2012-2014 Status Network Statewide Results

Florida Department of Environmental Protection (DEP)

Division of Environmental Assessment and Restoration

Water Quality Assessment Program,
Watershed Monitoring Section

Goal of the Status Monitoring Network

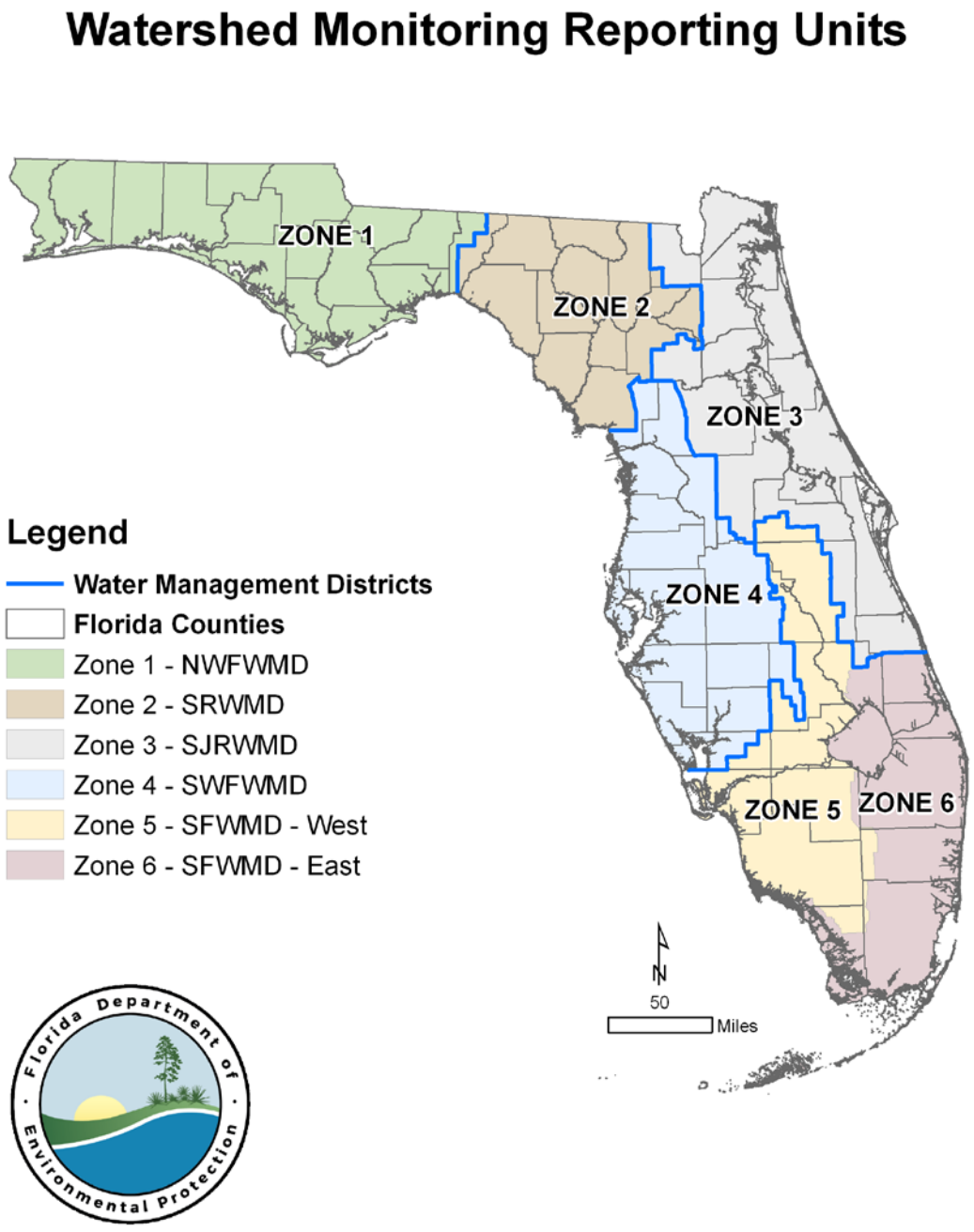
The goal of the Status Network is to broadly characterize Florida's fresh surface and ground water quality with a known statistical confidence. Since it is impossible to sample every waterbody in the state on an annual basis, the Network employs a statewide random-site monitoring design. The purpose of the design is to allow water sampling locations to be chosen in an unbiased manner. The water samples are analyzed in the DEP laboratory and inferential statistics are used to estimate the water quality conditions of the state as a whole. Based on this design, the Status Network provides a cost-effective way to produce statistically valid estimates of statewide water quality condition. The Network addresses statewide and regional (within Florida) water quality questions; it is not designed to evaluate specific waterbodies or wells. This report summarizes the 2012-2014 Status Monitoring Network design and results.

