2024 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

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CONTENTS

List of Tables .... *iv*

List of Figures .... *x*

Executive Summary xiv

Introduction ....

Chapter 1: Issues of Environmental Interest and Water Quality Initiatives 1

Monitoring of Harmful Algal Blooms (HABs) *1*

Implementing and Expanding Microbial Source Tracking (MST) *3*

Monitoring of Per- and Polyfluoroalkyl Substances (PFAS) *4*

Extractable Organics Sampling Equipment Study *5*

Continued Monitoring for Emerging Contaminants (EC) *6*

Chapter 2023-169, Laws of Florida *8*

Chapter 2: Statewide Probabilistic and Trend Assessments 10

Background *10*

Water Resources Monitored *10*

Summary of Status Network Surface Water Results *11*
Introduction 11
Results for Rivers, Streams, Canals, Large Lakes and Small Lakes 16
Sediment Quality Evaluation 22
Background 22
Sediment Evaluation for Large and Small Lakes 23
Discussion of Rivers, Streams, Canals, Large Lakes and Small Lakes 24

Summary of Status Network Groundwater Results *24*
Results for Confined and Unconfined Aquifers 25
Discussion of Confined and Unconfined Aquifers 29

Water Quality Trend Detection *29*
Background 29
Monotonic and Step Trends 29
Seasonal Kendall (SK) 30
Change Analysis 31
Summary of Trend Network SK Analysis 31
Surface Water Results 31
Groundwater Results 34
Change Analysis for Confined and Unconfined Aquifers, Lakes, and Flowing Waters. 37
Statewide Change Analyses Results 37
Discussion of Statewide SK and CHAN Results 39

Chapter 3: Designated Use Support in Surface Waters 43

Background 43

303(d) Listed Waters 45
Assessment Results 46
Impairment Summary 51
Biological Assessment 56
Delisting 57

Drinking Water Use Support 57
Overlap of Source Water Areas and Impaired Surface Waters 59

Chapter 4: TMDLs, Prioritization, and Alternative Restoration Plans 61

TMDL Priorities 61
2023-2024 TMDL Priorities Submitted to EPA 62

Alternative Restoration Plans 63
Background 63
Assessment Categories Used for Restoration Plans 64
Documenting Reasonable Progress 65
Tracking Improvements Through Time 66

Chapter 5: BMAP Program 68

Groundwater Monitoring and Assessment 72
Nitrogen 73
Phosphorus 73
Nutrient Criteria 73

References 76

Appendices 79

Appendix A. ToxEval Study 79

Appendix B. Status and Trend Network Appendices 81
Appendix B1: Status Network Reporting Unit (Zone) Analysis Results Calculated using Probabilistic Monitoring Design 81
Appendix B2: Surface Water and Groundwater Trends for Individual Stations 101
Appendix B3: Change Analysis Results for Status Network Reporting Units (Zones) 112

Appendix C. Water Quality Classifications 118

Appendix D. Section 314 (CWA) Impaired Lakes in Florida 120
Lake Trends for Nutrients 120

Appendix E. Strategic Monitoring Methodology for Surface Water 148
Florida Water Restoration Act (FWRA) 148
IWR 148
Watershed Management Approach 148
Determination of Use Support 151
Data Management 155
Sources 155
Quality Assurance/Quality Control (QA/QC) Criteria 155

Rationales for Exclusion of Existing Data 159
Use and Interpretation of Biological Results 159

Appendix F. IWR Methodology for Evaluating Impairment....162
Evaluation of Aquatic Life–Based Use Support....162
Evaluation of Primary Contact and Recreation Use Support 163
Evaluation of Fish and Shellfish Consumption Use Support 164
Evaluation of Drinking Water Use Attainment 164
Evaluation and Determination of Use Attainment 165
Exceedances of Numeric Criteria from the Florida Standards....165
Interpretation of Narrative Nutrient Criterion....168
Exceedances of Biological Thresholds....168
Metrics Used....169
Bioassessment Data Used....169
SCI 170
BioRecon....170
Delisting 171

Appendix G. IWR Guidance for Delisting WBIDs for Nutrients 172

List of Tables

Table 1 Status Sample Surveys for Wastewater Indicators, ECs and Pesticide 7

Table 2.1 Summary of Surface Water Resources Assessed by the Status Network's Probabilistic Monitoring, 2020–2022 12

Table 2.2a. Nutrient Indicators Used to Assess River, Stream and Canal Resources 13

Table 2.2b Nutrient Indicators Used to Assess Lake Resources 14

Table 2.2c DO Thresholds Used to Assess Surface Water Resources 14

Table 2.2d Additional Indicators for Aquatic Life and Recreation Use with Water Quality Thresholds 16

Table 2.3a Explanation of Terms Used in Tables 2.3b through 2.3f 16

Table 2.3b Statewide Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 17

Table 2.3c Statewide Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 18

Table 2.3d Statewide Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 19

Table 2.3e Statewide Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated using Probabilistic Monitoring Design 21

Table 2.3f Statewide Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 22

Table 2.4a DEP Freshwater Sediment PEC Threshold for Metals 22

Table 2.4b Statewide Percentage of Large Lakes Meeting PEC Values, 2020–2022 23

Table 2.4c Statewide Percentage of Small Lakes Meeting PEC Values, 2020–2022 23

Table 2.5 Status Network Physical/Other Indicators for Potable Water Supply for Groundwater with Water Quality Thresholds 26

Table 2.6a Legend for Terms Used in Tables 2.6b and 2.6c 26

Table 2.6b Statewide Percentage of Confined Aquifer Wells Expected to Meet Threshold Values for Indicators Calculated using Probabilistic Monitoring Design 28

Table 2.6c Statewide Percentage of Unconfined Aquifer Wells Expected to meet Threshold Values for Indicators Calculated using Probabilistic Monitoring Design 29

Table 2.9 Surface Water Trend Summary (1999–2022) 33

Table 2.10 Groundwater Trend Summary (2009–22) **36**

Table 2.11 Statewide Significant Change Analysis Results **38**

Table 3.1a Distribution of Assessment Results by Waterbody Type and Assessment Category (Number of WBIDs) **45**

Table 3.1b. Fifteen Most Frequently Identified Impairments by Waterbody Type **46**

Table 3.2a Assessment Results for FIB by Waterbody Type and Assessment Category (Number of WBIDs) **48**

Table 3.2b Assessment Results for Nutrients by Waterbody Type and Assessment Category (Number of WBIDs) **49**

Table 3.3a Miles of Rivers/Streams Impaired by Cause **52**

Table 3.3b Acres of Lakes Impaired by Cause **54**

Table 3.3c Acres of Estuaries Impaired by Cause **55**

Table 3.3d Miles of Coastal Waters Impaired by Cause **56**

Table 3.4 Distribution of Biological Assessment Results by Bioassessment Method **57**

Table 3.5 Waterbodies Designated for Drinking Water Use by Assessment Category (Results for Assessments Including Criteria for All Use Support) **58**

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 **60**

Table 4.1 2023 -2024 TMDL Priority Waterbodies **62**

Table 5.1 Summary of BMAPs **69**

Table 5.2 Average Concentrations (Nitrate and TP) and TMDL Targets for OFS WBIDs **75**

Table A.1 Compounds used in 2022 ToxEval Study. **79**

Table B1.1. Zone 1 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design **81**

Table B1.2. Zone 2 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design **81**

Table B1.3. Zone 3 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design **81**

Table B1.4. Zone 4 Percentage Of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design **82**

Table B1.5. Zone 5 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design **82**

Table B1.6. Zone 6 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 83

Table B1.7. Zone 1 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 83

Table B1.8. Zone 2 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 83

Table B1.9. Zone 3 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 84

Table B1.10. Zone 4 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 84

Table B1.11. Zone 5 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 84

Table B1.12. Zone 6 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 85

Table B1.13. Zone 3 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 85

Table B1.14. Zone 4 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 85

Table B1.15. Zone 5 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 86

Table B1.16. Zone 6 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 86

Table B1.17. Zone 1 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 86

Table B1.18. Zone 2 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 87

Table B1.19. Zone 3 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 87

Table B1.20. Zone 4 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 87

Table B1.21. Zone 5 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 88

Table B1.22. Zone 6 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 88

Table B1.23. Zone 1 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 88

Table B1.24. Zone 2 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 89

Table B1.25. Zone 3 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 89

Table B1.26. Zone 4 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 89

Table B1.27. Zone 5 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 90

Table B1.28. Zone 6 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 90

Table B1.29. Zone 1 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 90

Table B1.30. Zone 2 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 91

Table B1.31. Zone 3 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 91

Table B1.32. Zone 4 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 92

Table B1.33. Zone 5 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 92

Table B1.34. Zone 6 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 92

Table B1.35. Zone 1 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 93

Table B1.36. Zone 2 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 93

Table B1.37. Zone 3 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 94

Table B1.38. Zone 4 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 94

Table B1.39. Zone 5 Percentage of Small Lakes Meeting Sediment Pec Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design ... 94

Table B1.40. Zone 6 Percentage of Small Lakes Meeting Sediment Pec Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 95

Table B1.41. Zone 1 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 95

Table B1.42. Zone 2 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 96

Table B1.43. Zone 3 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 96

Table B1.44. Zone 4 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 96

Table B1.45. Zone 5 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 97

Table B1.46. Zone 6 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 97

Table B1.47. Zone 1 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 98

Table B1.48. Zone 2 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 98

Table B1.49. Zone 3 Percentage of Unconfined Aquifer Wells Meeting Threshold Values For Indicators Calculated Using Probabilistic Monitoring Design 98

Table B1.50. Zone 4 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 99

Table B1.51. Zone 5 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 99

Table B1.52. Zone 6 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design 100

Table B2.1a. Trends for Specified Analytes for 47 Stations from the Surface Water Trend Monitoring Network associated with a USGS, SJRWMD or SFWMD Gauging Station and Adjusted for Water Flow 101

Table B2.1b. Gauging Stations used for Surface Water Trend Monitoring Network Trend Analyses Adjusted for Water Flow 103

Table B2.2. Trends for Specified Analytes for 78 stations from the Surface Water Trend Monitoring Network, Not Adjusted for Water Flow. 105

Table B2.3. Trends for Specified Analytes for 23 Stations in the Groundwater Trend Monitoring Network, Confined Aquifers 109

Table B2.4. Trends for Specified Analytes for 28 Stations in the Groundwater Trend Monitoring Network, Unconfined Aquifers 110

Table B3.1 Zone 1 Significant Change Analysis Results 112

Table B3.2 Zone 2 Significant Change Analysis Results 113

Table B3.3 Zone 3 Significant Change Analysis Results 113

Table B3.4 Zone 4 Significant Change Analysis Results 115

Table B3.5 Zone 5 Significant Change Analysis Results 115

Table B3.6 Zone 6 Significant Change Analysis Results 116

Table D.1. Impaired Lakes of Florida........ 121

Table E.1. Basin Groups for the Implementation of the Watershed Management Approach by DEP District 149

Table E.2. Periods for the Development of the Planning, Study, and Verified Lists by Cycle and Basin Group..... 150

Table E3. Designated use Support Categories for Surface Waters in Florida........ 152

Table E.4. Categories for Waterbodies or Waterbody Segments DEP used in the *2024 Integrated Report* 152

Table E.6. Agencies and Organizations Providing Chemistry Data Used in the IWR Assessments........ 155

Table E.7. Agencies and Organizations Providing Bioassessment Data Used in the IWR Assessments........ 158

Table E.8. Data Excluded from IWR Assessments........ 160

Table F.1. Sample Counts for Analytes Having Numeric Criteria in the Florida Surface Water Quality Standards. 166

Table F.2. SCI Metrics for the Northeast, Big Bend, Panhandle and Peninsula Regions of Florida 170

Table F.3. BioRecon Metrics for the Northeast, Panhandle and Peninsula Regions of Florida 171

Table F.4. BioRecon Sample Size and Index Range 171

List of Figures

Figure 2.1 Nutrient Regions for River, Stream, and Canal Resources 13
Figure 2.2 Bioregions for Lake, River and Stream Resources 15
Figure 2.3 Statewide Status Network River Sampling Locations 17
Figure 2.4 Statewide Status Network Stream Sampling Locations 18
Figure 2.5 Statewide Status Network Canal Sampling Locations 19
Figure 2.6 Statewide Status Network Large Lake Sampling Locations 20
Figure 2.7 Statewide Status Network Small Lake Sampling Locations 21
Figure 2.8 Statewide Status Network Confined Aquifer Well Locations 27
Figure 2.9 Statewide Status Network Unconfined Aquifer Well Locations 28
Figure 2.10 Surface Water Trend Network Sampling Sites 32
Figure 2.11 Groundwater Trend Network Sampling Sites 35
Figure 2.12 Florida Mean Annual Air Temperature, 1998–2022 40
Figure 2.13 Florida Mean Annual Precipitation, 1998–2022 41
Figure 3.1 Results of Florida's Surface Water Quality Assessment: (a) EPA Assessment Categories and DEP Subcategories for FIB (b) EPA Assessment Categories and DEP Subcategories for Nutrients 51
Figure G.1.2. NNC Delisting Process for Chlorophyll *a*, TN, TP and Nitrate-Nitrite 173
Figure G.1.3. NNC Delisting Process for Nutrients–Other Information 174
Figure G.1.4. Study List (303[d] list) Removals for Assessment Category 4d DO Assessment 175

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
CO_2	Carbon Dioxide
CWA	Clean Water Act
DACS	Florida Department of Agriculture and Consumer Services
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
DOH	Florida Department of Health
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
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 (DACS)
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	Division of Aquaculture, formerly known as the Shellfish Environmental Assessment Section (DACS)
SFWMD	South Florida Water Management District
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)
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
TSI	Trophic State Index
U.S.	United States
USGS	U.S. Geological Survey
WBID	Waterbody Identification (Number)
WIN	Watershed Information Network (Database)
WMD	Water Management District

Executive Summary

Contents

- The **Introduction** describes the federal assessment and reporting requirements met by this report.
- **Chapter 1** summarizes current issues of environmental interest and ongoing water quality initiatives.
- **Chapter 2** summarizes water quality results from the Status and Trend Monitoring Networks for the 2020-22 assessment period. It also describes long-term trends in surface water and groundwater quality.
- **Chapter 3** summarizes significant surface water quality findings for strategic monitoring, including the attainment of designated uses.
- **Chapter 4** discusses the state's Total Maximum Daily Load Program and Priorities, and alternative restoration plans.
- **Chapter 5** describes the state's implementation of the basin management action plans.
- The **Appendices** contain important background information and supporting data.

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 (CWA). 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:

- Continued interagency coordination and monitoring of freshwater harmful algal blooms.
- Implementation and expansion of microbial source tracking to investigate and better identify potential sources of elevated fecal indicator bacteria in waterbodies.
- Development of monitoring strategies for Per- and Polyfluoroalkyl substances.
- Laboratory study to confirm recommended equipment types for the sampling of extractable organic compounds.
- Summary of continued monitoring for emerging contaminants.
- Summary of Chapter 2023-169, Laws of Florida.

Statewide Probabilistic and Trend Monitoring Results

The Status Monitoring Network uses an EPA-designed probabilistic strategy to estimate, with known confidence, the general water quality of freshwater in Florida, including rivers, streams, canals, lakes and groundwater resources. Data produced by the Status Network fulfills CWA 305(b) reporting needs and complement CWA 303(d) reporting. The results of Status Monitoring are used to provide a statistical valid estimate of the overall health of Florida's waterbodies by waterbody type (e.g., rivers, streams, lakes). In contrast, the Identification of Impaired Surface Waters Rule (IWR) 303(d) assessment (Chapter 3), provides an assessment of water quality standards attainment on a waterbody-by-waterbody basis. Status Network monitoring provides only a snapshot of conditions within individual waterbodies. Conclusions about the health or status of individual waterbodies cannot be determined based solely on the Status Network monitoring.

The Florida Department of Environmental Protection (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 2020-22. Additionally, analyses are provided for surface and groundwater data collected 2012-14 compared with surface and groundwater data collected 2020-22.

The Trend Monitoring Network consists of 78 flowing surface water stations (e.g., rivers and streams) and 51 groundwater stations (49 wells and two 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 at these trend stations and runs trend analyses every four years. Trend analyses for surface water stations were conducted on data collected 1998-2022, and for groundwater on data collected 2009-22.

The analyses of the Status and Trend Network data, discussed in **Chapter 2**, indicate that the main impacts on a statewide basis to Florida's groundwater and surface water are from nutrients and fecal indicator bacteria (FIB). Probabilistic analyses of the state's lake and flowing water resources indicate that nitrogen enrichment is most prevalent in flowing waters and that phosphorous is most prevalent in large lakes. The nutrient response indicator chlorophyll *a* is found to be the highest in lakes, with 61.9% of large lake area and 34.8% of small lake area estimated to potentially exceed the nutrient response threshold. The FIB *Escherichia coli* (*E. coli*) is most prevalent in streams, with 31.1% of the state's stream miles estimated to potentially exceed the recreational use threshold. The probabilistic analyses for groundwater for the same period show total coliform bacteria, in both confined and unconfined aquifers, as the potable water indicator with the highest exceedance rate, with 14.6% of confined and 21.0% of unconfined wells estimated to have exceedances of the primary drinking water standard.

For the 1998-2022 period, water quality trend analyses show that nutrient loads may be decreasing in flowing surface waters, lakes and aquifers. The nutrient response indicator chlorophyll *a* shows increasing trends at nearly half of the flowing waters trend stations. Comparison of Status Network data collected from the inception of the current monitoring design (2012-14 period of record) to that collected during the 2020-22 period of record shows that many of the lakes' indicators decreased between the two time periods (alkalinity, calcium, potassium, magnesium, sodium, specific conductance, sulfate, and total organic carbon), while only one indicator increased, water temperature. Fewer changes were observed for flowing waters, with dissolved oxygen, total ammonia nitrogen, total Kjeldahl nitrogen, and total phosphorous showing decreases in median values between the two time periods. Aquifers produced the least change for the same time periods, with confined aquifers showing a decrease in pH and an increase in water temperature. Unconfined aquifers showed decreases in dissolved oxygen and nitrate+nitrite and an increase in water temperature.

A likely driver for many of these surface and groundwater changes is the documented increase in rainfall over the periods of record. The interaction of precipitation with atmospheric carbon dioxide (CO_2) promotes the production of carbonic acid, a known rock-weathering agent. As limestone dissolves, the buffering capacity and pH of associated waters are known to increase. Additionally, it is likely that increasing water temperatures are driving changes in rock matrix analytes in groundwater. Because of the interconnection between surface water and groundwater in Florida lakes and the relatively long residence time of water in lakes, increased limestone dissolution may be promoting additional water quality changes in lakes.

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 IWR, Chapter 62-303, Florida Administrative Code. **Appendix C** lists the state's water quality classifications. This report summarizes results for those assessments performed through 2022, for the entire state.

Based on the data collected, DEP assessed 4,188 waterbody segments and found 2,038 were impaired. Of these impairments, 1,184 segments require the development of total maximum daily loads (TMDLs). The most frequently identified causes of impairment were nutrients, bacteria, and dissolved oxygen.

Appendix D lists over 540 publicly owned, impaired lakes that already have a TMDL, have a TMDL under development, or require a TMDL. **Appendix E** explains DEP's watershed management approach and framework for evaluating surface water quality. **Appendix F** provides more detail on the methodology for evaluating designated use attainment. **Appendix G** outlines the IWR's delisting process.

TMDL Program and Priorities

Chapter 4 discusses the process for developing TMDLs for waterbody segments placed on DEP's Verified List of Impaired Waters. A TMDL establishes 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 Hierarchy I nutrient 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.

As of Mar. 1, 2024, DEP adopted 460 TMDLs for the following parameters:

- 275 were developed for dissolved oxygen, nutrients and/or un-ionized ammonia;
- 179 were developed for bacteria; and
- five 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 1,500 waterbody segments.

As a TMDL alternative, DEP encourages local stakeholders to develop and implement alternative restoration plans to meet applicable state water quality standards at the earliest practical time. Once an alternative restoration plan is in place, water quality monitoring 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 meeting water quality objectives over time.

Basin Management Action Plans (BMAPs)

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 (BMPs), 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 has adopted 33 BMAPs and is working on updates to the BMAPs. While the majority address nutrient impairments, DEP also has adopted some BMAPs that target FIB.

Groundwater Monitoring and Assessment

Degraded groundwater quality is associated with multiple sources or land use practices in an area rather than a single contaminant source. The cumulative effect of human activities through leaching from nonpoint pollution sources can create groundwater quality problems.

Chapter 5 discusses the most significant sources that degrade groundwater, based on waste cleanup, monitoring and restoration actions undertaken by DEP and other agencies concerned with groundwater quality.

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 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.

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. 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 ongoing water quality initiatives being undertaken primarily by DEP.

Monitoring of Harmful Algal Blooms (HABs)

A 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 a reduction in the amount of light reaching submerged plants. Even blooms that do not produce toxins 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 produce toxins, 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, the state agencies use a conservative and precautionary approach that minimizes risk by informing the public early of a cyanobacteria bloom, rather than waiting for more detailed information. DEP and the Florida Department of Health (DOH) 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 (except for a couple of stations). Instead, DEP, the five water management districts (WMDs), DOH, Florida Fish and Wildlife Conservation Commission (FWC) and Florida Department of Agriculture and

Consumer Services (DACS) 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 (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 reported or observed bloom activity, staff from DEP or a partner agency visit the site and collect water samples. Once received, the DEP laboratory identifies the bloom species and determines 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 the 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 response and algal taxon identification and toxin results. If cyanotoxins are detected, DEP or a partner sampling agency revisit the site and may collect additional samples at the site until bloom conditions improve or toxins are no longer detected.

The results from the Algal Bloom Dashboard are also incorporated into the DEP Protecting Florida Together (PFT) website, which communicates to the public a broad scope of information on Florida's water quality. The PFT water quality map displays DEP's previous 10-day Blue Green Algae results, FWC's previous 8-day Red Tide results, and DOH's health notifications related to HABs. The map also displays information on waterbody impairment status and restoration projects. The PFT website also includes information about state actions, including the Blue-Green Algae Task Force, Red Tide Task Force, restoration initiatives and grants supporting water-related projects and innovative technologies to protect and restore Florida's water resources.

In addition to responding to reported blooms, DEP uses NOAA satellite imagery to monitor for bloom initiation and to aid in HAB response activities. WMDs have incorporated the collection of algal and cyanotoxin samples at some of their routine monitoring sites along the St. Johns River and on Lake Okeechobee. To obtain a statewide estimate of impact, cyanotoxin analyses were included in DEP's Status Monitoring Network.

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

Because DOH 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 beaches or other public bathing places where there is the risk of human exposure, the agency may post warning signs. Typically, local county health departments direct these actions after consultation with DOH's Aquatic Toxins Program staff. DOH also follows up on reports of 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 DOH 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, DOH'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.

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 DACS share responsibilities for the management of shellfish-harvesting waters. DEP coordinates with the FWRI HAB research team on estuarine and saltwater bloom response.

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.

Identifying the type of contamination and locating its source allows DEP to focus resources on addressing the source quickly. 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.

To do that, DEP devised a multipronged approach using the latest technologies available. The DEP 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.

DEP will continue to evaluate additional source-specific markers and pathogen detection methods and work to standardize the interpretation of qPCR results to 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.

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. In 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 potential 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 2018. DEP and DOH 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). More recently, other sources of PFAS contamination are also being investigated. In particular, the Drycleaning Program in the Division of Waste Management is monitoring ground water around drycleaning facilities.

DEP developed and validated PFAS analytical methods for waters and soils in late 2018. Since the initial development of these methods, the analyte list has grown from 14 to 39 compounds. Accuracy and precision have been improved by introducing an isotope dilution quantitation methodology. The DEP Laboratory currently has five 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. To date, the DEP Laboratory has processed over 14,000 PFAS samples between November 2018 and January 2024.

Extractable Organics Sampling Equipment Study

Numerous emerging contaminants of interest (e.g., acetaminophen, carbamazepine, primidone, imidacloprid) are in the extractable organics analytical group. Collecting samples for these analyses with equipment can present challenges due to potential interferences between equipment material and the contaminant of interest. If extractable organics are sampled, DEP SOP for field data collection (DEP SOP FS 1000) currently limit the sampling equipment construction materials to glass, stainless steel, Teflon® and other fluorocarbon polymers, polyethylene or polypropylene. However, plastics not approved in DEP SOP FS 1000 are often used in sampling equipment such as intermediate collection devices for surface water and flexible tubing attached to ground water pumps.

There are several potential negative outcomes if samples are collected with inappropriate equipment materials:

1. Analytes of interest may selectively adhere to the material such that a lower concentration is measured than what was in the waterbody.
2. Analytes of interest may selectively adhere to the material and leach back out into subsequent samples if the tubing is reused.
3. Analytes of interest may leach from the material such that a higher concentration is measured than what was in the waterbody.
4. Non-target analytes may leach from the material and interfere with the analysis.

DEP conducted a laboratory study to evaluate the implications of using unapproved equipment materials for extractable organics sample collection. The DEP Laboratory prepared a mix of 35 extractable organic compounds to serve as the experimental waterbody and analyzed study samples using laboratory SOP LC-001-3 (Reddy and Ware 2023), which is based on EPA method 8321B. Staff simulated surface water sampling with three types of submersed sample collection bottles (polycarbonate, acrylic, and polyvinyl chloride [PVC]), and simulated groundwater sampling with five types of tubing materials (high density polyethylene [HDPE], low density polyethylene [LDPE], Teflon®-lined HDPE, PVC nylobrade, and PVC clear vinyl).

Appropriate blanks and controls were collected to ensure clean sample collection and to monitor any changes in the analyte mix throughout the study.

Study results show that recovery of extractable organic compounds was generally within 20% of expected amounts regardless of equipment material, but there were differences among materials used for groundwater sampling. The materials currently allowed by DEP SOPs (HDPE, LDPE, and Teflon®-lined HDPE) allowed for greater and more consistent recovery of extractable organics than did the PVC tubing types. All three types of submersed sample collection bottles used for surface water sample collection resulted in 80-120% recovery of the spiked amount for more than 85% of analytes. Results differed among analytes, so it would be useful to consult study results for interpretation of analytical data for specific compounds.

Continued Monitoring for Emerging Contaminants (EC)

DEP's Division of Environmental Assessment and Restoration (DEAR) continues to collect samples for wastewater indicators, pesticides, pharmaceuticals, and personal care products in two monitoring networks: Status Monitoring Network and the Strategic Monitoring Program (SMP). These networks are described in detail in **Chapter 2** and **Chapter 3**, respectively. The primary objective of the Status Monitoring Network is to estimate the statewide water resource condition of lakes, flowing waters, and aquifers with a known statistical confidence through probabilistic sample surveys. Whereas the primary objective of the SMP is to ensure that all waters identified on previous Planning or Study Lists meet data sufficiency requirements for the determination of waterbody impairment per the IWR (Chapter 62-303, F.A.C.) through fixed monitoring stations.

Status probabilistic statewide surveys were conducted in 2012, 2015, 2016, 2017 and 2022 (Table 1). The lake sample survey results led to a follow up study of select lakes (DEP 2021) having histories of high concentrations of the wastewater indicator sucralose relative to statewide probabilistic surveys of Florida Lakes conducted in 2012, 2015 and 2017.

Table 1 Status Sample Surveys for Wastewater Indicators, ECs and Pesticide

X = Survey Completed, NA = non-applicable, [A] = Sucralose only.

Status Sample Surveys for Wastewater Indicators, ECs, & Pesticides							
Year	**Confined Aquifers**	**Unconfined Aquifers**	**Canals**	**Streams**	**Rivers**	**Small Lakes**	**Large Lakes**
2012[A]	X	X	X	X	X	X	X
2015	NA	X	X	X	X	X	X
2016	NA	NA	X	X	X	NA	NA
2017	NA	NA	NA	NA	NA	X	X
2022	NA	NA	X	X	X	NA	NA
2023	NA	X	NA	NA	NA	X	X

During 2022, 234 sites coming from the Status Monitoring Network's flowing waters sample surveys (rivers, streams, and canals) and 264 fixed monitoring locations within the SMP located mainly on flowing waters were sampled for 47 environmentally common extractable organic compounds (**Appendix A**). An examination of these data was performed using Exposure−Activity Ratio (EAR) methodology (Becker et al. 2015). The 47 compounds were grouped into seven compound classes: algal toxins, fungicides, herbicides, insecticides, pharmaceuticals and sweeteners. These compounds and their respective groups were examined for potential toxicity via utilization of the United States Geologic Survey (USGS) R package ToxEval (USGS 2022), which interfaces with EPA's ToxCast database. Waters having concentrations of compounds and compound classes which produce EARs > 1 are considered to have a high risk for molecular level effects to aquatic life (Blackwell et al. 2017).

Currently, the ToxCast database is comprised of primarily vertebrate cell line derived exposure–response results for a broad range of biological endpoints, including endocrine disruption and neurological effects (Bradley et al. 2023). Of the 47 compounds examined, 20 were determined to have available toxicity data in the ToxCast database, and these compounds are identified in **Appendix A**. No toxicity data were available for the six algal toxins or for the two sweeteners, therefore their compound groups were not represented in this analysis. The two sampling networks produced similar results for the twenty compounds investigated with a single compound group producing EARs greater than the threshold of 1: insecticides. For the insecticides, the compound producing the most threshold failures was imidacloprid with 45 of the 234 status sites failing the threshold, this was followed by two other neonicotinoids: clothianidin 2 of 234 and thiamethoxam 1 of 234 sites. Compared to 111 of the 264 SMP sites failing for imidacloprid followed by three other neonicotinoids clothianidin 18 of 264, thiamethoxam 23 of 264 sites. These results corroborate those presented in another study which utilized data from a third statewide DEP monitoring network, the fixed station surface water trend network (**Chapter 2**), with the neonicotinoid imidacloprid producing the most failures for both chronic and acute EPA aquatic life benchmark thresholds from a similar emerging contaminant compound suite for monthly data collected between August 2019 – July 2020 (Silvanima et al. 2022).

Chapter 2023-169, Laws of Florida

Chapter 2023, Laws of Florida, introduced several changes with a focus on improving water quality and environmental protection. One key aspect of this bill is the requirement for counties and municipalities within a basin management action plan (BMAP) to include in their comprehensive plans a list of projects necessary to achieve pollutant load reductions. These projects are intended to address the treatment and upgrading of wastewater treatment facilities, with a priority on advanced waste treatment.

Additionally, the bill requires comprehensive plans to consider the feasibility of providing sanitary sewer services within a 10-year planning horizon for areas with more than 50 residential lots that have a high density of onsite sewage and disposal systems (OSTDS, commonly called septic systems). These comprehensive plans must be updated periodically to accommodate future developments, except for designated rural areas of opportunity.

The bill also establishes the Indian River Lagoon Protection Program (IRLPP) within DEP, which includes the Banana River Lagoon BMAP, Central IRL BMAP, North IRL BMAP and Mosquito Lagoon Reasonable Assurance Plan (RAP). The IRLPP is designed to improve water quality within the Indian River Lagoon watershed. It emphasizes the need for periodic evaluation and updates of BMAPs, as well as strategies and projects to achieve water quality standards. The bill requires DEP to work with partners to establish and implement a comprehensive water quality monitoring network throughout the IRL and fund research to identify sources and prioritize projects for water quality and seagrass restoration.

The bill prohibits new conventional OSTDS within BMAPs where sewer systems are available, and the requirement to use enhanced nutrient reducing systems (achieving at least a 65% reduction in nitrogen loading) on parcels one acre or smaller where sewer is not available. The bill creates enhanced OSTDS requirements within the IRLPP by requiring all existing conventional OSTDS (regardless of parcel size) to be connected to sewer or upgraded to enhanced nutrient-reducing systems by July 1, 2030. The bill provides funding of $100 million for the fiscal year 2023-24 specifically for projects within the IRLPP. Local governments are tasked with providing updates on sanitary sewer construction in areas not meeting nutrient-related standards.

The bill expands prohibitions within any BMAP that includes an Outstanding Florida Spring (OFS) to include various restrictions such as limiting new conventional OSTDS, new domestic wastewater disposal facilities, and new HAZMAT disposal facilities. It also imposes requirements related to land application of biosolids and agricultural operations. These restrictions were previously limited to the priority focus area but now extend to the entire BMAP.

Lastly, the bill renames the Wastewater Grant Program as the Water Quality Improvement Grant Program, expanding the range of eligible projects to include OSTDS remediation, upgrades to domestic wastewater facilities, improvements to stormwater treatment facilities, and other BMAP-related initiatives. These changes collectively aim to enhance water quality and environmental conservation in Florida.

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 fulfills 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 (EPA 2003), DEP developed and annually updates the Florida Watershed Monitoring Status and Trend Program Design Document (DEP 2022), which describes both monitoring networks.

Water Resources Monitored

The Status and/or Trend 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.

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 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 Networks 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 2020–22 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 2023).

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.

During 2021 and 2022, approximately 15 samples were collected annually from each resource, in each of six 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 five. The zones correspond to the state’s five WMD boundaries, with the South Florida Water Management District (SFWMD) divided into eastern and western regions (DEP 2022, p. 14).

