tissue)
2	2213G	Lower St. Johns	St Johns River above Doctors Lake	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	2213H	Lower St. Johns	St Johns River above Julington Creek	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
2	2213I	Lower St. Johns	St Johns River above Black Creek	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
2	2213J	Lower St. Johns	St Johns River above Palmo Creek	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
2	2213K	Lower St. Johns	St Johns River above Tocoi	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2213L	Lower St. Johns	St Johns River above Federal Point	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
4	2339	Nassau–St. Marys	Ocean Pond	Mercury (in fish tissue)
2	2389	Lower St. Johns	Doctors Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	2392	Nassau–St. Marys	Palestine Lake	Mercury (in fish tissue)
3	239A	Choctawhatchee–St. Andrew	Pate Lake	Mercury (in fish tissue)
2	2509	Lower St. Johns	Lake Geneva	Lead, Mercury (in fish tissue)
2	2509C	Lower St. Johns	Lake Magnolia	Mercury (in fish tissue)
2	2509H	Lower St. Johns	Lake Lily	Lead
2	2509K	Lower St. Johns	Lowry Lake (Sand Hill Lake)	Mercury (in fish tissue)
2	2541	Lower St. Johns	Georges Lake	Mercury (in fish tissue)
2	2543F	Lower St. Johns	Lake Ross	Lead, Nutrients (TN)
2	2543G	Lower St. Johns	Goose Lake	DO (% saturation)
2	2575	Lower St. Johns	Cue Lake	Mercury (in fish tissue)
2	2575Q	Lower St. Johns	Mason Lake	Mercury (in fish tissue)
2	2582	Lower St. Johns	Lake Suggs	DO (% saturation), Lead
2	2582A	Lower St. Johns	Rowan Lake	DO (% saturation), Lead, Nutrients (TN)
4	25A	Pensacola	Lake Stone (southwest of Century)	Mercury (in fish tissue)
2	2606B	Lower St. Johns	Crescent Lake	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2615A	Lower St. Johns	Dead Lake	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
2	2617A	Lower St. Johns	Lake Broward	Mercury (in fish tissue)
2	2630B	Lower St. Johns	Lake Disston	Lead, Mercury (in fish tissue)
2	2661A	Lower St. Johns	Caraway Lake	Mercury (in fish tissue)
2	2667A	Lower St. Johns	Lake Dias	Mercury (in fish tissue)
2	2671A	Lower St. Johns	Lake Daugharty	Mercury (in fish tissue)
1	2700	Ocklawaha	Hammocks Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2705B	Ocklawaha	Newnans Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Turbidity

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	2706	Ocklawaha	Lake Moon	Nutrients (TP)
1	2713C	Ocklawaha	Holdens Pond	DO (% saturation)
1	2713D	Ocklawaha	Little Orange Lake	Mercury (in fish tissue), Nutrients (TP)
1	2717	Ocklawaha	Kanapaha Lake	DO (% saturation)
1	2718B	Ocklawaha	Bivans Arm	Turbidity
1	2719A	Ocklawaha	Lake Alice	Mercury (in fish tissue)
2	272	Apalachicola–Chipola	Thompson Pond	DO (% saturation)
1	2720A	Ocklawaha	Alachua Sink	DO (% saturation), Fecal Coliform, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2723A	Ocklawaha	Cowpen Lake	Mercury (in fish tissue)
1	2738A	Ocklawaha	Lochloosa Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Nutrients (TSI trend), Nutrients (TSI)
1	2740B	Ocklawaha	Lake Ocklawaha	Mercury (in fish tissue)
1	2741B	Ocklawaha	Wauberg Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2748X	Ocklawaha	Key Pond	DO (% saturation)
1	2749A	Ocklawaha	Orange Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2771A	Ocklawaha	Lake Eaton	Biology, Mercury (in fish tissue)
1	2779A	Ocklawaha	Mill Dam Lake	Mercury (in fish tissue)
1	2781A	Ocklawaha	Halfmoon Lake	DO (% saturation), Mercury (in fish tissue)
1	2782C	Ocklawaha	Lake Bryant	Mercury (in fish tissue)
1	2783A	Ocklawaha	Doe Lake	Mercury (in fish tissue)
1	2783B	Ocklawaha	Trout Lake	Mercury (in fish tissue)
1	2783F	Ocklawaha	Lake Catherine	Mercury (in fish tissue)
1	2783G	Ocklawaha	Lake Mary	Mercury (in fish tissue)
1	2785A	Ocklawaha	Smith Lake	Mercury (in fish tissue)
1	2790A	Ocklawaha	Lake Weir	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2790B	Ocklawaha	Little Lake Weir	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2797A	Ocklawaha	Ella Lake	Mercury (in fish tissue)
1	2803A	Ocklawaha	Holly Lake	Mercury (in fish tissue)
1	2806A	Ocklawaha	Lake Umatilla	Biology
1	2807A	Ocklawaha	Lake Yale	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2811	Ocklawaha	West Emeralda Marsh Conservation Area	DO (% saturation)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	2814A	Ocklawaha	Lake Griffin	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2816A	Ocklawaha	Eldorado Lake	Mercury (in fish tissue)
1	2817B	Ocklawaha	Lake Eustis	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
1	2819A	Ocklawaha	Trout Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2821B	Ocklawaha	Lake Joanna	Mercury (in fish tissue)
1	2825A	Ocklawaha	Silver Lake	Nutrients (TN)
1	2829A	Ocklawaha	Lake Lorraine	DO (% saturation)
3	283	Choctawhatchee - St. Andrew	Lake Juniper	Mercury (in fish tissue)
1	2831B	Ocklawaha	Lake Dora	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2832A	Ocklawaha	Lake Denham	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2834C	Ocklawaha	Lake Beauclair	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2835D	Ocklawaha	Lake Apopka	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Pesticides (in fish tissue)
1	2837A	Ocklawaha	Lake Jem	Biology
1	2837B	Ocklawaha	Lake Carlton	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2838A	Ocklawaha	Lake Harris	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2838B	Ocklawaha	Little Lake Harris	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2839A	Ocklawaha	Lake Minneola	Biology, Mercury (in fish tissue)
1	2839D	Ocklawaha	Lake Cherry	Mercury (in fish tissue)
1	2839F	Ocklawaha	Lake Emma	Mercury (in fish tissue)
1	2839M	Ocklawaha	Lake Louisa	Mercury (in fish tissue)
1	2839N	Ocklawaha	Lake Minnehaha	Mercury (in fish tissue)
1	2854A	Ocklawaha	Marshall Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2865A	Ocklawaha	Lake Florence	Biology
1	2872A	Ocklawaha	Lake Roberts	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2872C	Ocklawaha	Lake Lily	DO (% saturation)
1	2873C	Ocklawaha	Johns Lake	Biology, Mercury (in fish tissue)
1	2875B	Ocklawaha	Lake Tilden	Biology
1	2880A	Ocklawaha	Lake Glona	Mercury (in fish tissue)
1	2890A	Ocklawaha	Lake Lowery	Mercury (in fish tissue)
2	2892	Middle St. Johns	Lake Margaret	Mercury (in fish tissue)
3	28931	Upper St. Johns	Sawgrass Lake	DO (% saturation), Mercury (in fish tissue)
3	28932	Upper St. Johns	Lake Cone at Seminole	Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	2893A	Middle St. Johns	Lake George	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2893D	Middle St. Johns	Lake Monroe	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2893H	Middle St. Johns	Mullet Lake	Mercury (in fish tissue)
2	2893J	Middle St. Johns	Mud Lake	Mercury (in fish tissue)
3	2893K	Upper St. Johns	Lake Poinsett	Mercury (in fish tissue)
3	2893O	Upper St. Johns	Lake Washington	Biology, Mercury (in fish tissue)
3	2893Q	Upper St. Johns	Lake Helen Blazes	DO (% saturation), Mercury (in fish tissue)
2	2893U	Middle St. Johns	Lake Beresford	Nutrients (chlorophyll *a*)
3	2893V	Upper St. Johns	Blue Cypress Lake	Mercury (in fish tissue), Nutrients (TP)
3	2893Y	Upper St. Johns	Lake Winder	Biology, Mercury (in fish tissue)
2	2894	Middle St. Johns	Lake Delancy	Mercury (in fish tissue)
2	2899B	Middle St. Johns	Lake Kerr	Mercury (in fish tissue)
2	2899C	Middle St. Johns	Little Lake Kerr	Mercury (in fish tissue)
2	2902	Middle St. Johns	Louise Lake (Lower Segment)	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2905C	Middle St. Johns	Wildcat Lake	Mercury (in fish tissue)
2	2916B	Middle St. Johns	South Grasshopper Lake	Mercury (in fish tissue)
2	2917	Middle St. Johns	Boyd Lake	Mercury (in fish tissue)
2	2921	Middle St. Johns	Lake Woodruff	Mercury (in fish tissue)
2	2921C	Middle St. Johns	Lake Dexter	Mercury (in fish tissue)
2	2921D1	Middle St. Johns	Tick Island Mud Lake	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2921E	Middle St. Johns	Spring Garden Lake	Mercury (in fish tissue)
2	2925A	Middle St. Johns	Lake Ashby	Biology, Mercury (in fish tissue)
2	2929B	Middle St. Johns	Lake Norris	Mercury (in fish tissue)
2	2929C	Middle St. Johns	Lake Dorr	Mercury (in fish tissue)
2	2938H	Middle St. Johns	Lake Macy	Mercury (in fish tissue)
2	2949	Middle St. Johns	Lake Dalhousie	Mercury (in fish tissue)
2	2951	Middle St. Johns	Lake Marie	Biology
2	2953	Middle St. Johns	Bethel Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2954	Middle St. Johns	Konomac Lake Reservoir	Mercury (in fish tissue)
2	2956F	Middle St. Johns	Lake Brantley	Mercury (in fish tissue)
2	2961	Middle St. Johns	Lake Sylvan	Mercury (in fish tissue)
2	2961A1	Middle St. Johns	Banana Lake	Biology