Monitoring Design

Annually, the Watershed Monitoring Section (WMS) assesses seven fresh water resource types in Florida's Status Monitoring Network; these are located within six geographical zones (**Figure 1**). Five resources are surface water: small lakes, large lakes, rivers, streams and canals. The other two resources are ground water: unconfined and confined aquifers. Based on projected annual sample sizes (90 samples each from rivers, streams, large lakes and small lakes statewide, 60 samples from canals within Zone 3 through 6, and 120 samples from each ground water resource statewide), the design allows for reporting with a 95% confidence interval of approximately ± 12% for surface water resources and ± 9% for ground water resources. This means there is 95% confidence that actual statewide surface water conditions are within 12% of the reported values, and similarly, actual statewide ground water conditions are within 9% of the reported values.

Sampling locations are randomly selected from Geographical Information System (GIS) coverages of the water resources. Each year, WMS updates the resource coverages to incorporate documented changes, and deletions or additions of potential sampling locations. Randomly selected stations that can be sampled are termed accessible. Stations that cannot be sampled are either dry, inaccessible, or the wrong resource. If a selected station/site does not represent one of the assigned resources, it is removed from the coverage and added to the proper

Figure 1. Watershed Monitoring Section Reporting Units



resource for the following year's selections. Thus, the actual number of samples collected and used for analysis may be less than projected.

Reduced rainfall or periods of drought occur on a cyclical basis in Florida. This can cause water bodies to become dry or inaccessible. Prolonged or intense periods of drought can adversely affect water chemistry. Conversely, periods of extended rainfall potentially can dilute concentrations of certain water quality parameters; therefore, knowledge of the yearly rainfall can assist in better understanding the overall water quality of Florida. Rainfall amounts must be taken into account when interpreting the data analysis results. According to data published by the Southeast Regional Climate Center website, the average annual precipitation for the 2012-2014 period was 57.03 inches, an amount that is above the 30-year annual average of 53.28 inches.

Please see the 2014 Monitoring Design Document at the DEP website for more information on the Status Network design.

Resource Description and Detail

Lakes

Lakes are defined as natural or established reservoirs that are at least 1meter deep and contain at least 1/4 acre of open water (free of emergent vegetation and trees). These features are based on the 1:24000 (1:24K) National Hydrography Dataset (NHD) waterbody feature class. As lake areas and features are updated in the 1:24K NHD, these new geometries are used to enhance or replace geometries for features contained in the GIS coverage for probabilistic selection. To reduce the dataset to lake features that are most likely permanent or not wetlands, the lakes coverage does not include lakes that are less than 4 hectares in area.

The WMS divides lakes into two categories by size: small lakes of 4 to < 10 hectares (25 acres) and large lakes of 10 hectares and greater. This division allows a better characterization of the state's lake resources, as the two resources can have different habitats and uses. Based on this definition and specific GIS coverage for this program, the state of Florida has approximately 1,702 large and 1,891 small lakes. Lake sites are selected randomly in each of the lake resource types, and they are reconnoitered for ability to be sampled in the order of selection. The first 15 lake sites in each zone that pass sampling criteria are sampled for each lake resource.

Rivers, Streams and Canals

Rivers and Streams include linear waterbodies with perennial flow that are waters of the state (Chapters 373 and 403, Florida Statutes). WMS obtains these features from the 1:24K NHD flowline feature class. The GIS coverage is developed by matching the 1:24K features to the 1:100000 (1:100K) NHD flowline feature class as an enhancement to include permanent, non-ephemeral, and non-intermittent segments within the coverage.