Table 2.1 Summary of Surface Water Resources Assessed by the Status Network's Probabilistic Monitoring, 2020–2022

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	2629 miles / 4231 kilometers
Streams	15066 miles / 24246 kilometers
Canals	2370 miles / 3814 kilometers
Large Lakes	1684 lakes (934108 acres / 378020 hectares)
Small Lakes	1574 lakes (24797 acres / 10035 hectares)

The indicators selected for surface water reporting include total phosphorus (TP), total nitrogen (TN), dissolved oxygen (DO), chlorophyll *a*, *Escherichia coli* bacteria, pH, and total ammonia nitrogen (TAN). Tables 2.2a through 2.2d summarize the indicators and their threshold values. The Design Document (DEP 2022) contains a complete list of indicators used in the Status 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 have naturally 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

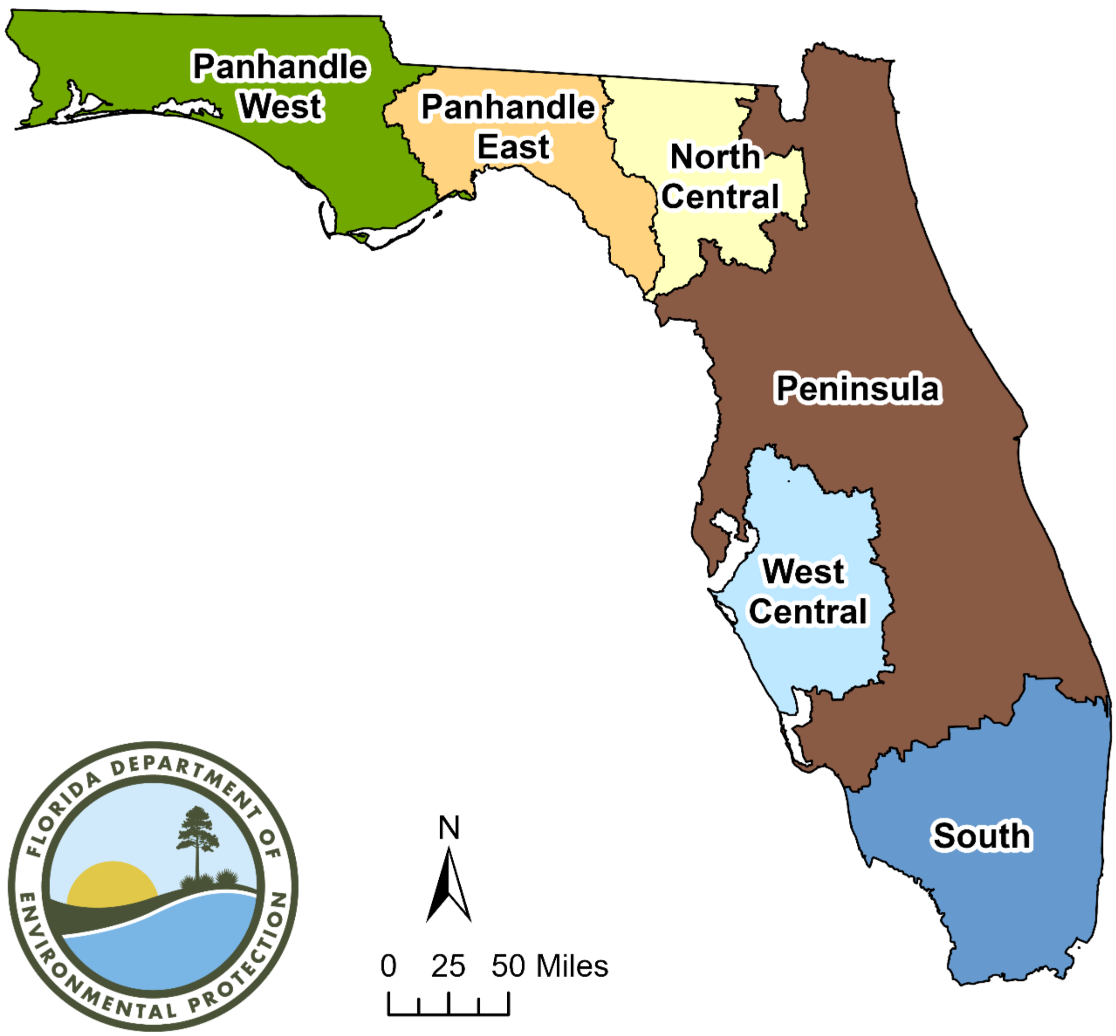


Figure 2.1 Nutrient Regions for River, Stream, and Canal Resources

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 $CaCO_3$	≤ 20	≤ 0.09	≤ 1.91	Aquatic Life
Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L $CaCO_3$	≤ 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

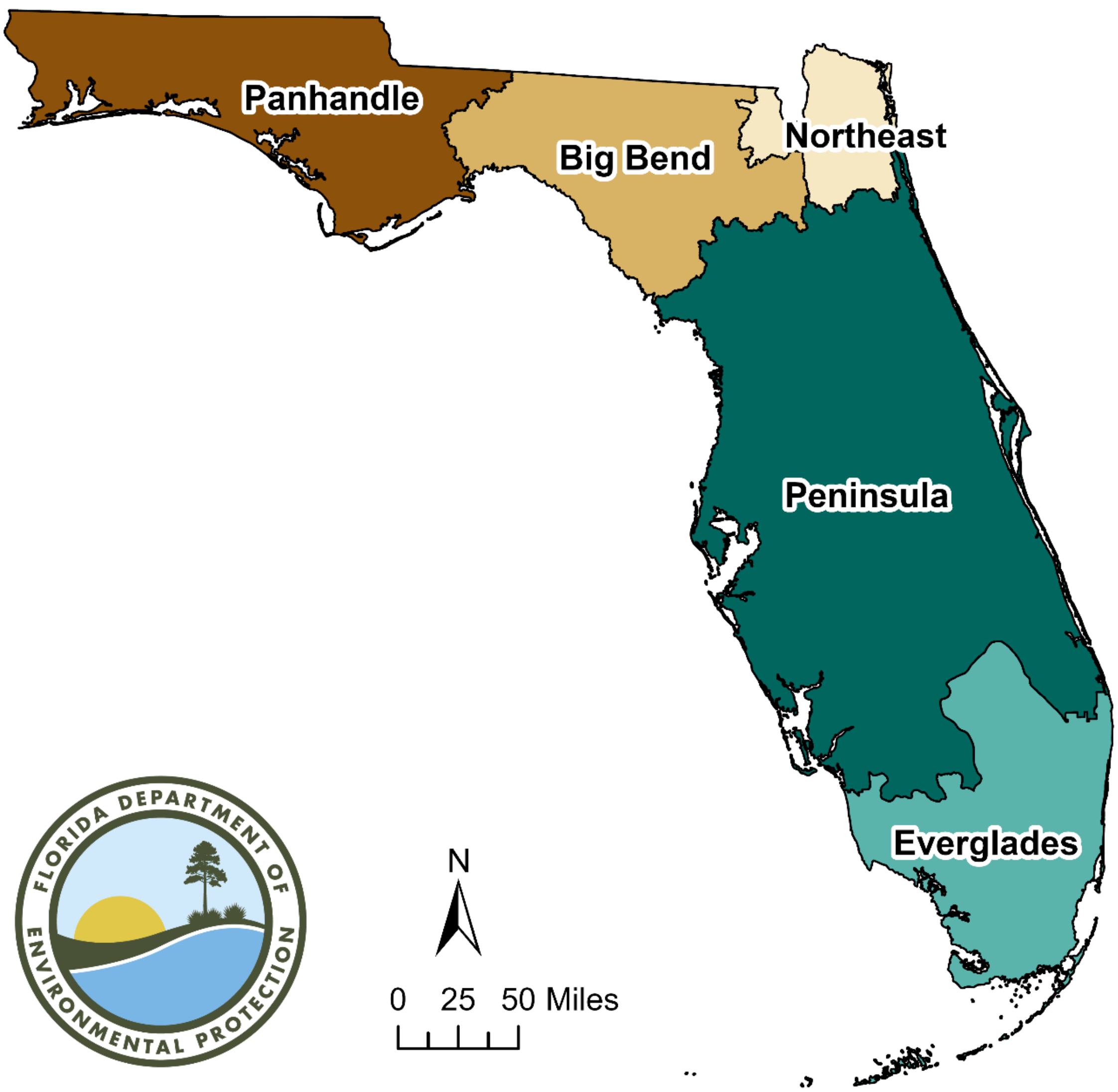


Figure 2.2 Bioregions for Lake, River and Stream Resources

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; HA = Habitat Assessment
[1]Not criteria, but rather a threshold used to estimate the impairment of state waters. [2]HA scores below this level indicate poor or marginal habitat which will likely cause stream condition index failures – refer to Stream Condition Index Stressor Identification study p 15 (DEP 2020a). 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. The HA scores apply to rivers and streams 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
Total Ammonia Nitrogen (TAN)	See DEP's total ammonia nitrogen criterion (subsection 62-302.530(3), F.A.C.)
HA[2]	HA score ≥ 80

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

The following pages present the statewide surface water Status Network results for rivers, streams, canals, 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. Regional results for each zone are presented in **Appendix B1**.

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.

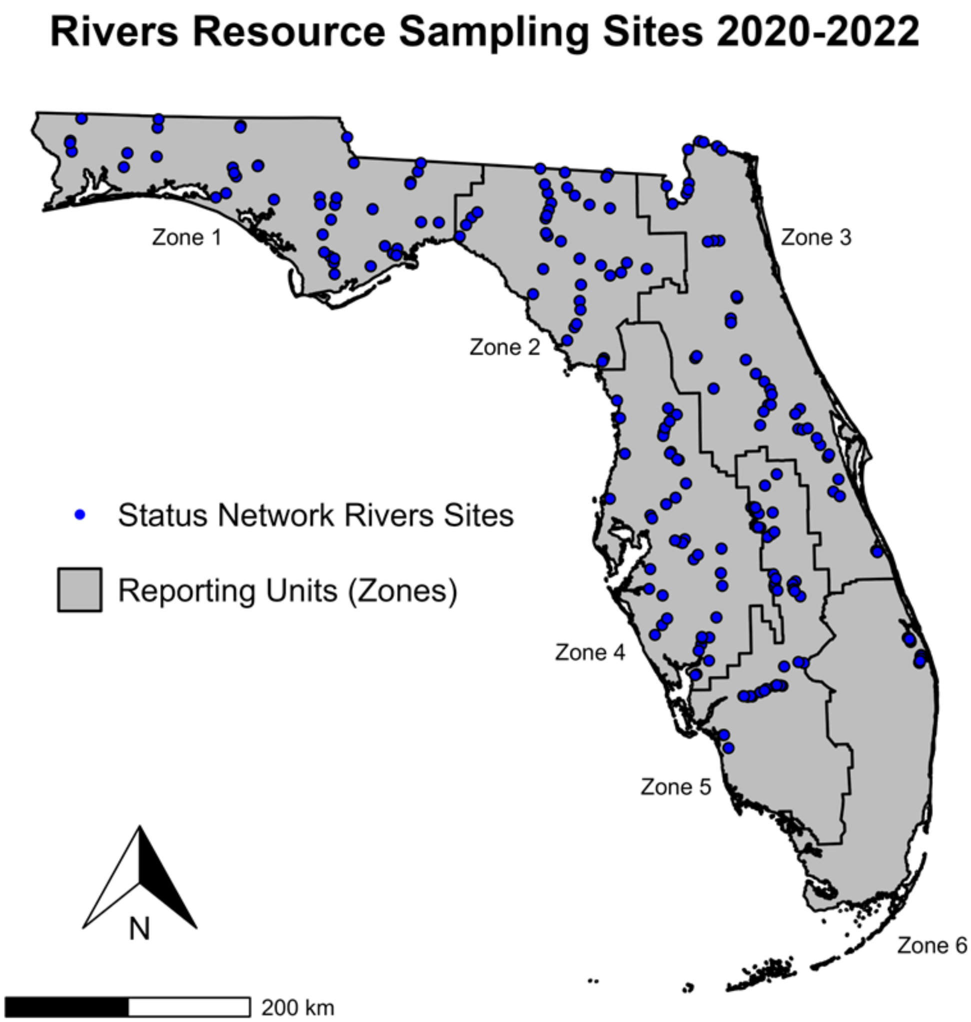


Figure 2.3 Statewide Status Network River Sampling Locations

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; HA = Habitat Assessment

[1]24/262 failures were below the pH threshold; 3/262 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	2629	262	100	100	2020-22
TN	2629	263	78.4	74.6-82.2	2020-22
TP	2629	263	86.0	83.2-88.7	2020-22
Chlorophyll a	2629	260	88.9	86.1-91.7	2020-22
***E. coli* bacteria**	2629	186	97.2	94.8-99.5	2020-22

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	2629	263	91.2	87.9-94.4	2020-22
pH[1]	2629	262	86.1	82.9-89.4	2020-22
HA	2629	228	97.1	96.5-97.6	2020-22

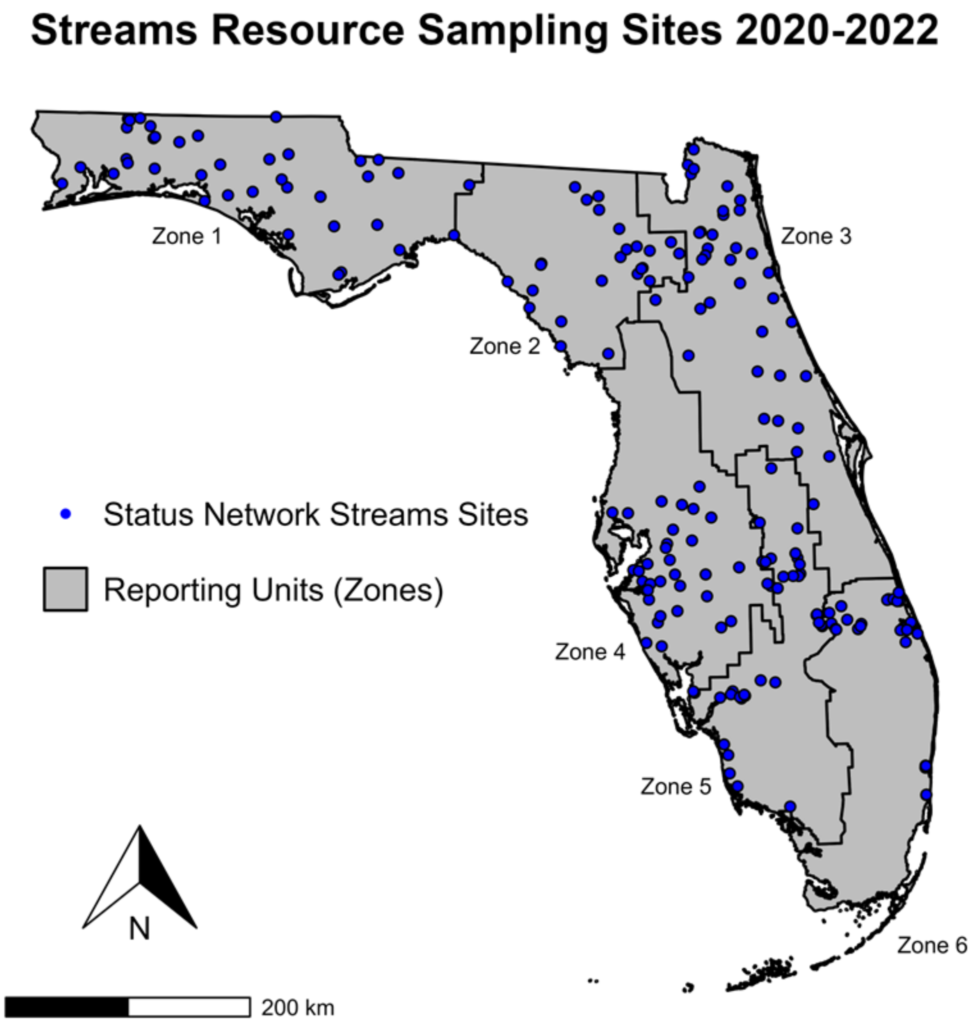


Figure 2.4 Statewide Status Network Stream Sampling Locations

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; HA = Habitat Assessment

[1]62/203 failures were below the pH threshold; 0/203 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	15066	203	100	100	2020-22
TN	15066	193	71.1	64.0-78.2	2020-22
TP	15066	194	78.7	73.0-84.4	2020-22
Chlorophyll a	15066	203	95.7	92.9-98.6	2020-22
E. coli bacteria	15066	202	68.9	61.6-76.2	2020-22
DO	15066	203	76.1	69.3-82.8	2020-22
pH[1]	15066	203	52.3	45.1-59.5	2020-22
HA	15066	190	86.9	82.0-91.9	2020-22

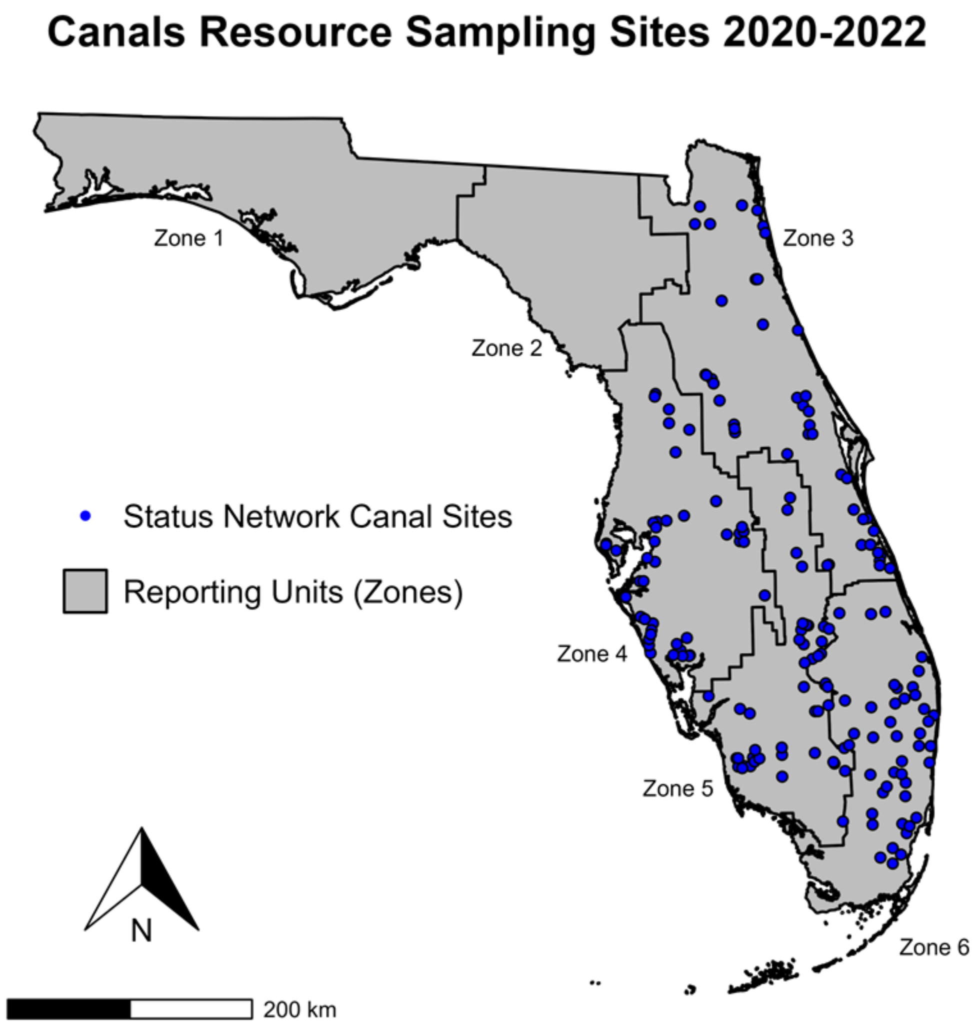


Figure 2.5 Statewide Status Network Canal Sampling Locations

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 non-applicability of numeric nutrient thresholds in South Nutrient Region (Table 2.2a).
[2]9/180 failures were below the pH threshold; 1/180 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	2370	180	100	100	2020-22
TN	2370	120	81.4	74.6-88.2	2020-22
TP	2370	120	87.4	80.7-94.0	2020-22
Chlorophyll a	2370	178	84.2	79.8-88.6	2020-22
***E. coli* bacteria**	2370	175	92.1	88.7-95.4	2020-22
DO	2370	180	84.7	79.5-89.9	2020-22
pH[1]	2370	180	97.0	95.6-98.3	2020-22

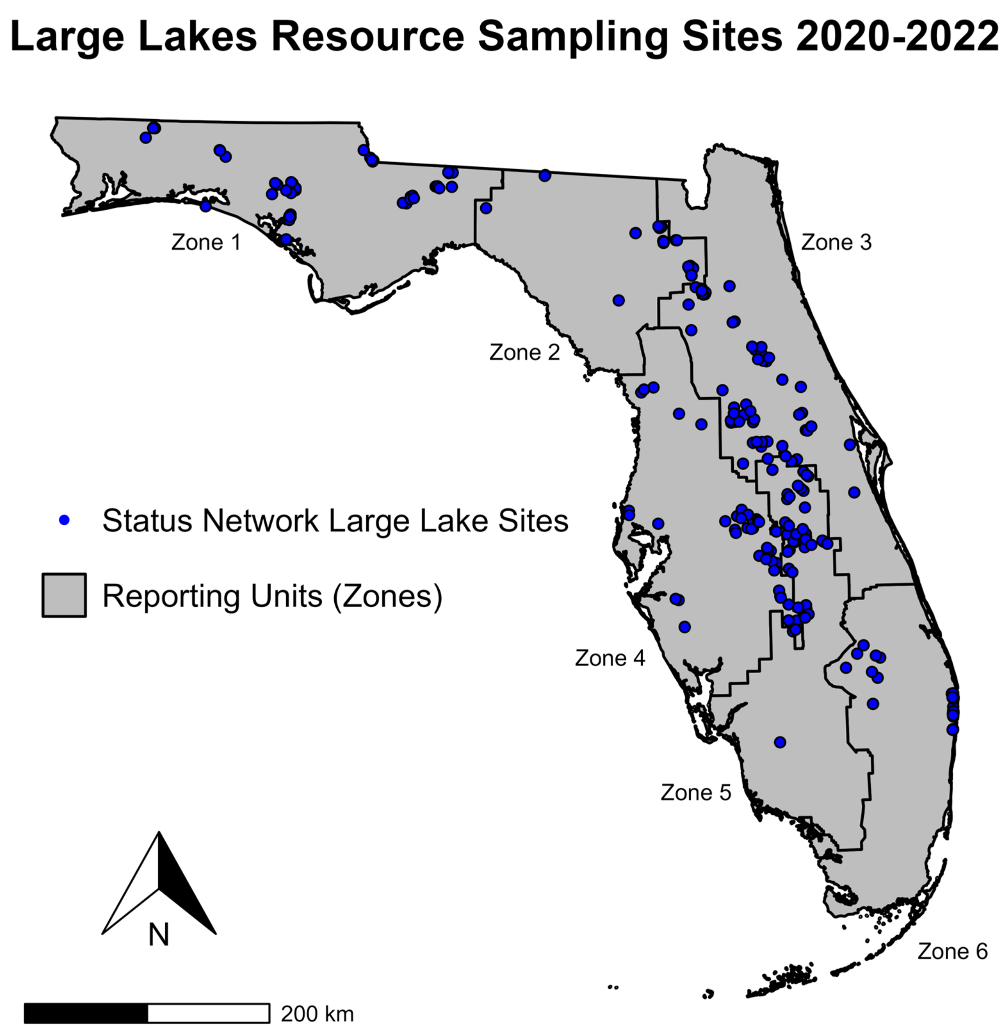


Figure 2.6 Statewide Status Network Large Lake Sampling Locations

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]41/267 failures were below the pH threshold; 59/267 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	934108	267	100	100	2020-22
TN	934108	266	91.4	88.2-94.6	2020-22
TP	934108	268	66.1	58.0-74.1	2020-22
Chlorophyll *a*	934108	268	38.1	25.6-50.6	2020-22
***E. coli* bacteria**	934108	259	100	100	2020-22
DO	934108	268	99.1	98.7-99.6	2020-22
pH[1]	934108	267	64.5	54.3-74.7	2020-22

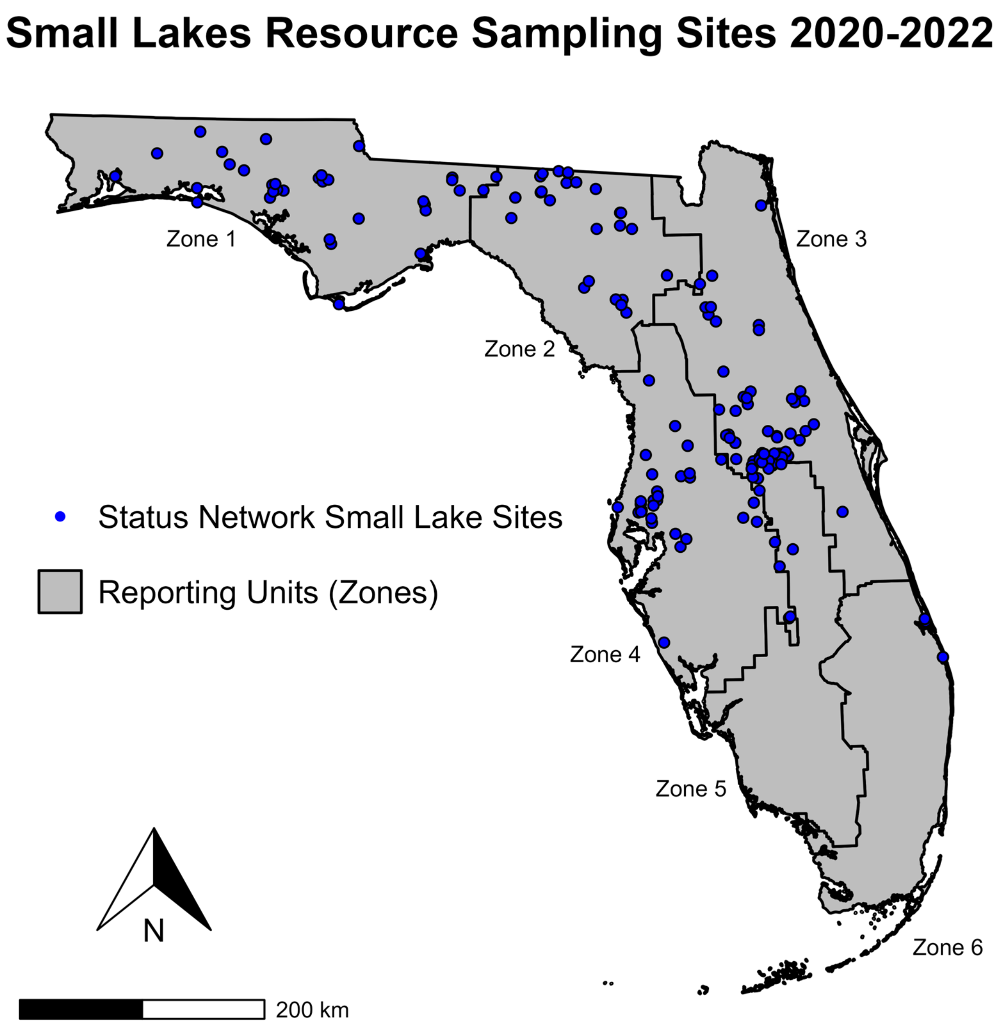


Figure 2.7 Statewide Status Network Small Lake Sampling Locations

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]69/179 failures were below the pH threshold; 7/179 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	24797	179	100	100	2020-22
TN	24797	181	95.8	92.2-99.4	2020-22
TP	24797	182	95.9	93.2-98.7	2020-22
Chlorophyll *a*	24797	182	65.2	57.4-73.0	2020-22
***E. coli* bacteria**	24797	180	98.5	96.0-100.0	2020-22
DO	24797	182	72.0	64.2-79.8	2020-22
pH[1]	24797	179	58.7	51.0-66.3	2020-22

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. Sediment contaminants such as metals, pesticides and excess nutrients come from upland runoff and discharges, organic decomposition, and atmospheric deposition. DEP does not have the statutory authority to establish sediment criteria or standards, but DEP does use scientifically defensible thresholds (guidelines) to evaluate Florida sediments. DEP freshwater sediment guidelines are based on a weight-of-evidence approach based on studies containing paired sediment chemistry and biological responses from benthic organisms (MacDonald Environmental Sciences and USGS 2003). The weight-of-evidence approach created two guidelines for each contaminant: a lower guideline, 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

Metal	PEC (mg/kg)
Silver	2.2
Nickel	49
Lead	130
Mercury	1.1
Zinc	460

Sediment Evaluation for Large and Small Lakes

DEP collected sediment samples from a total of 442 lake sites from 2020 to 2022: 176 from small lakes and 266 from large lakes. Samples were analyzed for certain abundant metals (aluminum and iron) and a suite of trace metals using EPA Method 3052 (total digestion method). Tables 2.4b and 2.4c list the statewide results. Regional results for each zone are presented in **Appendix B1**.

Table 2.4b Statewide Percentage of Large Lakes Meeting PEC Values, 2020–2022

CB = Confidence bounds

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	934108	266	99.7	99.3-100.0	2020-22
Cadmium	934108	266	100	100	2020-22
Chromium	934108	266	99.5	99.0-100.0	2020-22
Copper	934108	266	98.6	97.3-99.9	2020-22
Silver	934108	266	100	100	2020-22
Nickel	934108	266	99.1	97.8-100.0	2020-22
Lead	934108	266	98.6	97.3-99.9	2020-22
Mercury	934108	266	100	100	2020-22
Zinc	934108	266	100	100	2020-22
All	934108	266	96.8	94.7-98.8	2020-22

Table 2.4c Statewide Percentage of Small Lakes Meeting PEC Values, 2020–2022

CB = Confidence bounds

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	24797	174	96.7	94.1-99.2	2020-22
Cadmium	24797	174	100	100	2020-22
Chromium	24797	174	99.0	97.4-100.0	2020-22
Copper	24797	174	93.5	89.4-97.7	2020-22
Silver	24797	174	100	100	2020-22
Nickel	24797	174	100	100	2020-22
Lead	24797	174	91.5	86.7-96.3	2020-22
Mercury	24797	175	98.7	96.6-100.0	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Zinc	24797	174	96.4	93.0-99.9	2020-22
All	24797	176	84.1	78.2-90.0	2020-22

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. An inspection of the indicators listed in Tables 2.3b, 2.3c, 2.3d, 2.3e, and 2.3f reveals the following: 71.1% of stream miles, 81.4% of canal miles, and 78.4% of river miles passed the TN threshold; 87.4% of canal miles passed for TP; and 84.2% of canal miles passed for chlorophyll a. Passing rates for *E. coli* were quite high for rivers, canals, large lakes, and small lakes at 97.2%, 92.1%, 100%, and 98.5%, respectively. Streams were lower, with 68.9% 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 38.1% of the large lake area and 65.2% of the small lake area passing. Concerning TP and TN in lakes, 66.1% of the large lake area is expected to pass the TP threshold, while large and small lakes provided passing rates of greater than 90 % for TN. 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. An inspection of the indicators listed in Tables 2.4b and 2.4c shows 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. 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 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 2023).

Results for Confined and Unconfined Aquifers

The assessment period for this report is January 2020 through December 2022. 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 (NOx), 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] Thresholds noted in Table 2.5 are Maximum Contamination Levels of Primary Drinking Water Standards as defined in 62-550, F.A.C.
[2] 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)[1]
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
Total Coliform Bacteria	≤ 4 counts[2]/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. Regional results for each zone are presented in **Appendix B1**.

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.