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	2964A	Middle St. Johns	Lake Harney	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2964A4	Middle St. Johns	Lake Proctor	DO (% saturation)
3	2964B	Upper St. Johns	Puzzle Lake	Mercury (in fish tissue), Nutrients (TP)
3	2964C	Upper St. Johns	Ruth Lake	Mercury (in fish tissue)
3	2966A	Upper St. Johns	Buck Lake	Mercury (in fish tissue)
2	2973F	Middle St. Johns	Deforest Lake	DO (% saturation)
2	2973G	Middle St. Johns	Amory Lake	Biology, DO (% saturation)
3	2978A	Upper St. Johns	Loughman Lake	Mercury (in fish tissue)
2	2981	Middle St. Johns	Lake Jesup	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2981A	Middle St. Johns	Lake Jesup Near St Johns River	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2986D	Middle St. Johns	Lake Alma	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2986E	Middle St. Johns	Lake Searcy	Biology, DO (% saturation), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2986F	Middle St. Johns	Greenwood Lake	Nutrients (chlorophyll *a*), Nutrients (TP)
2	2987A	Middle St. Johns	Spring Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2991D	Middle St. Johns	Horseshoe Lake (South)	Biology
2	2993	Middle St. Johns	Lake Prevatt	DO (% saturation)
2	2993C	Middle St. Johns	Lake McCoy	Biology
2	2994K	Middle St. Johns	Lake Concord	Nutrients (chlorophyll *a*), Nutrients (TP)
2	2995	Middle St. Johns	Lake Charm	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2997B	Middle St. Johns	Lake Howell	Biology
2	2997B1	Middle St. Johns	Lake Ann	Biology
2	2997L	Middle St. Johns	Lake Winyah	Nutrients (chlorophyll *a*), Nutrients (TP)
2	2997P	Middle St. Johns	Lake Concord	Biology
2	2997Q	Middle St. Johns	Lake Dot	Fecal Coliform
2	2997R	Middle St. Johns	Lake Adair	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2997U	Middle St. Johns	Lake Park	Biology
2	2997V	Middle St. Johns	Lake Gem (Orange County)	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
2	2998A	Middle St. Johns	Lake Florida	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2998C	Middle St. Johns	Lake Orienta	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2998D	Middle St. Johns	Lake Marion	Biology

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
2	2998E	Middle St. Johns	Lake Adelaide	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2999B	Middle St. Johns	Noname Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3002D	Middle St. Johns	Starke Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN)
2	3002E	Middle St. Johns	Lake Prima Vista	Biology, Nutrients (chlorophyll *a*), Nutrients (TN)
2	3002G	Middle St. Johns	Lake Lotta	Biology, Nutrients (chlorophyll *a*)
2	3002Q	Middle St. Johns	Kasey Lake	Biology, Fecal Coliform, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3002R	Middle St. Johns	Kelly Lake	Nutrients (TP)
2	3002U	Middle St. Johns	Lake Pleasant	DO (% saturation)
2	3003	Middle St. Johns	Lake Pickett	Mercury (in fish tissue)
2	3004A	Middle St. Johns	Bear Lake	Mercury (in fish tissue)
2	3004C	Middle St. Johns	Lake Lawne	Nutrients (TN), Nutrients (TP)
2	3004D	Middle St. Johns	Silver Lake	Nutrients (TN), Nutrients (TP)
2	3004G	Middle St. Johns	Bay Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3004K	Middle St. Johns	Lake Orlando	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3004M	Middle St. Johns	Lake Lotus	Biology
2	3004N	Middle St. Johns	Lake Fairview	Mercury (in fish tissue)
2	3004R	Middle St. Johns	Lake Fairhope	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	3008A	Upper St. Johns	Fox Lake	Mercury (in fish tissue)
3	3008B	Upper St. Johns	South Lake	Mercury (in fish tissue)
2	3009	Middle St. Johns	Bear Gully Lake	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3009H	Middle St. Johns	Lake Nan	Biology
2	3009I	Middle St. Johns	Garden Lake	Biology
2	3011A	Middle St. Johns	Lake Weston	Nutrients (chlorophyll *a*)
2	3011C	Middle St. Johns	Lake Lucien	Mercury (in fish tissue)
2	3036	Middle St. Johns	Lake Frederica	Mercury (in fish tissue)
2	3036A1	Middle St. Johns	Lake Barber	Biology
2	3036B8	Middle St. Johns	Lake Dover–Lake C–Lake Santiago	Nutrients (chlorophyll *a*), Nutrients (TP)
3	3064A	Upper St. Johns	Florence Lake	Biology
3	3140	Upper St. Johns	Lake Kenansville	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168A	Kissimmee River	Lake Conway	Mercury (in fish tissue)
4	3168E	Kissimmee River	Lake Anderson	Nutrients (chlorophyll *a*)
4	3168F	Kissimmee River	Lake Bass	Nutrients (chlorophyll *a*), Nutrients (TN)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	3168H	Kissimmee River	Lake Holden	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168M	Kissimmee River	Lake Copeland	Biology
4	3168N	Kissimmee River	Lake Olive	Biology
4	3168Q	Kissimmee River	Lake Warren (Lake Mare Prairie)	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168W	Kissimmee River	Bear Head Lake	Biology
4	3168W3	Kissimmee River	Lake Wade	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168W4	Kissimmee River	Lake of The Woods	Nutrients (TN), Nutrients (TP)
4	3168W6	Kissimmee River	Lake Warren	Nutrients (TN)
4	3168W7	Kissimmee River	Lake Bumby	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Silver
4	3168X2	Kissimmee River	Hourglass Lake	Nutrients (chlorophyll *a*)
4	3168X4	Kissimmee River	Lake Rabama	Nutrients (TP)
4	3168X5	Kissimmee River	Lake Condel	Fecal Coliform, Lead, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168X8	Kissimmee River	Lake Angel	Nutrients (chlorophyll *a*), Nutrients (TP)
4	3168Y	Kissimmee River	Lake Lancaster	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Y2	Kissimmee River	Lake Como (Orange County)	Nutrients (TP)
4	3168Y3	Kissimmee River	Lake Greenwood	Nutrients (TP)
4	3168Y4	Kissimmee River	Lake Davis	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Y6	Kissimmee River	Lake Lurna	Nutrients (TP)
4	3168Y8	Kissimmee River	Lake Weldona	Nutrients (chlorophyll *a*)
4	3168Z3	Kissimmee River	Lake Arnold	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Z4	Kissimmee River	Lake Giles	Nutrients (TP)
4	3168Z9	Kissimmee River	Lake Lawsona	Nutrients (TP)
4	3169A2	Kissimmee River	Lake Tyler	Biology
4	3169C	Kissimmee River	Big Sand Lake	Lead, Mercury (in fish tissue)
4	3169G3	Kissimmee River	Lake Fran	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3169G4	Kissimmee River	Lake Kozart	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3169G5	Kissimmee River	Lake Walker	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3169G6	Kissimmee River	Lake Richmond	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3169G8	Kissimmee River	Lake Beardall	Nutrients (TP)
4	3169Q	Kissimmee River	Rock Lake	Nutrients (TN)
4	3169T	Kissimmee River	Lake Sandy	Nutrients (TP)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	3170B	Kissimmee River	Lake Russell	Mercury (in fish tissue)
4	3170H1	Kissimmee River	Lake Sheen	Mercury (in fish tissue)
4	3170H2	Kissimmee River	Pocket Lake	Mercury (in fish tissue)
4	3170I	Kissimmee River	Lake Hickorynut	Nutrients (TN)
4	3170Q	Kissimmee River	Lake Butler	Mercury (in fish tissue), Nutrients (TN)
4	3170S	Kissimmee River	Lake Down	Mercury (in fish tissue)
4	3170T	Kissimmee River	Lake Bessie	Mercury (in fish tissue)
4	3170W	Kissimmee River	Lake Louise	Mercury (in fish tissue)
4	3170Y	Kissimmee River	Lake Tibet Butler	Mercury (in fish tissue)
4	3170Z1	Kissimmee River	Little Fish Lake	Mercury (in fish tissue)
4	3171	Kissimmee River	Lake Hart	Lead, Mercury (in fish tissue)
4	3171A	Kissimmee River	Lake Mary Jane	Lead, Mercury (in fish tissue)
4	3171C	Kissimmee River	Red Lake	Copper
4	3172	Kissimmee River	East Lake Tohopekaliga	Mercury (in fish tissue)
4	3173A	Kissimmee River	Lake Tohopekaliga	Biology, Mercury (in fish tissue)
4	3174	Kissimmee River	Lake Center	Biology
4	3174D	Kissimmee River	Coon Lake	Biology
4	3176	Kissimmee River	Alligator Lake	Mercury (in fish tissue)
4	3177	Kissimmee River	Lake Gentry	Mercury (in fish tissue)
4	3177A	Kissimmee River	Brick Lake	Mercury (in fish tissue)
4	3180A	Kissimmee River	Lake Cypress	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3183B	Kissimmee River	Lake Kissimmee	Biology, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3183G	Kissimmee River	Lake Jackson (Osceola County)	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3184	Kissimmee River	Lake Marian	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3194G	St. Lucie–Loxahatchee	Lake Eden	Biology
1	3212A	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP)
1	3212B	Lake Okeechobee	Lake Okeechobee	Mercury (in fish tissue), Nutrients (TP)
1	3212C	Lake Okeechobee	Lake Okeechobee	DO (% saturation), Mercury (in fish tissue), Nutrients (TP)
1	3212D	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	3212E	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	3212F	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP)
1	3212G	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP)
1	3212H	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	3212I	Lake Okeechobee	Lake Okeechobee	Mercury (in fish tissue), Nutrients (TP)
3	3245B	Lake Worth Lagoon–Palm Beach Coast	Lake Clarke	Biology, Fecal Coliform
3	3245C1	Lake Worth Lagoon–Palm Beach Coast	Lake Mangonia	Fecal Coliform
3	3245C4	Lake Worth Lagoon–Palm Beach Coast	Pine Lake	Fecal Coliform, Nutrients (chlorophyll *a*)
3	3256A	Lake Worth Lagoon–Palm Beach Coast	Lake Osborne	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
1	3259W	Everglades West Coast	Lake Trafford	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	3262A	Lake Worth Lagoon–Palm Beach Coast	Lake Ida	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
1	3319A	Suwannee	Lake Alcyone	Mercury (in fish tissue)
1	3321A	Suwannee	Lake Octahatchee	Mercury (in fish tissue)
1	3322A	Suwannee	Lake Cherry	Mercury (in fish tissue), Nutrients (other information)
1	3366A	Suwannee	Lake Francis	Nutrients (chlorophyll *a*), Nutrients (TP)
1	3438A	Suwannee	Peacock Lake	DO (% saturation)
2	344	Apalachicola–Chipola	Ocheesee Pond	Mercury (in fish tissue)
1	3459A	Suwannee	Lake Louise	Mercury (in fish tissue)
1	3472	Suwannee	Tenmile Pond	DO (% saturation)
1	3496A	Suwannee	Low Lake	DO (% saturation)
1	3499A	Suwannee	Lake Jeffery	Mercury (in fish tissue)
1	3516A	Suwannee	Alligator Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TP)
1	3530B	Suwannee	Swift Creek Pond	Mercury (in fish tissue)
1	3566	Suwannee	Lake Butler	Mercury (in fish tissue)
1	3593A	Suwannee	Lake Crosby	Mercury (in fish tissue)
1	3598B	Suwannee	Lake Rowell	Biology, Mercury (in fish tissue)
1	3598D	Suwannee	Lake Sampson	Mercury (in fish tissue)
1	3605G	Suwannee	Santa Fe Lake	Mercury (in fish tissue)
1	3605H	Suwannee	Lake Alto	Mercury (in fish tissue)
1	3635A	Suwannee	Hampton Lake	Mercury (in fish tissue)
1	3731A	Suwannee	Lake Marion	DO (% saturation)
1	3738B	Suwannee	Bonable Lake	Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
4	38A	Pensacola	Lake Jackson	Mercury (in fish tissue)
1	442	Ochlockonee–St. Marks	Lake Iamonia	DO (% saturation), Mercury (in fish tissue)
3	516	Choctawhatchee–St. Andrew	Compass Lake	Mercury (in fish tissue)
2	51A	Apalachicola-Chipola	Dead Lakes	Mercury (in fish tissue)
1	540A	Ochlockonee–St. Marks	Lake Tallavana	Biology, Fecal Coliform, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Nutrients (TSI)
1	546A	Ochlockonee–St. Marks	Lower Dianne Lake	Biology
1	546C	Ochlockonee–St. Marks	Lake Monkey Business	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	553A	Choctawhatchee–St. Andrew	Deerpoint Lake	Mercury (in fish tissue)
3	555	Choctawhatchee–St. Andrew	Gap Lake	Mercury (in fish tissue)
1	564A	Ochlockonee–St. Marks	Lake Arrowhead	Nutrients (chlorophyll *a*), Nutrients (TP)
1	564B	Ochlockonee–St. Marks	Pine Hill Lake (Bockus Lake)	Biology
1	564C	Ochlockonee–St. Marks	Petty Gulf Lake	Biology, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	582B	Ochlockonee–St. Marks	Lake Jackson	DO (% saturation), Mercury (in fish tissue)
2	60	Apalachicola–Chipola	Lake Seminole	Biology
3	61A	Choctawhatchee–St. Andrew	Sand Hammock Pond	Mercury (in fish tissue)
1	647A	Ochlockonee–St. Marks	Lake Tom John	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	647E	Ochlockonee–St. Marks	Lake McBride	DO (% saturation)
1	647F	Ochlockonee–St. Marks	Lake Kanturk	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	647G	Ochlockonee–St. Marks	Alford Arm	DO (% saturation)
1	647I	Ochlockonee–St. Marks	Shakey Pond	Nutrients (chlorophyll *a*), Nutrients (TP)
1	647J	Ochlockonee–St. Marks	Lake Killarney	Nutrients (chlorophyll *a*), Nutrients (TP)
1	647K	Ochlockonee–St. Marks	Lake Kinsale	Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	662	Choctawhatchee–St. Andrew	Porter Lake	Mercury (in fish tissue)
1	689A	Ochlockonee–St. Marks	Lake Overstreet	DO (% saturation)