There have been issues using traditional classification, such as Strahler order, on the flowing surface waters of the state. In order to better categorize those waters, WMS contacted several

interested parties (e.g., Water Management Districts, other sections of DEP) to submit suggestions for the river resource classification. Based on these recommendations, the state has 2,677 linear miles of rivers. The remaining streams and tributaries in the coverage are designated as the stream resource, totaling about 16,385 additional linear miles. River and stream sites are randomly selected by resource type and reconnoitered in the order of selection. The first 15 river and stream sites in each zone that pass sampling criteria are sampled. As with lakes, the two resources can have different habitats and uses.

Canals are man-made linear waterbodies that are waters of the state. Specifically, 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 (Section 312.020, Florida Administrative Code, or F.A.C.). WMS contacted the Water Management Districts and other sections in DEP for recommendations on a canal coverage. Based on these recommendations, irrigation and drainage ditches were excluded, and a GIS coverage of primary canals was developed. Using this definition, the state has 2,630 linear miles of canals. The first 15 canal sites in Zones 3 through 6 that pass sampling criteria are sampled.

Aquifers

Aquifers are permeable layers of sand, gravel, or other rock capable of producing water as from a well. Unconfined aquifers are near the land surface and are easily affected by human activities. Confined aquifers lie below a layer of material, such as fine-grained clay, that limits or prevents the downward flow of water. Water in confined aquifers is older and less affected by human activities. Ground water is monitored through wells in unconfined and confined aquifers.

The WMS annually solicits candidate wells from federal, state and local agencies, and private individuals. Currently there are 16,027 unconfined and 13,499 confined wells available for sampling evaluation. Wells are randomly selected from each aquifer type and reconnoitered in the order of selection. The first 20 wells of each aquifer type in each zone that pass sampling criteria are sampled.

Combining Yearly Data for Analysis

Increased sample size is desirable because it generally has a positive effect on the confidence levels for the reported data, thereby increasing the confidence for statewide reporting. One way to increase the sample size is to combine data collected in different years. For this report, three years of annually collected status monitoring network data have been combined. This increases the sample size in each Zone sufficiently to allow reporting by Zone with 95% confidence levels at $\pm < 20\%$ for regional assessments. Additionally, the increase in sample size allows statewide reporting with 95% confidence levels at $\pm < 10\%$

Sampling and Analysis

For the three-year period, 270 large lake, 231 small lake, 270 river, 271 stream and 207 canal samples were collected for surface water analysis. For ground water analysis, 344 confined and

343 unconfined aquifer samples were collected. In addition to an overall statewide assessment, WMS evaluated water conditions for each zone.

Summary of Resources Assessed

Table 1 summarizes the statewide extent and the number of samples collected for each water resource used to infer statewide water quality results.

Table 1. Summary of Water Resources Assessed by the Status Monitoring Network

This is a three-column table. Columns 1 and 2 list the resource type and resource size. Column 3 lists the number of samples analyzed 2012-2014.

Water Resource	*Resource Size (number/area/length)*	*Number of Samples*
Large Lake (10 hectares or >)	1,702 lakes (1,577 square miles)	270
Small Lake (4 to <10 hectares)	1,891 lakes (45 square miles)	231
River	2,677 miles	270
Stream	16,385 miles	271
Canals	2,630 miles	207
Confined Aquifer	13,449 wells	344
Unconfined Aquifer	16,027 wells	343

Results

Figures 2, 4, and **6** show the sample locations for each resource, and **Figures 3, 5,** and **7** show the percentages of waterbodies attaining water quality standards. **Appendix A** lists the definitions and numeric thresholds for water quality indicators. **Appendix B** provides the attainment results. All data reported are the results of inferential statistics used to estimate statewide or zone-wide water quality conditions based on the data collected at sampled locations.

For example, the data collected from 270 large lake sampling locations throughout the state indicate that 100% of the state's large lake area has fecal coliform levels that meet the thresholds described in Appendix A. For a given resource type, at least 27 samples are needed to obtain a margin of error within ± 20%. Therefore, if a sample size had < 27 samples, then insufficient data (ISD) was reported. The regional and statewide 95% confidence intervals varied to a maximum of ± 6.2% for ground water indicators and a maximum of ± 15.9% for surface water indicators.