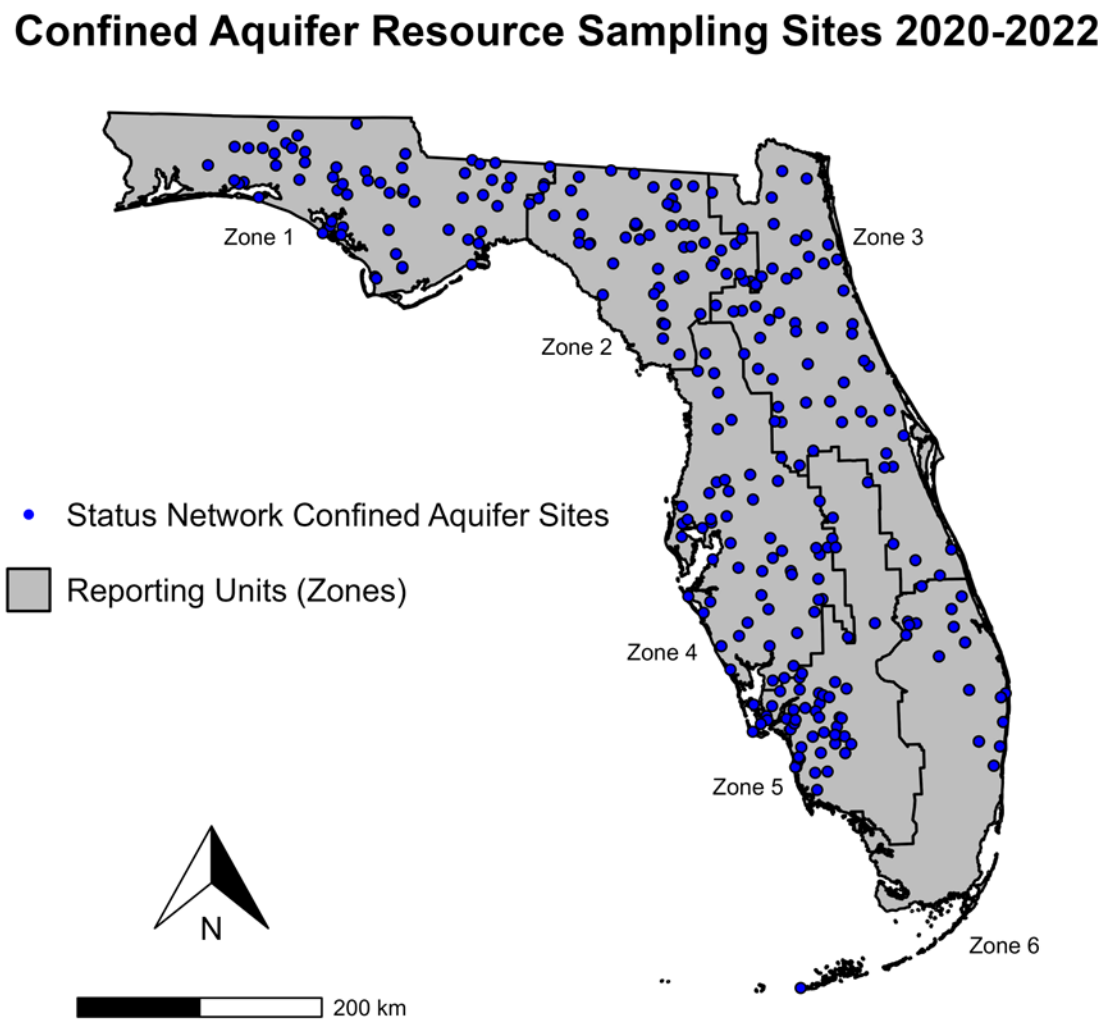


Figure 2.8 Statewide Status Network Confined Aquifer Well Locations

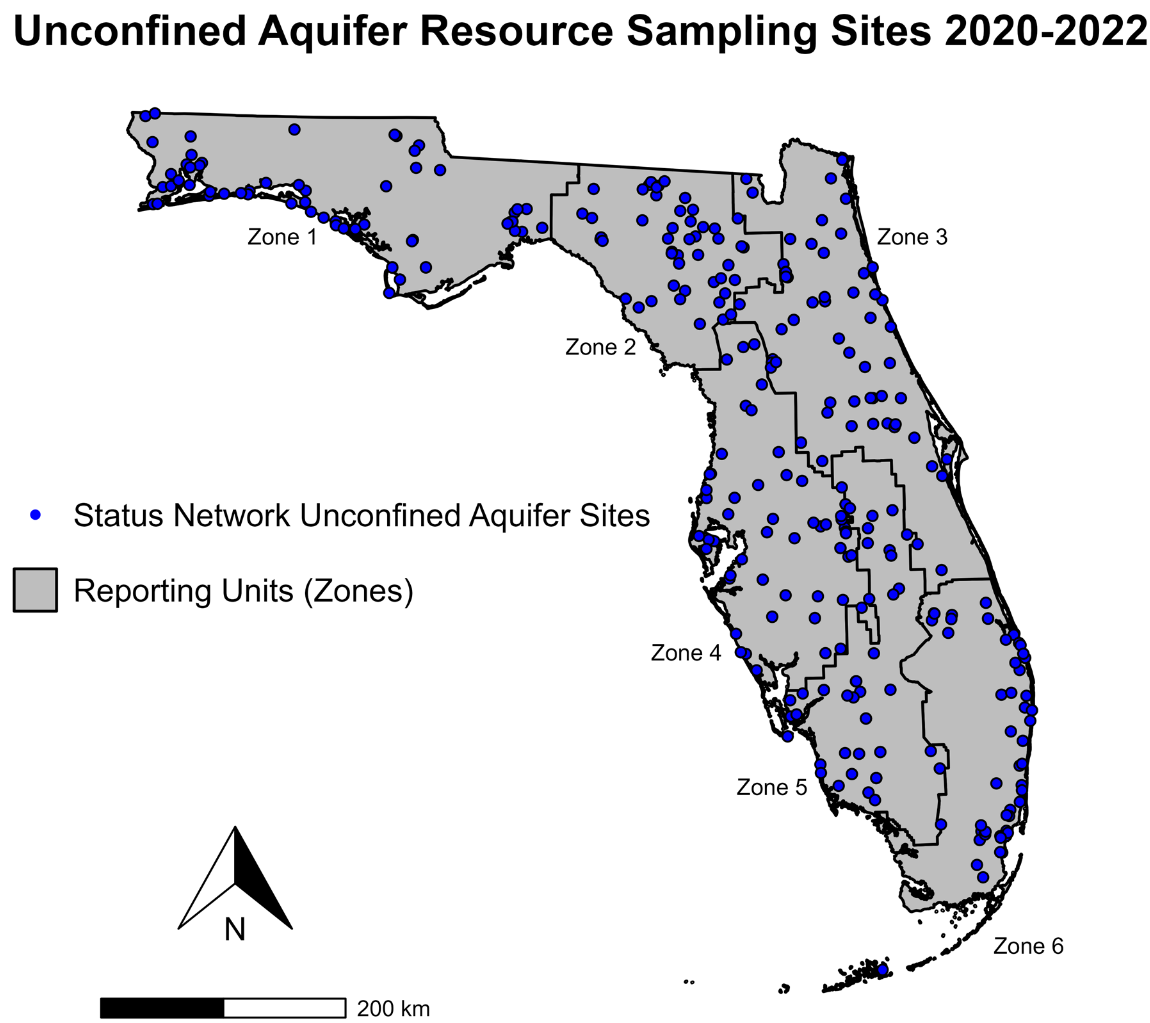


Figure 2.9 Statewide Status Network Unconfined Aquifer Well Locations

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	15424	349	97.2	95.1-99.3	2020-22
Cadmium	15424	349	100	100	2020-22
Chromium	15424	349	100	100	2020-22
Lead	15424	349	99.8	99.6-100.0	2020-22
Nitrate+Nitrite	15424	347	99.7	99.3-100.0	2020-22
Sodium	15424	349	97.5	96.8-98.3	2020-22
Fluoride	15424	349	100	100	2020-22

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Total Coliform Bacteria	15424	295	85.4	79.1-91.7	2020-22

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	22581	343	92.8	85.5-100.0	2020-22
Cadmium	22581	343	100	100	2020-22
Chromium	22581	343	100	100	2020-22
Lead	22581	343	99.3	98.7-99.9	2020-22
Nitrate+Nitrite	22581	343	98.9	97.7-100.0	2020-22
Sodium	22581	343	98.3	97.1-99.4	2020-22
Fluoride	22581	343	100	100	2020-22
Total Coliform Bacteria	22581	299	79.0	70.0-88.0	2020-22

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 statewide, 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 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 et al., 2020). 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.

The Trend analysis protocols are provided in the document *Status and Trend Monitoring Networks Trend Data Analysis Protocols* (DEP 2020b). 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%).

Seasonal Kendall (SK)

Trend Network monitoring data were used to determine monotonic trends at individual stations. 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 2022) version 4.1.3 (2022-03-10) 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, SJRWMD, and SFWMD gauging 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 estimator: the median difference among all observations over the time series (Gilbert 1987). The Sen Slope 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 2022) contains a detailed explanation of the information goals for the Trend Monitoring Network, including data sufficiency and analytical methods.

The periods of record differ between the surface water and groundwater trend analyses. For surface water, laboratory analyses were conducted on raw (total) rather than dissolved constituents from 1998 to 2022. In contrast, prior to 2009, groundwater samples were filtered, and analyses were conducted on dissolved constituents. Beginning in 2009, groundwater sample analyses changed from dissolved to total constituents. To be consistent with surface water, groundwater trend analyses in this report are based on raw water data collected from 2009 to 2022.

Change Analysis

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 the analysis of 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). DEP used the Change Analysis function (Kincaid and Olsen 2019) found in R software's (R Core Team 2022) package spsurvey version 5.4.1 (Dumelle et al. 2023), to perform these step trend statistical tests. DEP staff wrote individual R scripts for each water resource analyzed.

CHANs for core indicators are provided for confined and unconfined aquifers, flowing waters (combined canals, rivers and streams) and lakes (combined large and small lakes). In this report, the periods of record used for these analyses are 2012-14 vs 2020-22. Prior to 2012, statewide resource specific sampling periods, and in the case of flowing waters and lakes, target population definitions differed; therefore, those data are not directly comparable to 2012 and later data.

Summary of Trend Network SK Analysis

Surface Water Results

DEP's Surface Water Trend Network consists of 78 fixed sites sampled monthly (Figure 2.10). As of August 2023, 47 surface water stations have co-located USGS, SJRWMD, or SFWMD gauge stations allowing for flow adjustments. Using the SK, DEP conducts surface water trend analyses every four years for each station.

The most recent analyses included data collected from Nov. 1998 through Dec. 2022. Water quality indicators examined included total alkalinity (ALK), total ammonia nitrogen (TAN), total calcium (CAL), total organic carbon (TOC), total chloride (CL), total magnesium (Mg), total nitrate+nitrite (NOx), total Kjeldahl nitrogen (TKN), TN, TP, total potassium (K), total sodium (Na), specific conductance (SC), total suspended solids (TSS), total sulfate (SO4), temperature (Temp), chlorophyll a (CHL), *E. coli*, turbidity (Turb), pH, and DO. The DEP laboratory conducted these analyses on raw (total) rather than dissolved constituents.

Flow adjusted and non-flow adjusted surface water trend analysis outcomes for the 47 stations co-located with a gauging station and for all 78 surface water stations are provided for each indicator tested in **Appendix B2**. Summaries of these outcomes follow.

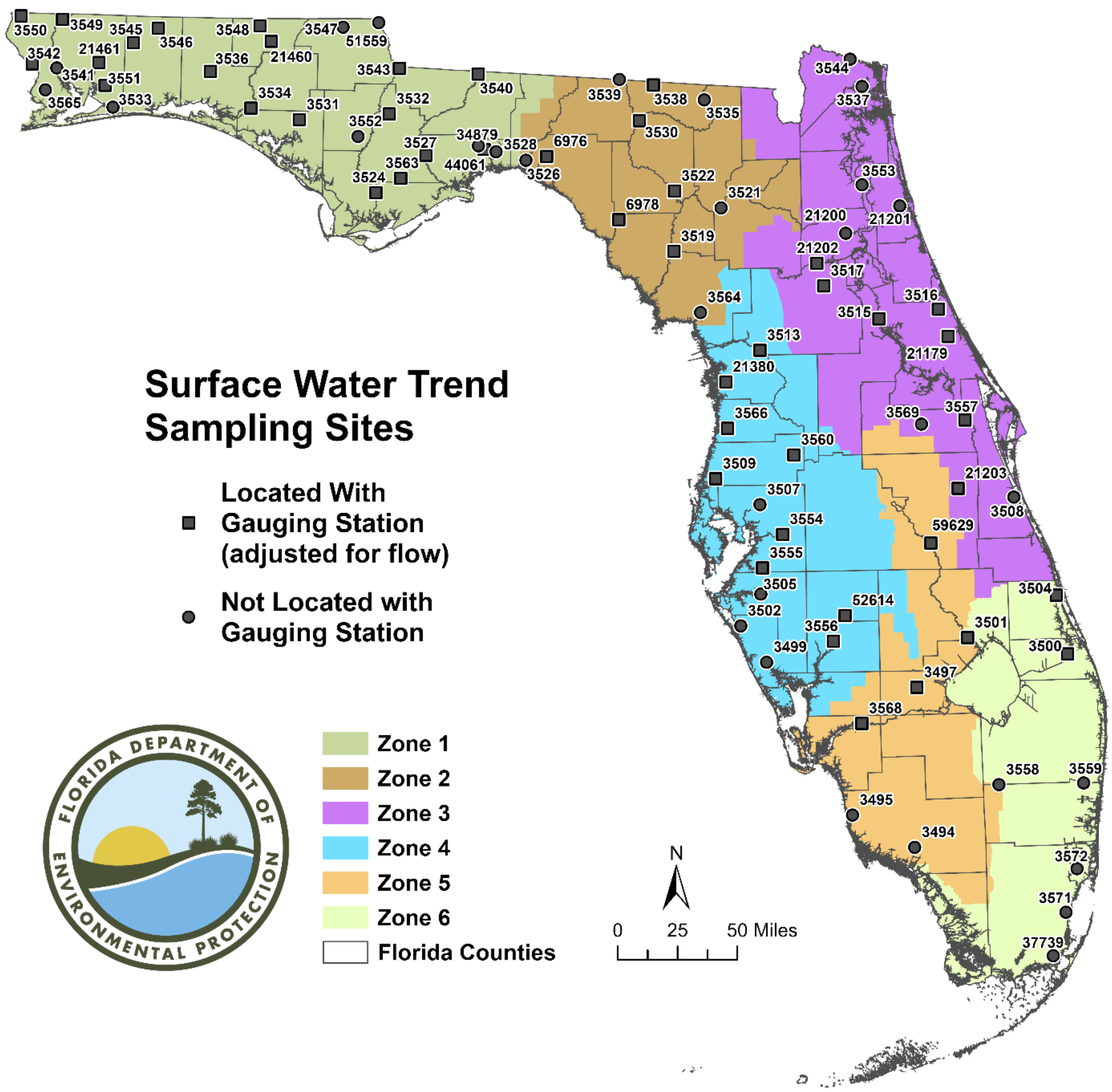


Figure 2.10 Surface Water Trend Network Sampling Sites

For the 1998–2022 period of record, Table 2.9 provides a summary of the SK analysis outcomes per indicator.

Table 2.9 Surface Water Trend Summary (1999–2022)

Note: Percentages are calculated by number of trends (increasing, decreasing, or no trend), divided by the total number of stations. Flow-adjusted site percentages were calculated based on a sample size of 47 stations that are associated with a USGS, SJRWMD, or SFWMD gauging station and adjusted for water flow. Nonflow–adjusted site percentages were calculated based on a sample size of 78 stations. Percentages for Escherichia coli at flow adjusted sites were calculated based a sample size of 45 flow adjusted sites, as 2 sites had insufficient data for analysis. Percentages for chlorophyll a at flow adjusted sites were calculated based a sample size of 46 flow adjusted sites, as 1 site had insufficient data for analysis. For all sites, the period of record for Escherichia coli reporting begins in October 2013. Prior to October 2013, data collection frequency for Escherichia coli was insufficient for analysis.

Flow-Adjusted Sites

Analyte	Decreasing Trend (%)	Increasing Trend (%)	No Trend (%)	Insufficient Evidence of Trend (%)
Alkalinity	2.1	63.8	29.8	4.3
Calcium	2.1	51.1	44.7	2.1
Chloride	25.5	25.5	44.7	4.3
Chlorophyll *a*	15.2	45.7	30.4	8.7
Dissolved Oxygen	10.6	17.0	72.3	0.0
Escherichia coli	6.7	13.3	77.8	2.2
Kjeldahl Nitrogen	27.7	8.5	61.7	2.1
Magnesium	8.5	57.4	31.9	2.1
Nitrate+Nitrite	14.9	53.2	31.9	0.0
pH	34.0	29.8	36.2	0.0
Potassium	10.6	29.8	55.3	4.3
Sodium	23.4	40.4	36.2	0.0
Specific Conductance	14.9	34.0	48.9	2.1
Sulfate	61.7	8.5	25.5	4.3
Total Ammonia Nitrogen	87.2	2.1	10.6	0.0
Total Nitrogen	31.9	38.3	27.7	2.1
Total Organic Carbon	36.2	6.4	55.3	2.1
Total Phosphorus	44.7	4.3	51.1	0.0
Total Suspended Solids	70.2	2.1	27.7	0.0
Turbidity	17.0	40.4	42.6	0.0
Water Temperature	0.0	51.1	46.8	2.1

Nonflow-Adjusted Sites

Analyte	Decreasing Trend (%)	Increasing Trend (%)	No Trend (%)	Insufficient Evidence of Trend (%)
Alkalinity	20.5	17.9	60.3	1.3
Calcium	24.4	20.5	52.6	2.6
Chloride	33.3	23.1	38.5	5.1
Chlorophyll *a*	21.8	44.9	23.1	10.3

Analyte	Decreasing Trend (%)	Increasing Trend (%)	No Trend (%)	Insufficient Evidence of Trend (%)
Dissolved Oxygen	16.7	20.5	62.8	0.0
Escherichia coli	1.3	24.4	74.4	0.0
Kjeldahl Nitrogen	24.4	29.5	44.9	1.3
Magnesium	26.9	29.5	41.0	2.6
Nitrate+Nitrite	20.5	41.0	37.2	1.3
pH	37.2	17.9	43.6	1.3
Potassium	19.2	39.7	38.5	2.6
Sodium	28.2	30.8	37.2	3.8
Specific Conductance	35.9	15.4	48.7	0.0
Sulfate	70.5	2.6	21.8	5.1
Total Ammonia Nitrogen	79.5	1.3	16.7	2.6
Total Nitrogen	33.3	39.7	25.6	1.3
Total Organic Carbon	14.1	20.5	64.1	1.3
Total Phosphorus	33.3	12.8	53.8	0.0
Total Suspended Solids	38.5	2.6	50.0	9.0
Turbidity	9.0	51.3	37.2	2.6
Water Temperature	3.8	43.6	48.7	3.8

Groundwater Results

The Groundwater Trend Network currently consists of 51 fixed stations, 46 of which have sufficient data for SK analyses (Figure 2.11). Using the SK test, DEP conducts groundwater trend analyses every four years for each station.

The latest analyses included data collected from Jan. 2009 through Dec. 2022, 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 (WL), total dissolved solids (TDS), TOC, total coliform (TC), total ammonia nitrogen (TAN), total nitrate+nitrite (NOx), TKN, TN, orthophosphate (OPO4), TP, total potassium, total sulfate, total sodium, total chloride, total calcium, total magnesium, turbidity (Turb), and total alkalinity.

Confined and unconfined groundwater trend station analysis outcomes are provided for each of the stations for each indicator tested in **Appendix B2**. Summaries of these outcomes follow.

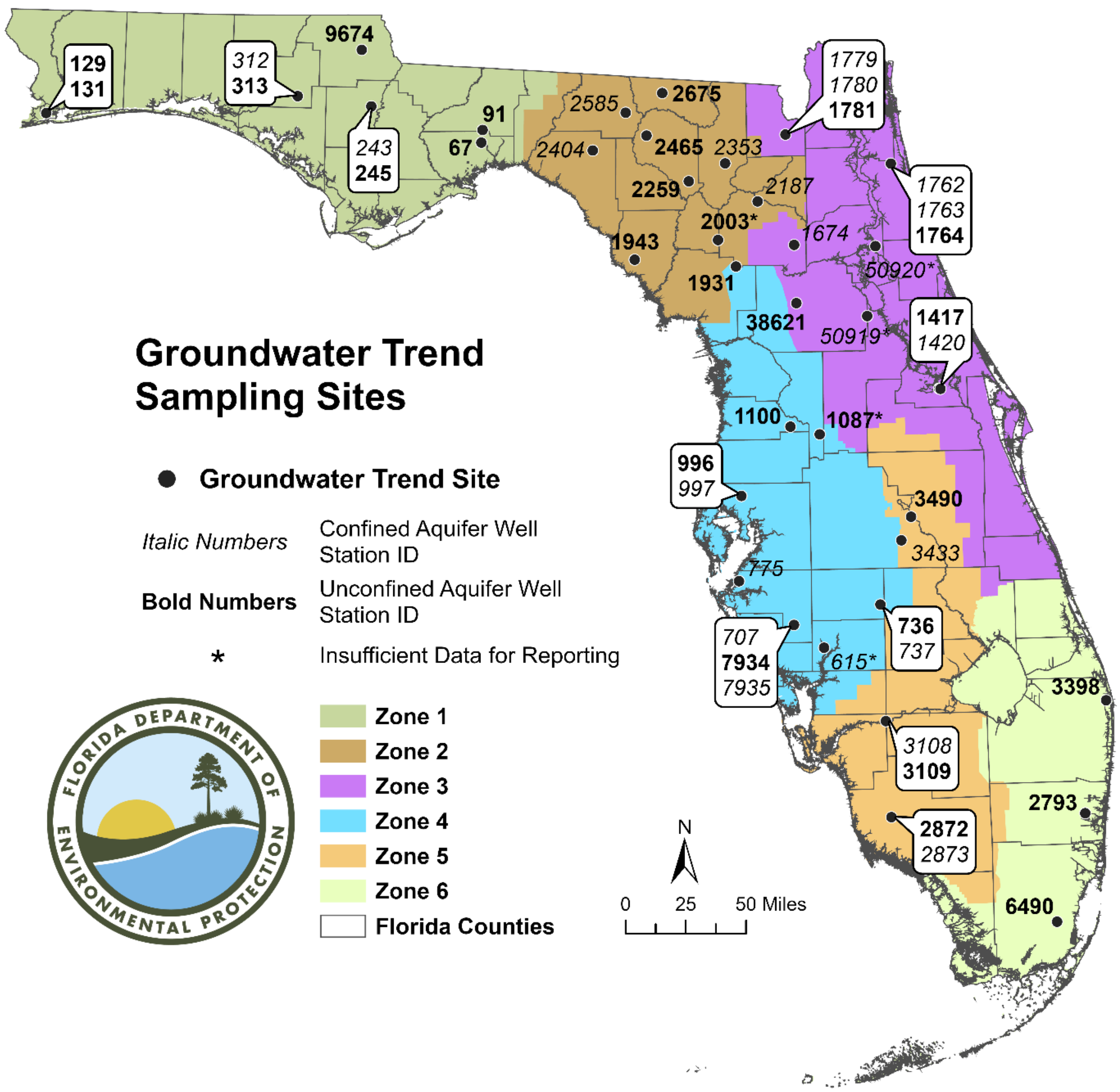


Figure 2.11 Groundwater Trend Network Sampling Sites

For the 2009–22 period of record, Table 2.10 provides a summary of the SK analysis outcomes per indicator.

Table 2.10 Groundwater Trend Summary (2009–22)

Note: Percentages were based on sample sizes of 20 confined stations and 26 unconfined stations for all the analytes with the exception of WL. Percentages for WL were based on 19 confined stations and 24 unconfined stations, as 1 confined and 2 unconfined stations had insufficient WL data for analyses.

Confined Stations

Analyte	Decreasing Trend (%)	Increasing Trend (%)	No Trend (%)	Insufficient Evidence of Trend (%)
Alkalinity	20.0	15.0	65.0	0.0
Calcium	15.0	50.0	30.0	5.0
Chloride	15.0	20.0	40.0	25.0
Dissolved Oxygen	40.0	30.0	25.0	5.0
Kjeldahl Nitrogen	15.0	5.0	65.0	15.0
Magnesium	5.0	30.0	60.0	5.0
Nitrate+Nitrite	5.0	0.0	45.0	50.0
Orthophosphate	15.0	20.0	50.0	15.0
pH	20.0	5.0	65.0	10.0
Potassium	10.0	5.0	75.0	10.0
Sodium	20.0	20.0	55.0	5.0
Specific Conductance	20.0	25.0	45.0	10.0
Sulfate	30.0	20.0	35.0	15.0
Total Ammonia Nitrogen	30.0	0.0	55.0	15.0
Total Coliform	0.0	0.0	50.0	50.0
Total Dissolved Solids	20.0	10.0	60.0	10.0
Total Nitrogen	25.0	5.0	65.0	5.0
Total Organic Carbon	55.0	0.0	45.0	0.0
Total Phosphorus	25.0	15.0	40.0	20.0
Turbidity	20.0	5.0	55.0	20.0
Water Level	0.0	57.9	36.8	5.3
Water Temperature	5.0	55.0	20.0	20.0

Unconfined Stations

Analyte	Decreasing Trend (%)	Increasing Trend (%)	No Trend (%)	Insufficient Evidence of Trend (%)
Alkalinity	34.6	30.8	30.8	3.8
Calcium	30.8	34.6	30.8	3.8
Chloride	19.2	42.3	34.6	3.8
Dissolved Oxygen	50.0	11.5	38.5	0.0
Kjeldahl Nitrogen	11.5	19.2	53.8	15.4
Magnesium	30.8	26.9	42.3	0.0
Nitrate+Nitrite	15.4	19.2	38.5	26.9
Orthophosphate	23.1	15.4	38.5	23.1
pH	42.3	23.1	26.9	7.7
Potassium	19.2	11.5	46.2	23.1
Sodium	23.1	38.5	34.6	3.8
Specific Conductance	34.6	38.5	26.9	0.0
Sulfate	57.7	11.5	19.2	11.5
Total Ammonia Nitrogen	38.5	11.5	38.5	11.5
Total Coliform	0.0	3.8	76.9	19.2
Total Dissolved Solids	26.9	26.9	42.3	3.8
Total Nitrogen	30.8	23.1	34.6	11.5
Total Organic Carbon	46.2	11.5	38.5	3.8
Total Phosphorus	26.9	15.4	50.0	7.7
Turbidity	26.9	7.7	57.7	7.7
Water Level	4.2	58.3	37.5	0.0
Water Temperature	0.0	73.1	19.2	7.7

Change Analysis for Confined and Unconfined Aquifers, Lakes, and Flowing Waters.

Statewide Change Analyses Results

Table 2.11 summarizes the indicator results displaying statewide change based on the CHAN trend tests for the comparison of 2012-14 and 2020-22 data.

Appendix B3 summarizes the significant indicator results of the CHAN tests for each of the six reporting units (zones) for the comparison of 2012-14 and 2020-22 data.

Table 2.11 Statewide Significant Change Analysis Results

E = Early (2012-2014); L = Late (2020-22); N = Number of samples; Est. = Estimate of Mean; CB = 95th percentile confidence bounds of the total difference estimate; ALK = Alkalinity (mg/L); CAL = Calcium (mg/L); CL = Chloride (mg/L); DO = Dissolved oxygen (% saturation); K = Potassium (mg/L); Mg = Magnesium (mg/L); Na = Sodium (mg/L); NOx = Nitrate+Nitrite (mg/L); SC = Specific conductance (uS/cm); SO4 = Sulfate (mg/L); TAN = Total ammonia nitrogen (mg/L); Temp = Temperature (degrees C); TKN = Total Kjeldahl nitrogen (mg/L); TOC = Total organic carbon (mg/L); TP = Total phosphorus (mg/L); TSS = Total Suspended Solids (mg/L)
For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Lakes	ALK	77.32	475	69.83	450	-7.49	-11.87	-3.10	Negative Step
Lakes	CAL	36.58	475	32.19	450	-4.38	-6.58	-2.19	Negative Step
Lakes	CL	73.68	475	62.21	450	-11.47	-20.92	-2.02	Negative Step
Unconfined Aquifers	DO	48.99	284	30.41	342	-18.58	-27.44	-9.73	Negative Step
Flowing Surface Waters	DO	71.23	705	67.01	646	-4.23	-7.76	-0.69	Negative Step
Lakes	K	5.76	475	4.79	450	-0.97	-1.32	-0.62	Negative Step
Lakes	Mg	11.21	475	9.26	450	-1.94	-2.75	-1.14	Negative Step
Lakes	Na	40.02	475	34.60	450	-5.41	-10.51	-0.32	Negative Step
Unconfined Aquifers	NOx	1.69	286	0.93	343	-0.76	-1.32	-0.21	Negative Step
Confined Aquifers	pH	7.58	299	7.27	349	-0.31	-0.41	-0.21	Negative Step
Lakes	SC	454.53	475	397.65	450	-56.88	-94.51	-19.25	Negative Step
Lakes	SO4	30.67	475	23.80	450	-6.87	-9.38	-4.36	Negative Step
Flowing Surface Waters	TAN	0.06	704	0.04	646	-0.01	-0.02	0.00	Negative Step
Confined Aquifers	Temp	21.61	299	22.04	348	0.43	0.08	0.77	Positive Step
Unconfined Aquifers	Temp	21.66	286	22.62	343	0.95	0.62	1.29	Positive Step
Lakes	Temp	24.80	475	28.53	450	3.73	3.26	4.20	Positive Step
Flowing Surface Waters	TKN	0.92	704	0.84	645	-0.08	-0.15	-0.01	Negative Step
Lakes	TOC	16.33	475	13.73	450	-2.60	-3.96	-1.23	Negative Step
Flowing Surface Waters	TP	0.19	705	0.15	646	-0.05	-0.09	0.00	Negative Step

Discussion of Statewide SK and CHAN Results

For flowing waters, TAN and TP decreased statewide over the periods of record for both CHAN and at many SK sites (Tables 2.9, 2.11). However, the nutrient TN showed no change statewide over the period of record for the CHAN analysis and nearly as many stations with decreasing trends as those with increasing trends for the SK. Conversely, many 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. TKN produced a decreasing trend in the CHAN, yet SK showed nearly as many stations with increasing trends as those with decreasing trends. As no fixed station trend sites are located on lakes, we only can provide results for the CHAN. Lake CHAN results produced statewide decreases over the periods of record for ALK, CAL, CL, K, Mg, Na, SC, SO4, and TOC. The only statewide lake indicator with a documented increase was Temp.

Based on the CHAN results, pH decreased (negative step trends) in confined aquifers, while Temp increased in both confined and unconfined aquifers. Regarding SK analyses for pH, 4 of the confined wells (20%) and 11 of the unconfined wells (42%) produced decreasing trends. For Temp, 11 (55 %) confined wells and 19 (73 %) unconfined wells had increasing trends.

Regarding CHAN for unconfined aquifers, DO and NOx each had a downward step trend. SK trends at individual stations did not always support statewide results. Only four of the nine sites displaying SK trends for NOx were decreasing. Conversely, the results of the SK tests for two of the analytes supported the results of CHAN. Regarding DO, 13 of the 16 sites displaying SK trends have decreasing trends, while all 19 of the sites displaying SK trends for Temp were increasing.

The significant statewide changes (Table 2.11) are driven by several factors. Some of these factors may be related to statewide temperature and precipitation (rainfall). Temperature increased in both confined aquifers, unconfined aquifers and lakes, and the majority of trend stations (11 confined wells, 19 unconfined wells and 34 flowing water stations). A plausible explanation is the statewide increase in air temperature during the period of CHAN analyses (Figure 2.12). During the CHAN early period (2010-12) the mean statewide Florida air temperature was 71.4 degrees F (Florida Climate Center, 2023). During the late period (2020-22), it was 72.6 degrees F.

Although not specific to Florida, according to the National Oceanic and Atmospheric Administration [NOAA] (2023), worldwide concentrations of CO_2 in the atmosphere increased from approximately 370 ppm in 2000 to 390 ppm in 2010 and to 410 ppm in 2020. Rainfall absorbs CO_2 from the atmosphere, forming carbonic acid and is therefore slightly acidic (US EPA 2023).

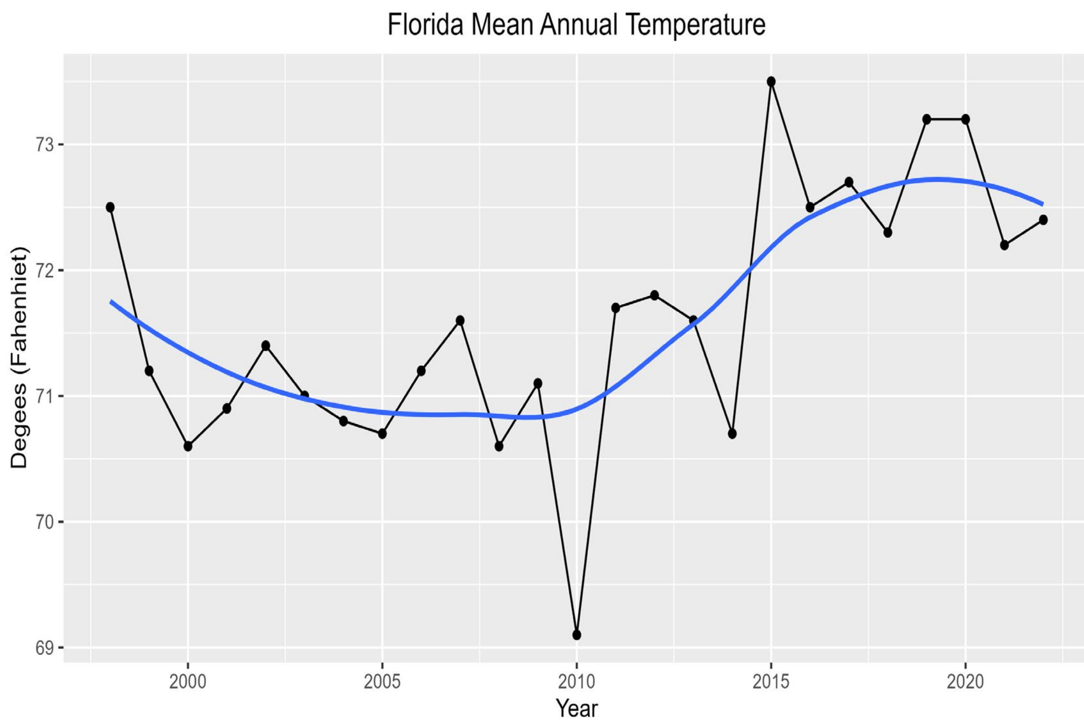


Figure 2.12 Florida Mean Annual Air Temperature, 1998–2022
Thick solid line = LOWESS moving average. Data from SERCC (2023).