Basin Group	WBID	Basin Group Name	Waterbody Name	Identified Parameters
1	756B	Ochlockonee–St. Marks	Lake Piney Z	Mercury (in fish tissue), Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	756C	Ochlockonee–St. Marks	Lake Lafayette (Lower Segment)	DO (% saturation)
1	756F	Ochlockonee – St. Marks	Lake Lafayette (Upper Segment)	Nutrients (chlorophyll *a*), Nutrients (TP)
3	780A	Choctawhatchee–St. Andrew	Rattlesnake Lake	Nutrients (TN), Nutrients (TP)
3	786A	Choctawhatchee–St. Andrew	Bass Lake	DO (% saturation), Nutrients (TN)
1	791N	Ochlockonee–St. Marks	Lake Miccosukee	Mercury (in fish tissue)
1	807C	Ochlockonee–St. Marks	Lake Munson	Lead, Nutrients (chlorophyll *a*), Nutrients (TN), Nutrients (TP), Nutrients (TSI), Turbidity
1	878A	Ochlockonee–St. Marks	Lake Bradford	Lead
1	878D	Ochlockonee–St. Marks	Cascade Lake	Lead
1	878E	Ochlockonee–St. Marks	Grassy Lake	DO (% saturation)
1	889A	Ochlockonee–St. Marks	Moore Lake	Mercury (in fish tissue)
2	926A1	Apalachicola–Chipola	Lake Mystic	Mercury (in fish tissue)
3	959G	Choctawhatchee–St. Andrew	Fuller Lake	DO (% saturation)
1	971C	Ochlockonee–St. Marks	Eagle Lake	DO (% saturation)

Appendix C: Strategic Monitoring Methodology for Surface Water

FWRA

The 1999 FWRA (Section 403.067 et seq., F.S.) clarified the statutory authority of DEP to establish TMDLs, required DEP to develop a scientifically sound methodology for identifying impaired waters, specified that DEP could develop TMDLs only for waters identified as impaired using the new methodology, and directed DEP to establish an Allocation Technical Advisory Committee (ATAC) to ensure the equitable allocation of load reductions when implementing TMDLs.

The 2005 FWRA amendments included provisions that removed the ATAC requirement and added the development and implementation of BMAPs to guide TMDL activities and reduce urban and agricultural nonpoint sources of pollution. Nevertheless, BMAPs are not mandatory for the implementation of TMDLs. The Legislature established a long-term funding source that provided $20 million per year for urban stormwater retrofitting projects to reduce pollutant loadings to impaired waters. However, over the years the level of funding has been inconsistent.

The FWRA also requires FDACS and DEP to adopt rules for BMPs. As Florida already had an urban stormwater regulatory program, this new authority was particularly important in strengthening Florida's agricultural nonpoint source management program. The law requires DEP to verify the effectiveness of BMPs in reducing pollutant loads. The BMP rules and associated BMP manuals are available from the [FDACS Office of Agricultural Water Policy](#) (OAWP) web site. DEP can take enforcement action against permittees who do not implement the BMPs they agreed to implement in the BMAP.

IWR

DEP uses the methodology in Florida's IWR (Chapter 62-303, F.A.C.) to evaluate water quality data and identify impaired waters. The rule also addresses data sufficiency, data quality, and delisting requirements. **Appendix D** contains detailed information on the IWR.

Watershed Management Approach

DEP's statewide method for water resource management, called the watershed management approach, is the framework for developing and implementing the provisions of Section 303(d) of the federal CWA as required by federal and state laws. This approach manages water resources based on hydrologic units—natural boundaries such as river basins—rather than political or regulatory boundaries. DEP assesses each basin as an entire functioning system and evaluates aquatic resources from a basinwide perspective that considers the cumulative effects of human activities. From that framework, DEP addresses the causes of pollution.

Rather than relying on single solutions to water resource issues, the watershed management approach is intended to improve the health of surface water and groundwater resources by

strengthening coordination among such activities as monitoring, stormwater management, wastewater treatment, wetland restoration, agricultural BMPs, land acquisition, and public involvement. Stakeholder involvement (including federal, state, regional, tribal, and local governments and individual citizens) is an important feature to cooperatively define, prioritize, and resolve water quality problems. Coordination among the many existing water quality programs helps manage basin resources and reduce duplication of effort.

For the basin assessment included in this report, DEP implemented the watershed management approach by using a 5-year basin rotation cycle. Under this approach, DEP grouped Florida's 52 HUC basins (51 HUCs plus the Florida Keys) into 29 distinct basins distributed among each of DEP's 6 districts. Within each district, DEP assessed 1 basin group each year (except for the Northeast District) and assessed each basin every 5 years.**Table C.1** lists the basin groups included in each of the basin rotations by DEP district. **Table C.2** lists the specific assessment periods for the Planning, Study, and Verified Lists for each of the 5 basin groups for 4 cycles of the basin rotation.

Table C.1.   Basin groups for the implementation of the watershed management approach,by DEP district

- = No basin assessed

DEP District	Group 1 Basins	Group 2 Basins	Group 3 Basins	Group 4 Basins	Group 5 Basins
Northwest	Ochlockonee–St. Marks	Apalachicola–Chipola	Choctawhatchee–St. Andrew	Pensacola	Perdido
Northeast	Suwannee	Lower St. Johns	-	Nassau–St. Marys	Upper East Coast
Central	Ocklawaha	Middle St. Johns	Upper St. Johns	Kissimmee River	Indian River Lagoon
Southwest	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay–Peace–Myakka	Withlacoochee	Springs Coast
South	Everglades West Coast	Charlotte Harbor	Caloosahatchee	Fisheating Creek	Florida Keys
Southeast	Lake Okeechobee	St. Lucie–Loxahatchee	Lake Worth Lagoon–Palm Beach Coast	Southeast Coast–Biscayne Bay	Everglades

Table C.2. **Periods for the development of the Planning, Study, and Verified Lists by cycle and basin group**

Cycle Rotation	Basin Group	Planning Period	Verified Period
1	1	1989–1998	1/1/1995–6/30/2002
1	2	1991–2000	1/1/1996–6/30/2003
1	3	1992–2001	1/1/1997–6/30/2004
1	4	1993–2002	1/1/1998–6/30/2005
1	5	1994–2003	1/1/1999–6/30/2006
2	1	1995–2004	1/1/2000–6/30/2007
2	2	1996–2005	1/1/2001–6/30/2008
2	3	1997–2006	1/1/2002–6/30/2009
2	4	1998–2007	1/1/2003–6/30/2010
2	5	1999–2008	1/1/2004–6/30/2011
3	1	2000–09	1/1/2005–6/30/2012
3	2	2002–11	1/1/2007–6/30/2014
3	3	2003–12	1/1/2008–6/30/2015
3	4	2004–13	1/1/2009–6/30/2016
3	5	2005–14	1/1/2010–6/30/2017
4	1	2006–16	1/1/2011–6/30/2018
4	2	2007–17	1/1/2012–6/30/2019
4	3	2008–18	1/1/2013–6/30/2020
4	4	2009–19	1/1/2014–6/30/2021
4	5	2010–20	1/1/2015–6/30/2022

The watershed management approach also involves the coordination of multiple programs within DEP. First, DEP prepares a monitoring plan in collaboration with stakeholders to determine when and where additional monitoring is needed to assess potentially impaired waters. This effort culminates in the preparation of a strategic monitoring plan (SMP). DEP then executes the monitoring plan primarily using DEP staff in its Regional Operations Centers (ROCs). Data from this effort and other data providers from WIN, Florida STORET, DEP's Statewide Biological Database (SBIO), and external biological data sources are used to produce a Verified List of Impaired Waters, developed by applying the surface water quality standards in Chapter 62-302, F.A.C., and the IWR methodology in Chapter 62-303, F.A.C. Next, DEP provides draft lists to stakeholders for comment and finalizes the lists based on those comments and any additional information received throughout the process. Finally, as required by Subsection 403.067(4), F.S., DEP adopts the Verified List for each basin by Secretarial Order.