Surface Water

Statewide, greater than 90% of both large and small lakes met the thresholds for un-ionized ammonia, total nitrogen and fecal coliform. A lower percentage of large lakes met the thresholds for total phosphorus and chlorophyll-a than small lakes. Small lakes had a lower percentage meeting the dissolved oxygen threshold than large lakes. There were not enough Lake Vegetation

Index (LVI) samples for large lakes in Zones 1, 2, 5 or 6, or for small lakes in Zone 6 to evaluate. Large lakes in Zones 3 and 4 had a higher percentage meeting the LVI thresholds than small lakes in those same zones. For Zones 1, 2, and 5, greater than 70% of small lakes met the LVI thresholds.

Statewide, greater than 90% of rivers and streams met the thresholds for un-ionized ammonia and chlorophyll-a. A greater percentage of rivers (> 90%) met the thresholds for fecal coliform and dissolved oxygen than streams. Although less than 90% of rivers and streams met the thresholds for total nitrogen and total phosphorus, the percentage meeting those thresholds was higher for rivers than for streams. For habitat assessment in rivers and streams, close to 70% of each resource met the thresholds.

Statewide, greater than 90% of canals met the thresholds for dissolved oxygen, total phosphorus, un-ionized ammonia, and fecal coliform. Chlorophyll-a and total nitrogen thresholds were met in greater than 80% of canals. For habitat assessment, a low percentage of canals met the thresholds (22.7 ± 2.4%). This finding is not unexpected since the Habitat Assessment procedure was not calibrated or designed for use in canals.

Ground Water

Statewide, greater than 90% of confined and unconfined aquifers met the thresholds for all indicators assessed. Regionally, lower percentages of confined aquifers meeting the sodium thresholds were found in Zone 5 (69.5%) and Zone 6 (14.3%). The percentage of unconfined aquifers meeting the total coliform thresholds was higher in Zone 1 and 2 (both > 90%), as compared to that in Zones 3, 4, 5, and 6 (ranging from 70.8-77.0 %).

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Figure 2. Sampling Location Map for Large and Small Lakes