Upchurch et al. (Ch 2, 2019) indicate that increases in dissolved carbon dioxide (CO2) concentrations can potentially lower pH levels in groundwater. Thus, increases in atmospheric CO2 could be the driving force of the lowering of pH in both confined and unconfined aquifers. Also note that regarding SK analyses, of the unconfined aquifer Trend Network wells displaying significant pH trends, 11 of the 17 (65%) displayed downward trends: thus, the majority produced decreasing pH trends.

Similar to groundwater CHAN results, temperature, and, perhaps to a lesser extent, precipitation, were likely the most significant drivers of these changes for both flowing waters and lakes. As noted, ambient statewide air temperature increased over the period of record used for CHAN (Fig. 2.12). Florida went into an active hurricane/precipitation period from 2012 through 2022, and due to this precipitation was relatively ‘stable’ yet elevated in comparison to the more recent past (Fig. 2.13). The decreases noted for statewide flowing waters TAN, TP and TKN and for statewide lakes ALK, CAL, CL, K, Mg, Na, SC, SO4 and TOC are likely due to similar processes as identified in the groundwater section above: dilution and acidification due to increased precipitation, and increased water temperature.

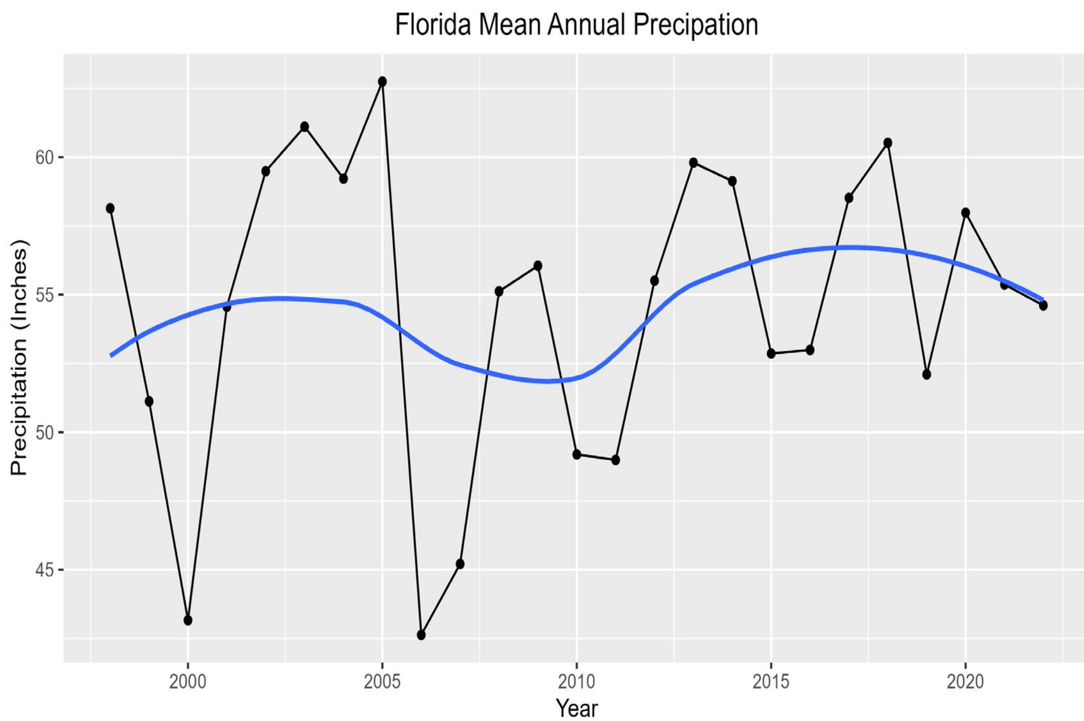


Figure 2.13 Florida Mean Annual Precipitation, 1998–2022
Thick solid line = LOWESS moving average. Data from SERCC (2023).

For flowing waters and lakes, the following differences are noted when comparing these CHAN results to those reported in DEP's *2020 Integrated Report* (2020c, pp. 66–69), which compared data collected between 2000 through 2003 to data collected during 2015 through 2017. As reported in 2020, flowing waters pH, SC, TKN, TN and TP decreased, whereas TKN, TP and the newly added indicator TAN decreased in this analysis. For lakes, CHL, DO, pH, Temp and TP increased as reported in 2020; only Temp increased in this analysis. The following discussion investigates the potential drivers for the observed discrepancies.

In contrast to the relatively consistent year to year rainfall which occurred 2012–22, precipitation increased somewhat dramatically during the first time period (2000-03) used in the 2020 CHAN (Fig. 2.13). The 2020 CHAN analyses provided a disparity between pH results in surface waters and groundwaters, with confined and unconfined aquifers and flowing waters having decreased pH, yet lakes having increasing pH. This was thought to be due to dissolution of limestone resulting in increased lake buffering capacity and pH because of increased carbonic acid provided through the increased rainfall and increasing water temperatures in association with the longer residence times of lakes (versus flowing waters). In the current analysis, it appears that the recent period of consistent year to year rainfall has diluted the lake constituents as noted above, and, perhaps, the rate of lime rock dissolution has stabilized.

In the 2020 CHAN analysis, DO was found to increase in flowing waters and lakes, and to decrease in both confined and unconfined aquifers; whereas DO concentrations decreased in flowing waters and unconfined aquifers in the present CHAN analysis. Intuitively, one would assume that increased precipitation would increase flows and therefore increase DO levels in flowing waters and in freshly recharged groundwater. Thus, reasons for the DO concentration decreases in aquifers are not fully understood.

The present CHAN analysis provides decreasing TP for flowing waters, as was the case for the 2020 CHAN, and no change for TP in lakes. This result contrasts with the increasing lake TP provided in the 2020 CHAN. Additionally, in groundwaters there were no significant differences for NOx in the 2020 CHAN; however, the present CHAN analysis provides decreasing concentrations in unconfined aquifers. These nutrient results may also be related to the possible drivers given for pH and perhaps a decrease in nutrient loads due to various statewide nutrient management plans including 1) agricultural BMPs and restoration plans, 2) providing incentives for homeowners to upgrade their septic systems in groundwater basins associated with Outstanding Florida Springs (Section 373.807, F.S.), and 3) reduction of fertilizer runoff from residential properties through adoption of DEP's "Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes" for municipalities located within the watershed of a waterbody, or waterbody segment, that is listed as impaired by nutrients (Section 403.9337, F.S.). Another possibility is the increased rainfall and recharge resulted in dilution of the concentrations of these analytes.

Chapter 3: Designated Use Support in Surface Waters

Background

Florida's surface waters are protected for the designated use classifications listed in **Appendix C**. DEP 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 was historically implemented using a rotating basin management approach. Florida's 52 hydrologic unit code (HUC) basins are divided into 29 drainage basins that are distributed among the department's six regulatory districts. There are five basins in the Northwest, Central, Southwest, South, and Southeast Districts, and four basins in the Northeast District. Using the rotating basin management approach ensured that one basin would be assessed in each district every five years (except the Northeast, which only has four basins).

Beginning in 2020, DEP changed its approach for assessing waters under the Impaired Waters Rule (Chapter 62-303, F.A.C.). With the new process, termed the Biennial Assessment, all basins in Florida are now assessed every two years rather than 20 percent of the state being assessed each year for five years in repeating cycles. All assessments now have the same assessment period and use consistent application of water quality criteria. The impairment analysis is done based on all available data, and an updated impaired waters list for the entire state is published every two years. Under the Biennial Assessment, DEP continues to assess individual basins, identify impaired waters requiring the development of TMDLs, and work with local stakeholders to develop alternative restoration plans (ARPs, such as Reasonable Assurance Plans [RAP] and Pollutant Reduction Plans [PRP]) and BMAPs to restore water quality. This chapter summarizes the results of the assessments performed through 2022 for the entire state (Basin Groups 1 through 5).

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. The Strategic Monitoring Program's (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.

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 the subcategories of 2b, 2e, and 2t.
- **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 nutrientthresholds, 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	300	1		2					55	358
Coastal	94	1			11		2	10	25	143
Estuary	112	29	10	10	8	4	43	42	358	616
Lake	482	114	101	81	1	75	136	29	157	1,176
Spring	5	6	2	35		31		32	19	130
Stream	320	264	98	37		101	320	55	570	1,765
Total	**1,313**	**415**	**211**	**165**	**20**	**211**	**501**	**168**	**1,184**	**4,188**

303(d) Listed Waters

Only those WBID/analyte combinations placed in EPA Category 5 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 biennial 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 is not currently 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 D** lists 540 publicly owned lakes identified as impaired, for which a TMDL will be needed. Currently, 16 of these lakes are on DEP's priority list for TMDL development to be completed in the next two years. In addition, all 540 publicly owned 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 are DO, FIB, nutrients, and chlorophyll *a*. Table 3.1b lists the 15 most frequently identified impairments by waterbody type.

Table 3.1b. Fifteen Most Frequently Identified Impairments by Waterbody Type

SEAS = Shellfish Environmental Assessment Section (FDACS)
Note: Counts exclude assessments in Category 4c.

Identified Cause	Lake	Stream	Coastal	Estuary	Spring	Beach	Total Impairments Identified
Dissolved Oxygen (Percent Saturation)	72	497	4	155	7		735
Nutrients (Total Phosphorus)	211	189	7	79	2		488
Nutrients (Total Nitrogen)	173	139	16	125	1		454
Nutrients (Chlorophyll *a*)	193	107	10	143			453
Escherichia coli	4	255					259
Biology	151	97					248
Fecal Coliform	8	169		63			240
Iron	7	97	1	84			189
Enterococci			1	147	1		149
Fecal Coliform (SEAS Classification)			10	109			119
Nutrients (Macrophytes)		113			1		114

Identified Cause	Lake	Stream	Coastal	Estuary	Spring	Beach	Total Impairments Identified
Nutrients (Nitrate-Nitrite)	1	16	1		82		100
Nutrients (Algal Mats)	1	28			33		62
Copper	1	3	10	45	1		60
Bacteria (Beach Advisories)						57	57

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 nutrientthresholds, 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	90	3	1				1		10	105
Estuary	96	77	33	1			11	31	235	484
Lake	230	295	5				3		9	542
Spring	5	15							1	21
Stream	257	490	94				17	46	360	1,264
Beach	300	1		2					55	358
Total	**978**	**881**	**133**	**3**	**0**	**0**	**32**	**77**	**670**	**2,774**

Table 3.2b Assessment Results for Nutrients by Waterbody Type and Assessment Category (Number of WBIDs)

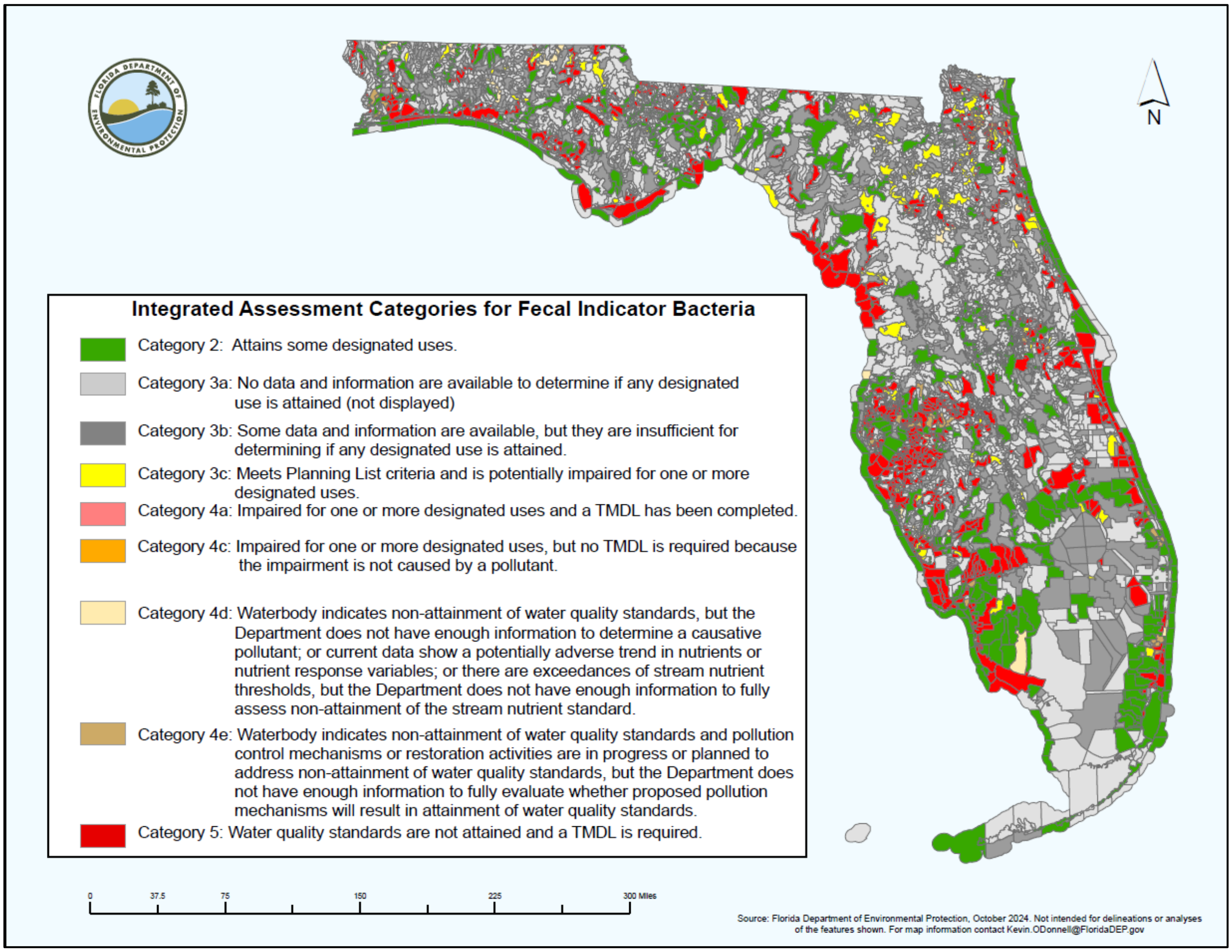
Note: There are no waters in EPA Category 1 (attaining all designated uses) because DEP does not sample for all uses. Category 2 comprises waters attaining all the uses that are sampled for.

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.

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
Estuary	275	81	18	51	13			37	105	580
Coastal	32	35	1		23			11	7	109
Lake	569	284	44	106	1			23	126	1,153
Spring	28	13	3	35				32	18	129
Stream	817	419	60	41			150	22	152	1,661
Total	**1,721**	**832**	**126**	**233**	**37**	**0**	**150**	**125**	**408**	**3,632**

a.)


Integrated Assessment Categories for Fecal Indicator Bacteria
Category 2: Attains some designated uses.
Category 3a: No data and information are available to determine if any designated use is attained (not displayed)
Category 3b: Some data and information are available, but they are insufficient for determining if any designated use is attained.
Category 3c: Meets Planning List criteria and is potentially impaired for one or more designated uses.
Category 4a: Impaired for one or more designated uses and a TMDL has been completed.
Category 4c: Impaired for one or more designated uses, but no TMDL is required because the impairment is not caused by a pollutant.
Category 4d: Waterbody indicates non-attainment of water quality standards, but the Department 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 the Department does not have enough information to fully assess non-attainment of the stream nutrient standard.
Category 4e: Waterbody indicates non-attainment of water quality standards and pollution control mechanisms or restoration activities are in progress or planned to address non-attainment of water quality standards, but the Department does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
Category 5: Water quality standards are not attained and a TMDL is required.
N
0
37.5
75
150
225
300 Miles
Source: Florida Department of Environmental Protection, October 2024. Not intended for delineations or analyses of the features shown. For map information contact Kevin.ODonnell@FloridaDEP.gov

b.)

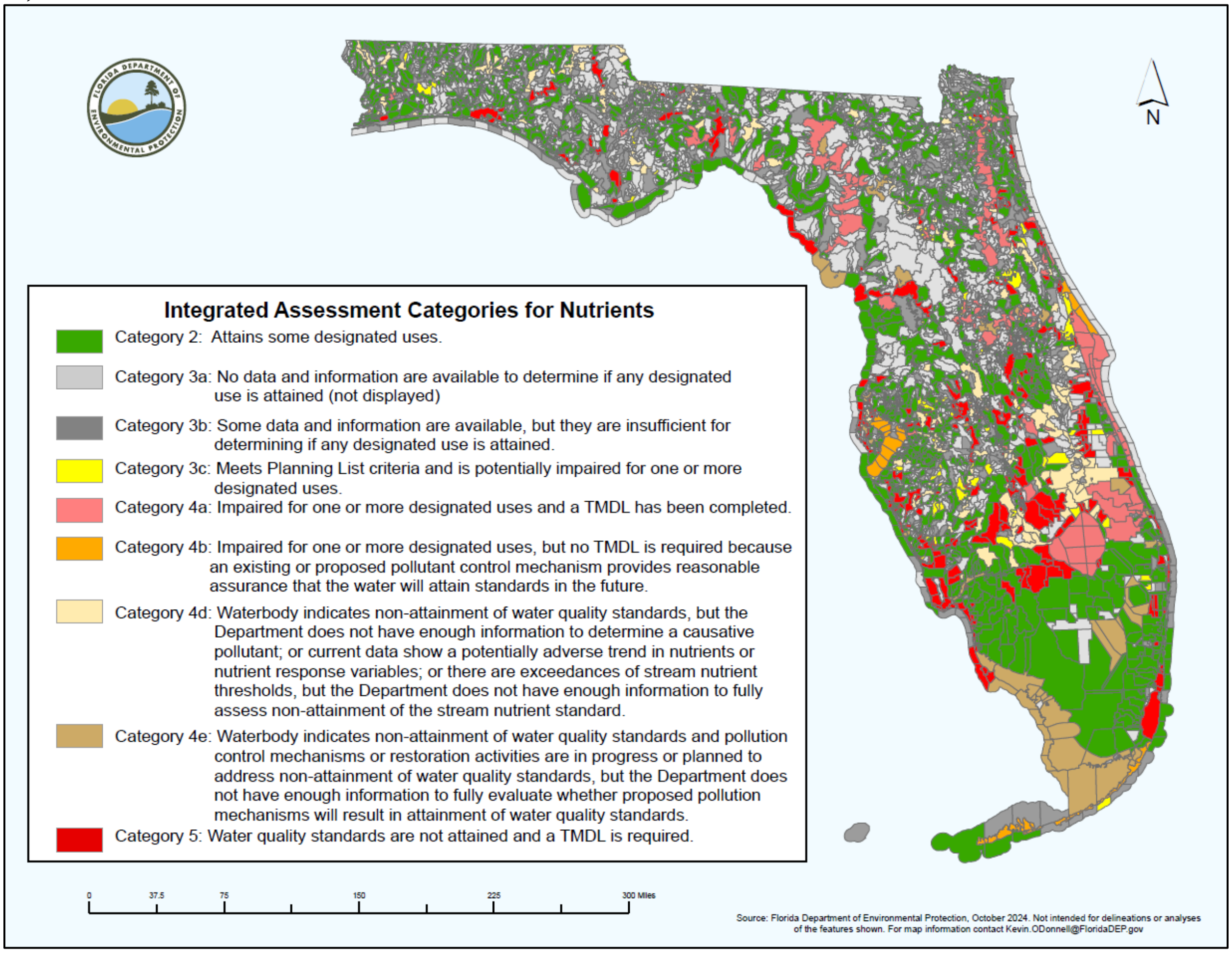


Figure 3.1 Results of Florida's Surface Water Quality Assessment: (a) EPA Assessment Categories and DEP Subcategories for FIB (b) EPA Assessment Categories and DEP Subcategories for Nutrients

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 roughly 362,000 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

SCI = Stream Condition Index; SEAS = Shellfish Environmental Assessment Section (FDACS)
[1] *Escherichia coli* assessed as a monthly geometric mean.

Identified Cause	Waterbody Type	Units	Number of Stream Segments Identified as Impaired	Total Number of Stream Miles
Dissolved Oxygen (Percent Saturation)	Stream	Miles	469	4,808
Escherichia coli	Stream	Miles	255	1,914
Nutrients (Total Phosphorus)	Stream	Miles	189	1,862
Nutrients (Total Nitrogen)	Stream	Miles	139	1,762
Fecal Coliform	Stream	Miles	169	1,762
Nutrients (Macrophytes)	Stream	Miles	113	1,228
Iron	Stream	Miles	97	1,201
Nutrients (Chlorophyll *a* **)**	Stream	Miles	107	1,063
Biology (SCI)	Stream	Miles	97	853
Nutrients (Algal Mats)	Stream	Miles	28	392
Lead	Stream	Miles	31	380
Nutrients (Nitrate-Nitrite)	Stream	Miles	16	245
Turbidity	Stream	Miles	3	89
Specific Conductance	Stream	Miles	7	78
Dissolved Oxygen	Stream	Miles	5	68
Silver	Stream	Miles	3	59
Chloride	Stream	Miles	3	41
***Escherichia coli*[1]**	Stream	Miles	1	31

Identified Cause	Waterbody Type	Units	Number of Stream Segments Identified as Impaired	Total Number of Stream Miles
Copper	Stream	Miles	3	16
Total Ammonia	Stream	Miles	1	15
Bacteria (Shellfish Harvesting Classification)	Stream	Miles	1	14
Arsenic (in fish tissue)	Stream	Miles	1	10
Total	**Stream**	**Miles**	**1,738**	**17,891**

Table 3.3b Acres of Lakes Impaired by Cause

LVI = Lake Vegetation Index

Identified Cause	Waterbody Type	Units	Number of Lake Segments Identified as Impaired	Total Water Area for Lake Segments Identified as Impaired
Nutrients (Total Phosphorus)	Lake	Acres	211	731,882
Nutrients (Total Nitrogen)	Lake	Acres	173	337,308
Turbidity	Lake	Acres	8	334,209
Iron	Lake	Acres	7	295,298
Nutrients (Chlorophyll *a*)	Lake	Acres	193	291,727
Biology (LVI)	Lake	Acres	151	134,792
Dissolved Oxygen (Percent Saturation)	Lake	Acres	72	40,846
Pesticides (in fish tissue)	Lake	Acres	4	32,361
Lead	Lake	Acres	15	7,707
Fecal Coliform	Lake	Acres	8	1,416
pH	Lake	Acres	1	682
Nutrients (Other Information)	Lake	Acres	1	485
Specific Conductance	Lake	Acres	1	363
Nutrients (Algal Mats)	Lake	Acres	1	274
Nutrients (Nitrate-Nitrite)	Lake	Acres	1	274
Escherichia coli	Lake	Acres	4	156
Copper	Lake	Acres	1	122
Silver	Lake	Acres	1	11
Total	**Lake**	**Acres**	**853**	**2,209,913**

Table 3.3c Acres of Estuaries Impaired by Cause

SEAS = Shellfish Environmental Assessment Section (FDACS); TN = Total nitrogen; TP = Total phosphorus
[1] Fecal coliform assessed in Class II waters as a median value.

Identified Cause	Waterbody Type	Units	Number of Estuary Segments Identified as Impaired	Total Water Area for Estuary Segments Identified as Impaired
Fecal Coliform (SEAS Classification)	Estuary	Acres	109	834,943
Nutrients (Total Nitrogen)	Estuary	Acres	120	810,529
Nutrients (Chlorophyll *a*)	Estuary	Acres	143	647,982
Nutrients (Total Phosphorus)	Estuary	Acres	74	543,656
Iron	Estuary	Acres	84	226,719
Nutrients (Other Information)	Estuary	Acres	13	155,953
Fecal Coliform[1]	Estuary	Acres	37	138,482
Enterococci	Estuary	Acres	147	110,303
Dissolved Oxygen (Percent Saturation)	Estuary	Acres	155	87,064
Copper	Estuary	Acres	45	36,888
Fecal Coliform	Estuary	Acres	63	36,785
pH	Estuary	Acres	2	26,278
Thallium	Estuary	Acres	2	5,541
Aluminum	Estuary	Acres	2	3,989
Dissolved Oxygen	Estuary	Acres	1	3,560
Dioxin (in fish tissue)	Estuary	Acres	1	177
Lead	Estuary	Acres	2	23
Selenium	Estuary	Acres	1	3
Total	Estuary	Acres	**1,001**	**3,668,875**

Table 3.3d Miles of Coastal Waters Impaired by Cause

SEAS = Shellfish Environmental Assessment Section (FDACS)
[1] Fecal coliform assessed in Class II waters as a median value.

Identified Cause	Waterbody Type	Units	Number of Estuary Segments Identified as Impaired	Total Water Size for Coastal Segments Identified as Impaired
Nutrients (Total Nitrogen)	Coastal	Miles	16	441
Nutrients (Other Information)	Coastal	Miles	23	333
Fecal Coliform (SEAS Classification)	Coastal	Miles	10	312
Nutrients (Chlorophyll *a*)	Coastal	Miles	10	312
Copper	Coastal	Miles	10	181
Nutrients (Total Phosphorus)	Coastal	Miles	7	181
Dissolved Oxygen (Percent Saturation)	Coastal	Miles	4	78
Fecal Coliform[1]	Coastal	Miles	2	69
Iron	Coastal	Miles	1	33
Nutrients (Nitrate-Nitrite)	Coastal	Miles	1	31
Enterococci	Coastal	Miles	1	9
Total			**85**	**1,980**

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 E** and **F** 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 Biennial Assessment 2020- 22 assessment period, 674 waterbodies have sufficient data to demonstrate a healthy biological community and 248 waterbodies fail to meet biological integrity standards and are listed in Categories 4 or 5. Another 500 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.

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
SCI 2012	245	146	109	13	0	0	105	14	19	**651**
LVI 2012	429	112	133	1	0	0	77	4	15	**771**
Total	674	258	242	14	0	0	182	18	34	**1,422**

Delisting

The flow chart in **Appendix G** 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 (e.g., aquatic life support, recreational). Table 3.5 lists the status of rivers/streams and lakes/reservoirs designated for drinking water use in each of EPA's 5 reporting categories. Lake Okeechobee is a Class I waterbody and comprises 362,000 acres of the 382,000 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	18
Rivers/Streams	3a	No Data	21
Rivers/Streams	3b	Insufficient Data	10
Rivers/Streams	3c	Planning List	3
Rivers/Streams	4a	TMDL Complete	0
Rivers/Streams	4b	Reasonable Assurance	0
Rivers/Streams	4c	Natural Condition	1
Rivers/Streams	4d	No Causative Pollutant	10
Rivers/Streams	4e	Ongoing Restoration	2
Rivers/Streams	5*	Impaired	23

Lakes/Reservoirs

Waterbody Type	Assessment Category	Assessment Status	Number of WBIDs
Lakes/Reservoirs	2	Not Impaired	3
Lakes/Reservoirs	3a	No Data	2
Lakes/Reservoirs	3b	Insufficient Data	2
Lakes/Reservoirs	3c	Planning List	1
Lakes/Reservoirs	4a	TMDL Complete	3
Lakes/Reservoirs	4b	Reasonable Assurance	0
Lakes/Reservoirs	4c	Natural Condition	1
Lakes/Reservoirs	4d	No Causative Pollutant	6
Lakes/Reservoirs	4e	Ongoing Restoration	0
Lakes/Reservoirs	5*	Impaired	11

Overlap of Source Water Areas and Impaired Surface Waters

In 2023, there were 4,991 public drinking water systems statewide, 18 of which obtain their supplies from surface water. An additional 73 systems wholly or partially purchase water from these 18 systems.

DEP compared all waterbodies that do not attain applicable water quality standards for fecal indicator bacteria (Categories 4a, 4b, 4d, 4e, and 5) 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 three-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. It should be noted that DEP's *E. coli* and enterococci criteria are intended to protect recreational uses (e.g., swimming) in and on the water and an exceedance of the applicable criterion does not necessarily indicate an impairment of the drinking water use.

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	870 miles
Lakes/Reservoirs	1,280 acres

Chapter 4: TMDLs, Prioritization, and Alternative Restoration Plans

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 and non-point sources all use TMDLs as the basis for their water quality goals.

To date, DEP has adopted a total of 460 TMDLs. Of these, 275 were developed for DO, nutrients, and/or un-ionized ammonia; 179 were developed for bacteria; five were for other parameters such as iron or lead, and one TMDL for turbidity. In addition, DEP adopted a statewide TMDL for mercury, based on fish consumption advisories affecting over 1,500 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 more TMDLs in various stages of development.

TMDL Priorities

DEP has coordinated with EPA Region 4 to implement a new TMDL prioritization for the 10 years from 2022-32 consistent with EPA's 303(d) TMDL framework, termed the "2022 – 2032 Vision for the Clean Water Act Section 303(d) Program." EPA’s 303(d) TMDL Framework provided guidance to states on how they can prioritize waterbodies through 303(d) program activities and other point and nonpoint programs to achieve water quality objectives for the nation’s water resources.

DEP's goals are 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, evaluating whether an entire estuary nutrient region is impaired, ecological significance (e.g., Outstanding Florida Waters, Aquatic Preserves, parks), and opportunities for stakeholder-led alternative restoration plans (i.e., RAPs and PRPs). The new TMDL prioritization was developed with public input, 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 fecal indicator bacteria (FIB) impairments that began in 2022. Under this approach, individual TMDLs will be calculated for all FIB verified impaired waters within a particular basin, 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 initiated this new consolidated approach for FIB impairments in the Everglades West Coast Basin. This project provides stakeholders an opportunity to become familiar with the new approach, provide comments, and identify needed process improvements before moving to additional basins or statewide implementation. DEP anticipates completing rulemaking for the pilot TMDL in summer 2024. Following the pilot project and beginning in summer 2024, DEP will target the Lower St. Johns Basin and subsequently additional basins to create basin specific consolidated FIB TMDL reports until all FIB impairments are addressed. The basin specific consolidated reports will provide TMDLs for all newly identified bacteria-impaired waterbodies and will allow for waters with existing fecal coliform TMDLs to be revised with the new FIB indicator parameters.

Additional information on the 2022 – 2032 TMDL Prioritization 2.0 is available on the DEP website. This webpage includes the TMDL Priority Framework Document, a list of the waters prioritized for TMDL development, and the TMDL Priority Screening Metrics and Rankings used to identify waters.

2023-2024 TMDL Priorities Submitted to EPA

DEP will continue to develop, propose, and adopt TMDLs during the 2023-24 period as it implements the first two-year cycle under Prioritization 2.0. Florida submitted the 2023-24 TMDL priority list as bridge metric priorities to EPA as part of EPA's 2022 Vision Goals (Table 4.1). The 2023-24 priorities include the initiation of TMDL development for verified impaired waterbodies to address four copper-impaired waterbodies in the Everglades West Coast Basin and eight nutrient TMDLs for verified impaired lakes in the Kissimmee River and Middle St. Johns River Basins.

Table 4.1 2023 -2024 TMDL Priority Waterbodies

Basin	WBID Number	Waterbody Name	Parameters Addressed by TMDL	Year Added to the Verified List
Middle St. Johns	3168W3	Lake Wade	Chlorophyll *a*, TN, and TP	2017
Kissimmee River	3168W7	Lake Bumby	Chlorophyll *a*, TN, and TP	2017
Middle St. Johns	3168Y4	Lake Davis	Chlorophyll *a*, TN, and TP	2017
Middle St. Johns	3168Y8	Lake Weldona	Chlorophyll *a*	2017
Kissimmee River	3169G3	Lake Fran	Chlorophyll *a*, TN, and TP	2017
Kissimmee River	3169G4	Lake Kozart	Chlorophyll *a*, TN, and TP	2017
Kissimmee River	3169G5	Lake Walker	Chlorophyll *a*, TN, and TP	2017
Kissimmee River	3169G6	Lake Richmond	Chlorophyll *a*, TN, and TP	2017
Everglades West Coast	3278Q1	Clay Bay	Copper	2013
Everglades West Coast	3278R1	Haldeman Creek (Lower)	Copper	2013
Everglades West Coast	3278R3	Rock Creek	Copper	2013
Everglades West Coast	3278R4	Naples Bay (Coastal Segment)	Copper	2013

Alternative Restoration Plans

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), 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 subcategory 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 (EPA revised this term to be identified as an "advance restoration plan" (ARP) in February 2023) 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. ARP development may be preferred 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 the required documentation results in DEP 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 current assessment cycle (conducted on a biennial basis beginning in 2022), prior to the department initiating TMDL development. 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, the department 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. The department'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 the department 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, 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 is a requirement. 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. 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 plan and pollutant specific. Documentation must support specific progress towards the restoration of applicable 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. Restoration of an impaired waterbody may take many years to fully complete and 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 E.4) 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 and developed for a specific basin, all BMAPs include restoration projects and management strategies, implementation schedules and milestones, allocation or reduction requirements, funding strategies, tracking mechanisms, and extensive water quality monitoring networks.