After Secretarial adoption, the Watershed Evaluation and TMDL (WET) Section uses the Verified List and additional considerations to set priorities for TMDL development. A TMDL assigns preliminary allocations to point and nonpoint pollution sources. DEP adopts all TMDLs by rule. Depending on the circumstances, a basin working group may be formed to develop a

BMAP to guide TMDL implementation activities. DEP works closely with watershed stakeholders to ensure they understand and support the approaches for developing and implementing the TMDLs.

The basin working group and other stakeholders—especially other state agencies, WMDs, and representatives of county and municipal governments—develop the BMAP. The BMAP may include some or all watersheds and basins that flow into the impaired waterbody. The development process may take several months to years and culminates in the formal adoption of the BMAP by DEP's Secretary.

The most important BMAP component is the list of management strategies to reduce pollutant sources. Local entities (e.g., wastewater facilities, industrial sources, agricultural producers, county and city stormwater systems, military bases, water control districts, and individual property owners) usually implement these efforts. The management strategies may improve the treatment of pollution (e.g., wastewater treatment facility upgrades, or retrofits in an urban area to enhance stormwater treatment) or improve source control.

Watershed restoration plans that implement TMDLs can be achieved through the development of a BMAP or other regulatory requirements such as National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) bacteria pollution control plans (BPCPs) or TMDL implementation plans. In addition, there are opportunities for stakeholders to develop plans that address impairments and improve water quality prior to TMDL development and adoption.

Determination of Use Support

Section 303(c) of the CWA requires that water quality standards established by the states and tribes include appropriate designated uses to be achieved and protected for jurisdictional waters. The CWA also establishes the national goal of "fishable and swimmable" for all waters wherever that goal is attainable. **Table C.3** lists the use support categories evaluated under IWR assessments. These categories correspond hierarchically to the surface water classifications provided in **Appendix A**.

Table C.3.   Designated use support categories for surface waters in Florida

IWR = Impaired Surface Waters Rule

Designated Use Category Evaluated by Assessments Performed under the IWR	Applicable Surface Water Classification
Aquatic Life Use	Class I, II, III, III-Limited
Primary Contact and Recreation	Class I, II, III, III-Limited
Fish and Shellfish Consumption	Class I, II, III, III-Limited
Drinking Water	Class I
Protection of Human Health	Class I, II, III, III-Limited

Although the IWR establishes the assessment methodology for identifying impaired waters, DEP uses EPA's multicategory, integrated reporting guidance to report use support status. **Table C.4** lists the categories for waterbodies or waterbody segments used by DEP in this *2022 Integrated Report*, and **Table C.5** lists the categories anticipated to be used in the *2024 Integrated Report*.

Table C.4.   Categories for waterbodies or waterbody segments DEP used in the *2022 Integrated Report*

Note: The TMDLs are established only for impairments caused by pollutants (a TMDL quantifies how much of a given pollutant a waterbody can receive and still meet its designated uses). For purposes of the IWR assessment, pollutants are chemical and biological constituents, introduced by humans into a waterbody, that may result in pollution (water quality impairment). Other causes of pollution, such as the physical alteration of a waterbody (e.g., canals, dams, and ditches) are not linked to specific pollutants.

TMDL = Total maximum daily load; WAS = Watershed Assessment Section; WET = Watershed Evaluation and TMDL Section; WPCS BMAP = Watershed Planning and Coordination Section–Basin Management Action Plan; NPDES MS4 = National Pollutant Discharge Elimination System (NPDES)–Municipal Separate Storm Sewer System (MS4) Section; DWRA NPS = Division of Water Restoration Assistance–Nonpoint Source Section; IWR = Impaired Surface Waters Rule; BMAP = Basin Management Action Plan; EPA = U.S. Environmental Protection Agency; DO = Dissolved oxygen

Category	Description	Comments
1	Attains all designated uses.	Not currently used by DEP.
2	Attains some designated uses and insufficient or no information or data are available to determine if remaining uses are attained.	If attainment is verified for some designated uses of a waterbody or segment, DEP will propose partial delisting for those uses that are attained. Future monitoring will be recommended to acquire sufficient data and/or information to determine if the remaining designated uses are attained.
2t	Attains one or more designated uses and a TMDL has already been completed.	The waterbody is not impaired for the parameter being assessed and has a TMDL that addresses the parameter. A comprehensive and coordinated evaluation will be implemented that includes DEP staff (WAS, WET, WPCS BMAP, NPDES MS4, DWRA NPS, etc.) and/or stakeholders to determine whether the use of the assessment category is warranted (i.e., has attainment/success really been achieved) or whether the evaluation of the data used in the current assessment is considered preliminary. If additional data are needed to confirm attainment, the waterbody should be retained in Assessment Category 4a.
3a	No data and/or information are available to determine if any designated use is attained.	Future monitoring will be recommended to acquire sufficient data and/or information to determine if designated uses are attained.
3b	Some data and information are available but not enough to determine if any designated use is attained.	Future monitoring will be recommended to acquire sufficient data and/or information to determine if designated uses are attained.
3c	Enough data and information are available to determine that one or more designated uses may not be attained according to the Planning List in the IWR.	These waters are placed on the Planning List and will be prioritized for future monitoring to acquire sufficient data and/or information to determine if designated uses are attained.
4a	Impaired for one or more designated uses but does not require TMDL development because a TMDL has already been completed.	After EPA approves a TMDL for the impaired waterbody or segment, it will be included in a restoration plan or BMAP to reduce pollutant loading toward the attainment of designated use(s).
4b	Impaired for one or more designated uses but does not require TMDL development because the water will attain water quality standards based on existing or proposed measures.	Pollutant control mechanisms designed to attain applicable water quality standards within a reasonable time have either already been proposed or are already in place.

Category	Description	Comments
4c	Impaired for one or more criteria or designated uses but does not require TMDL development because the impairment is not caused by a pollutant.	This category includes segments that do not meet water quality standards because of naturally occurring conditions or pollution; more frequently such circumstances appear linked to impairments for low DO or elevated iron concentrations. In these cases, the impairment observed is not caused by specific pollutants but is believed to represent a naturally occurring condition, or to be caused by pollution.
4d	Identified as not attaining one or more designated uses, but DEP does not have sufficient information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but DEP does not have enough information to fully assess the nonattainment of the stream nutrient standard.	This category includes segments that do not meet their water quality standards, but no causative pollutant has been identified, or where there are adverse trends in nutrients, nutrient response variables, or DO. Waters in this category are included on the basin-specific Study List and submitted to EPA as additions to Florida's 303(d) list of impaired waters.
4e	Does not attain water quality standards, and pollution control mechanisms or restoration activities are in progress or planned to address the nonattainment of water quality standards. DEP does not have enough information to fully evaluate whether proposed pollution mechanisms will result in the attainment of water quality standards.	Restoration activities for waterbodies in this category have been completed, are planned, or are ongoing, such that once the activities are completed or the waterbody has had a chance to stabilize, in the opinion of DEP staff it will meet its designated uses. Waters in this category are included on the basin-specific Study List and submitted to EPA as additions to Florida's 303(d) list of impaired waters.
5	Water quality standards are not attained and a TMDL is required.	Waterbodies or segments in this category have been identified as impaired for one or more designated uses by a pollutant or pollutants. Waters in this category are included on the basin-specific Verified List adopted by Secretarial Order and submitted to EPA as additions to Florida's 303(d) list of impaired waters.

Table C.5. **Categories for waterbodies or waterbody segments DEP plans to use in the *2024 Integrated Report***

RAP = Reasonable assurance plan; ARP = Alternative restoration plan; WAS = Watershed Assessment Section; WET = Watershed Evaluation and TMDL Section; WPCS BMAP = Watershed Planning and Coordination Section–Basin Management Action Plan; NPDES MS4 = National Pollutant Discharge Elimination System (NPDES)–Municipal Separate Storm Sewer System (MS4) Section; DWRA NPS = Division of Water Restoration Assistance–Nonpoint Source Section

Category	Description	Comments
2b	Attains one or more designated uses and a RAP has already been completed.	Waterbody is not impaired for the parameter being assessed and has a RAP that addresses the parameter. A comprehensive and coordinated evaluation will be implemented that includes DEP staff (WAS, WET, WPCS BMAP, NPDES MS4, DWRA NPS, etc.) and/or stakeholders to determine whether the use of the assessment category is warranted (i.e., has attainment/success really been achieved) or whether the evaluation of the data used in the current assessment is considered preliminary. If additional data are needed to confirm attainment, the waterbody is retained in Assessment Category 4b.
2e	Attains one or more designated uses and an ARP has already been completed.	Waterbody is not impaired for the parameter being assessed and has an alternative restoration plan that addresses the parameter. A comprehensive and coordinated evaluation will be implemented that includes DEP staff (WAS, WET, WPCS BMAP, NPDES MS4, DWRA, NPS, etc.) and/or stakeholders to determine whether the use of the assessment category is warranted (i.e., has attainment/success really been achieved) or whether the evaluation of the data used in the current assessment is considered preliminary. If additional data are needed to confirm attainment, the waterbody is retained in Assessment Category 4e.

Data Management

SOURCES

WIN, Florida STORET, and SBIO are the primary sources for assessment data, but external bioassessment data are also an important source. For assessments performed for the current assessment period, 87% of the data used came from Florida STORET, 12% came from WIN, and less than 1% came from other sources. **Tables C.6** and **C.7** list the agencies and organizations that provided chemistry or biological data, respectively, used in the IWR assessments.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) CRITERIA

The IWR addresses QA/QC by requiring all data providers to use established SOPs and National Environmental Laboratory Accreditation Conference–certified laboratories to generate results intended for use in IWR assessments. All data must meet DEP QA rule requirements (Chapter 62-160, F.A.C.). To further ensure that the QA/QC objectives are being met, DEP's Aquatic Ecology and Quality Assurance (AEQA) Section, on request, audits data providers (or laboratories used by data providers).