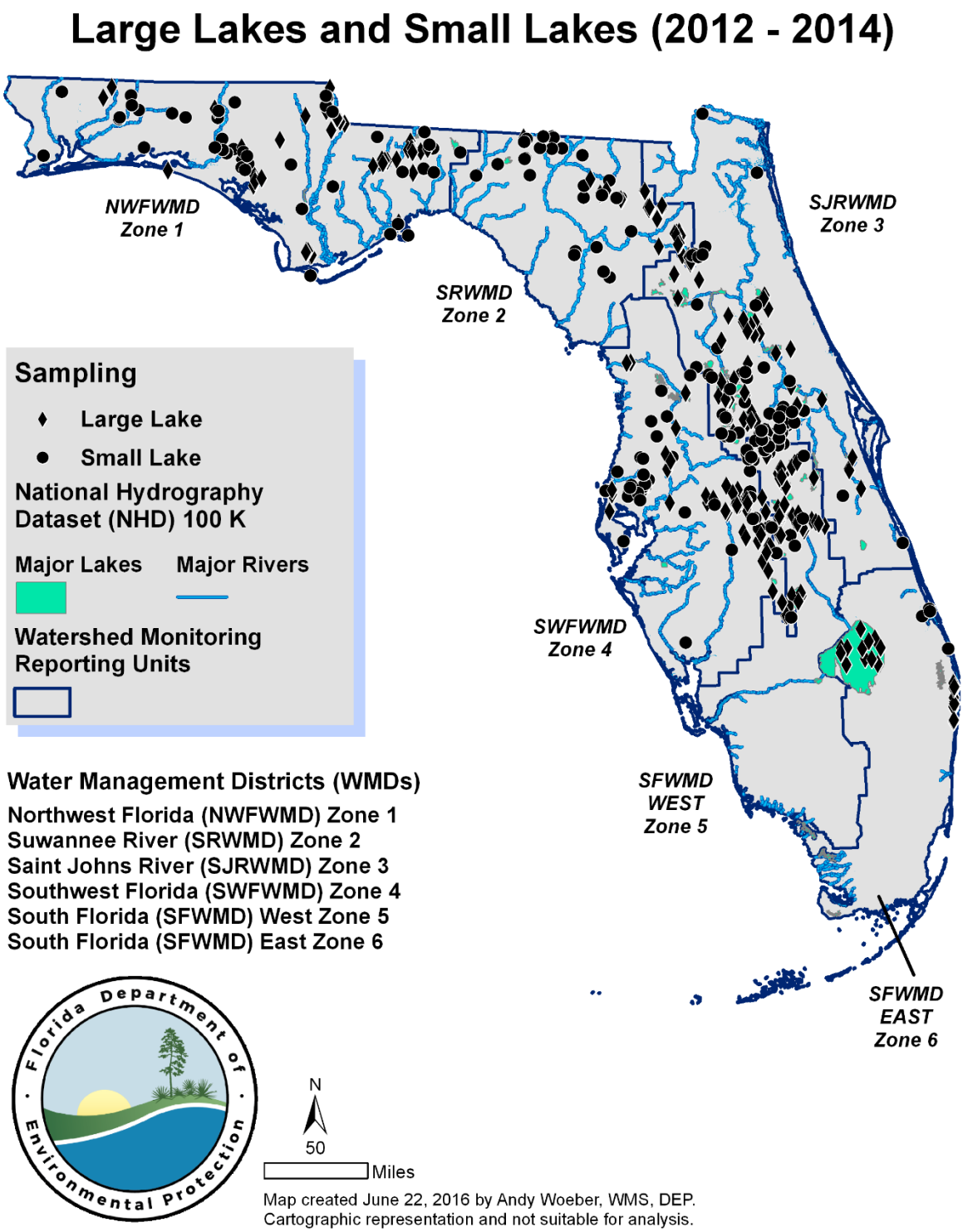


Figure 3. Percent of Large and Small Lakes Meeting Indicator Thresholds