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.

During its 2023 session, the Florida Legislature passed House Bill 1379, a comprehensive environmental protection legislation supporting the goals of Executive Order 23-06 (Achieving Even More Now for Florida’s Environment), which was signed by Governor DeSantis in January 2023. This legislation strengthens water quality protections and BMAPs. It requires a list of projects that achieve five-year implementation milestones and meet TMDL allocations, a specific list of regional projects to achieve nutrient reductions established for agricultural nonpoint sources, and requires increased coordination with local governments, WMDs and other stakeholders to identify projects.

To date, DEP has adopted 33 BMAPs and is working on updating all nutrient BMAPs by July 1, 2025, as required by the Clean Waterways Act (Chapter 2020-150, Laws of Florida). Table 5.1 summarizes the status of all BMAPs. While the majority address nutrient impairments, DEP also has adopted BMAPs that target fecal indicator bacteria 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.

The 2016 legislation directed DEP to develop a Florida Statewide Annual Report for all BMAPs. DEP prepares and submits this report to the Governor and Legislature annually by July 1 of each year DEP has met this deadline in each of the last five years.

Table 5.1 Summary of BMAPs

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

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
Alafia River Basin	Adopted March 2014	FIB/TN/TP/DO	This BMAP, adopted in 2014, is under review for updates required to satisfy the Clean Waterways Act. These updates are due by July 1, 2025.
Banana River Lagoon (BRL)	Adopted February 2013; Updated February 2021	TN/TP	This BMAP, adopted in 2013, was updated in 2021 in conjunction with the Central and North IRL BMAPs. Currently, it is under review for updates required to satisfy the Clean Waterways Act. These updates are due by July 1, 2025.
Bayou Chico (Pensacola Basin)	Adopted October 2011	FIB	The BMAP, adopted in 2011, currently is being reviewed for any necessary updates as source identification efforts continue.
Caloosahatchee Estuary Basin	Adopted November 2012; Updated January 2020	TN	The NEEPP BMAP, adopted in 2012, covered theTidal Caloosahatchee Watershed. In January 2020 the BMAP was updated to meet the new requirements outlined in Executive Order 19-12 and to include the East and West Caloosahatchee subwatersheds. The second formal 5-Year Review of the BMAP was submitted to the Florida Legislature and Governor in January 2023. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025,
Central IRL	Adopted February 2013; Updated February 2021 (update effective October 2021)	TN/TP	The BMAP, adopted in 2013, was updated in 2021 in conjunctionwith the North IRL and BRL BMAPs. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
DeLeon Spring	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. is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Everglades West Coast	Adopted November 2012	TN/DO	The BMAP, adopted in 2012, covers the impaired waterbodies Hendry Creek and Imperial River. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Gemini Springs	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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Hillsborough River	Adopted September 2009	FIB	The BMAP, adopted in 2009, currently is being reviewed for any necessary updates as source identification efforts continue.

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
Homosassa and Chassahowitzka Springs Groups	Adopted June 2018	TN/NO_3	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Jackson Blue Spring	Adopted June 2018	NO_3	The BMAP, which was revised to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Kings Bay/Crystal River	Adopted June 2018	$TN/TP/NO_3/OPO_4$	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Lake Harney, Lake Monroe, Middle St. Johns River, and Smith Canal	Adopted August 2012	TN/TP	The BMAP, adopted in 2012, is currently being reviewed for any necessary updates. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Lake Okeechobee Basin	Adopted December 2014; Updated January 2020	TP	The Northern Everglades and Estuaries Protection Program (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. The second formal 5-Year Review of the BMAP will be submitted to the Florida Legislature and Governor in December 2024. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Long Branch	Adopted May 2008	FIB/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, is currently being reviewed for any necessary updates as restoration efforts continue. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Lower St. Johns River Basin Tributaries I	Adopted December 2009	FIB	The BMAP, adopted in 2011, currently is being reviewed for any necessary updates as source identification efforts continue.
Lower St. Johns River Basin Tributaries II	Adopted August 2010	FIB	The BMAP, adopted in 2010, currently is being reviewed for any necessary updates as source identification efforts continue.
Manatee River Basin	Adopted March 2014	FIB/TN/TP/DO	The BMAP, adopted in 2014 and in its third year of implementation, is currently being reviewed for any necessary updates. The BMAP is currently being reviewed for any

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
			necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Middle and Lower Suwannee River Basin	Adopted 2016	TN	The BMAP, updated and adopted in May 2016. As the result of an administrative challenge, updates have been delayed. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act and other applicable requirements.
North IRL	Adopted February 2013; Updated February 2021	TN/TP	The BMAP, adopted in 2013, was updated in 2021 in conjunctionwith the Central IRL and BRL BMAPs. All three BMAPs are being reviewed to identify whether any updates are necessary as the end of the firstphase of implementation nears. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Santa Fe River Basin	Adopted February 2012	NO_3/DO	The BMAP was originally adopted in February 2012. As the result of an administrative challenge, updates have been delayed. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act and other applicable requirements.
Silver Springs and Upper Silver River and Rainbow Spring Group and Rainbow River	Adopted 2015	NO_3	The BMAP was originally adopted in 2015. As the result of an administrative challenge, updates have been delayed. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act and other applicable requirements.
St. Lucie River and Estuary Basin	Adopted June 2013; Updated January 2020	TN/TP/BOD	The Northern Everglades and Estuary Protection Program (NEEPP) BMAP, adopted in 2013, covers thewatershed contributing to the St. Lucie Estuary. In January 2020The BMAP was updated to meet the new requirements outlined in Executive Order 19-12 and to include updates to the modeling and updated allocations of load reductions. The second formal 5-Year Review of the BMAP was submitted to the Florida Legislature and Governor in June 2023. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Upper Ocklawaha 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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Upper Wakulla River and Wakulla Springs	Adopted June 2018	NO_3	The BMAP, revised to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted in June 2018. The BMAP is currently being reviewed for any

BMAP	BMAP Status	Parameter(s) Addressed	Implementation Status
			necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Volusia Blue Springs	Adopted May 2021	NO_3	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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Weeki Wachee Spring and Spring Run	Adopted June 2018	NO_3	The BMAP, developed to meet the requirements of the Florida Springs and Aquifer Protection Act of 2016, was adopted on June 30, 2018. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
Wekiva River, Rock Springs Run,and Little Wekiva Canal	Adopted October 2015	NO_3/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. The BMAP is currently being reviewed for any necessary updates. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.
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. The BMAP will be updated by July 1, 2025, to meet Clean Waterways Act requirements.

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. 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 than nitrate, 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 phosphatic rock deposits are a significant source of phosphorus 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 criterion 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 (subparagraph 62-302.531(2)(b)2., F.A.C.). Based on spring-specific evidence, nitrate water quality target concentrations in some Outstanding Florida Springs (OFS) have been established as site-specific interpretations of the narrative nutrient criteria. 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 Numeric Nutrient Criteria (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 (2020–2022) Nitrate (mg/L)	Average Concentration (2020–2022) TP (mg/L)	TMDL Target Nitrate (mg/L)	TMDL Target Phosphorus (mg/L)
Alexander Spring	2918Z	0.04	0.055		
Chassahowitzka Main Spring	1348Z	0.49	-	0.23	
Columbia Spring	3605T	0.41	0.131		
Crystal River (including Kings Bay Spring Group)	1341	0.15	0.031	0.23	0.028*
Deleon Spring	2921A	0.66	0.065	0.35	
Devil's Ear Spring	3605S	1.76	0.051	0.35	
Falmouth Spring	3422Z	1.30	0.070	0.35	
Fanning Springs	3422S	6.10	0.078	0.35	
Gainer Spring Group	553W	0.21	0.013		
Gemini Springs	2893	1.34	0.078	0.35	
Homosassa Springs Group	1345G	0.74	0.026	0.23	
Hornsby Spring	3653Z	0.66	0.090	0.35	
Ichetucknee Spring Group	3519Z	0.81	0.030	0.35	
Jackson Blue Spring	180Z	3.75	0.021	0.35	
Lafayette Blue Spring	3528Z	3.47	0.074	0.35	
Madison Blue Spring	3315Z	1.82	0.059	0.35	
Manatee Spring	3422R	2.44	0.036	0.35	
Peacock Springs	3483	3.66	0.070	0.35	
Poe Spring	3605W	0.29	0.088		
Rainbow Spring Group	1320A	2.53	0.063	0.35	
Rock Springs Run	2967	0.90	0.097	0.286	0.065+
Silver Glen Springs	28934	0.05	0.036		
Silver Springs	2772A	2.01	0.054	0.35	
Treehouse Spring	3605Q	0.44	0.121		
Troy Spring	3422T	1.73	0.064	0.35	
Volusia Blue Spring	28933	0.75	0.071	0.35	
Wacissa Spring Group	3424Z	0.46	0.037	0.24	
Wakulla Spring	1006X	0.38	0.027	0.35	
Weeki Wachee Spring Group	1382B	0.92	0.008	0.28	
Wekiwa Spring	2956C	1.08	0.128	0.286	0.065+

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Appendices

Appendix A. ToxEval Study

Table A.1 Compounds used in 2022 ToxEval Study.

Bold font indicates ToxEval data available.
[1] = Chemical Abstract Service code

Chemical	CAS[1]	Class	UNITS
Anatoxin-a	64285-06-9	ALGAL_TOXIN	µg/L
Cylindrospermopsin	143545-90-8	ALGAL_TOXIN	µg/L
Desmethyl microcystin LR	120011-66-7	ALGAL_TOXIN	µg/L
Microcystin HilR	169789-55-3	ALGAL_TOXIN	µg/L
Microcystin HtyR	478001-08-0	ALGAL_TOXIN	µg/L
Microcystin LA	96180-79-9	ALGAL_TOXIN	µg/L
Microcystin LF	154037-70-4	ALGAL_TOXIN	µg/L
Microcystin LR	101043-37-2	ALGAL_TOXIN	µg/L
Microcystin LW	157622-02-1	ALGAL_TOXIN	µg/L
Microcystin LY	123304-10-9	ALGAL_TOXIN	µg/L
Microcystin RR	111755-37-4	ALGAL_TOXIN	µg/L
Microcystin WR	138234-58-9	ALGAL_TOXIN	µg/L
Microcystin YR	101064-48-6	ALGAL_TOXIN	µg/L
Nodularin-R	118399-22-7	ALGAL_TOXIN	µg/L
Benzovindiflupyr	1072957-71-1	FUNGICIDE	µg/L
Mandestrobin	173662-97-0	FUNGICIDE	µg/L
Pyraclostrobin	175013-18-0	FUNGICIDE	µg/L
2,4,5-T	93-76-5	HERBICIDE	µg/L
2,4,5-TP (Silvex)	93-72-1	HERBICIDE	µg/L
2,4-D	94-75-7	HERBICIDE	µg/L
Bentazone	25057-89-0	HERBICIDE	µg/L
Diuron	330-54-1	HERBICIDE	µg/L
Fenuron	101-42-8	HERBICIDE	µg/L
Fluridone	59756-60-4	HERBICIDE	µg/L
Glufosinate	51276-47-2	HERBICIDE	µg/L
Glyphosate, Total	1071-83-6	HERBICIDE	µg/L
Imazapyr	81334-34-1	HERBICIDE	µg/L
Linuron	330-55-2	HERBICIDE	µg/L
MCPP	93-65-2	HERBICIDE	µg/L
Triclopyr	55335-06-3	HERBICIDE	µg/L
Acetamiprid	135410-20-7	INSECTICIDE	µg/L
Afidopyropen	915972-17-7	INSECTICIDE	µg/L
AMPA	1066-51-9	INSECTICIDE	µg/L

Chemical	CAS[1]	Class	UNITS
Clothianidin	210880-92-5	INSECTICIDE	µg/L
Dinotefuran	165252-70-0	INSECTICIDE	µg/L
Endothall	145-73-3	INSECTICIDE	µg/L
Imidacloprid	138261-41-3	INSECTICIDE	µg/L
Thiamethoxam	153719-23-4	INSECTICIDE	µg/L
Tolfenpyrad	129558-76-5	INSECTICIDE	µg/L
Acetaminophen	103-90-2	PHARMACEUTICAL	µg/L
Carbamazepine	298-46-4	PHARMACEUTICAL	µg/L
Hydrocodone	125-29-1	PHARMACEUTICAL	µg/L
Ibuprofen	15687-27-1	PHARMACEUTICAL	µg/L
Naproxen	22204-53-1	PHARMACEUTICAL	µg/L
Primidone	125-33-7	PHARMACEUTICAL	µg/L
Acesulfame K	55589-62-3	SWEETENER	µg/L
Sucralose	56038-13-2	SWEETENER	µg/L

Appendix B. Status and Trend Network Appendices

Appendix B1: Status Network Reporting Unit (Zone) Analysis Results Calculated using Probabilistic Monitoring Design

For analysis results reported in this Appendix: CB = Confidence bounds; ISD = insufficient data for reporting; PEC = probable effects concentration.

The following abbreviations for analytes are used: TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; CHL = Chlorophyll *a*; *E. coli* = *Escherichia coli*; DO = Dissolved oxygen; HA = Habitat Assessment.

Table B1.1. Zone 1 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	908	45	100	100	2020-22
TN	908	45	57.8	48.8-66.8	2020-22
TP	908	45	91.1	84.9-97.4	2020-22
CHL	908	45	97.8	94.1-100.0	2020-22
E. coli	908	33	97.0	91.7-100.0	2020-22
DO	908	45	82.2	74.0-90.5	2020-22
pH	908	45	80.0	72.1-87.8	2020-22
HA	908	44	100	100	2020-22

Table B1.2. Zone 2 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	508	38	100	100	2020-22
TN	508	39	100	100	2020-22
TP	508	39	100	100	2020-22
CHL	508	39	100	100	2020-22
E. coli	508	28	100	100	2020-22
DO	508	39	100	100	2020-22
pH	508	38	81.6	73.8-89.4	2020-22
HA	508	38	100	100	2020-22

Table B1.3. Zone 3 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	430	45	100	100	2020-22
TN	430	45	84.4	76.9-92.0	2020-22
TP	430	45	88.9	81.4-96.3	2020-22
CHL	430	43	81.4	73.2-89.6	2020-22
E. coli	430	33	90.9	82.5-99.3	2020-22
DO	430	45	97.8	94.2-100.0	2020-22
pH	430	45	82.2	76.3-88.0	2020-22
HA	430	41	100	100	2020-22

Table B1.4. Zone 4 Percentage Of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	579	44	100	100	2020-22
TN	579	44	90.9	83.6-98.2	2020-22
TP	579	44	63.6	58.7-68.6	2020-22
CHL	579	44	86.4	77.5-95.2	2020-22
E. coli	579	30	100	100	2020-22
DO	579	44	93.2	86.8-99.5	2020-22
pH	579	44	100	100	2020-22
HA	579	15	ISD	ISD	2020-22

Table B1.5. Zone 5 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	192	45	100	100	2020-22
TN	192	45	66.6	55.6-77.6	2020-22
TP	192	45	86.7	80.1-93.2	2020-22
CHL	192	44	40.8	31.2-50.5	2020-22
E. coli	192	31	96.8	91.6-100.0	2020-22
DO	192	45	88.9	82.1-95.7	2020-22
pH	192	45	93.3	86.9-99.6	2020-22
HA	192	45	68.9	62.5-75.3	2020-22

Table B1.6. Zone 6 Percentage of Rivers Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	12	45	100	100	2020-22
TN	12	45	100	100	2020-22
TP	12	45	71.1	63.0-79.2	2020-22
CHL	12	45	77.8	69.8-85.7	2020-22
E. coli	12	31	96.8	91.1-100.0	2020-22
DO	12	45	97.8	94.1-100.0	2020-22
pH	12	45	100	100	2020-22
HA	12	45	64.4	59.2-69.7	2020-22

Table B1.7. Zone 1 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	7656	38	100	100	2020-22
TN	7656	38	65.8	53.1-78.5	2020-22
TP	7656	38	89.5	80.8-98.1	2020-22
CHL	7656	38	97.4	92.8-100.0	2020-22
E. coli	7656	38	76.3	64.1-88.5	2020-22
DO	7656	38	71.1	59.1-83.1	2020-22
pH	7656	38	28.9	16.0-41.8	2020-22
HA	7656	36	91.7	84.0-99.3	2020-22

Table B1.8. Zone 2 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	1357	24	100	100	2020-22
TN	1357	24	70.9	54.2-87.6	2020-22
TP	1357	24	54.2	37.2-71.2	2020-22
CHL	1357	24	91.7	82.3-100.0	2020-22
E. coli	1357	24	41.7	25.2-58.2	2020-22
DO	1357	24	91.6	82.1-100.0	2020-22
pH	1357	24	75.0	62.6-87.5	2020-22
HA	1357	24	87.6	75.8-99.3	2020-22

Table B1.9. Zone 3 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	2770	37	100	100	2020-22
TN	2770	37	94.6	88.4-100.0	2020-22
TP	2770	37	81.1	70.1-92.0	2020-22
CHL	2770	37	97.3	92.9-100.0	2020-22
E. coli	2770	37	73.0	60.1-85.8	2020-22
DO	2770	37	86.5	76.7-96.4	2020-22
pH	2770	37	62.2	49.7-74.7	2020-22
HA	2770	36	86.1	76.3-95.9	2020-22

Table B1.10. Zone 4 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	2590	35	100	100	2020-22
TN	2590	35	62.8	49.6-76.0	2020-22
TP	2590	35	60.0	45.3-74.7	2020-22
CHL	2590	35	94.3	87.5-100.0	2020-22
E. coli	2590	35	57.2	42.3-72.1	2020-22
DO	2590	35	74.3	62.5-86.0	2020-22
pH	2590	35	91.4	83.0-99.9	2020-22
HA	2590	28	74.9	61.8-88.1	2020-22

Table B1.11. Zone 5 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	581	35	100	100	2020-22
TN	581	30	64.0	49.8-78.2	2020-22
TP	581	31	74.2	62.7-85.7	2020-22
CHL	581	35	86.0	76.4-95.7	2020-22
E. coli	581	34	73.3	59.5-87.1	2020-22
DO	581	35	65.8	52.7-78.9	2020-22
pH	581	35	77.5	68.1-86.9	2020-22

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
HA	581	34	79.5	68.1-91.0	2020-22

Table B1.12. Zone 6 Percentage of Streams Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	112	34	100	100	2020-22
TN	112	29	79.3	69.5-89.1	2020-22
TP	112	29	27.5	16.6-38.4	2020-22
CHL	112	34	79.4	68.0-90.8	2020-22
E. coli	112	34	44.1	30.8-57.3	2020-22
DO	112	34	67.6	56.4-78.8	2020-22
pH	112	34	88.2	84.4-92.1	2020-22
HA	112	32	49.9	36.4-63.4	2020-22

Table B1.13. Zone 3 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	303	45	100	100	2020-22
TN	303	45	77.2	67.5-86.9	2020-22
TP	303	45	83.9	74.4-93.4	2020-22
CHL	303	44	90.7	85.6-95.8	2020-22
E. coli	303	44	75.3	63.8-86.7	2020-22
DO	303	45	84.6	75.4-93.7	2020-22
pH	303	45	80.3	72.6-88.1	2020-22

Table B1.14. Zone 4 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	250	45	100	100	2020-22
TN	250	45	86.8	79.5-94.1	2020-22
TP	250	45	89.1	81.3-96.9	2020-22
CHL	250	44	79.4	69.0-89.9	2020-22
E. coli	250	44	77.3	67.3-87.4	2020-22

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	250	45	86.5	78.0-95.1	2020-22
pH	250	45	100	100	2020-22

Table B1.15. Zone 5 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	572	45	100	100	2020-22
TN	572	23	78.3	65.2-91.4	2020-22
TP	572	23	100	100	2020-22
CHL	572	45	82.2	76.0-88.5	2020-22
E. coli	572	42	100	100	2020-22
DO	572	45	84.4	76.2-92.7	2020-22
pH	572	45	97.8	93.8-100.0	2020-22

Table B1.16. Zone 6 Percentage of Canals Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (miles)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	1245	45	100	100	2020-22
TN	1245	7	ISD	ISD	2020-22
TP	1245	7	ISD	ISD	2020-22
CHL	1245	45	84.4	77.0-91.9	2020-22
E. coli	1245	45	95.6	90.3-100.0	2020-22
DO	1245	45	84.4	75.7-93.2	2020-22
pH	1245	45	100	100	2020-22

Table B1.17. Zone 1 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	44521	45	100	100	2020-22
TN	44521	45	100	100	2020-22
TP	44521	45	100	100	2020-22
CHL	44521	45	73.0	64.1-81.8	2020-22
E. coli	44521	45	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	44521	45	87.1	84.1-90.1	2020-22
pH	44521	45	57.3	50.5-64.1	2020-22

Table B1.18. Zone 2 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	18696	44	100	100	2020-22
TN	18696	44	100	100	2020-22
TP	18696	44	100	100	2020-22
CHL	18696	44	67.8	57.0-78.6	2020-22
E. coli	18696	44	100	100	2020-22
DO	18696	44	100	100	2020-22
pH	18696	44	50.3	40.7-59.8	2020-22

Table B1.19. Zone 3 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	293806	45	100	100	2020-22
TN	293806	44	79.7	70.1-89.2	2020-22
TP	293806	45	95.7	91.0-100.0	2020-22
CHL	293806	45	25.7	14.9-36.6	2020-22
E. coli	293806	41	100	100	2020-22
DO	293806	45	100	100	2020-22
pH	293806	45	58.3	45.0-71.6	2020-22

Table B1.20. Zone 4 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	106339	45	100	100	2020-22
TN	106339	44	88.5	80.8-96.2	2020-22
TP	106339	45	90.7	84.1-97.4	2020-22
CHL	106339	45	47.2	35.8-58.6	2020-22
E. coli	106339	44	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	106339	45	97.8	94.1-100.0	2020-22
pH	106339	45	73.4	62.7-84.1	2020-22

Table B1.21. Zone 5 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	149585	43	100	100	2020-22
TN	149585	44	94.0	88.9-99.1	2020-22
TP	149585	44	86.0	79.1-92.9	2020-22
CHL	149585	44	31.2	24.6-37.9	2020-22
E. coli	149585	41	100	100	2020-22
DO	149585	44	100	100	2020-22
pH	149585	43	59.4	48.8-70.1	2020-22

Table B1.22. Zone 6 Percentage of Large Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	321163	45	100	100	2020-22
TN	321163	45	100	100	2020-22
TP	321163	45	14.8	0.0-37.6	2020-22
CHL	321163	45	43.0	8.3-77.6	2020-22
E. coli	321163	44	100	99.9-100.0	2020-22
DO	321163	45	100	100	2020-22
pH	321163	45	71.5	45.2-97.7	2020-22

Table B1.23. Zone 1 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	4730	35	100	100	2020-22
TN	4730	34	100	100	2020-22
TP	4730	35	94.5	87.9-100.0	2020-22
CHL	4730	35	65.5	52.4-78.6	2020-22
E. coli	4730	35	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	4730	35	74.3	61.7-86.9	2020-22
pH	4730	35	39.6	25.4-53.8	2020-22

Table B1.24. Zone 2 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	890	34	100	100	2020-22
TN	890	35	80.0	70.0-90.0	2020-22
TP	890	35	77.1	65.7-88.5	2020-22
CHL	890	35	45.6	32.6-58.6	2020-22
E. coli	890	35	97.1	91.9-100.0	2020-22
DO	890	35	82.8	71.4-94.2	2020-22
pH	890	34	20.5	8.3-32.7	2020-22

Table B1.25. Zone 3 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	11789	35	100	100	2020-22
TN	11789	35	94.3	87.1-100.0	2020-22
TP	11789	35	97.2	92.8-100.0	2020-22
CHL	11789	35	68.0	54.6-81.4	2020-22
E. coli	11789	34	97.0	91.7-100.0	2020-22
DO	11789	35	68.8	54.8-82.7	2020-22
pH	11789	35	60.1	47.2-73.1	2020-22

Table B1.26. Zone 4 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	6585	32	100	100	2020-22
TN	6585	34	97.4	92.9-100.0	2020-22
TP	6585	34	97.4	92.9-100.0	2020-22
CHL	6585	34	60.6	46.6-74.6	2020-22
E. coli	6585	34	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
DO	6585	34	72.9	60.5-85.3	2020-22
pH	6585	32	72.1	58.4-85.8	2020-22

Table B1.27. Zone 5 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	751	34	100	100	2020-22
TN	751	34	100	100	2020-22
TP	751	34	94.1	88.5-99.8	2020-22
CHL	751	34	82.4	71.9-92.9	2020-22
E. coli	751	33	100	100	2020-22
DO	751	34	85.3	76.0-94.6	2020-22
pH	751	34	85.4	76.2-94.6	2020-22

Table B1.28. Zone 6 Percentage of Small Lakes Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
TAN	52	9	ISD	ISD	2020-22
TN	52	9	ISD	ISD	2020-22
TP	52	9	ISD	ISD	2020-22
CHL	52	9	ISD	ISD	2020-22
E. coli	52	9	ISD	ISD	2020-22
DO	52	9	ISD	ISD	2020-22
pH	52	9	ISD	ISD	2020-22

Table B1.29. Zone 1 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	44521	45	100	100	2020-22
Cadmium	44521	45	100	100	2020-22
Chromium	44521	45	100	100	2020-22
Copper	44521	45	100	100	2020-22
Silver	44521	45	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Nickel	44521	45	100	100	2020-22
Lead	44521	45	100	100	2020-22
Mercury	44521	45	100	100	2020-22
Zinc	44521	45	100	100	2020-22
All	44521	45	100	100	2020-22

Table B1.30. Zone 2 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	18696	44	100	100	2020-22
Cadmium	18696	44	100	100	2020-22
Chromium	18696	44	100	100	2020-22
Copper	18696	44	100	100	2020-22
Silver	18696	44	100	100	2020-22
Nickel	18696	44	100	100	2020-22
Lead	18696	44	100	100	2020-22
Mercury	18696	44	100	100	2020-22
Zinc	18696	44	100	100	2020-22
All	18696	44	100	100	2020-22

Table B1.31. Zone 3 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	293806	45	100	100	2020-22
Cadmium	293806	45	100	100	2020-22
Chromium	293806	45	100	100	2020-22
Copper	293806	45	97.9	94.4-100.0	2020-22
Silver	293806	45	100	100	2020-22
Nickel	293806	45	97.3	92.9-100.0	2020-22
Lead	293806	45	97.9	94.4-100.0	2020-22
Mercury	293806	45	100	100	2020-22
Zinc	293806	45	100	100	2020-22
All	293806	45	95.2	89.5-100.0	2020-22

Table B1.32. Zone 4 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	106339	45	97.7	94.0-100.0	2020-22
Cadmium	106339	45	100	100	2020-22
Chromium	106339	45	95.8	91.3-100.0	2020-22
Copper	106339	45	93.4	88.0-98.8	2020-22
Silver	106339	45	100	100	2020-22
Nickel	106339	45	100	100	2020-22
Lead	106339	45	93.4	87.1-99.8	2020-22
Mercury	106339	45	100	100	2020-22
Zinc	106339	45	100	100	2020-22
All	106339	45	84.8	76.6-93.1	2020-22

Table B1.33. Zone 5 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	149585	42	100	100	2020-22
Cadmium	149585	42	100	100	2020-22
Chromium	149585	42	100	100	2020-22
Copper	149585	42	100	100	2020-22
Silver	149585	42	100	100	2020-22
Nickel	149585	42	100	100	2020-22
Lead	149585	42	100	100	2020-22
Mercury	149585	42	100	100	2020-22
Zinc	149585	42	100	100	2020-22
All	149585	42	100	100	2020-22

Table B1.34. Zone 6 Percentage of Large Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	321163	45	100	100	2020-22
Cadmium	321163	45	100	100	2020-22
Chromium	321163	45	100	100	2020-22
Copper	321163	45	100	100	2020-22
Silver	321163	45	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Nickel	321163	45	100	100	2020-22
Lead	321163	45	100	100	2020-22
Mercury	321163	45	100	100	2020-22
Zinc	321163	45	100	100	2020-22
All	321163	45	100	100	2020-22

Table B1.35. Zone 1 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	4730	31	100	100	2020-22
Cadmium	4730	31	100	100	2020-22
Chromium	4730	31	100	100	2020-22
Copper	4730	31	100	100	2020-22
Silver	4730	31	100	100	2020-22
Nickel	4730	31	100	100	2020-22
Lead	4730	31	93.4	85.6-100.0	2020-22
Mercury	4730	32	100	100	2020-22
Zinc	4730	31	100	100	2020-22
All	4730	33	93.8	86.5-100.0	2020-22

Table B1.36. Zone 2 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	890	35	100	100	2020-22
Cadmium	890	35	100	100	2020-22
Chromium	890	35	97.1	92.2-100.0	2020-22
Copper	890	35	100	100	2020-22
Silver	890	35	100	100	2020-22
Nickel	890	35	100	100	2020-22
Lead	890	35	97.1	91.9-100.0	2020-22
Mercury	890	35	100	100	2020-22
Zinc	890	35	100	100	2020-22
All	890	35	94.1	87.2-100.0	2020-22

Table B1.37. Zone 3 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	11789	35	100	100	2020-22
Cadmium	11789	35	100	100	2020-22
Chromium	11789	35	100	100	2020-22
Copper	11789	35	94.4	87.5-100.0	2020-22
Silver	11789	35	100	100	2020-22
Nickel	11789	35	100	100	2020-22
Lead	11789	35	88.7	80.0-97.5	2020-22
Mercury	11789	35	97.2	92.8-100.0	2020-22
Zinc	11789	35	94.4	87.8-100.0	2020-22
All	11789	35	83.2	73.4-93.0	2020-22

Table B1.38. Zone 4 Percentage of Small Lakes Meeting Sediment PEC Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	6585	32	87.6	78.2-97.0	2020-22
Cadmium	6585	32	100	100	2020-22
Chromium	6585	32	96.6	90.6-100.0	2020-22
Copper	6585	32	87.5	78.0-97.1	2020-22
Silver	6585	32	100	100	2020-22
Nickel	6585	32	100	100	2020-22
Lead	6585	32	94.4	87.8-100.0	2020-22
Mercury	6585	32	100	100	2020-22
Zinc	6585	32	97.2	92.4-100.0	2020-22
All	6585	32	77.9	65.6-90.3	2020-22

Table B1.39. Zone 5 Percentage of Small Lakes Meeting Sediment Pec Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	751	32	100	100	2020-22
Cadmium	751	32	100	100	2020-22
Chromium	751	32	100	100	2020-22
Copper	751	32	87.5	78.3-96.7	2020-22
Silver	751	32	100	100	2020-22

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Nickel	751	32	100	100	2020-22
Lead	751	32	90.6	82.7-98.5	2020-22
Mercury	751	32	100	100	2020-22
Zinc	751	32	96.8	91.7-100.0	2020-22
All	751	32	78.1	66.0-90.2	2020-22

Table B1.40. Zone 6 Percentage of Small Lakes Meeting Sediment Pec Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (acres)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	52	9	ISD	ISD	2020-22
Cadmium	52	9	ISD	ISD	2020-22
Chromium	52	9	ISD	ISD	2020-22
Copper	52	9	ISD	ISD	2020-22
Silver	52	9	ISD	ISD	2020-22
Nickel	52	9	ISD	ISD	2020-22
Lead	52	9	ISD	ISD	2020-22
Mercury	52	9	ISD	ISD	2020-22
Zinc	52	9	ISD	ISD	2020-22
All	52	9	ISD	ISD	2020-22

Table B1.41. Zone 1 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	10507	60	97.2	94.5-99.9	2020-22
Cadmium	10507	60	100	100	2020-22
Chromium	10507	60	100	100	2020-22
Lead	10507	60	100	100	2020-22
Nitrate+Nitrite	10507	60	100	100	2020-22
Sodium	10507	60	100	100	2020-22
Fluoride	10507	60	100	100	2020-22
Total Coliform Bacteria	10507	52	89.4	80.6-98.3	2020-22

Table B1.42. Zone 2 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	2670	58	95.7	89.9-100.0	2020-22
Cadmium	2670	58	100	100	2020-22
Chromium	2670	58	100	100	2020-22
Lead	2670	58	100	100	2020-22
Nitrate+Nitrite	2670	58	98.8	96.7-100.0	2020-22
Sodium	2670	58	100	100	2020-22
Fluoride	2670	58	100	100	2020-22
Total Coliform Bacteria	2670	55	80.9	72.2-89.5	2020-22

Table B1.43. Zone 3 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	1152	58	100	100	2020-22
Cadmium	1152	58	100	100	2020-22
Chromium	1152	58	100	100	2020-22
Lead	1152	58	98.0	94.7-100.0	2020-22
Nitrate+Nitrite	1152	57	98.7	96.7-100.0	2020-22
Sodium	1152	58	87.0	79.1-94.9	2020-22
Fluoride	1152	58	100	100	2020-22
Total Coliform Bacteria	1152	49	80.4	69.3-91.5	2020-22