Table C.6.   Agencies and organizations providing chemistry data used in the IWR assessments

- Alabama Department of Environmental Management
- Alachua County Environmental Protection Department
- AMEC
- Apalachicola National Estuarine Research Reserve
- Avon Park Air Force Range
- Babcock Ranch
- Biological Research Associates (ENTRIX)
- Bream Fishermen Association
- Brevard County Stormwater Utility Department
- Broward County Environmental Protection Department
- Charlotte County Department of Health
- Charlotte County Stormwater Division
- Charlotte Harbor National Estuary Program (CHNEP)–East Wall
- CHNEP–Estero Bay
- CHNEP–Lower Lemon Bay
- CHNEP–Matlacha Pass
- CHNEP–Peace River
- CHNEP–Pine Island Sound
- CHNEP–San Carlos Bay
- CHNEP–Tidal Caloosahatchee River
- CHNEP–Tidal Myakka River
- CHNEP–Tidal Peace River
- CHNEP–West Wall
- Choctawhatchee Basin Alliance
- City of Altamonte Springs
- City of Atlantic Beach
- City of Bonita Springs
- City of Cape Coral
- City of Deltona
- City of Fort Myers
- City of Jacksonville
- City of Jacksonville Beach
- City of Key West
- City of Kissimmee
- City of Lakeland
- City of Marco Island
- City of Naples
- City of Neptune Beach
- City of Orlando
- City of Port St. Lucie
- City of Punta Gorda
- City of Saint Petersburg
- City of Sanibel Natural Resources Department
- City of Tallahassee Stormwater Management Division
- City of Tampa Bay Study Group
- City of West Palm Beach

- Collier County Coastal Zone Management Department
- Collier County Pollution Control
- Dade County Environmental Resource Management
- Environmental Services and Permitting, Inc.
- Florida Department of Agriculture and Consumer Services
- Florida Department of Environmental Protection (DEP)–Central District
- DEP–Charlotte Harbor Aquatic/Buffer Preserves
- DEP–Ground Water Monitoring Section
- DEP–Northeast District
- DEP–Northwest District
- DEP–Okaloosa County Environmental Council
- DEP–South District
- DEP–Southeast District
- DEP–Southwest District
- DEP–Tallahassee Regional Operations Center
- DEP–Water Quality Standards and Special Projects
- DEP–Watershed Assessment Section
- DEP– Watershed Evaluation and TMDL (Section)
- Florida Department of Health, Division of Environmental Health
- Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute
- Florida Game and Fresh Water Fish Commission
- Florida Keys National Marine Sanctuary–Seagrass Monitoring Program
- Florida Keys National Marine Sanctuary–Water Quality Monitoring Program
- Florida LakeWatch
- Florida Marine Research Institute
- Frydenborg Ecologic LLC
- Georgia Environmental Protection Division
- Guana Tolomato Matanzas Research Reserve
- Gulf Power Company
- Harbor Branch Oceanographic Institution
- Highlands County Natural Resources (Biology)
- Hillsborough County, Florida Water Quality Data
- Howard T. Odum Florida Springs Institute
- Jacksonville Electric Authority
- Lake County Water Resource Management
- Lee County Environmental Laboratory
- Lehigh Acres Municipal Services Improvement District
- Leon County Public Works
- Loxahatchee River District
- Manatee County Environmental Management Department
- Marine Resources Council of East Florida
- McGlynn Laboratories, Inc.
- National Health and Environmental Effects Research Laboratory (EPA)
- Naval Station Mayport
- Northwest Florida Water Management District
- Orange County Environmental Protection Division
- Palm Beach County Environmental Resource Management
- Pasco County Stormwater Management Division
- Peace River Manasota Regional Water Authority

- Pelican Bay Services
- Pinellas County Department of Engineering and Environmental Services
- Polk County Natural Resources Division
- Reedy Creek Improvement District Environmental Services
- Sanibel Captiva Conservation Foundation
- Sarasota County Environmental Services
- Seminole County
- SMR Communities, Inc.
- South Florida Water Management District
- Southwest Florida Water Management District (SWFWMD)
- SWFWMD–Project Coast
- St. John's River Water Management District
- Suwannee River Water Management District
- Tampa Bay Water
- The Nature Conservancy of the Florida Keys
- Turrell, Hall & Associates, Inc.
- University of South Florida Water Institute (Biology)
- U.S. Geological Survey Data
- Volusia County Environmental Health Laboratory

Table C.7.   Agencies and organizations providing bioassessment data used in the IWR assessments

- Alachua County Environmental Protection Department
- Biological Research Associates
- Bream Fishermen Association
- City of Cape Coral
- City of Tallahassee Stormwater Management Division
- Environmental Services and Permitting, Inc.
- Florida Department of Environmental Protection
- Florida Game and Fresh Water Fish Commission
- Frydenborg Ecologic LLC.
- Highlands County
- Jones Edmunds and Associates
- Leon County Public Works
- Mosaic Fertilizer, LLC– Cardo
- Northwest Florida Water Management District
- Orange County Environmental Protection Division
- Pinellas County Department of Engineering and Environmental Services
- Polk County Natural Resources Division
- Reedy Creek Improvement District Environmental Services
- Seminole County
- South Florida Water Management District
- Southwest Florida Water Management District
- St. John's River Water Management District
- Suwannee River Water Management District
- Sweetgum Environmental
- University of South Florida Water Institute

RATIONALES FOR EXCLUSION OF EXISTING DATA

In assessing surface water quality under the IWR, DEP attempts to assemble and use all readily available ambient surface water quality data. Measurements or observations that are known not to be representative of ambient waters (e.g., results for samples collected from discharges or in approved mixing zones) are excluded from IWR assessments. In addition, data collected at locations or during periods that are not representative of the general condition of the waterbody (e.g., samples collected during or immediately after a hurricane or samples linked to a short-term event such as a sewage spill) are subject to additional review before inclusion in the IWR assessment process.

If QA/QC audits identify specific data deficiencies, corresponding data subsets may be excluded from the assessment process. In these situations, the AEQA Section will provide recommendations to the appropriate data providers. Similarly, if a review of water quality assessment data identifies specific discrepancies or anomalies, these data also may be precluded from an assessment. Typically, such discrepancies include systematic issues such as errors in the conversion of units, errors caused by using an incorrect fraction to characterize an analyte, or other data-handling errors that may have occurred in conjunction with the data-loading process. In these cases, DEP staff will work with the data provider to resolve the underlying issues. Upon resolution, corrected data are (re)loaded to Florida STORET and made available for subsequent IWR assessments.

Table C.8 contains additional details about the specific types of data excluded from assessments performed under the IWR.

Use and Interpretation of Biological Results

The biological assessment tools used in conjunction with IWR assessments consist of the SCI, LVI, RPS, LVS, Habitat Assessment (HA), and BioRecon. Because BioRecon is primarily a screening tool, DEP does not use low BioRecon scores alone as the basis for impairment decisions. Instead, it requires follow-up sampling with the SCI to provide a more comprehensive measure of aquatic life use support. In addition, a single SCI with a score less than the acceptable value is not sufficient to support an impairment or delisting decision. When SCIs are used as the basis for impairment decisions, DEP requires a minimum of at least two temporally independent SCIs.

Table C.8.   Data excluded from IWR assessments

IWR = Impaired Surface Waters Rule; WMD = Water management district; USGS = U.S. Geological Survey; MDL = Method detection limit; PQL = Practical quantitation limit; QC = Quality control; AEQA = Aquatic Ecology and Quality Assurance Section

Data Excluded	Comment
Results reported in Florida STORET that did not include units or included units that were inappropriate for the particular analyte.	The reported values cannot be quantified accurately or relied on for assessment purposes under the IWR.
Results reported as negative values.	Except in cases where documentation is presented that indicates otherwise, any results reporting a negative value for the substance analyzed represent reporting errors. Credible data cannot have any values less than the detection limit (in all cases a positive value) reported, and therefore results reported as negative values cannot be relied on for assessment purposes under the IWR.
Results reported as "888" "8888" "88888" "888888" "8888888" and "999" "9999" "99999" "999999" "9999999."	Upon investigation, all data reported using these values are provided by a particular WMD. The district intentionally codes the values in this manner to flag the fact that they should not be used, as the values reported from the lab are suspect. The data coded in this manner are generally older.
Extremely old USGS data (from the beginning of the previous century).	These results do not have complete date information available, and accurate date information is required to assess results under the IWR. The USGS data using USGS Parameter Codes 32230 or 32231 also are excluded from assessments performed under the IWR, based on information in a memo sent from USGS.
Results for iron that were confirmed to be entered into Database Hydrologic (dbHydro) (South Florida WMD's environmental database) using an incorrect Legacy STORET parameter code.	These results are limited to a subset of the results reported by a particular WMD.
Results reported associated with "K," "T," and "W" qualifier codes, when the reported value of the MDL was greater than the criterion, or the MDL was not provided.	The results are estimated because of uncertainty in the precision of the data. The actual value is not known but is known to be less than the value shown.
Results reported associated with "U" or "I" qualifier codes and an MDL is not provided, but the MDL is required based on the applicable method. For example, does not apply to chlorophyll results.	The MDL is required by the applicable method to compare with the numeric value of the criterion.
Results reported for metals using an "I" qualifier code if the applicable criterion was expressed as a function of hardness, and the numeric value of the metal criteria corresponding to the reported hardness value was between the MDL and PQL.	Because of the uncertainty regarding results with an MDL above a criterion, it is not possible to determine the precision of the data and the applicable water quality criterion.
Results reported using an "L" qualifier code (meaning that the actual value was known to be greater than the reported value) where the reported value for the upper quantitation limit was less than the criterion.	Data are excluded for similar reasons discussed above for results reported as below the MDL.