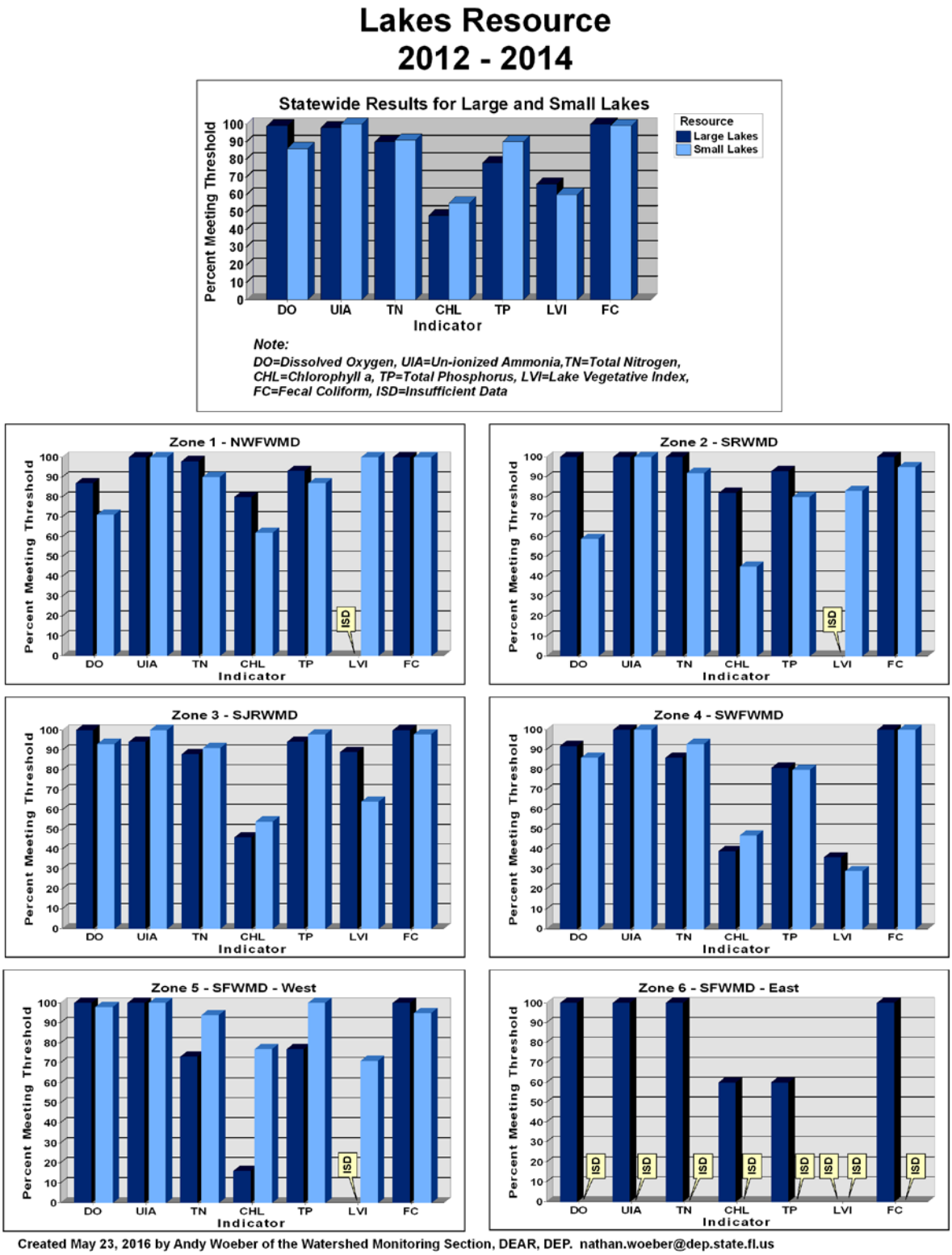


Figure 4. Sampling Location Map for Rivers, Streams, and Canals

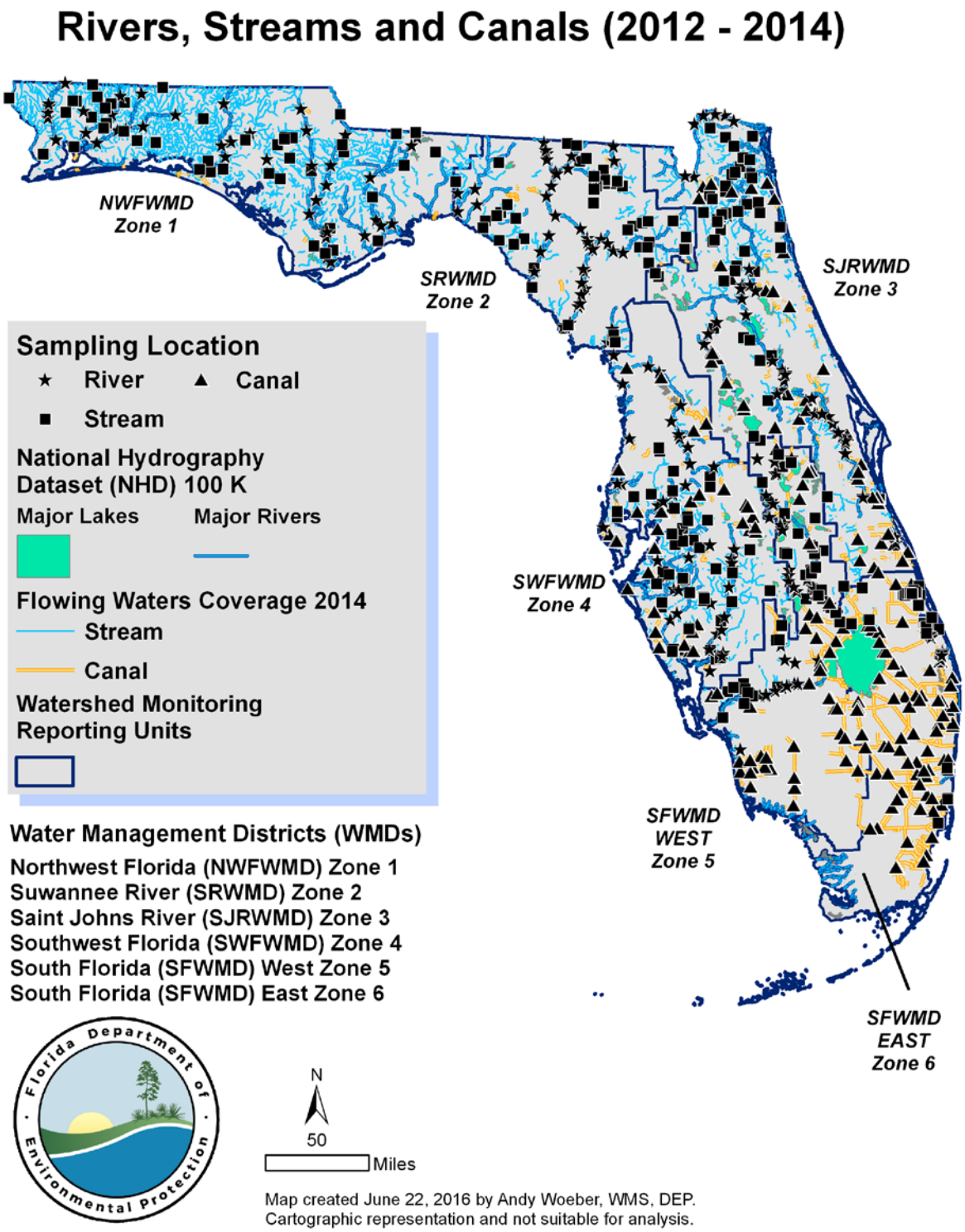