Table B1.44. Zone 4 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	869	56	97.5	93.2-100.0	2020-22
Cadmium	869	56	100	100	2020-22
Chromium	869	56	100	100	2020-22
Lead	869	56	100	100	2020-22
Nitrate+Nitrite	869	55	100	100	2020-22

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Sodium	869	56	83.0	75.3-90.8	2020-22
Fluoride	869	56	100	100	2020-22
Total Coliform Bacteria	869	48	64.8	52.1-77.4	2020-22

Table B1.45. Zone 5 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	203	58	100	100	2020-22
Cadmium	203	58	100	100	2020-22
Chromium	203	58	100	100	2020-22
Lead	203	58	96.8	93.3-100.0	2020-22
Nitrate+Nitrite	203	58	100	100	2020-22
Sodium	203	58	67.9	59.7-76.1	2020-22
Fluoride	203	58	100	100	2020-22
Total Coliform Bacteria	203	46	50.8	37.6-64.0	2020-22

Table B1.46. Zone 6 Percentage of Confined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	23	59	100	100	2020-22
Cadmium	23	59	100	100	2020-22
Chromium	23	59	100	100	2020-22
Lead	23	59	100	100	2020-22
Nitrate+Nitrite	23	59	100	100	2020-22
Sodium	23	59	6.8	2.0-11.6	2020-22
Fluoride	23	59	100	100	2020-22
Total Coliform Bacteria	23	45	95.9	90.9-100.0	2020-22

Table B1.47. Zone 1 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	16866	60	91.7	82.0-100.0	2020-22
Cadmium	16866	60	100	100	2020-22
Chromium	16866	60	100	100	2020-22
Lead	16866	60	100	100	2020-22
Nitrate+Nitrite	16866	60	100	100	2020-22
Sodium	16866	60	99.1	97.6-100.0	2020-22
Fluoride	16866	60	100	100	2020-22
Total Coliform Bacteria	16866	56	85.1	73.7-96.6	2020-22

Table B1.48. Zone 2 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	3378	51	97.1	92.3-100.0	2020-22
Cadmium	3378	51	100	100	2020-22
Chromium	3378	51	100	100	2020-22
Lead	3378	51	96.8	93.1-100.0	2020-22
Nitrate+Nitrite	3378	51	93.1	85.4-100.0	2020-22
Sodium	3378	51	100	100	2020-22
Fluoride	3378	51	100	100	2020-22
Total Coliform Bacteria	3378	44	63.0	49.0-77.0	2020-22

Table B1.49. Zone 3 Percentage of Unconfined Aquifer Wells Meeting Threshold Values For Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	689	59	100	100	2020-22
Cadmium	689	59	100	100	2020-22
Chromium	689	59	100	100	2020-22
Lead	689	59	98.3	95.6-100.0	2020-22
Nitrate+Nitrite	689	59	100	100	2020-22

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Sodium	689	59	94.1	89.7-98.6	2020-22
Fluoride	689	59	100	100	2020-22
Total Coliform Bacteria	689	54	65.2	53.2-77.2	2020-22

Table B1.50. Zone 4 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	673	59	88.8	79.4-98.3	2020-22
Cadmium	673	59	100	100	2020-22
Chromium	673	59	100	100	2020-22
Lead	673	59	95.2	91.6-98.7	2020-22
Nitrate+Nitrite	673	59	97.4	94.9-100.0	2020-22
Sodium	673	59	89.5	81.1-97.9	2020-22
Fluoride	673	59	100	100	2020-22
Total Coliform Bacteria	673	48	53.4	41.7-65.1	2020-22

Table B1.51. Zone 5 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	221	56	92.8	84.4-100.0	2020-22
Cadmium	221	56	100	100	2020-22
Chromium	221	56	100	100	2020-22
Lead	221	56	96.5	93.4-99.6	2020-22
Nitrate+Nitrite	221	56	100	100	2020-22
Sodium	221	56	95.6	91.9-99.3	2020-22
Fluoride	221	56	100	100	2020-22
Total Coliform Bacteria	221	48	39.5	25.7-53.3	2020-22

Table B1.52. Zone 6 Percentage of Unconfined Aquifer Wells Meeting Threshold Values for Indicators Calculated Using Probabilistic Monitoring Design

Analyte	Target Population (wells)	Number of Samples	% Meeting Threshold	Meeting Threshold 95% CB	Assessment Period
Arsenic	754	58	95.8	90.8-100.0	2020-22
Cadmium	754	58	100	100	2020-22
Chromium	754	58	100	100	2020-22
Lead	754	58	100	100	2020-22
Nitrate+Nitrite	754	58	100	100	2020-22
Sodium	754	58	83.6	75.9-91.2	2020-22
Fluoride	754	58	100	100	2020-22
Total Coliform Bacteria	754	49	43.9	31.6-56.3	2020-22

Appendix B2: Surface Water and Groundwater Trends for Individual Stations

For all analysis results reported in this Appendix the following abbreviations for analytes are used: ALK = Alkalinity (mg/L); CAL = Calcium (mg/L); CL = Chloride (mg/L); CHL = Chlorophyll *a* (ug/L); DO = Dissolved oxygen (% saturation); *E. coli* = E*scherichia coli* (CFU/100mL or MPN/100mL); K = Potassium (mg/L); Mg = Magnesium (mg/L); Na = Sodium (mg/L); NOx = Nitrate+Nitrite (mg/L); OPO4 = orthophosphate (mg/L); SC = Specific conductance (uS/cm); SO4 = Sulfate (mg/L); TAN = Total ammonia nitrogen (mg/L); Temp = Temperature (degrees C); TC = Total coliform (CFU/100mL or MPN/100mL); TDS = Total dissolved solids (mg/L); TKN = Total Kjeldahl nitrogen (mg/L); TN = Total nitrogen (mg/L); TOC = Total organic carbon (mg/L); TP = Total phosphorus (mg/L); TSS = Total suspended solids (mg/L); Turb = Turbidity (NTU); WL = Water Level (ft).

Table B2.1a. Trends for Specified Analytes for 47 Stations from the Surface Water Trend Monitoring Network associated with a USGS, SJRWMD or SFWMD Gauging Station and Adjusted for Water Flow

Note: A positive trend is indicated with a plus sign (+), a negative trend is indicated with a minus sign (-), no trend is indicated by a lower-case letter "o," insufficient data to determine a trend is indicated by (ISD), and insufficient evidence to determine a trend is indicated by (ISE). Unless otherwise noted, analyses are based on data collected between October 1998 and December 2022. Analyses are based on data collected between October 1998 and December 2022, with the following exceptions:
[1]For all stations, the period of record for *Escherichia coli* reporting begins in October 2013.
[2]For station 3506/59629, the period of record begins in February 1999.
[3]For stations 3501 and 3504, the period of record begins in March 1999.
[4]For stations 3497 and 3568, the period of record begins in April 1999.
[5]For stations 6976 and 6978, the period of record begins in October 1999.
[6]For station 3551, the period of record begins in October 2001.
[7]For stations 21179, 21202, 21380, 21460 and 21461, the period of record begins in October 2004.
[8]For station 3538, the period of record begins in October 2006.
[9]For station 34879, the period of record begins in October 2008.
[10]For station 21203, the period of record begins in October 2010.
[11]For station 3500, the period of record begins in August 2017.

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3497[4]	Fisheating Creek	+	o	-	+	+	o	-	-	-	o	+	-	-	-	o	-	-	o	o	-	+
3500[11]	St. Lucie River	o	o	o	o	o	o	o	o	o	o	o	o	-	o	o	o	o	o	o	o	o
3501[3]	Kissimmee River	-	-	o	+	o	-	o	o	o	o	o	o	-	o	+	o	o	-	o	o	+
3504[3]	Belcher Canal	+	o	+	+	o	o	+	+	+	o	o	+	o	-	o	-	-	o	o	-	+
3509	Anclote River	o	o	o	-	+	o	-	-	o	-	o	ISE	-	-	o	-	-	-	-	-	o
3513	Withlacoochee River	+	o	+	+	o	o	o	+	+	+	o	o	-	-	o	o	o	o	-	-	o
3515	St. Johns River	o	o	o	o	o	o	-	o	o	o	o	o	-	-	+	-	-	o	o	-	-
3516	Tomoka River	+	+	+	o	o	o	o	+	+	+	+	+	-	-	+	o	o	o	o	-	+

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3517	Oklawaha River	+	+	ISE	+	o	o	o	+	+	+	+	+	-	-	+	o	+	o	o	o	+
3519	Suwannee River	+	+	+	+	o	o	+	+	+	+	+	+	+	-	+	o	+	-	-	-	-
3522	Suwannee River	+	+	+	+	+	o	+	+	+	+	+	+	+	-	+	o	+	o	-	-	-
3524	Apalachicola River	+	+	o	+	o	o	o	+	-	+	o	o	-	-	+	o	+	-	-	-	o
3527	Ochlockonee River	o	+	-	+	o	o	o	+	-	+	-	o	-	-	o	o	+	o	o	-	o
3530	Suwannee River	+	+	o	+	o	o	+	+	+	+	+	+	+	-	+	o	+	o	o	-	-
3531	Econfina Creek	+	+	o	-	o	-	+	+	+	+	+	+	o	-	o	o	+	-	-	-	o
3532	Telogia Creek	+	+	o	-	o	o	o	+	o	+	o	o	-	-	+	o	+	o	o	o	+
3534	Choctawhatchee River	+	+	+	+	o	+	+	+	+	+	-	+	-	-	+	o	+	-	o	o	o
3536	Alaqua Creek	+	+	o	-	o	o	+	o	o	-	-	o	o	-	+	o	-	o	-	-	-
3538[8]	Alapaha River	ISE	o	-	o	o	+	o	o	-	o	+	-	ISE	-	o	-	-	-	o	-	o
3540	Ochlockonee River	ISE	+	-	+	o	ISE	o	+	-	o	-	o	-	-	o	o	o	o	-	o	+
3542	Perdido River	+	+	+	-	o	o	o	+	-	o	-	-	-	-	+	o	-	o	-	-	o
3543	Apalachicola River	+	+	o	+	o	o	o	+	-	+	o	o	-	-	+	o	+	o	-	-	-
3545	Blackwater River	o	o	o	-	o	o	+	o	+	+	-	-	-	-	o	o	o	o	-	-	o
3546	Yellow River	+	+	o	+	o	o	o	+	o	+	-	+	-	-	o	o	+	-	o	o	o
3548	Choctawhatchee River	+	+	+	ISE	o	o	+	+	+	+	-	+	-	-	+	o	+	-	o	-	o
3549	Escambia River	+	+	-	+	o	o	o	+	+	+	-	+	o	+	o	+	+	o	+	+	+
3550	Brushy Creek	o	+	-	-	+	o	o	+	-	-	-	-	-	-	+	-	-	-	-	o	+
3551[6]	Yellow River	+	+	o	o	o	ISD	o	+	+	+	-	+	o	-	o	-	o	-	-	o	o
3554	Alafia River	+	ISE	o	+	+	o	o	+	o	-	+	+	o	-	+	o	-	o	-	-	-
3555	Little Manatee River	+	o	ISE	o	o	o	ISE	ISE	+	-	o	o	o	-	+	o	-	+	-	-	+
3556	Peace River	+	o	-	ISE	o	o	o	o	o	o	o	o	-	-	o	o	o	o	-	o	+
3557	St. Johns River	+	o	o	+	o	o	ISE	o	o	o	o	o	-	-	+	-	-	o	o	o	+
3560	Withlacoochee River	+	o	o	o	+	o	-	o	+	o	+	o	-	-	o	-	-	-	o	-	-
3563	New River	o	o	o	+	o	o	+	+	o	o	o	o	-	o	o	+	+	+	o	o	+

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3566	Weeki Wachee River	+	+	+	o	o	+	+	+	+	+	-	+	+	-	o	+	+	-	-	-	o
3568[4]	Caloosahatchee River	o	o	-	ISE	+	o	o	-	-	-	o	-	-	-	o	o	-	o	-	o	+
6976[5]	Econfina River	o	+	o	o	o	o	+	+	o	+	+	+	o	-	+	-	o	-	o	-	+
6978[5]	Steinhatchee River	o	o	-	o	o	+	+	o	-	+	+	o	-	-	+	o	o	ISE	o	-	+
21179[7]	Spruce Creek	o	o	+	o	-	-	o	o	+	+	o	o	ISE	-	+	ISE	ISE	o	-	-	o
21202[7]	Orange Creek	+	o	o	+	o	o	o	+	o	+	+	o	o	-	+	-	-	-	-	-	o
21203[10]	Crabgrass Creek	o	o	o	ISD	o	ISD	o	o	+	+	+	o	o	o	o	+	+	+	+	-	o
21380[7]	Homosassa Spring Run	+	o	-	o	+	o	-	-	-	+	o	-	-	-	o	-	+	-	o	-	+
21460[7]	Wrights Creek	o	o	-	o	-	+	o	+	o	o	-	o	-	-	+	o	o	o	o	-	o
21461[7]	Big Coldwater Creek	o	+	+	o	-	o	+	+	o	+	-	+	-	-	o	o	+	o	-	-	o
34879[9]	Wakulla River	+	+	o	+	-	+	o	o	o	-	-	o	o	-	ISE	-	-	o	o	-	+
3506 / 59629[2]	Kissimmee River	+	+	+	ISE	-	o	o	o	+	o	-	o	-	-	+	o	o	-	o	-	o
3561 / 52614	Charlie Creek	+	o	-	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	-	+

Table B2.1b. Gauging Stations used for Surface Water Trend Monitoring Network Trend Analyses Adjusted for Water Flow

Water Quality Station	Waterbody Name	Flow Data Source	Flow Station
3497	Fisheating Creek	USGS	02256500
3500	St. Lucie River	USGS	02276998
3501	Kissimmee River	SFWMD	S65E_S
3504	Belcher Canal	SFWMD	S50_S
3509	Anclote River	USGS	02310000
3513	Withlacoochee River	USGS	02313000

Water Quality Station	Waterbody Name	Flow Data Source	Flow Station
3515	St. Johns River	USGS	02236125
3516	Tomoka River	USGS	02247510
3517	Oklawaha River	USGS	02240500
3519	Suwannee River	USGS	02323500
3522	Suwannee River	USGS	02320500
3524	Apalachicola River	USGS	02359170
3527	Ochlockonee River	USGS	02330150
3530	Suwannee River	USGS	02319500
3531	Econfina Creek	USGS	02359500
3532	Telogia Creek	USGS	02330100
3534	Choctawhatchee River	USGS	02366500
3536	Alaqua Creek	USGS	02366996
3538	Alapaha River	USGS	02317620
3540	Ochlockonee River	USGS	02328522
3542	Perdido River	USGS	02376500
3543	Apalachicola River	USGS	02358000
3545	Blackwater River	USGS	02370000
3546	Yellow River	USGS	02367900
3548	Choctawhatchee River	USGS	02365200
3549	Escambia River	USGS	02375500
3550	Brushy Creek	USGS	02376293
3551	Yellow River	USGS	02369600
3554	Alafia River	USGS	02301500
3555	Little Manatee River	USGS	02300500
3556	Peace River	USGS	02296750
3557	St. Johns River	USGS	02232500
3560	Withlacoochee River	USGS	02311500
3563	New River	USGS	02330400

Water Quality Station	Waterbody Name	Flow Data Source	Flow Station
3566	Weeki Wachee River	USGS	02310525
3568	Caloosahatchee River	USGS	02292900
6976	Econfina River	USGS	02326000
6978	Steinhatchee River	USGS	02324000
21179	Spruce Creek	USGS	02248000
21202	Orange Creek	USGS	02243000
21203	Crabgrass Creek	SJRWMD	02090218
21380	Homosassa Spring Run	USGS	02310678
21460	Wrights Creek	USGS	02365470
21461	Big Coldwater Creek	USGS	02370500
34879	Wakulla River	USGS	02327022
3506 / 59629	Kissimmee River	SFWMD	S65_S
3561 / 52614	Charlie Creek	USGS	02296500

Table B2.2. Trends for Specified Analytes for 78 stations from the Surface Water Trend Monitoring Network, Not Adjusted for Water Flow.

Note: A positive trend is indicated with a plus sign (+), a negative trend is indicated with a minus sign (-), no trend is indicated by a lower-case letter "o," insufficient data to determine a trend is indicated by (ISD), and insufficient evidence to determine a trend is indicated by (ISE). Analyses are based on data collected between October 1998 and December 2022, with the following exceptions:
[1]For all stations, the period of record for *Escherichia coli* reporting begins in October 2013.
[2]For station 3559, the period of record begins in November 1998.
[3]For Stations 3494 and 3495, the period of record begins in December 1998.
[4]For station 3506/59629, the period of record begins in February 1999.
[5]For stations 3500, 3501, 3504 and 3558, the period of record begins in March 1999.
[6]For stations 3497 and 3568, the period of record begins in April 1999.
[7]For stations 6976 and 6978, the period of record begins in October 1999.
[8]For stations 21179, 21200, 21201, 21202, 21380, 21460 and 21461, the period of record begins in October 2004.
[9]For station 34879, the period of record begins in October 2008.
[10]For station 21203, the period of record begins in October 2010.
[11]For station 44061, the period of record begins in October 2013.
[12]For station 51559, the period of record begins in October 2017.

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3494[3]	Barron River	o	+	+	ISE	o	o	ISE	ISE	+	+	-	o	o	o	o	ISE	ISE	ISE	+	-	+

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3495[3]	Golden Gate Canal	-	-	+	+	+	o	+	+	+	+	+	o	-	-	+	o	o	-	-	-	o
3497[6]	Fisheating Creek	o	-	-	+	+	o	-	-	-	+	+	-	-	-	o	-	-	+	o	o	+
3499	Myakka River	o	+	+	+	+	+	+	+	+	o	+	+	+	-	+	o	+	o	o	ISE	+
3500[5]	St. Lucie River	+	o	-	+	o	o	-	-	-	-	+	-	-	-	+	-	-	o	-	-	o
3501[5]	Kissimmee River	-	-	o	+	o	o	o	o	o	o	o	o	-	o	+	o	o	-	o	o	+
3502	Phillippe Creek	o	o	+	+	o	o	o	o	+	o	-	o	-	-	o	+	+	o	o	o	+
3504[5]	Belcher Canal	o	o	o	+	o	+	+	+	o	o	o	o	-	-	+	o	o	o	+	o	+
3505	Manatee River	o	o	o	+	+	o	+	o	+	o	+	o	o	-	+	+	+	+	o	o	o
3507	Hillsborough River	o	o	ISE	+	o	o	ISE	o	ISE	-	o	o	-	-	o	o	-	o	o	-	o
3508	Crane Creek	+	o	-	+	-	+	+	-	-	+	o	-	-	-	ISE	-	-	o	o	-	-
3509	Anclote River	-	-	ISE	ISE	+	o	-	-	ISE	-	ISE	-	-	-	o	o	-	o	-	ISE	o
3513	Withlacoochee River	+	o	+	ISE	-	o	o	-	+	+	-	-	-	-	o	+	+	+	+	o	+
3515	St. Johns River	o	-	-	o	-	o	-	-	-	o	-	-	-	-	+	-	-	o	o	-	-
3516	Tomoka River	o	o	+	o	o	o	+	o	+	+	o	o	-	-	+	o	o	o	o	o	+
3517	Oklawaha River	+	+	+	o	o	+	+	+	+	o	o	+	-	-	+	+	+	o	o	o	+
3519	Suwannee River	o	o	+	o	o	o	+	o	+	+	o	o	o	-	o	+	+	+	o	ISE	o
3521	Santa Fe River	o	o	-	-	o	+	o	-	-	+	o	o	-	-	o	o	+	o	o	-	o
3522	Suwannee River	o	o	+	-	o	o	+	o	o	+	o	o	o	-	o	+	+	+	-	o	+
3524	Apalachicola River	o	o	o	+	o	o	o	+	-	+	-	o	-	-	o	o	+	o	o	-	+
3526	Aucilla River	o	o	o	-	o	o	o	o	o	+	+	o	o	-	o	+	+	o	o	-	o
3527	Ochlockonee River	o	o	-	+	o	o	o	+	-	+	-	-	-	-	o	+	+	+	o	o	+
3528	St. Marks River	ISE	ISE	+	-	-	+	+	+	+	o	o	+	-	-	-	+	+	o	+	-	+
3530	Suwannee River	o	o	+	o	+	o	+	o	o	+	o	o	o	-	o	+	+	o	-	o	+
3531	Econfina Creek	+	+	o	-	-	-	+	+	+	+	o	+	-	-	+	+	+	+	o	o	+
3532	Telogia Creek	-	+	o	o	o	o	+	+	o	+	-	o	-	-	+	+	+	+	o	o	+
3533	East Bay River	o	o	o	-	o	o	o	o	o	-	-	o	o	-	o	-	-	o	-	-	o
3534	Choctawhatchee River	o	o	o	ISE	o	o	+	o	o	+	-	o	-	-	o	o	+	o	o	o	+

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3535	Suwannee River	o	o	o	-	o	o	+	+	o	o	o	-	-	-	o	o	o	o	o	o	+
3536	Alaqua Creek	+	+	o	-	o	+	+	+	+	-	-	+	ISE	-	+	o	-	o	-	ISE	o
3537	Nassau River	o	o	o	+	-	o	o	o	o	o	o	o	o	-	+	-	-	o	o	-	o
3538	Alapaha River	-	o	-	+	o	o	+	o	-	-	o	-	-	-	o	o	-	o	-	o	+
3539	Withlacoochee River	o	o	+	+	o	+	+	o	+	o	o	o	-	-	o	o	o	o	-	o	o
3540	Ochlockonee River	o	o	-	+	o	+	o	o	-	o	-	o	-	-	o	o	-	o	-	o	+
3541	Escambia River	o	o	o	+	+	o	o	+	o	+	-	o	o	o	o	+	+	o	+	+	+
3542	Perdido River	o	+	o	-	o	+	+	o	-	-	-	-	-	-	+	o	-	+	-	o	+
3543	Apalachicola River	o	o	-	+	o	o	o	+	-	+	o	o	-	-	+	o	+	o	o	o	o
3544	St. Marys River	-	-	-	-	-	o	-	-	-	-	-	-	-	-	+	-	-	o	-	-	o
3545	Blackwater River	o	o	o	-	o	o	+	o	+	o	-	-	-	-	o	o	o	o	o	o	+
3546	Yellow River	o	o	o	+	o	o	o	o	o	+	-	o	-	-	o	o	+	o	o	o	o
3547	Cowarts Creek	+	+	+	ISE	o	o	+	+	+	+	o	+	o	o	+	+	+	o	+	ISE	+
3548	Choctawhatchee River	o	o	o	+	o	o	+	+	o	+	-	o	-	-	o	o	+	o	o	o	+
3549	Escambia River	o	o	-	+	o	o	o	+	o	+	-	o	-	+	o	+	+	o	+	+	+
3550	Brushy Creek	o	+	-	-	+	+	o	+	-	-	-	-	-	-	o	-	-	o	-	o	+
3551	Yellow River	o	+	+	o	o	o	+	+	+	+	-	+	-	-	o	o	o	o	o	o	+
3552	Chipola River	+	+	ISE	ISE	o	o	+	+	-	+	o	+	-	-	+	+	+	+	o	o	+
3553	St. Johns River	+	o	-	+	-	o	-	-	-	o	o	-	-	-	+	-	-	o	-	o	+
3554	Alafia River	+	ISE	-	+	o	o	o	+	o	-	+	o	-	-	+	o	-	o	-	-	o
3555	Little Manatee River	o	o	-	o	o	o	-	o	+	-	o	-	ISE	-	+	o	-	+	-	o	+
3556	Peace River	o	-	-	+	o	o	o	-	o	o	-	-	-	-	o	+	o	o	-	o	ISE
3557	St. Johns River	o	-	-	ISE	o	o	-	-	-	o	o	-	-	-	+	-	-	o	o	-	o
3558[5]	Miami Canal	-	-	o	o	o	o	o	o	o	-	o	-	-	o	+	-	-	-	-	-	-
3559[2]	Hillsboro Canal	o	o	o	+	+	+	o	-	o	o	+	o	ISE	o	+	-	-	-	o	-	o
3560	Withlacoochee River	o	o	o	-	+	o	-	o	o	o	+	-	-	-	o	-	-	-	o	-	-

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3563	New River	o	o	-	o	o	o	+	+	o	o	o	o	-	ISE	o	+	+	+	o	o	+
3564	Waccasassa River	-	-	o	o	o	o	o	-	o	o	o	-	-	-	o	+	+	+	-	-	o
3565	Eleven Mile Creek	-	-	-	-	+	o	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ISE
3566	Weeki Wachee River	+	+	+	-	o	+	+	+	+	+	-	+	+	-	-	+	+	-	-	-	o
3568[6]	Caloosahatchee River	o	o	-	+	+	o	o	-	-	-	o	-	-	-	o	-	-	o	-	o	+
3569	Little Econlockhatchee River	o	o	o	+	o	+	-	o	+	o	+	o	-	o	+	-	o	o	-	-	-
3571	Black Creek Canal C-1	-	-	+	+	+	o	+	o	+	+	o	o	o	-	+	o	+	-	o	-	-
3572	Miami River	-	-	o	+	+	o	o	-	o	o	+	-	-	-	+	-	-	-	-	-	-
6976[7]	Econfina River	-	-	-	-	o	+	+	-	-	o	o	-	-	-	o	o	o	o	o	-	o
6978[7]	Steinhatchee River	-	-	-	-	o	+	+	-	-	ISE	o	-	-	o	o	+	+	+	+	ISE	+
21179[8]	Spruce Creek	o	o	o	o	o	o	o	o	o	+	-	o	-	-	+	o	o	+	-	-	o
21200[8]	Rice Creek	o	o	o	o	o	o	-	o	o	o	o	o	o	o	+	o	o	o	o	-	o
21201[8]	Moultrie Creek	+	+	o	+	o	+	-	o	o	+	+	+	ISE	-	+	o	o	o	o	o	+
21202[8]	Orange Creek	-	-	o	o	o	o	o	-	o	o	o	-	-	-	+	o	o	o	o	o	+
21203[10]	Crabgrass Creek	o	o	o	+	-	o	o	o	+	+	+	o	o	o	o	+	+	o	+	o	o
21380[8]	Homosassa Spring Run	+	-	-	o	+	o	-	-	-	+	o	-	-	-	o	-	+	-	o	-	+
21460[8]	Wrights Creek	-	-	-	o	-	+	+	o	o	o	-	-	-	-	o	+	o	+	+	o	+
21461[8]	Big Coldwater Creek	o	+	o	o	-	o	+	+	o	+	-	o	-	-	ISE	o	+	o	o	o	o
34879[9]	Wakulla River	o	+	+	+	-	+	o	o	+	-	-	+	o	-	ISE	-	-	o	o	-	+
44061[11]	Wakulla River	+	+	+	+	o	o	o	o	+	-	o	+	o	o	+	o	-	o	o	o	o
51559[12]	Chattahoochee River	o	o	-	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3506 / 59629[4]	Kissimmee River	o	o	o	ISE	-	o	o	-	+	o	-	o	-	-	+	o	o	-	o	o	o

Station	Waterbody Name	ALK	CAL	CL	CHL	DO	*E.coli*[1]	K	Mg	Na	NOx	pH	SC	SO4	TAN	Temp	TKN	TN	TOC	TP	TSS	Turb
3561 / 52614	Charlie Creek	o	o	-	+	o	o	o	o	-	o	-	o	o	o	o	o	o	o	o	ISE	+
3570 / 37739	Aerojet Canal Number C-111	-	-	ISE	+	+	o	-	ISE	ISE	+	+	o	-	ISE	+	o	o	o	-	-	o

Table B2.3. Trends for Specified Analytes for 23 Stations in the Groundwater Trend Monitoring Network, Confined Aquifers

Note: A positive trend is indicated with a plus sign (+), a negative trend is indicated with a minus sign (-), no trend is indicated by a lower-case letter "o," insufficient data to determine a trend is indicated by (ISD), and insufficient evidence to determine a trend is indicated by (ISE). Analyses are based on data collected between January 2009 and December 2022, with the following exceptions:
[1]For all stations, the period of record for ALK, CAL, CL, K, Mg, Na, NOx, SO4, TAN, TKN, TN, and TP reporting begins in October 2009.
[2]For stations 50919 and 50920, the period of record begins in June 2017.

Station	ALK[1]	CAL[1]	CL[1]	DO	K[1]	Mg[1]	Na[1]	NOx[1]	OPO4	pH	SC	SO4[1]	TAN[1]	Temp	TC	TDS	TKN[1]	TN[1]	TOC	TP[1]	Turb	WL
243	o	o	o	+	o	o	o	ISE	o	-	+	o	-	o	o	o	o	o	-	o	o	+
312	-	-	o	o	o	+	o	ISE	o	-	-	-	-	o	o	-	o	o	-	o	-	+
615	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD
707	-	+	o	-	o	+	o	o	-	o	+	+	o	+	ISE	+	o	o	o	-	o	+
737	o	-	+	-	o	+	+	o	-	o	o	o	o	o	o	o	o	o	o	-	-	o
775	o	+	o	-	o	o	o	o	o	o	o	o	ISE	ISE	o	o	o	o	o	o	ISE	+
997	-	+	+	-	o	+	+	ISE	ISE	ISE	ISE	+	o	ISE	ISE	ISE	o	o	-	o	+	o
1420	o	o	ISE	ISE	o	o	o	o	ISE	o	o	o	o	+	ISE	ISE	o	o	-	ISE	ISE	+
1674	o	o	-	+	o	o	o	-	+	-	-	o	o	+	ISE	-	o	-	o	o	o	o
1762	o	+	ISE	+	ISE	ISE	ISE	ISE	o	o	o	ISE	ISE	+	ISE	o	o	o	o	-	o	o
1763	o	ISE	ISE	+	o	o	o	ISE	+	o	o	ISE	ISE	ISE	ISE	o	+	+	o	ISE	ISE	o
1779	o	o	-	+	ISE	o	-	ISE	o	o	o	-	o	+	o	-	o	o	-	ISE	o	+
1780	o	o	o	o	o	o	o	ISE	o	o	o	o	-	+	ISE	o	ISE	ISE	-	+	o	+
2187	-	+	o	-	o	o	o	ISE	-	o	+	+	-	o	o	o	o	o	o	-	-	+
2353	+	+	+	+	+	+	+	o	+	o	+	o	o	+	o	+	ISE	o	o	+	o	+
2404	o	+	o	o	-	o	o	o	o	o	o	-	o	+	o	o	-	-	-	-	o	o
2585	+	+	o	o	o	o	o	o	+	o	o	-	o	+	o	o	o	o	o	o	o	o
2873	o	o	ISE	-	o	o	-	o	o	ISE	-	ISE	o	ISE	ISE	o	ISE	-	-	o	ISE	+

Station	ALK[1]	CAL[1]	CL[1]	DO	K[1]	Mg[1]	Na[1]	NOx[1]	OPO4	pH	SC	SO4[1]	TAN[1]	Temp	TC	TDS	TKN[1]	TN[1]	TOC	TP[1]	Turb	WL
3108	+	-	ISE	-	-	-	-	ISE	ISE	+	ISE	-	-	-	ISE	-	-	-	-	ISE	-	ISE
3433	o	+	+	-	o	o	+	ISE	o	-	+	+	o	+	o	o	o	o	-	+	o	ISD
7935	o	+	-	o	o	+	-	o	o	o	-	-	-	+	ISE	o	-	-	-	o	o	+
50919[2]	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD
50920[2]	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD

Table B2.4. Trends for Specified Analytes for 28 Stations in the Groundwater Trend Monitoring Network, Unconfined Aquifers

Note: A positive trend is indicated with a plus sign (+), a negative trend is indicated with a minus sign (-), no trend is indicated by a lower-case letter "o," insufficient data to determine a trend is indicated by (ISD), and insufficient evidence to determine a trend is indicated by (ISE). Analyses are based on data collected between January 2009 and December 2022, with the following exceptions:
[1]For all stations, the period of record for ALK, CAL, CL, K, Mg, Na, NOx, SO4, TAN, TKN, TN and TP reporting begins in October 2009.
[2]For station 38621, the period of record begins in July 2010.
[3]For station 9674, the period of record begins in January 2012.