Data Excluded	Comment
Results reported with a "Z" qualifier code (indicating that the results were too numerous to count).	These results are excluded because there is no consistency among data providers in how data using this qualifier code are reported. Some data providers enter numeric estimates of bacteria counts, while others enter the dilution factor. As a result, the meaningful interpretation of data reported using this qualifier is not uniformly possible.
Results reported with an "F" qualifier code (indicating female species).	Since the IWR does not assess any analytes for which this qualifier code is appropriate, the intended meaning of the use of the code is unknown. The reported result is therefore rendered uninterpretable (although there are very few instances of the use of this qualifier code in the IWR dataset, and some agencies may use it to indicate a field measurement).
Results reported with a "G" qualifier code (analyte detected in blank).	Data are excluded when the blank value is greater than 10% of the associated sample value.
Results reported with an "O" qualifier code (indicating that the sample was collected but that the analysis was lost or not performed).	Data are excluded because no results are reported.
Results reported with an "N" qualifier code (indicating a presumption of evidence of the presence of the analyte).	Comparing concentrations of analytes with water quality criteria requires a numeric result value. Presence or absence, for the purposes of assessments performed under the IWR, is not sufficient information on which to base an impairment decision.
Results reported with a "V" or "Y" qualifier code (indicating the presence of an analyte in both the environmental sample and the blank, or a laboratory analysis from an unpreserved or improperly preserved sample).	Such data may not be accurate. The use of these codes indicates that the reported result is not reliable enough to be used in IWR assessments.
Results reported in WIN with a "?"qualifier (data are rejected).	These results are excluded because some or all of the QC data for the analyte are outside criteria, and the presence or absence of the analyte cannot be determined from the data.
Results reported with a "Q" qualifier code (indicating that the holding time was exceeded).	The data are reviewed to validate whether the appropriate holding times were used, and if so, whether they were exceeded. All parameters reported with a "Q" qualifier code are excluded from IWR assessments, except bacteria.
Results reported for mercury not collected and analyzed using clean techniques, as required by the IWR.	The use of clean techniques removes the chance for contamination of samples collected and analyzed for mercury. Mercury concentrations obtained from contaminated samples are not representative of the true mercury concentrations in the target waterbody segments.
Results recommended for exclusion by DEP's AEQA Section as a result of lab or field audits.	The data excluded based on lab audits are generally analyte specific and refer to a specific period. While the data issues encountered are variable, the lack of acceptable or verifiable records is a common issue.
Certain DO measurements collected using a field kit (as opposed to a sonde).	The results are excluded because of the lack of data quality based on field kits.

Appendix D: IWR Methodology for Evaluating Impairment

DEP evaluates the quality of waters of the state by using the science-based assessment methodology described in Chapter 62-303, F.A.C. The methodology provides a detailed process for determining the attainment of applicable water quality standards. Two distinct steps, as follows, are aimed at identifying impaired waters: (1) using a statistical methodology to identify waterbody segments that exceed water quality criteria ("potentially impaired waters"), and (2) subjecting these segments to further review. If an exceedance for a potentially impaired segment caused by a pollutant later is verified, the segment is placed on the Verified List of Impaired Waters. The methodology described in the IWR specifies data sufficiency requirements and statistical confidence levels that assessment results must meet to accurately characterize the quality of waters of the state.

In addition to providing assessment and listing thresholds, the IWR also (1) describes data sufficiency requirements, (2) addresses data quality objectives, and (3) describes the requirements for delisting segments that were previously included on the Verified List. The results in this report, including those assessments performed through 2020, are based on water quality criteria that were recently revised to incorporate DO (as percent saturation, replacing DO as concentration), NNC (DEP 2013a), recreational bacteria, and TAN (replacing un-ionized ammonia).

The particular type of data and/or information required to determine use support varies by designated use (**Appendix A**) and—in addition to physical and chemical analytical results characterizing the water column—includes biological data, fish consumption advisories, and beach closure and advisory information, as well as changes in the classification of shellfish-harvesting areas. At times, DEP also uses field survey and reconnaissance information to help identify impairments.

Evaluation of Aquatic Life–Based Use Support

Aquatic life–based use support refers to the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. To determine aquatic life–based use support, the IWR methodology uses three distinct types of data (Rule 62-303.310, F.A.C.):

1. Comparisons of discrete water quality measurements with particular class-specific numeric criteria from the Florida Standards (and other, similarly worded numeric threshold values, as described in Rule 62-303.320, F.A.C.).

2. Comparisons of results calculated for multimetric biological indices with waterbody type–specific biological assessment thresholds (as described in Rule 62-303.330, F.A.C.).

3. Comparisons of annual summary statistics with numeric values based on an interpretation of narrative nutrient criteria from the Florida Standards (as described in Rule 62-303.350, F.A.C.).

Evaluations performed under the IWR rely primarily on discrete sample data obtained primarily from Florida STORET and WIN. Subject to data sufficiency and data quality requirements, exceedances of applicable criteria and/or threshold values indicate that aquatic life–based use support is not achieved. However, the IWR allows waterbodies with values not meeting the DO criterion that have healthy biological assessments to be omitted from the Verified List. Parameters that meet the listing requirements for the Planning List are further evaluated for impairment using the most recent 7.5 years of data in the Verified Period, but applying the data sufficiency requirements in Rule 62-303.420, F.A.C.

Evaluation of Primary Contact and Recreation Use Support

When a Class I, II, or III waterbody fails to meet its applicable water quality criteria for bacteriological quality, the waterbody is assessed as impaired under the IWR. Subject to data sufficiency and data quality requirements, exceedances of applicable thresholds indicate that primary contact and recreation use support is not attained. For bacteria assessments evaluated using the binomial distribution of discrete water quality samples, WAS applies the assessment guidance shown in **Figure D.1**. This evaluation takes into consideration the exceedance ratios and whether land use, chemical tracers, or molecular markers indicate potential anthropogenic sources of bacteria. The process also includes a review of management actions being implemented by local and state agencies through the NPDES MS4 program, such as BPCPs.

The IWR methodology determines primary contact and recreation use attainment by evaluating the following (Rule 62-303.360, F.A.C.):

1. Comparisons of discrete water quality measurements with specific numeric criteria values for bacteria, consisting of comparisons with the relevant class-specific numeric criteria from the Florida Standards (and other similarly worded numeric threshold values, as described in Rule 62-303.360, F.A.C.).

2. Evaluation of beach closures, beach advisories, or warnings. This information must be based on bacteriological data, issued by the appropriate governmental agency, as described in Rule 62-303.360, F.A.C.

3. Comparison of summary measures of bacteriological data with threshold values described in Rule 62-303.360, F.A.C.

For the purpose of assessments using bacteria counts, FDOH reports the bacteriological results used as the basis for beach advisories, closures, and warnings to WIN. DEP combines these data

with bacteriological results from other data providers statewide. Subject to data sufficiency and data quality requirements, exceedances of applicable criteria and/or threshold values indicate that primary contact and recreational use support are not achieved. Parameters that meet the listing requirements for the Planning List are further evaluated for impairment using the most recent 7.5 years of data in the Verified Period, but applying the data sufficiency requirements in Rule 62-303.460, F.A.C.

Evaluation of Fish and Shellfish Consumption Use Support

The evaluation of fish and shellfish consumption use support relies on the evaluation of both quantitative and qualitative information, as follows (as described in Rule 62-303.370, F.A.C.):

1. Comparisons of discrete water quality measurements with specific numeric criteria values for bacteria, consisting of comparisons with the relevant class-specific numeric criteria from the Florida Standards (and other similarly worded numeric threshold values, as outlined in Rule 62-303.320, F.A.C.).

2. Evaluation of fish advisories issued by FDOH or another authorized governmental entity.

3. Evaluation of shellfish-harvesting actions taken by FDACS, provided those actions were based on bacteriological contamination or water quality data.

In addition, if FDOH has issued a fish consumption advisory, or if FDACS has classified a Class II waterbody segment as anything other than approved for shellfish harvesting or propagation, that segment is verified as impaired and determined not to meet its designated use. Parameters that meet the listing requirements for the Planning List are further evaluated for impairment using the most recent 7.5 years of data in the Verified Period, but applying the data sufficiency requirements in Rule 62-303.470, F.A.C.

Evaluation of Drinking Water Use Attainment

The evaluation of drinking water use attainment is based on the following type of information (Rule 62-303.380, F.A.C.):

1. Comparisons of discrete water quality measurements with class-specific threshold values or numeric criteria from the Florida Standards, as outlined in Rule 62-303.320, F.A.C.

Parameters that meet the listing requirements for the Planning List are further evaluated for impairment using the most recent 7.5 years of data in the Verified Period, but applying the data sufficiency requirements in Rule 62-303.480, F.A.C.

Figure D.1.   Bacteria assessments applied using the binomial distribution

Note: The paperclip symbol in the figure below shows the linkage in the decision key.

Evaluation and Determination of Use Attainment

EXCEEDANCES OF NUMERIC CRITERIA FROM THE FLORIDA STANDARDS

Table D.1 lists the analytes for which numeric criteria exist in the Florida Standards and the number of sample results available for assessments performed under the IWR.

Table D.1. **Sample counts for analytes having numeric criteria in the Florida Standards**

Analyte	Number of Samples
2,4-D	4,545
2,4-Dichlorophenol	186
2,4-Dinitrophenol	224
Acenaphthene	236
Aldrin	1,820
Alkalinity	151,490
Aluminum	42,964
Anthracene	246
Antimony	23,432
Arsenic	59,990
Barium	39,038
Benzene	293
Beryllium	24,075
Beta BHC	1,831
Boron	9,668
Cadmium	60,477
Carbon Tetrachloride	292
Chlordane	1,608
Chloride	150,868
Chlorine	49
Chlorophenol	229
Chromium III	55,054
Copper	64,501
Corrected Chlorophyll *a*	279,714
Cyanide	8
DDT	1,816
Demeton	1,565
Detergents	25
Dichloroethylene	159
Dieldrin	1,917
Dissolved Solids	97,259
Endosulfan	1,835
Endrin	1,737
Enterococci	183,788

Analyte	Number of Samples
Escherichia coli	28,654
Fecal Coliform	296,583
Fluoranthene	246
Fluorene	236
Fluoride	64,086
Guthion	1,806
Heptachlor	1,828
Iron	71,123
Lead	61,580
Lindane	1,755
Malathion	2,211
Manganese	42,384
Mercury	2,078
Methoxychlor	1,655
Mirex	1,712
Nickel	50,645
Nitrate	49,087
Nitrate-Nitrate	289,530
Oil/Grease	269
Pentachlorophenol	196
pH	695,880
Phenol	1,115
Pyrene	246
Selenium	40,867
Sevin (Carbaryl)	304
Silver	48,058
Specific Conductance	606,531
Tetrachloroethylene	238
Thallium	23,223
Total Ammonia Nitrogen	288,751
Total Nitrogen	408,385
Total Phosphorus	451,983
Toxaphene	1,615
Trichloroethylene	293
Turbidity	337,734
Zinc	58,382

Since the numeric water quality criteria from Chapter 62-302, F.A.C., are class and waterbody-type specific, DEP classifies segments first by their appropriate waterbody class and as one of four categories of waterbody types: stream (including springs, rivers, and canals), lake, estuary,

or coastal. For each analyte with a criterion in the Florida Standards, DEP calculates four-day station median concentrations (or, in some instances, daily values) and compares these values with the applicable class-specific criterion values in the Florida Standards.