Figure 5. Percent of Rivers, Streams and Canals Meeting Indicator Thresholds

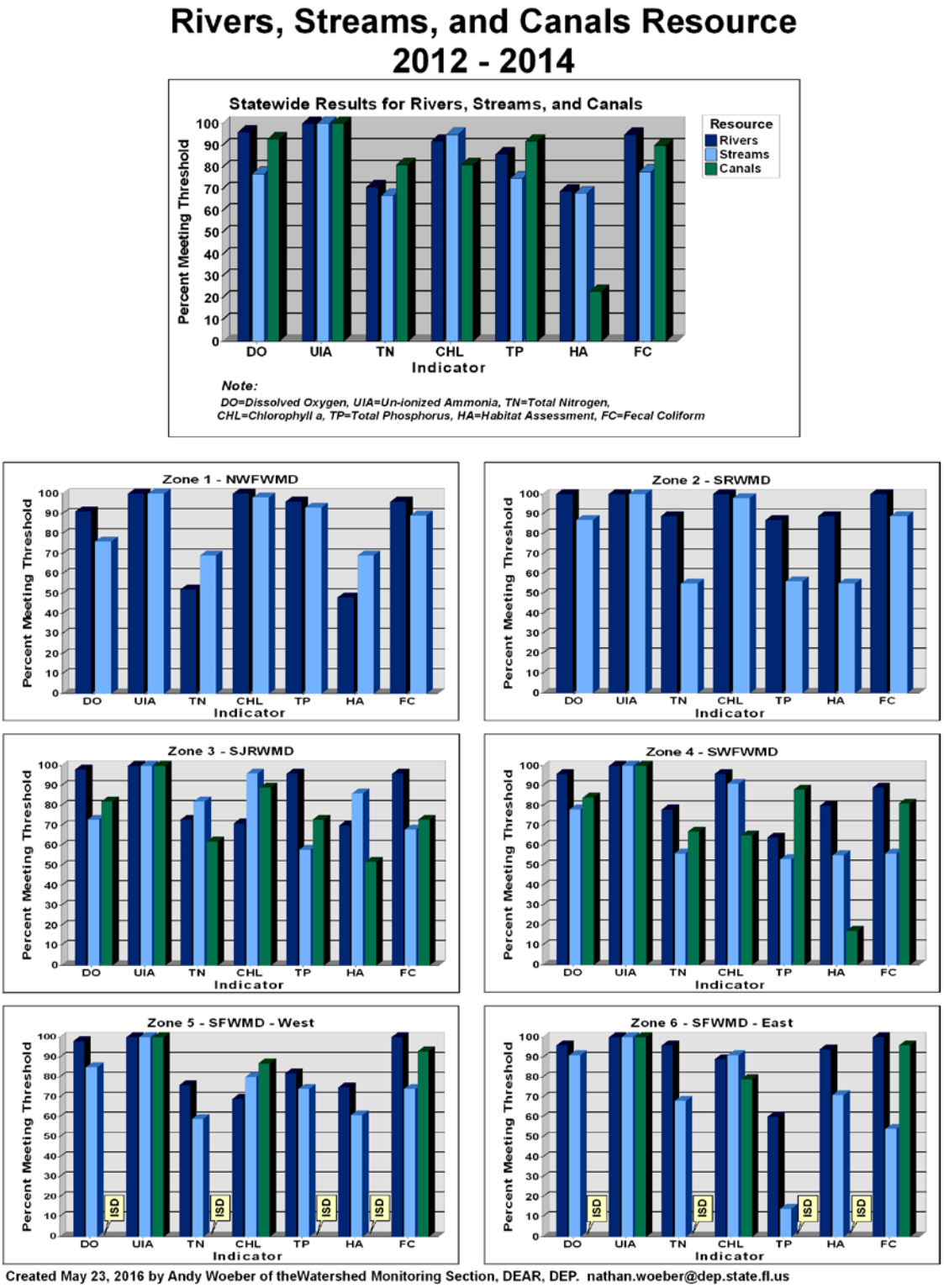