Station	ALK[1]	CAL[1]	CL[1]	DO	K[1]	Mg[1]	Na[1]	NOx[1]	OPO4	pH	SC	SO4[1]	TAN[1]	Temp	TC	TDS	TKN[1]	TN[1]	TOC	TP[1]	Turb	WL
67	o	+	o	-	o	o	o	ISE	-	-	+	ISE	ISE	o	o	o	o	ISE	o	-	ISE	ISD
91	o	+	o	-	o	o	o	+	-	-	o	o	-	+	o	o	o	o	-	o	o	o
129	o	+	o	o	-	+	o	o	o	-	o	o	-	o	o	o	o	-	o	o	o	+
131	o	+	+	o	o	o	+	o	o	-	+	-	o	+	o	+	-	-	o	-	o	+
245	o	o	+	-	ISE	+	+	+	ISE	-	+	-	o	+	o	o	o	+	-	o	-	+
313	+	o	+	-	ISE	+	+	-	ISE	-	+	+	-	+	ISE	+	o	-	o	o	-	+
736	-	-	+	-	-	o	+	o	-	-	-	-	+	ISE	o	-	-	-	-	-	o	o
996	+	+	o	-	o	-	-	o	ISE	+	+	-	-	o	ISE	+	+	o	+	+	+	o
1087	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD
1100	+	+	-	o	o	o	o	o	+	o	o	-	o	o	o	o	ISE	o	-	+	+	+
1417	o	o	o	o	o	o	-	o	o	+	o	-	o	+	ISE	o	o	o	o	ISE	ISE	+
1764	-	-	o	o	+	o	o	ISE	o	-	+	o	+	+	o	+	+	+	+	ISE	o	o
1781	-	-	ISE	o	o	-	o	o	-	ISE	-	-	-	+	o	-	ISE	-	o	-	o	+
1931	+	+	+	-	ISE	+	+	+	+	-	+	+	-	ISE	o	+	ISE	+	o	+	o	+
1943	+	+	+	-	ISE	+	+	o	o	o	+	-	o	+	o	+	o	o	-	o	o	o
2003	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD	ISD

Station	ALK[1]	CAL[1]	CL[1]	DO	K[1]	Mg[1]	Na[1]	NOx[1]	OPO4	pH	SC	SO4[1]	TAN[1]	Temp	TC	TDS	TKN[1]	TN[1]	TOC	TP[1]	Turb	WL
2259	-	o	+	o	+	o	+	+	+	o	o	+	o	+	o	o	+	+	-	+	-	+
2465	-	-	-	o	ISE	-	-	-	o	+	-	-	o	+	o	-	o	-	-	o	o	+
2675	-	-	o	o	o	o	-	o	ISE	+	-	-	o	+	o	-	o	o	o	o	o	+
2793	o	-	-	+	o	-	o	o	o	o	o	-	-	+	o	-	-	-	-	o	-	-
2872	ISE	o	o	-	-	-	o	-	o	+	-	-	ISE	o	o	ISE	o	-	-	-	o	+
3109	-	-	-	-	-	-	-	ISE	-	+	-	-	-	+	ISE	-	ISE	ISE	ISE	o	o	o
3398	-	o	o	+	o	o	o	ISE	-	o	-	o	o	+	o	-	o	o	-	-	-	o
3490	+	ISE	-	-	ISE	o	-	ISE	ISE	o	-	ISE	-	+	ISE	o	o	o	-	-	o	o
6490	-	o	+	+	o	-	+	ISE	ISE	ISE	o	-	-	+	o	o	+	ISE	-	o	o	o
7934	+	-	+	-	-	-	+	ISE	o	o	-	-	+	+	o	o	+	+	+	o	-	+
9674[3]	o	o	+	-	+	+	ISE	+	+	-	+	ISE	ISE	+	+	o	o	+	o	o	o	ISD
38621[2]	+	+	+	o	o	+	+	-	o	-	+	o	o	+	o	+	o	o	o	o	-	+

Appendix B3: Change Analysis Results for Status Network Reporting Units (Zones)

For all analysis results reported in this Appendix: E = Early (2012-14); L = Late (2020-22); N = Number of samples; Est. = Estimate of Mean; CB = 95th percentile confidence bounds of the total difference estimate.

The following abbreviations for analytes are used: ALK = Alkalinity (mg/L); CAL = Calcium (mg/L); CL = Chloride (mg/L); CHL = Chlorophyll *a* (ug/L); DO = Dissolved oxygen (% saturation); K = Potassium (mg/L); Mg = Magnesium (mg/L); Na = Sodium (mg/L); NOx = Nitrate+Nitrite (mg/L); SC = Specific conductance (uS/cm); SO4 = Sulfate (mg/L); TAN = Total ammonia nitrogen (mg/L); Temp = Temperature (degrees C); TC = Total coliform (CFU/100mL or MPN/100mL); TDS = Total dissolved solids (mg/L); TKN = Total Kjeldahl nitrogen (mg/L); TN = Total nitrogen (mg/L); TOC = Total organic carbon (mg/L); TP = Total phosphorus (mg/L); TSS = Total suspended solids (mg/L); Turb = Turbidity (NTU).

Table B3.1 Zone 1 Significant Change Analysis Results

For each test, p-value < 0.05.
[1] For Unconfined Aquifers Late (2020-22), sample size is reduced for TKN and TN. Data for these analytes were not collected in 2022.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Unconfined Aquifers	DO	54.23	59	33.32	59	-20.91	-32.52	-9.30	Negative Step
Confined Aquifers	K	1.33	59	1.98	60	0.65	0.17	1.13	Positive Step
Unconfined Aquifers	Mg	1.64	59	2.86	60	1.22	0.49	1.95	Positive Step
Unconfined Aquifers	NOx	1.97	59	0.66	60	-1.31	-1.87	-0.74	Negative Step
Confined Aquifers	pH	7.67	59	7.23	60	-0.43	-0.57	-0.29	Negative Step
Lakes	TAN	0.03	78	0.01	80	-0.02	-0.03	-0.01	Negative Step
Confined Aquifers	Temp	21.12	59	21.62	60	0.50	0.01	0.99	Positive Step
Unconfined Aquifers	Temp	21.37	59	22.33	60	0.95	0.52	1.39	Positive Step
Lakes	Temp	22.81	78	29.14	80	6.33	5.64	7.03	Positive Step
Lakes	TN	0.76	78	0.57	79	-0.20	-0.32	-0.07	Negative Step
Unconfined Aquifers	TN[1]	2.17	59	0.96	40	-1.21	-1.81	-0.61	Negative Step
Lakes	TOC	8.38	78	6.40	80	-1.97	-3.17	-0.78	Negative Step
Lakes	TP	0.05	78	0.03	80	-0.02	-0.04	-0.01	Negative Step
Lakes	TSS	4.87	78	3.49	80	-1.38	-2.28	-0.48	Negative Step
Confined Aquifers	Turb	5.93	59	2.69	51	-3.24	-6.43	-0.05	Negative Step
Lakes	Turb	5.92	78	2.84	80	-3.08	-4.68	-1.48	Negative Step

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Flowing Surface Waters	Turb	4.79	88	7.41	83	2.62	0.77	4.47	Positive Step

Table B3.2 Zone 2 Significant Change Analysis Results

For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Lakes	CL	14.83	87	11.86	79	-2.97	-4.43	-1.51	Negative Step
Unconfined Aquifers	DO	38.64	55	23.58	51	-15.06	-25.76	-4.37	Negative Step
Lakes	K	1.40	87	1.15	79	-0.26	-0.45	-0.07	Negative Step
Lakes	Mg	1.93	87	1.59	79	-0.34	-0.46	-0.23	Negative Step
Lakes	Na	8.29	87	7.40	79	-0.89	-1.60	-0.17	Negative Step
Lakes	NOx	0.04	86	0.01	79	-0.03	-0.04	-0.01	Negative Step
Lakes	SC	97.50	87	80.29	79	-17.22	-25.90	-8.53	Negative Step
Lakes	SO4	7.15	87	5.30	79	-1.85	-2.83	-0.86	Negative Step
Unconfined Aquifers	Temp	21.19	57	22.32	51	1.13	0.62	1.63	Positive Step
Lakes	Temp	22.64	87	27.02	79	4.38	3.72	5.04	Positive Step
Lakes	TKN	0.85	86	0.70	79	-0.14	-0.22	-0.07	Negative Step
Lakes	TN	0.89	86	0.72	79	-0.17	-0.25	-0.09	Negative Step
Lakes	TOC	16.30	87	11.88	79	-4.42	-6.21	-2.63	Negative Step
Flowing Surface Waters	TOC	35.65	90	26.28	63	-9.38	-14.54	-4.22	Negative Step
Lakes	TSS	3.24	87	4.29	79	1.05	0.01	2.08	Positive Step
Lakes	Turb	3.23	87	5.15	79	1.92	0.59	3.26	Positive Step

Table B3.3 Zone 3 Significant Change Analysis Results

For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Unconfined Aquifers	ALK	124.10	60	87.17	59	-36.93	-69.44	-4.42	Negative Step
Confined Aquifers	DO	16.32	58	5.93	58	-10.39	-14.84	-5.94	Negative Step
Unconfined Aquifers	DO	22.93	60	14.83	59	-8.10	-14.96	-1.25	Negative Step

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Confined Aquifers	K	6.19	58	2.93	58	-3.26	-6.22	-0.30	Negative Step
Lakes	K	6.84	86	4.86	80	-1.99	-2.82	-1.16	Negative Step
Confined Aquifers	Mg	36.80	58	19.14	58	-17.66	-33.64	-1.68	Negative Step
Lakes	Mg	16.25	86	12.69	80	-3.56	-5.67	-1.45	Negative Step
Lakes	NOx	0.01	86	0.01	79	-0.01	-0.02	0.00	Negative Step
Unconfined Aquifers	pH	6.07	60	5.63	59	-0.44	-0.76	-0.12	Negative Step
Flowing Surface Waters	pH	6.61	123	6.31	127	-0.30	-0.53	-0.08	Negative Step
Lakes	SO4	42.83	86	33.90	80	-8.93	-16.07	-1.79	Negative Step
Confined Aquifers	TAN	0.37	58	0.24	58	-0.13	-0.24	-0.02	Negative Step
Flowing Surface Waters	TAN	0.06	123	0.03	127	-0.03	-0.04	-0.01	Negative Step
Confined Aquifers	Temp	22.82	58	23.46	58	0.64	0.11	1.17	Positive Step
Unconfined Aquifers	Temp	23.35	60	23.82	59	0.47	0.16	0.78	Positive Step
Lakes	Temp	22.83	86	27.57	80	4.74	4.15	5.33	Positive Step
Flowing Surface Waters	TKN	1.02	123	0.85	127	-0.17	-0.29	-0.05	Negative Step
Flowing Surface Waters	TN	1.14	123	0.93	127	-0.21	-0.32	-0.09	Negative Step
Lakes	TOC	22.37	86	15.74	80	-6.63	-10.58	-2.68	Negative Step
Unconfined Aquifers	TP	0.21	60	0.12	59	-0.08	-0.17	0.00	Negative Step
Flowing Surface Waters	TP	0.15	123	0.08	127	-0.07	-0.10	-0.03	Negative Step
Flowing Surface Waters	TSS	13.92	123	6.20	127	-7.71	-13.40	-2.02	Negative Step

Table B3.4 Zone 4 Significant Change Analysis Results

For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Flowing Surface Waters	ALK	59.75	115	75.60	124	15.85	4.03	27.68	Positive Step
Confined Aquifers	DO	14.56	54	7.91	56	-6.65	-11.18	-2.12	Negative Step
Unconfined Aquifers	pH	6.56	53	6.12	59	-0.44	-0.71	-0.17	Negative Step
Flowing Surface Waters	pH	6.68	115	7.02	124	0.34	0.09	0.58	Positive Step
Confined Aquifers	TC	11.21	53	233.82	53	222.61	42.48	402.73	Positive Step
Unconfined Aquifers	TC	13.69	53	166.59	59	152.90	55.11	250.68	Positive Step
Confined Aquifers	Temp	24.61	54	25.20	55	0.58	0.07	1.10	Positive Step
Unconfined Aquifers	Temp	24.22	53	24.97	59	0.76	0.25	1.26	Positive Step
Lakes	Temp	25.00	87	29.33	79	4.33	3.81	4.85	Positive Step
Flowing Surface Waters	Temp	26.57	115	25.87	124	-0.70	-1.22	-0.17	Negative Step
Flowing Surface Waters	TKN	1.50	115	1.25	124	-0.25	-0.48	-0.02	Negative Step

Table B3.5 Zone 5 Significant Change Analysis Results

For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Confined Aquifers	ALK	186.40	47	219.97	58	33.57	8.97	58.17	Positive Step
Lakes	ALK	33.90	85	29.14	78	-4.77	-9.00	-0.53	Negative Step
Flowing Surface Waters	ALK	87.35	127	111.12	125	23.78	12.51	35.04	Positive Step
Confined Aquifers	CAL	76.73	47	97.02	58	20.29	7.69	32.89	Positive Step

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Flowing Surface Waters	CAL	38.75	127	49.80	125	11.05	5.52	16.58	Positive Step
Lakes	CHL	31.34	85	44.67	78	13.32	4.96	21.69	Positive Step
Flowing Surface Waters	CHL	10.83	127	14.41	124	3.58	1.10	6.05	Positive Step
Confined Aquifers	DO	12.33	47	1.14	57	-11.19	-14.14	-8.25	Negative Step
Flowing Surface Waters	DO	77.48	127	60.89	125	-16.59	-22.21	-10.97	Negative Step
Lakes	K	3.60	85	4.05	78	0.45	0.09	0.82	Positive Step
Lakes	Na	12.12	85	13.52	78	1.40	0.14	2.65	Positive Step
Lakes	NOx	0.01	85	0.00	78	0.00	-0.01	0.00	Negative Step
Flowing Surface Waters	NOx	0.04	127	0.11	124	0.07	0.03	0.11	Positive Step
Confined Aquifers	pH	7.45	47	7.30	58	-0.15	-0.25	-0.05	Negative Step
Confined Aquifers	TAN	0.29	47	0.39	58	0.10	0.05	0.15	Positive Step
Confined Aquifers	Temp	24.86	47	26.09	58	1.23	0.77	1.68	Positive Step
Lakes	Temp	24.81	85	28.68	78	3.87	3.18	4.56	Positive Step
Flowing Surface Waters	Temp	25.85	127	23.93	125	-1.92	-2.67	-1.17	Negative Step
Confined Aquifers	TN	0.55	47	0.69	58	0.14	0.00	0.28	Positive Step
Flowing Surface Waters	TP	0.09	127	0.07	125	-0.02	-0.04	0.00	Negative Step

Table B3.6 Zone 6 Significant Change Analysis Results

For each test, p-value < 0.05.

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Unconfined Aquifers	ALK	248.21	32	218.87	58	-29.34	-52.73	-5.95	Negative Step
Lakes	ALK	120.22	52	104.10	54	-16.12	-23.34	-8.89	Negative Step
Lakes	CAL	52.44	52	44.89	54	-7.54	-10.36	-4.72	Negative Step

Resource	Indicator	Est (E)	N (E)	Est (L)	N (L)	Difference	Lower CB	Upper CB	Change Interpretation
Unconfined Aquifers	CL	145.84	32	686.22	58	540.38	33.38	1047.37	Positive Step
Lakes	CL	64.37	52	47.89	54	-16.49	-20.57	-12.41	Negative Step
Lakes	DO	103.83	52	96.71	54	-7.12	-14.08	-0.16	Negative Step
Flowing Surface Waters	DO	86.00	162	64.08	124	-21.92	-29.40	-14.44	Negative Step
Lakes	K	6.62	52	5.48	54	-1.14	-1.65	-0.63	Negative Step
Lakes	Mg	13.27	52	11.03	54	-2.24	-3.50	-0.98	Negative Step
Unconfined Aquifers	Na	89.09	32	356.57	58	267.48	0.07	534.89	Positive Step
Lakes	Na	36.66	52	27.70	54	-8.96	-11.78	-6.14	Negative Step
Unconfined Aquifers	pH	7.04	32	6.96	58	-0.08	-0.17	0.00	Negative Step
Flowing Surface Waters	pH	7.63	162	7.47	124	-0.16	-0.24	-0.07	Negative Step
Unconfined Aquifers	SC	956.25	32	2377.01	58	1420.77	18.66	2822.87	Positive Step
Lakes	SC	509.78	52	415.99	54	-93.79	-122.78	-64.81	Negative Step
Lakes	SO4	36.26	52	24.00	54	-12.27	-14.69	-9.85	Negative Step
Unconfined Aquifers	TDS	530.17	32	1420.44	58	890.26	22.80	1757.72	Positive Step
Unconfined Aquifers	Temp	25.49	32	26.42	58	0.93	0.53	1.34	Positive Step
Lakes	Temp	27.04	52	29.08	54	2.04	0.82	3.27	Positive Step
Flowing Surface Waters	Temp	23.57	162	22.09	124	-1.48	-2.07	-0.89	Negative Step
Flowing Surface Waters	TKN	1.30	161	1.15	124	-0.15	-0.25	-0.06	Negative Step
Unconfined Aquifers	TOC	9.20	32	7.00	58	-2.20	-4.22	-0.18	Negative Step
Flowing Surface Waters	TOC	18.58	162	16.12	124	-2.46	-3.89	-1.03	Negative Step
Flowing Surface Waters	TSS	5.96	162	3.74	124	-2.22	-3.23	-1.20	Negative Step
Flowing Surface Waters	Turb	4.35	162	3.07	124	-1.28	-2.40	-0.17	Negative Step

Appendix C. 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 Class III, except for those specifically identified in Rule 62-302.400, 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 D. Section 314 (CWA) Impaired Lakes in Florida

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 D.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 must analyze the potential risk of nonattainment of the narrative nutrient criteria in paragraph 62-302.530(47)(b), F.A.C. This analysis must 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 must 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.

Because the IWR methodology focuses on the identification of impaired waters in 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 D.1. Impaired Lakes of Florida

ARP = Alternative restoration plan; TN = Total nitrogen; TP = Total phosphorus; DO = Dissolved oxygen; TSI = Trophic State Index
Note: The most current Verified List of Impaired Waters, by basin group, is available on DEP's Comprehensive Verified List website. 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	Water Segment 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	Dissolved Oxygen (% Saturation)
4	1329L	Withlacoochee	Tank Lake	Dissolved Oxygen (% Saturation)
4	1329M	Withlacoochee	Irvin Lake	Biology
4	1329T	Withlacoochee	Blue Sink (Blue Sink Lake)	Dissolved Oxygen (% Saturation), Nutrients (TP)
4	1329V	Withlacoochee	Lake Blue Cove	Biology, Nutrients (TP)
4	1329W	Withlacoochee	Bystre Lake	Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1329Z	Withlacoochee	Neff Lake	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1340A	Withlacoochee	Davis Lake	Dissolved Oxygen (% Saturation), Mercury (in fish tissue)
4	1340C	Withlacoochee	Magnolia Lake	Dissolved Oxygen (% Saturation)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	1340H	Withlacoochee	Hernando Lake	Mercury (in fish tissue)
4	1340K	Withlacoochee	Cato Lake	Dissolved Oxygen (% Saturation)
4	1340L	Withlacoochee	Cooter Lake	Biology, Dissolved Oxygen (% Saturation)
4	1340N	Withlacoochee	Henderson Lake	Mercury (in fish tissue)
4	1340Q	Withlacoochee	Tussock Lake	Dissolved Oxygen (% Saturation)
4	1340R	Withlacoochee	Tsala Apopka Lake (Floral City Arm)	Mercury (in fish tissue)
4	1340V	Withlacoochee	Bradley Lake	Dissolved Oxygen (% Saturation)
4	1342Y	Withlacoochee	Cherry Lake	Mercury (in fish tissue)
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	1361A	Springs Coast	Skinner Lake	Dissolved Oxygen (% Saturation)
5	1382C	Springs Coast	Tooke Lake	Nutrients (TN)
5	1391	Springs Coast	Hunters Lake	Mercury (in fish tissue)
5	1392B	Springs Coast	Lake Hancock	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
5	1392C	Springs Coast	Middle Lake	Nutrients (Chlorophyll *a*), 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 (TP)
5	1423B	Springs Coast	Green 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	Dissolved Oxygen (% Saturation)
2	1440C	Tampa Bay Tributaries	Gooseneck Lake	Dissolved Oxygen (% Saturation)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
2	1443H	Tampa Bay Tributaries	Hillsborough Reservoir	Dissolved Oxygen (% 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
5	1456A	Springs Coast	Lake Thomas	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
5	1456C	Springs Coast	Vienna Lake	Biology
2	1459	Tampa Bay Tributaries	Banjo Lake	Nutrients (Chlorophyll *a*), Nutrients (TP)
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	Dissolved Oxygen (% 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, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
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	1473Z	Tampa Bay	James Lake	Biology
1	1474A	Tampa Bay	Lake Wastena	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1474W	Tampa Bay	Lake Dead Lady	Nutrients (Chlorophyll *a*)
1	1478H	Tampa Bay	Lake Reinheimer	Dissolved Oxygen (% Saturation)
4	1480	Kissimmee River	Lake Marion	Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1484B	Withlacoochee	Lake Juliana	Nutrients (TN)
1	1486A	Tampa Bay	Lake Tarpon	Biology, Mercury (in fish tissue), Nutrients (Chlorophyll *a*)
3	14882	Sarasota Bay - Peace - Myakka	Lake Fannie	Biology
3	1488A	Sarasota Bay - Peace - Myakka	Lake Smart	Nutrients (Chlorophyll *a*), Nutrients (TN)
3	1488B	Sarasota Bay - Peace - Myakka	Lake Rochelle	Biology, Nutrients (TN)
3	1488C	Sarasota Bay - Peace - Myakka	Lake Haines	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1488D	Sarasota Bay - Peace - Myakka	Lake Alfred	Nutrients (Chlorophyll *a*), Nutrients (TN)
3	1488P	Sarasota Bay - Peace - Myakka	Lake Martha	Biology
3	1488R	Sarasota Bay - Peace - Myakka	Lake Idyl	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1488U	Sarasota Bay - Peace - Myakka	Lake Conine	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1488Y	Sarasota Bay - Peace - Myakka	Lake Pansy	Biology
2	1491A	Tampa Bay Tributaries	Lester Lake	Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
2	1491B	Tampa Bay Tributaries	Galloway Lake	Dissolved Oxygen (% Saturation), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1493D	Tampa Bay	Williams Lake	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1496Z	Tampa Bay	Lake Jackson	Dissolved Oxygen (% Saturation)
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	1497D	Sarasota Bay - Peace - Myakka	Lake Gibson	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1497D1	Sarasota Bay - Peace - Myakka	Lake Crago	Nutrients (Chlorophyll *a*), Nutrients (TN), 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 (TN), Nutrients (TP)
3	1497H	Sarasota Bay - Peace - Myakka	Lake Morton	Nutrients (Chlorophyll *a*), Nutrients (TN), 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	15001	Sarasota Bay - Peace - Myakka	Little Lake Hamilton	Nutrients (Chlorophyll *a*), Nutrients (TN)
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)
1	1502A	Tampa Bay	Lake Estes	Biology
1	1502C	Tampa Bay	Chapman Lake	Biology, Nutrients (Chlorophyll *a*)
4	1503	Withlacoochee	Lake Van	Biology

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
3	15041	Sarasota Bay - Peace - Myakka	Lake Hamilton	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
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	1516F	Tampa Bay	White Trout Lake	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	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)
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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
3	1521P	Sarasota Bay - Peace - Myakka	Deer Lake	Nutrients (TN)
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)	Dissolved Oxygen (% 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)
2	1537	Tampa Bay Tributaries	Lake Wire	Dissolved Oxygen (% Saturation), Lead
2	1537A	Tampa Bay Tributaries	Lake Bonnet	Biology, Lead, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
3	1549C	Sarasota Bay - Peace - Myakka	Lake Bentley	Nutrients (Chlorophyll *a*)
3	1549D	Sarasota Bay - Peace - Myakka	Lake Horney	Nutrients (Chlorophyll *a*), Nutrients (TN), 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, Escherichia coli, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1588A	Sarasota Bay - Peace - Myakka	Lake Mcleod	Biology, Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1590B	Sarasota Bay - Peace - Myakka	Lake Ashton (Lake Myrtle)	Mercury (in fish tissue)
2	1597A	Tampa Bay Tributaries	Scott Lake	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1603C	Tampa Bay	Beckett Lake	Biology, Dissolved Oxygen (% Saturation)
1	1603E	Tampa Bay	Harbor Lake	Biology
1	1605B	Tampa Bay	Gornto Lake	Biology
2	1610	Tampa Bay Tributaries	Carter Road Park Lakes	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1613B	Sarasota Bay - Peace - Myakka	Lake Gordon	Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
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*)
2	1621G1	Tampa Bay Tributaries	Branwood Dr Pond	Biology
3	1622	Sarasota Bay - Peace - Myakka	Lake Garfield	Mercury (in fish tissue)
3	1623L	Sarasota Bay - Peace - Myakka	Lake Hancock	Biology, Dissolved Oxygen (% Saturation), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1623M	Sarasota Bay - Peace - Myakka	Eagle Lake	Biology, 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	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)
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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	1730B	Kissimmee River	Livingston Lake	Mercury (in fish tissue), Nutrients (TP)
4	1730D	Kissimmee River	Lake Adelaide	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	1731A	Tampa Bay	Lake Maggiore	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP), Specific Conductance
4	1758E	Kissimmee River	Pansy Lake	Nutrients (TP)
4	1761H	Kissimmee River	Lake Lucas	Dissolved Oxygen (% Saturation)
4	179A	Pensacola	Bear Lake	Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TP)
2	1807B	Tampa Bay Tributaries	Lake Manatee Reservoir	Biology, Fecal Coliform, Mercury (in fish tissue)
2	180A	Apalachicola - Chipola	Merritts Mill Pond	Nutrients (Algal Mats), 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	1813C	Kissimmee River	Lake Letta	Biology
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	Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1860B	Kissimmee River	Lake Josephine	Biology, Mercury (in fish tissue)
4	1860D	Kissimmee River	Lake Jackson	Biology, Mercury (in fish tissue)
4	1860G	Kissimmee River	Little Lake Jackson	Biology
4	1891A	Kissimmee River	Red Beach Lake	Mercury (in fish tissue)
4	1893	Kissimmee River	Huckleberry Lake	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	1898	Kissimmee River	Lake Wolf	Biology
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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	1932E	Kissimmee River	Lake Huntley	Mercury (in fish tissue)
4	1932G	Kissimmee River	Lake Apthorpe	Mercury (in fish tissue)
4	1932I	Kissimmee River	Buck Lake	Nutrients (TN)
4	1932M	Kissimmee River	Blue Lake	Biology, Nutrients (TN)
4	1938	Kissimmee River	Lake Henry	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
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), Nutrients (TP)
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	1971	Sarasota Bay - Peace - Myakka	Clark Lake	Escherichia coli, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
3	1981	Sarasota Bay - Peace - Myakka	Lake Myakka (Lower Segment)	Mercury (in fish tissue)
3	1981C	Sarasota Bay - Peace - Myakka	Lake Myakka (Upper Segment)	Biology, Mercury (in fish tissue)
3	2041B	Sarasota Bay - Peace - Myakka	Shell Creek Reservoir (Hamilton Reservoir)	Dissolved Oxygen (% Saturation)
2	2074A	Charlotte Harbor	Alligator Lake	Mercury (in fish tissue)
2	2092H	Charlotte Harbor	The Dunes Community Stormwater Lakes	Dissolved Oxygen (% Saturation), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	2105A	Nassau - St. Marys	Hampton Lake	Dissolved Oxygen (% 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	Water Segment 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)
5	2320B1	Upper East Coast	Lake Vedra	Nutrients (Chlorophyll *a*), 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	2528A	Lower St. Johns	Smith Lake	Dissolved Oxygen (% Saturation)
2	2541	Lower St. Johns	Georges Lake	Mercury (in fish tissue)
2	2543F	Lower St. Johns	Lake Ross	Lead, Nutrients (TN), Nutrients (TP)
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	Dissolved Oxygen (% Saturation), Lead, Nutrients (TN), Nutrients (TP)
2	2582A	Lower St. Johns	Rowan Lake	Dissolved Oxygen (% Saturation), Lead, Nutrients (TN)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	25A	Pensacola	Lake Stone (Southwest of Century)	Biology, 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)
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)
1	2706	Ocklawaha	Lake Moon	Dissolved Oxygen (% Saturation), Nutrients (TP)
1	2713C	Ocklawaha	Holdens Pond	Dissolved Oxygen (% Saturation)
1	2713D	Ocklawaha	Little Orange Lake	Mercury (in fish tissue), Nutrients (TP)
1	2717	Ocklawaha	Kanapaha Lake	Dissolved Oxygen (% Saturation), Nutrients (TP)
1	2718B	Ocklawaha	Bivans Arm	Turbidity
1	2719A	Ocklawaha	Lake Alice	Mercury (in fish tissue), Nutrients (TP)
2	272	Apalachicola - Chipola	Thompson Pond	Dissolved Oxygen (% Saturation)
1	2720A	Ocklawaha	Alachua Sink	Dissolved Oxygen (% Saturation), Fecal Coliform, Nutrients (TN), Nutrients (TP)
1	2723A	Ocklawaha	Cowpen Lake	Mercury (in fish tissue)
1	2738A	Ocklawaha	Lochloosa Lake	Nutrients (TN), Nutrients (TP)
1	2740B	Ocklawaha	Lake Ocklawaha	Biology, Dissolved Oxygen (% Saturation), Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
1	2741B	Ocklawaha	Wauberg Lake	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	2748X	Ocklawaha	Key Pond	Dissolved Oxygen (% 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	Dissolved Oxygen (% 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	2805	Ocklawaha	Northeast Emeralda Marsh Conservation Area	Pesticides (in fish tissue)
1	2806A	Ocklawaha	Lake Umatilla	Biology
1	2807A	Ocklawaha	Lake Yale	Mercury (in fish tissue), Nutrients (TP)
1	2809	Ocklawaha	Southwest Emeralda Marsh Conservation Area	Dissolved Oxygen (% Saturation), Pesticides (in fish tissue)
1	2811	Ocklawaha	West Emeralda Marsh Conservation Area	Dissolved Oxygen (% Saturation), Pesticides (in fish tissue)
1	2814A	Ocklawaha	Lake Griffin	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
1	2816A	Ocklawaha	Eldorado Lake	Mercury (in fish tissue)
1	2817B	Ocklawaha	Lake Eustis	Biology, 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	Dissolved Oxygen (% 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	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 (TP)
1	2838B	Ocklawaha	Little Lake Harris	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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
1	2872B	Ocklawaha	Lake Pearl	Biology
1	2872C	Ocklawaha	Lake Lily	Dissolved Oxygen (% 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	Dissolved Oxygen (% Saturation), Mercury (in fish tissue)
3	28932	Upper St. Johns	Lake Cone at Seminole	Mercury (in fish tissue)
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)
3	2893I	Upper St. Johns	St Johns River above Puzzle Lake	Dissolved Oxygen (% Saturation), Iron, Mercury (in fish tissue)
2	2893J	Middle St. Johns	Mud Lake	Mercury (in fish tissue)
3	2893K	Upper St. Johns	Lake Poinsett	Biology, Mercury (in fish tissue)
3	2893L	Upper St. Johns	St Johns River above Lake Poinsett	Mercury (in fish tissue), Nutrients (TN), Nutrients (TP)
3	2893N	Upper St. Johns	St Johns River above Lake Winder	Dissolved Oxygen (% Saturation), Mercury (in fish tissue), Nutrients (TP)
3	2893O	Upper St. Johns	Lake Washington	Biology, Mercury (in fish tissue)
3	2893Q	Upper St. Johns	Lake Helen Blazes	Dissolved Oxygen (% Saturation), Mercury (in fish tissue), Nutrients (TP)
3	2893V	Upper St. Johns	Blue Cypress Lake	Mercury (in fish tissue), Nutrients (TP)
3	2893X	Upper St. Johns	St Johns River above Sawgrass Lake	Dissolved Oxygen (% Saturation), Mercury (in fish tissue), Nutrients (TP)
3	2893X1	Upper St. Johns	Little Sawgrass Lake Drain	Dissolved Oxygen (% Saturation), Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
3	2893Y	Upper St. Johns	Lake Winder	Biology, Dissolved Oxygen (% Saturation), Mercury (in fish tissue)
2	2893Z	Middle St. Johns	St Johns River below Lake Dexter	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	29061	Middle St. Johns	Shaw Lake	Dissolved Oxygen (% Saturation)
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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
2	2961A1	Middle St. Johns	Banana Lake	Biology
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	Dissolved Oxygen (% 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	Dissolved Oxygen (% Saturation)
2	2973G	Middle St. Johns	Amory Lake	Biology, Dissolved Oxygen (% 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, Dissolved Oxygen (% 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 (TN), Nutrients (TP)
2	2991D	Middle St. Johns	Horseshoe Lake (South)	Biology
2	2993	Middle St. Johns	Lake Prevatt	Dissolved Oxygen (% 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	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	2997B	Middle St. Johns	Lake Howell	Biology