For waters assessed under Subsection 62-303.320(1), F.A.C., and for each segment and analyte combination, DEP counts the number of samples and exceedances of the applicable criterion and compares the exceedance count with the listing threshold value for the corresponding sample size. The listing thresholds represent the minimum number of samples not meeting the applicable water quality criterion necessary to obtain the required confidence levels. Comparisons performed for acute toxicity–based exceedances, or exceedances of synthetic organic chemicals and pesticides, have a lower listing threshold of more than a single exceedance in any consecutive three-year period.

Subject to data sufficiency requirements, DEP places a waterbody segment assessed under Subsection 62-303.320(1), F.A.C., on the Planning List if there are a sufficient number of samples to attain at least 80% confidence that the actual criterion exceedance rate was greater than or equal to 10%. Waters placed on the Planning List are subject to additional data collection and review.

To place a waterbody segment assessed under Subsection 62-303.420(2), F.A.C., on the Verified List, the number of samples must be sufficient to attain at least 90% confidence that the actual criterion exceedance rate was greater than or equal to 10%.

INTERPRETATION OF NARRATIVE NUTRIENT CRITERION

The Florida Standards include a narrative nutrient criterion, which states, "In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna." In Rule 62-303.350, F.A.C., the IWR provides a working interpretation of this criterion. Under this interpretation, the AGMs for chlorophyll *a*, TN, and TP concentrations (for streams, lakes, and estuaries) and nitrate-nitrite (for spring vents) are used to assess whether a waterbody should be further assessed for nutrient impairment under the rule in effect in 2020.

Exceedances of Biological Thresholds

Biota inhabiting a waterbody act as continual natural monitors of environmental quality, capable of detecting the effects of both episodic, as well as cumulative, alterations in water quality, hydrology, and habitat. A biological assessment uses the response of resident aquatic biological communities to various stressors as a method of evaluating ecosystem health. Because these communities can manifest long-term water quality conditions, they can provide a direct measure of whether the designated use of a "well-balanced population of fish and wildlife" is being attained (Rule 62-302.400, F.A.C.) better than characterization by discrete chemical or physical

measurements alone. In addition, bioassessment often can provide insights into appropriate restoration strategies.

METRICS USED

Bioassessment tools used with the IWR assessments incorporate multimetric methods to quantify biological community structure or function. When multimetric methods are used, the results of individual metrics (e.g., number of long-lived taxa, number of sensitive taxa, percent filter feeders, percent clingers) are combined into a single dimensionless, multimetric index. Such indices offer potential advantages over the use of individual metrics by integrating multiple nonredundant measures into a single score reflecting a wider range of biological information. The SCI and BioRecon are two examples of multimetric indices used to quantify the health of rivers and streams based on the biological health of macroinvertebrate populations.

Recalibrations of the SCI and the BioRecon methods completed in 2007 involved the use of the Human Disturbance Gradient (HDG), which ranks sites based on independent assessments of habitat quality, degree of hydrologic disturbance, water quality, and human land use intensity. The SCI and BioRecon scores calculated before August 2007 used a smaller, similar set of input metrics.

Since both sets of scores represent valid biological assessments performed during discrete periods, both are used in assessments of biological health performed under the IWR. The BioRecon is used to place waterbodies on the Planning List only, but the SCI is used in conjunction with floral metrics (chlorophyll *a*, RPS, and LVS, as described in Rules 62-302.531 and 62-302.532, F.A.C.). This implementation is consistent with the document *Implementation of Florida's Numeric Nutrient Standards* (DEP 2013a).

Additional efforts to develop multimetric indices for periphyton (attached algae) and phytoplankton (drifting algae) that incorporate the HDG also have been attempted, but significant relationships between human disturbance and biological response in these communities have not been established. DEP has since developed and implemented an RPS method to evaluate periphyton communities and continues to use chlorophyll *a* concentrations to quantify imbalances in phytoplankton communities.

BIOASSESSMENT DATA USED

IWR bioassessments used macroinvertebrate data only from ambient sites located in surface waters of the state. DEP excluded data from effluent outfall sites and monitoring sites not clearly established to collect ambient water quality data.

Site-specific habitat and physicochemical assessment (e.g., percent suitable macroinvertebrate habitat, water velocities, extent of sand or silt smothering, and width of riparian buffer zones) provide information important for identifying the stressors responsible for a failed SCI score. This information also can be extremely useful in determining biological impairment, since

biological communities sometimes respond to factors other than water quality, such as habitat disruption and hydrologic disturbances. Waterbody segments adversely affected only by pollution (e.g., a lack of habitat or hydrologic disruption) but not by a pollutant (a water quality exceedance) are not placed on the Verified List.

DEP's SOPs provide definitions and specific methods for the generation and analysis of bioassessment data. Because these bioassessment procedures require specific training and expertise, the IWR also requires that persons conducting bioassessments must comply with the QA requirements of Chapter 62-160, F.A.C., attend at least eight hours of DEP-sanctioned field training, and pass a DEP-sanctioned field audit. Meeting these requirements helps ensure samplers will follow the applicable SOPs in Chapter 62-160, F.A.C., before collecting bioassessment data used in IWR assessments.

SCI

The total SCI score is the average of 10 metric scores: total number of taxa, total number of taxa belonging to the order Ephemeroptera, total taxa of the order Trichoptera, percent filter feeders, total number of long-lived taxa, total number of clinger taxa, percent dominant taxa, percent taxa in the tribe Tanytarsini, total number of sensitive taxa, and percent very tolerant taxa (**Table D.2** lists the formulae).

Table D.2.   SCI metrics for the Northeast, Big Bend, Panhandle, and Peninsula regions of Florida

X = Raw metric value
ln = Natural log

SCI Metric	Northeast	Big Bend	Panhandle West	Peninsula
Total taxa	10 * (X–15)/27	10 * (X–17)/23	10 * (X–19)/28	10* (X-15)/24
Ephemeroptera taxa	10 * X /5	10 * X /5	10 * X /8	10 * X /5
Trichoptera taxa	10 * X /8	10 * X /7	10 * (X-1) /9	10 * X /7
% filterer	10 * (X-0.7)/40.5	10 * (X-1)/53	10 * (X-2.7)/47	10 * (X-0.7)/43
Long-lived taxa	10 * X /4	10 * X /3	10 * X /5	10 * X /3
Clinger taxa	10 * X /10	10 * X /8	10 * (X-2) /10	10 * X /7
% dominant	10 - (10 * [(X-11)/48])	10 - (10 * [(X-12.5)/54])	10 - (10 * [(X-10.5)/36])	10 - (10 * [(X-14)/50])
% Tanytarsini	10 * [ln (X + 1) /3.2]	10 * [ln (X + 1) /3.1]	10 * [ln (X + 1) /3.2]	10 * [ln (X + 1) /3.4]
Sensitive taxa	10 * X /13	10 * X /10	10 * (X-2) /15	10 * X /7
% Very tolerant	10 - (10 * [ln (X + 1)/4.1])	10 - (10 * [(ln (X + 1)-0.6)/3.6])	10 - (10 * [ln (X + 1)/3.3])	10 - (10 * [(ln (X + 1)-0.7)/4.0])

BIORECON

A BioRecon data impairment rating uses the six metrics as calculated in **Table D.3** and the index thresholds in **Table D.4**.

Table D.3.   BioRecon metrics for the Northeast, Panhandle, and Peninsula regions of Florida

X = Raw metric value

BioRecon Metric	Northeast	Panhandle	Peninsula
Total taxa	(X–14) /23	(X–16) /33	(X–11) /25
Ephemeroptera taxa	X /3.5	X /12	X /5
Trichoptera taxa	X /6.5	X /7	X /7
Long-lived taxa	X /6	X /10	X /7
Clinger taxa	X /7	X /15.5	X /8
Sensitive taxa	X /11	X /19	X /9

Table D.4.   BioRecon sample size and index range

BioRecon	Index Range
1 sample: Pass	(6–10)
1 sample: Fail	(0–6)
2 samples: Good	(7–10)
2 samples: Fair	(4–7)
2 samples: Poor	(0–4)

Delisting

A waterbody segment on the 303(d) list or the Verified List may be proposed for delisting when it is demonstrated that water quality criteria are currently being met. Waterbody segments also may be proposed for delisting for other reasons, including if the original listing is in error, or if a water quality exceedance is from natural causes or not caused by a pollutant.