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
2	2997B1	Middle St. Johns	Lake Ann	Biology
2	2997L	Middle St. Johns	Lake Winyah	Biology, Nutrients (Chlorophyll *a*)
2	2997P	Middle St. Johns	Lake Concord	Biology
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 (TN), 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 (TN), Nutrients (TP)
2	2998D	Middle St. Johns	Lake Marion	Biology
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	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 (TP)
2	3002R	Middle St. Johns	Kelly Lake	Nutrients (Chlorophyll *a*), Nutrients (TP)
2	3002U	Middle St. Johns	Lake Pleasant	Dissolved Oxygen (% 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 (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
2	3004K	Middle St. Johns	Lake Orlando	Biology, Nutrients (Chlorophyll *a*), 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, Escherichia coli, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
2	3004S	Middle St. Johns	Lake Hill	Biology
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*), Nutrients (TP)
2	3011C	Middle St. Johns	Lake Lucien	Mercury (in fish tissue)
2	3011D	Middle St. Johns	Lake Lovely	Nutrients (Chlorophyll *a*)
2	3036	Middle St. Johns	Lake Frederica	Mercury (in fish tissue)
2	3036A1	Middle St. Johns	Lake Barber	Biology
3	3064A	Upper St. Johns	Florence Lake	Biology, Dissolved Oxygen (% Saturation)
3	3140	Upper St. Johns	Lake Kenansville	Dissolved Oxygen (% Saturation), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168A	Kissimmee River	Lake Conway	Mercury (in fish tissue)
4	3168B2	Kissimmee River	Lake Michelle	Nutrients (Chlorophyll *a*)
4	3168E	Kissimmee River	Lake Anderson	Nutrients (Chlorophyll *a*), Nutrients (TP)
4	3168F	Kissimmee River	Lake Bass	Nutrients (Chlorophyll *a*), Nutrients (TP)
4	3168H	Kissimmee River	Lake Holden	Biology, Nutrients (TN), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	3168M	Kissimmee River	Lake Copeland	Biology, Nutrients (TP)
4	3168N	Kissimmee River	Lake Olive	Biology
4	3168W	Kissimmee River	Bear Head Lake	Biology
4	3168W2	Kissimmee River	Druid Lake	Dissolved Oxygen (% Saturation)
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	Dissolved Oxygen (% Saturation)
4	3168W7	Kissimmee River	Lake Bumby	Nutrients (Chlorophyll *a*), Nutrients (TP), Silver
4	3168X2	Kissimmee River	Hourglass Lake	Nutrients (Chlorophyll *a*)
4	3168X3	Kissimmee River	Lake Terrace	Nutrients (Chlorophyll *a*), 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 (TP)
4	3168Y2	Kissimmee River	Lake Como (Orange County)	Nutrients (TP)
4	3168Y4	Kissimmee River	Lake Davis	Escherichia coli, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Y8	Kissimmee River	Lake Weldona	Nutrients (Chlorophyll *a*), Nutrients (TP)
4	3168Z3	Kissimmee River	Lake Arnold	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Z4	Kissimmee River	Lake Giles	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
4	3168Z9	Kissimmee River	Lake Lawsona	Nutrients (Chlorophyll *a*), Nutrients (TP)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	3169A2	Kissimmee River	Lake Tyler	Biology
4	3169A3	Kissimmee River	Lake Buchanan	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
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	3169T	Kissimmee River	Lake Sandy	Nutrients (TP)
4	31702A	Kissimmee River	Lake Floyd (Orange County)	Dissolved Oxygen (% Saturation)
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	3170Q	Kissimmee River	Lake Butler	Mercury (in fish tissue)
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

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
4	3172	Kissimmee River	East Lake Tohopekaliga	Mercury (in fish tissue)
4	3173A	Kissimmee River	Lake Tohopekaliga	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)
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), Turbidity
1	3212C	Lake Okeechobee	Lake Okeechobee	Dissolved Oxygen (% Saturation), Mercury (in fish tissue), Nutrients (TP)
1	3212D	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP), Turbidity
1	3212E	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP), Turbidity
1	3212F	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP), Turbidity
1	3212G	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP), Turbidity
1	3212H	Lake Okeechobee	Lake Okeechobee	Iron, Mercury (in fish tissue), Nutrients (TP), Turbidity

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
1	3212I	Lake Okeechobee	Lake Okeechobee	Mercury (in fish tissue), Nutrients (TP), Turbidity
3	3245B	Lake Worth Lagoon - Palm Beach Coast	Lake Clarke	Biology, Nutrients (Chlorophyll *a*), Nutrients (TP)
3	3245C4	Lake Worth Lagoon - Palm Beach Coast	Pine Lake	Biology, Fecal Coliform, Nutrients (Chlorophyll *a*), Nutrients (TP)
3	3256A	Lake Worth Lagoon - Palm Beach Coast	Lake Osborne	Biology
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	Dissolved Oxygen (% Saturation), Nutrients (TP)
2	344	Apalachicola - Chipola	Ocheesee Pond	Mercury (in fish tissue)
1	3459A	Suwannee	Lake Louise	Mercury (in fish tissue)
1	3472	Suwannee	Tenmile Pond	Dissolved Oxygen (% Saturation)
1	3496A	Suwannee	Low Lake	Dissolved Oxygen (% 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)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
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	Dissolved Oxygen (% Saturation)
1	3738B	Suwannee	Bonable Lake	Mercury (in fish tissue)
4	38A	Pensacola	Lake Jackson	Mercury (in fish tissue)
1	442	Ochlockonee - St. Marks	Lake Iamonia	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, Dissolved Oxygen (% Saturation), Fecal Coliform, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	546A	Ochlockonee - St. Marks	Lower Dianne Lake	Biology, Nutrients (TP)
1	546C	Ochlockonee - St. Marks	Lake Monkey Business	Nutrients (Chlorophyll *a*), Nutrients (TP)
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, Nutrients (Chlorophyll *a*), Nutrients (TP)
1	564C	Ochlockonee - St. Marks	Petty Gulf Lake	Biology, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	582B	Ochlockonee - St. Marks	Lake Jackson	Dissolved Oxygen (% Saturation), Mercury (in fish tissue)
2	60	Apalachicola - Chipola	Lake Seminole	Biology
3	61A	Choctawhatchee - St. Andrew	Sand Hammock Pond	Mercury (in fish tissue)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
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	Nutrients (Chlorophyll *a*), Nutrients (TP)
1	647F	Ochlockonee - St. Marks	Lake Kanturk	Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	647G	Ochlockonee - St. Marks	Alford Arm	Dissolved Oxygen (% 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)
5	697A	Perdido	Crescent Lake	Mercury (in fish tissue)
1	756B	Ochlockonee - St. Marks	Lake Piney Z	Mercury (in fish tissue), Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	756F	Ochlockonee - St. Marks	Lake Lafayette (Upper Segment)	Nutrients (Chlorophyll *a*), Nutrients (TP)
3	786A	Choctawhatchee - St. Andrew	Bass Lake	Biology, Dissolved Oxygen (% Saturation)
1	791N	Ochlockonee - St. Marks	Lake Miccosukee	Mercury (in fish tissue)
3	795A	Choctawhatchee - St. Andrew	Crystal Lake	Biology
1	807C	Ochlockonee - St. Marks	Lake Munson	Lead, Nutrients (Chlorophyll *a*), Nutrients (TN), Nutrients (TP)
1	878A	Ochlockonee - St. Marks	Lake Bradford	Lead
1	878D	Ochlockonee - St. Marks	Cascade Lake	Lead
1	878E	Ochlockonee - St. Marks	Grassy Lake	Dissolved Oxygen (% Saturation)

Basin Group	WBID	Basin Group Name	Water Segment Name	Identified Parameters
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	Dissolved Oxygen (% Saturation)
3	959H	Choctawhatchee - St. Andrew	Allen Lake	Dissolved Oxygen (% Saturation)
1	971C	Ochlockonee - St. Marks	Eagle Lake	Dissolved Oxygen (% Saturation)

Appendix E. Strategic Monitoring Methodology for Surface Water

Florida Water Restoration Act (FWRA)

The 1999 FWRA (section 403.067, 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 for urban stormwater retrofitting projects to reduce pollutant loadings to impaired waters.

The FWRA also requires DACS 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 agricultural landowners who do not enroll and implement BMPs established in the FDACS BMP Program.

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 basin wide 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 activities such as monitoring, stormwater management, wastewater treatment, wetland restoration, 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 surface water assessment described in Chapter 3 in this report, DEP implemented the methodology in Florida's IWR, Chapter 62-303, F.A.C. to evaluate Florida's 52 HUC basins (51 HUCs plus the Florida Keys), which are delineated into 29 distinct basins distributed among each of six DEP six districts. Table E.1 lists the basin groups included in each of the basin rotations by DEP district. Table E.2 lists the specific assessment periods for the Planning, Study, and Verified Lists for each of the 5 basin groups, including this most recent statewide biennial assessment.

Table E.1. Basin Groups for the Implementation of the Watershed Management Approach by DEP District

- = No basin included.

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 E.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 – 2009	1/1/2005 – 6/30/2012
3	2	2002 – 2011	1/1/2007 – 6/30/2014
3	3	2003 – 2012	1/1/2008 – 6/30/2015
3	4	2004 – 2013	1/1/2009 – 6/30/2016
3	5	2005 – 2014	1/1/2010 – 6/30/2017
4	1	2006 – 2015	1/1/2011 – 6/30/2018
4	2	2007 – 2016	1/1/2012 – 6/30/2019
Biennial Assessment 2020 – 2022		2008 – 2017	1/1/2013 – 6/30/2020

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, DEP 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, upgrades to OSTDS) 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 E.3** lists the use support categories evaluated under IWR assessments. These categories correspond hierarchically to the surface water classifications provided in **Appendix C**.

Table E3. 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 E.4** lists the categories for waterbodies or waterbody segments used by DEP in this *2022 Integrated Report*.

Table E.4. Categories for Waterbodies or Waterbody Segments DEP used in the *2024 Integrated Report*

Note: The TMDLs are established only for impairments caused by pollutants. For purposes of the IWR assessment, pollutants are chemical and biological constituents, introduced byhumans 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.

RAP = reasonable assurance plan; ARP = alternative restoration plan; TMDL = total maximum daily load; 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 areattained.	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.
2b	Attains one or more designated uses and a RAP has already been completed.	Used for a waterbody that 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 department staff 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 too preliminary. If additional data are needed to confirm attainment, the waterbody should be retained in assessment category 4b.
2e	Attains one or more designated uses and a Pollutant Reduction Plan 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 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

Category	Description	Comments
		needed to confirm attainment, the waterbody is retained in Assessment Category 4e.
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 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.
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.

Category	Description	Comments
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.

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, 77% of the data used came from Florida STORET, 21% came from WIN, and roughly 2% came from other sources. Tables E.6 and E.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, on request, audits data providers (or laboratories used by data providers).

Table E.6. Agencies and Organizations Providing Chemistry Data Used in the IWR Assessments

Alabama Department of Environmental Management
Alachua County Environmental Protection Department
AMEC
Avon Park Air Force Range
Babcock Ranch
Biological Research Associates (ENTRIX)
Biscayne Bay Aquatic Preserve
Bream Fisherman Association
Brevard County Stormwater Utility Department
Broward County Environmental Protection Department
Charlotte County Department of Health
Charlotte County Stormwater Division
Charlotte Harbor National Estuaries Program – East Wall
Charlotte Harbor National Estuaries Program – Lower Lemon Bay
Charlotte Harbor National Estuaries Program – Matlacha Pass
Charlotte Harbor National Estuaries Program – Peace River
Charlotte Harbor National Estuaries Program – San Carlos Bay
Charlotte Harbor National Estuaries Program – Tidal Myakka River
Charlotte Harbor National Estuaries Program – Tidal Peace River
Charlotte Harbor National Estuaries Program – 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 Kissimmee
City of Lakeland, Florida
City of Marco Island
City of Naples
City of Neptune Beach
City of Orlando
City of Port St. Lucie
City of Saint Petersburg
City of Sanibel, Natural Resources Department
City of Tallahassee Stormwater Management Division
Collier County Coastal Zone Management Department
Collier County Pollution Control
Coral Reef Conservation Program
Dade County Environmental Resource Management
Department of Agriculture and Consumer Services
Division of Environmental Health
Environmental Services and Permitting, Inc.
Escambia County
DEP – Ground Water Monitoring Section
DEP Charlotte Harbor Aquatic/Buffer Preserves
DEP Tallahassee Regional Operation Center
DEP Watershed Assessment
DEP, Water Quality Standards and Special Projects
Florida Department of Environmental Protection (Central ROC)
Florida Department of Environmental Protection (Northeast ROC)
Florida Department of Environmental Protection (Northwest ROC)
Florida Department of Environmental Protection (South ROC)
Florida Department of Environmental Protection (Southeast ROC)
Florida Department of Environmental Protection (Southwest ROC)
Florida Dept. Env. Protection – Okaloosa County Environmental Council
Florida Dept. of Environmental Protection
Florida Dept. of Environmental Protection – WET Sect
Florida Game & Freshwater Fish Commission
Florida Keys NMS – Water Quality Monitoring Program
Florida Lake Watch

Frydenborg Ecologic LLC
Guana Tolomato Matanzas (GTM) Estuarine
Hillsborough County Environmental Services Division
Hillsborough County, Fl Water Quality Data
Howard T. Odum Florida Springs Institute
Jacksonville Electric Authority
Lake County Water Resource Management
Lee County Environmental Lab
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.
Monroe County Board of County Commissioners
Mosaic Fertilizer, LLC.
Naval Station Mayport
Northwest Florida Water Management District
Nutter and Associates
Orange County Environmental Protection
Palm Beach County Env. Resource Management
Pasco County Stormwater Management Division
Peace River Manasota Regional Water Authority
Pelican Bay Services
Pinellas County Dept. of Engineering and Env. Services
Polk County Natural Resources Division
Reedy Creek Improvement Dist. Environmental Svcs.
Sanibel Captiva Conservation Foundation
Sarasota County Environmental Services
Seminole County
SMR Communities, Inc.
South Florida Water Management District
Southwest Florida Water Management District
Southwest Florida Water Mgt. Dist. (Project Coast’
St. John's River Water Management District
Suwannee River Water Management District
Tampa Bay Water
Turrell, Hall, Inc.
US Geological Survey Data
Volusia County Environmental Health Lab

Table E.7. Agencies and Organizations Providing Bioassessment Data Used in the IWR Assessments

Alachua County Environmental Protection Department
Biological Research Associates (ENTRIX)
Bream Fisherman Association
City of Cape Coral
City of Tallahassee Stormwater Management Division
Florida Department of Health
Environmental Services and Permitting, Inc.
Escambia County
DEP Charlotte Harbor Aquatic/Buffer Preserves
DEP Tallahassee Regional Operation Center
DEP Watershed Assessment
DEP, Water Quality Standards and Special Projects
Florida Department of Environmental Protection (Central ROC)
Florida Department of Environmental Protection (Northeast ROC)
Florida Department of Environmental Protection (Northwest ROC)
Florida Department of Environmental Protection (South ROC)
Florida Department of Environmental Protection (Southeast ROC)
Florida Department of Environmental Protection (Southwest ROC)
Florida Department of Environmental Protection
Florida Department of Environmental Protection - WET Section
Florida Game and Freshwater Fish Commission
Frydenborg Ecologic LLC
Highlands County Biology
Jones Edmunds and Associates
Lee County Environmental Lab
Leon County Public Works
Mosaic Fertilizer, LLC.
Northwest Florida Water Management District
Orange County Environmental Protection
Pinellas County Dept. of Engineering and Env. Services
Polk County Natural Resources Division
Reedy Creek Improvement Dist. Environmental Svcs.
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
USF Water Institute Biology

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, DEP will provide recommendations to the appropriate data providers. 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 theconversion 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 will work with the data provider to resolve the underlying issues. Upon resolution corrected data are (re)loaded to WIN and made available for subsequent IWR assessments.

Table E.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 E.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

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 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 as a result of DEP 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 F. 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 type of data and/or information required to determine use support varies by designated use (**Appendix E**) 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. DEP also uses field survey and reconnaissance information to helpidentify 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 Surface Water Quality Standards 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 some waterbodies with values not meeting the DO saturation criterion that have healthy SCI assessments to be omitted from the Verified List because there is evidence that the aquatic life use is being met on a site-specific basis. 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, DEP applies the assessment guidance shown in Figure F.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:

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 Surface Water Quality Standards 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.

DOH reports bacteriological results to WIN that are used as the basis for beach advisories, closures and warnings. 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 recreational use support is 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 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 Water Quality 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 DOH or another authorized governmental entity.

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

In addition, if DOH has issued a fish consumption advisory, or if DACS 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.

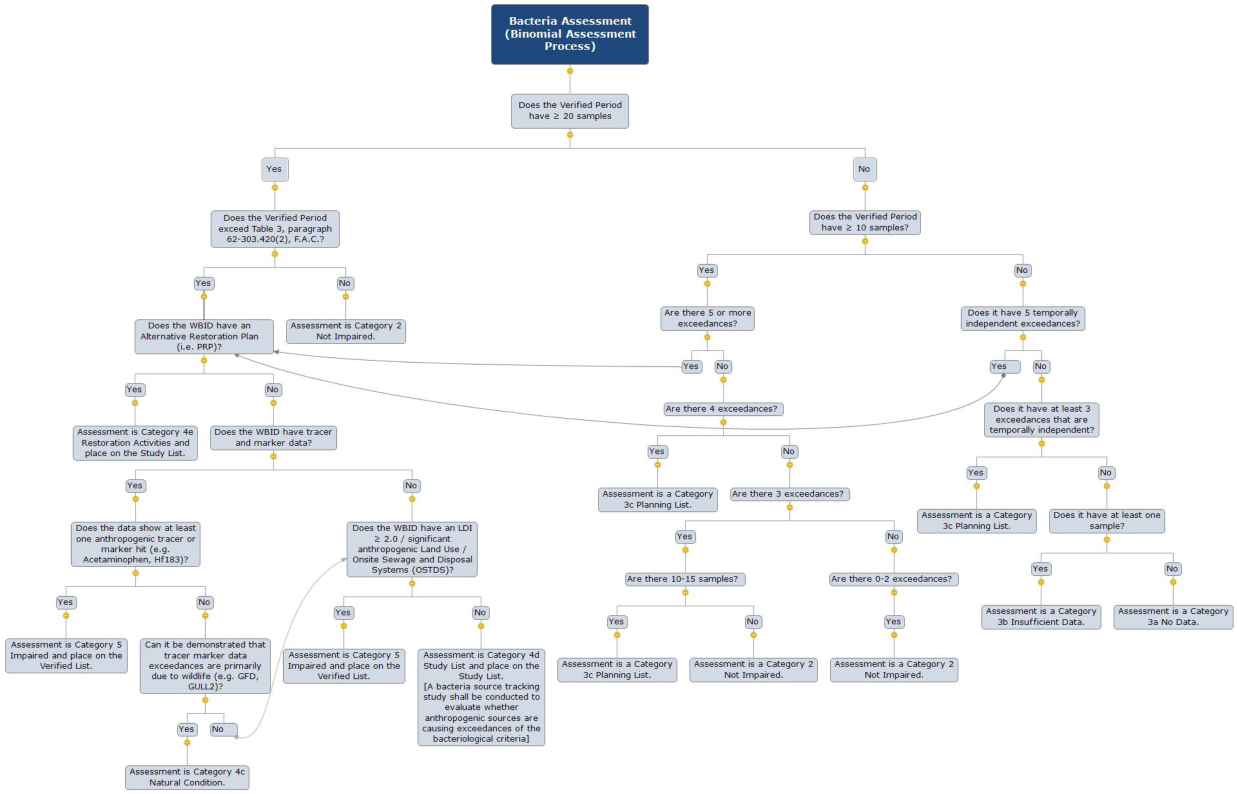
Evaluation of Drinking Water Use Attainment

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 Water Quality Standards 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.

Bacteria Assessments Applied Using the Binomial Distribution.



Evaluation and Determination of Use Attainment

Exceedances of Numeric Criteria from the Florida Standards

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

Table F.1. Sample Counts for Analytes Having Numeric Criteria in the Florida Surface Water Quality Standards

Analyte	Number of Samples
2,4-D	5,865
2,4-Dichlorophenol	189
2,4-Dinitrophenol	227
Acenaphthene	234
Aldrin	2,009
Alkalinity	147,419
Aluminum	45,425
Anthracene	244
Antimony	27,295
Arsenic	59,761
Barium	40,509
Benzene	296
Beryllium	27,139
Beta BHC	2,019
Boron	11,260
Cadmium	58,867
Carbaryl	464
Carbon Tetrachloride	295
Chlordane	1,855
Chloride	147,706
Chlorine	49
Chlorophenol	232
Chlorophyll *a* (corrected)	295,351
Chromium III	54,437
Copper	63,668
Cyanide	10
DDT	1,987
Demeton	1,922
Detergents	25
Dichloroethylene	158
Dieldrin	2,094
Dissolved Oxygen	805,224
Dissolved Oxygen (Percent Saturation)	804,235
Dissolved Solids	92,765
Endosulfan	2,020
Endrin	1,919
Enterococci	204,197

Analyte	Number of Samples
Escherichia coli	39,822
Fecal Coliform	292,776
Fluoranthene	244
Fluorene	234
Fluoride	57,802
Guthion	2,085
Heptachlor	2,015
Iron	71,684
Lead	59,950
Lindane	1,943
Malathion	2,497
Manganese	43,494
Mercury	2,125
Methoxychlor	1,809
Mirex	1,888
Nickel	50,556
Nitrate	45,880
Nitrate-Nitrite	316,606
Oil/Grease	267
Ortho Phosphate	12,286
Pentachlorophenol	199
pH	741,076
Phenol	1,229
Phosphorus in Total Orthophosphate	107,596
Pyrene	244
Selenium	42,287
Silver	31,707
Specific Conductance	650,369
Tetrachloroethylene	246
Thallium	26,872
Total Ammonia	304,632
Total Nitrogen	428,507
Total Phosphorus	475,233
Toxaphene	1,867
Trichloroethylene	296
Turbidity	354,643
Un-ionized Ammonia	159,743
Zinc	56,677

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 Surface Water Quality 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, data 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.

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 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).

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 because 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 F.2 lists the formulae).

Table F.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
Ephemeropterataxa	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 F.3 and the index thresholds in Table F.4.

Table F.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 F.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)

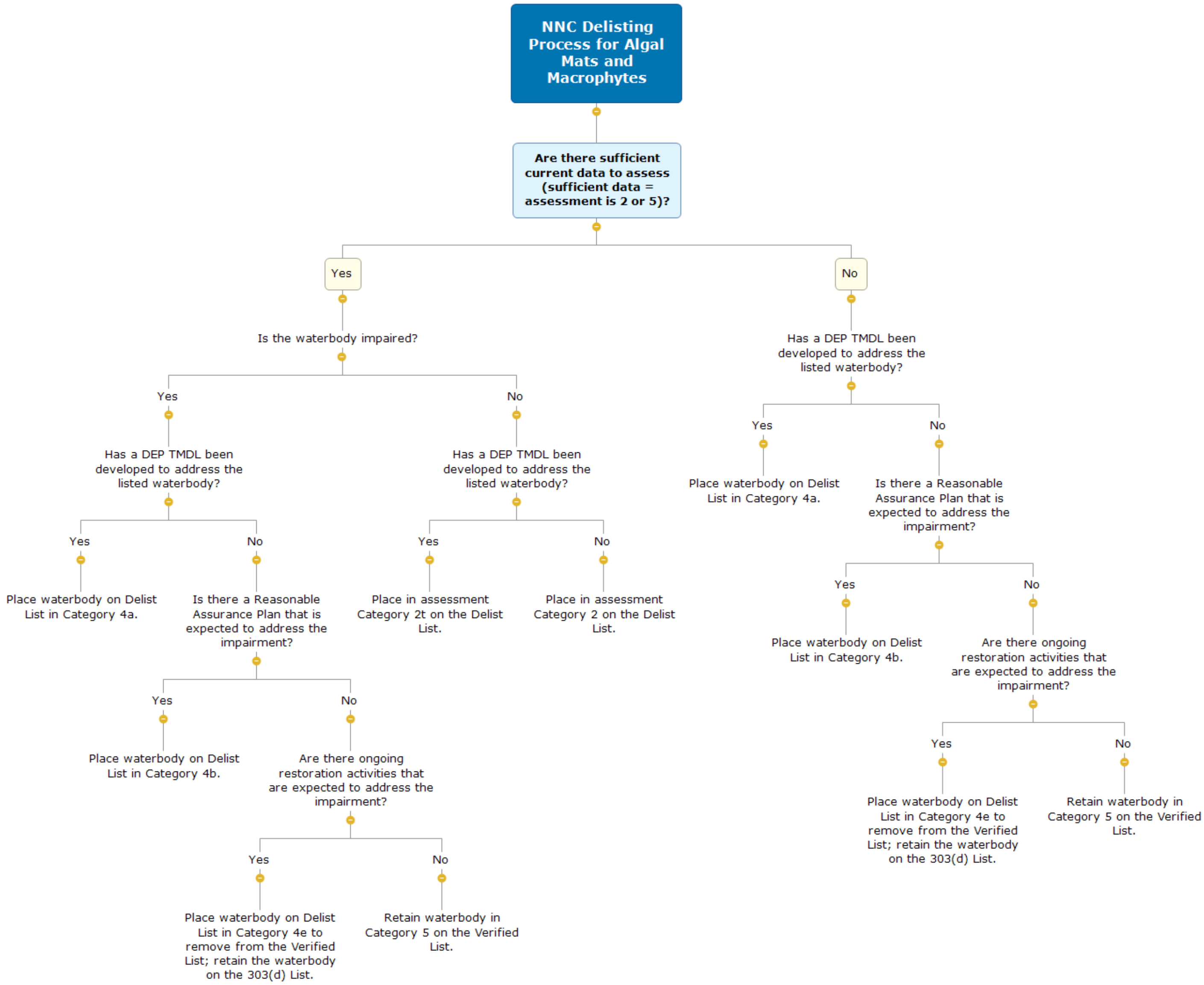
Delisting

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 G**). 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 E**). 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.

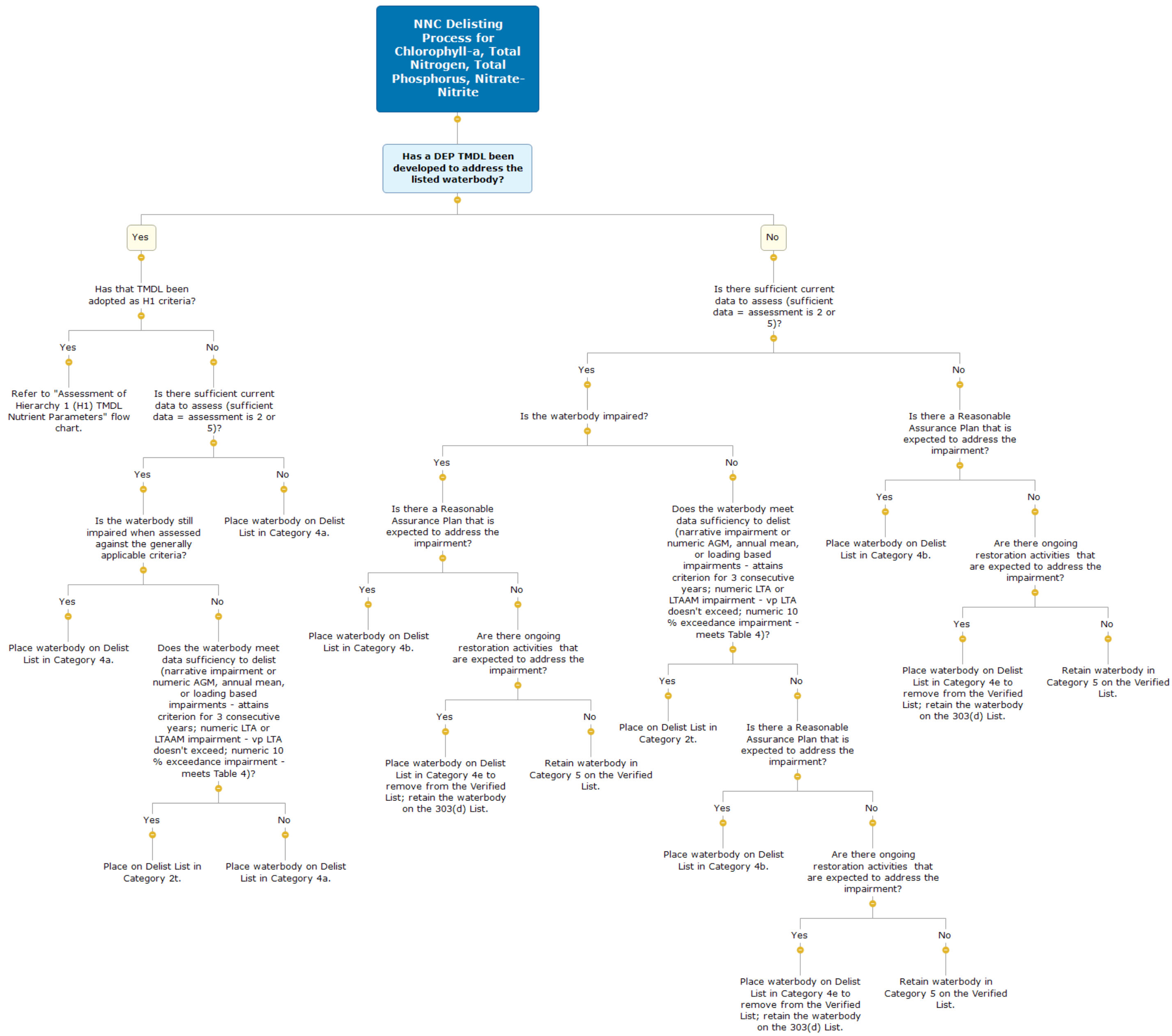
Appendix G. IWR Guidance for Delisting WBIDs for Nutrients

Figure G.1. NNC Delisting Process for Algal Mats and Macrophytes



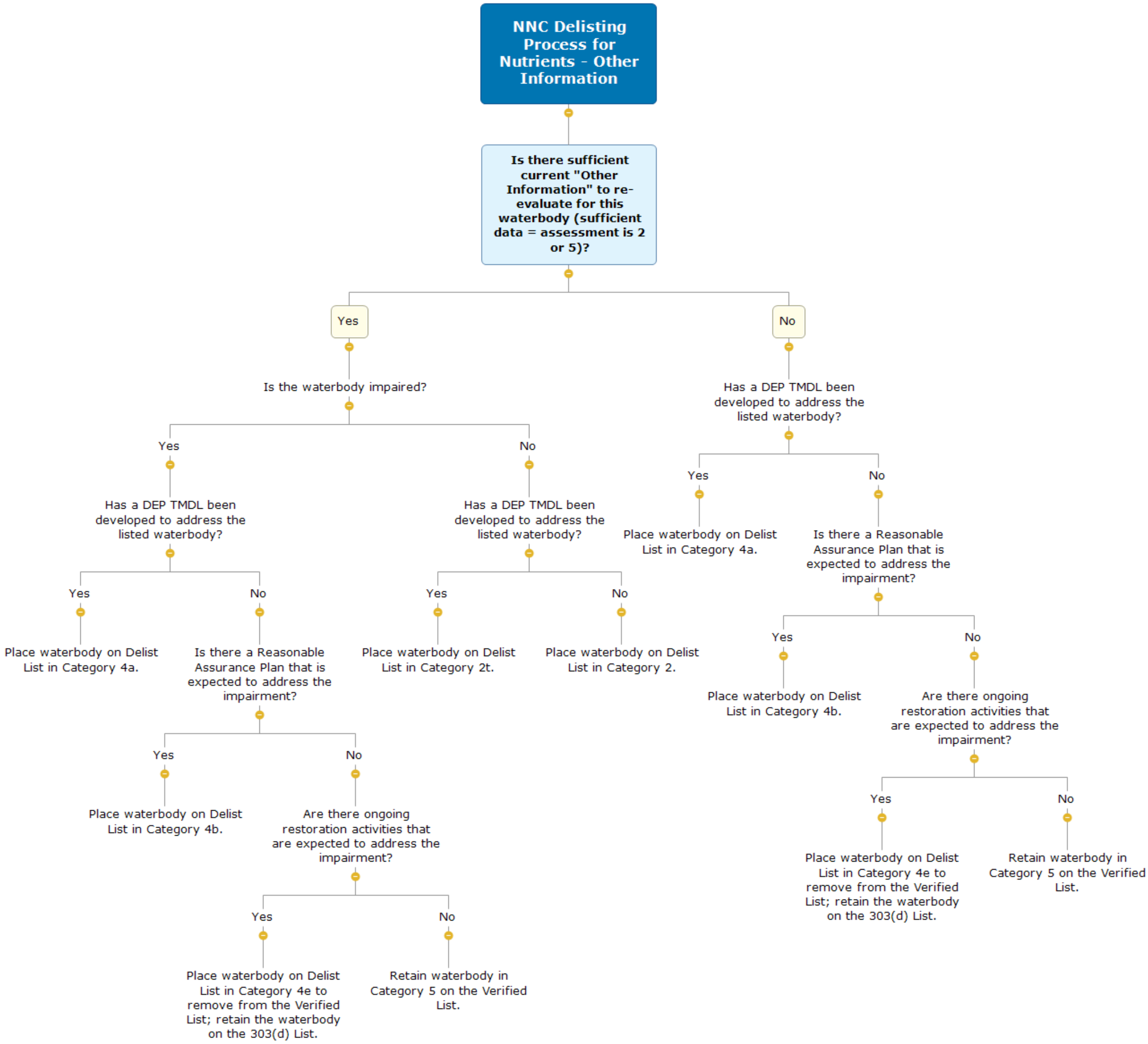
Note: In rare cases a WBID may also be delisted based on a flaw in the original analysis (62-303.720(2)(a)(3)).

Figure G.1.1. NNC Delisting Process for Chlorophyll *a*, TN, TP and Nitrate-Nitrite



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 G.1.2. NNC Delisting Process for Nutrients–Other Information



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 G.1.3. Study List (303[d] list) Removals for Assessment Category 4d DO Assessment