Although the IWR has specific requirements for delisting decisions, determining the ultimate assessment category (or subcategory) for delisted segments is not necessarily straightforward (**Appendix E**). For example, EPA has provided guidance that a waterbody previously identified as impaired for nutrients based on chlorophyll *a* or TSI assessments can be delisted if the waterbody does not exceed the IWR threshold values or NNC (DEP 2013a). However, until sufficient site-specific information is available to demonstrate use attainment, stream waterbody segments cannot be placed in Assessment Category 2 and instead are assigned to Assessment Category 3b (**Appendix C**). The required site-specific information to place the waterbody segment in Assessment Category 2 can include, but is not limited to, measures of biological response such as the SCI and macrophyte or algal surveys.
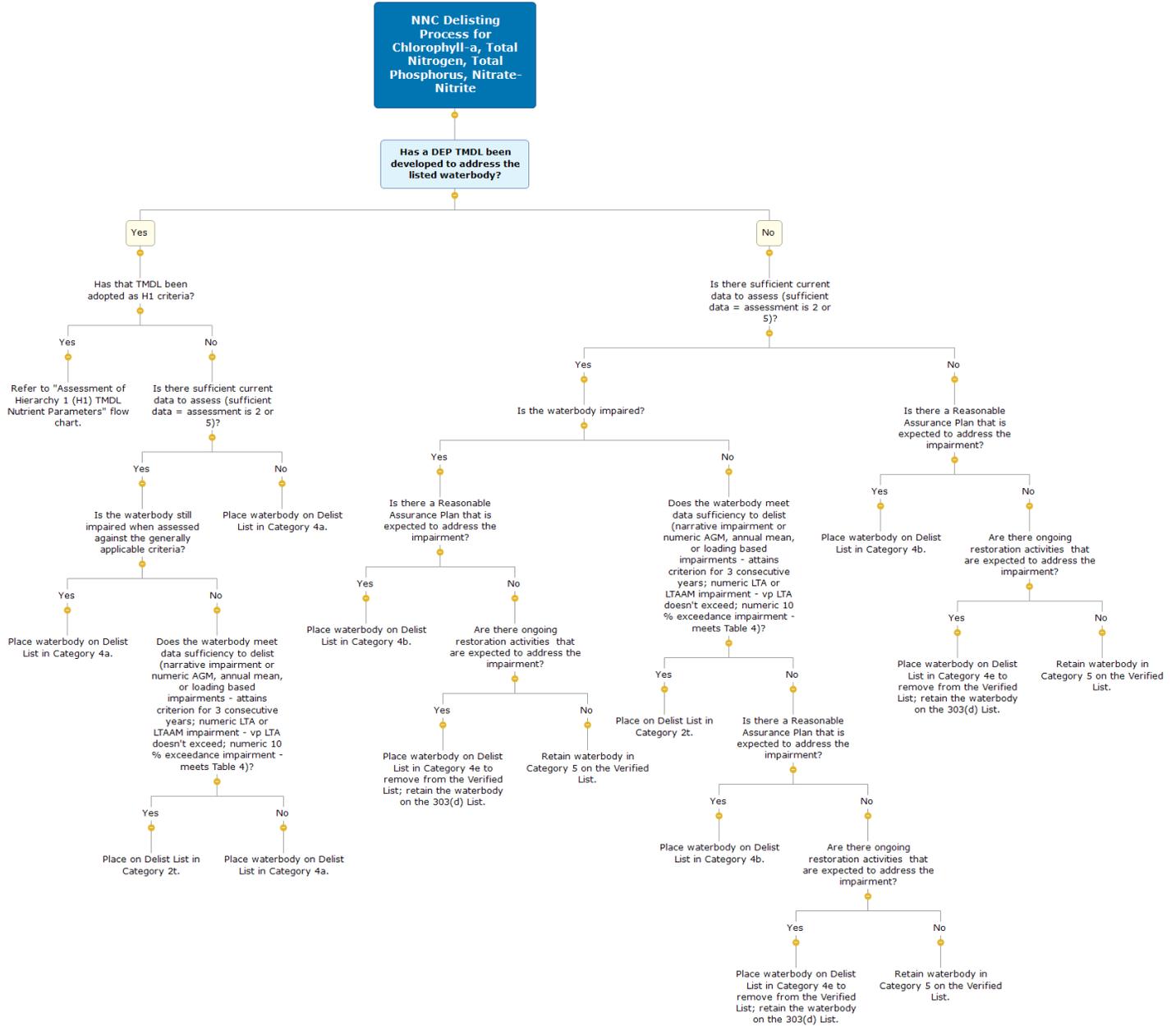
Appendix E: IWR Guidance for Delisting WBIDs for Nutrients

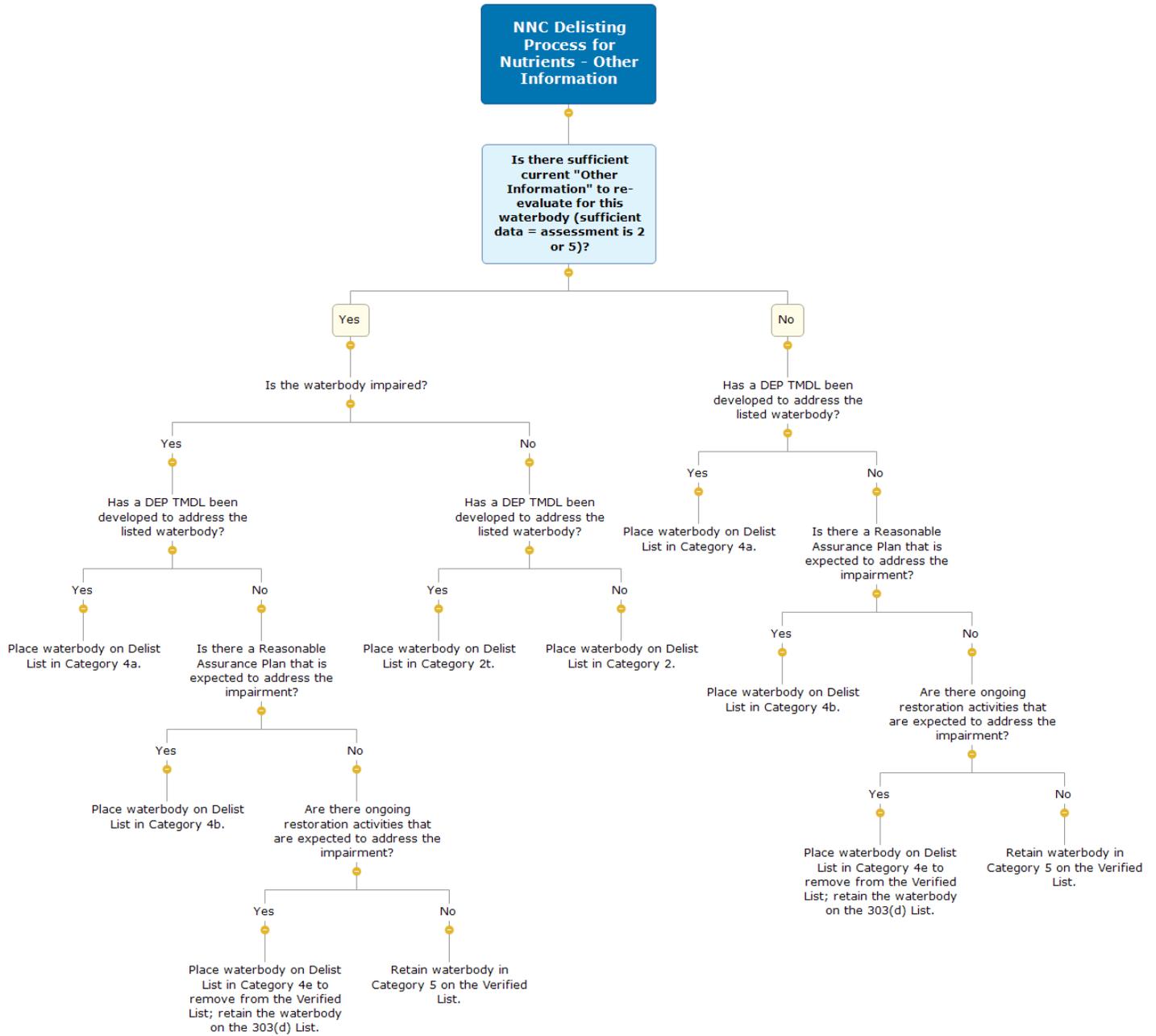**Figure E.1.   NNC delisting process for algal mats and macrophytes**
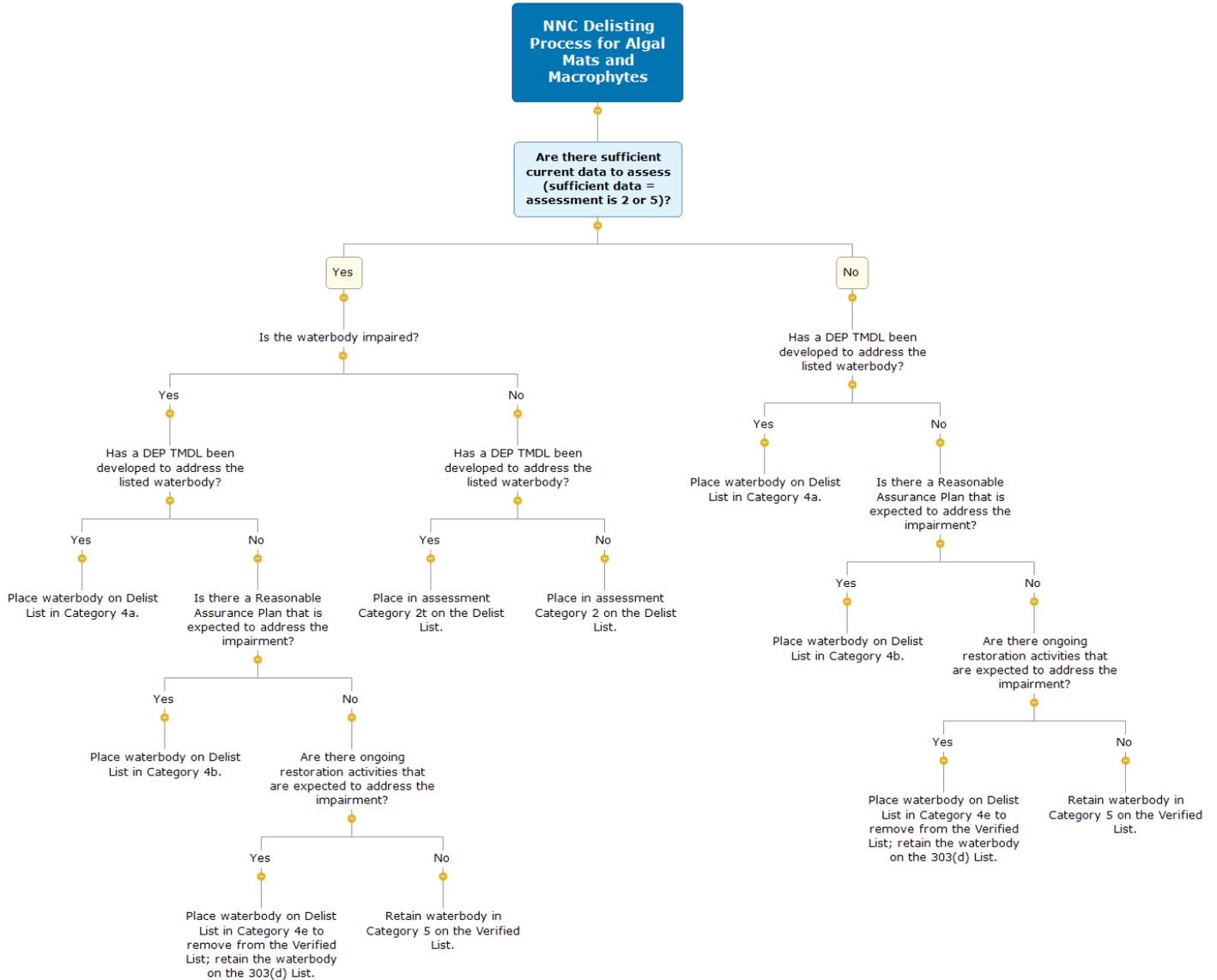
Note: In rare cases a WBID may also be delisted based on a flaw in the original analysis (62-303.720(2)(a)(3)).

Figure E.2.   NNC delisting process for chlorophyll *a*, TN, TP, and nitrate-nitrite

Figure E.3.   NNC delisting process for nutrients–other information

Figure E.4.   Study List (303[d] list) removals for Assessment Category 4d DO assessments