Figure 6. Sampling Location Map for Confined and Unconfined Aquifers

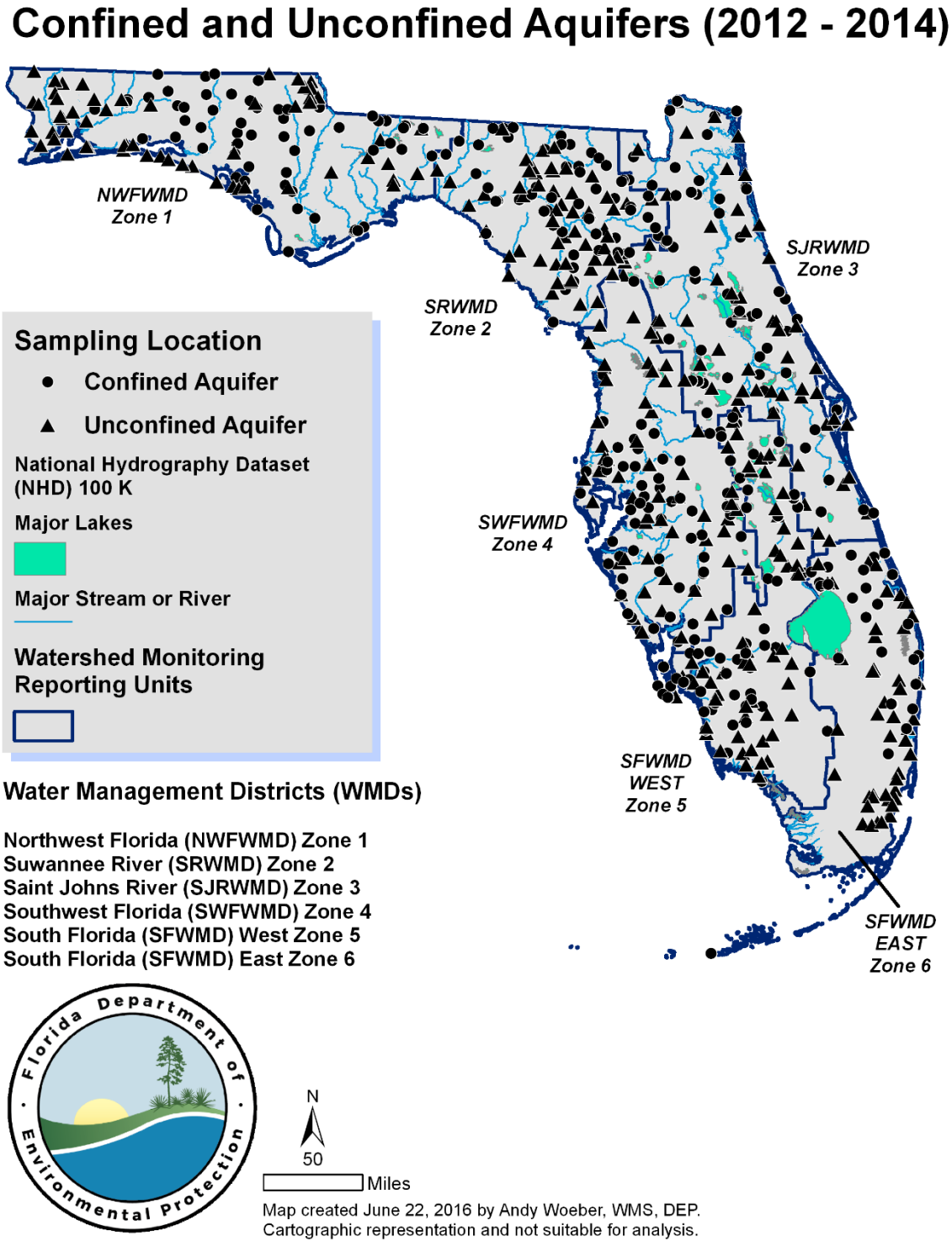
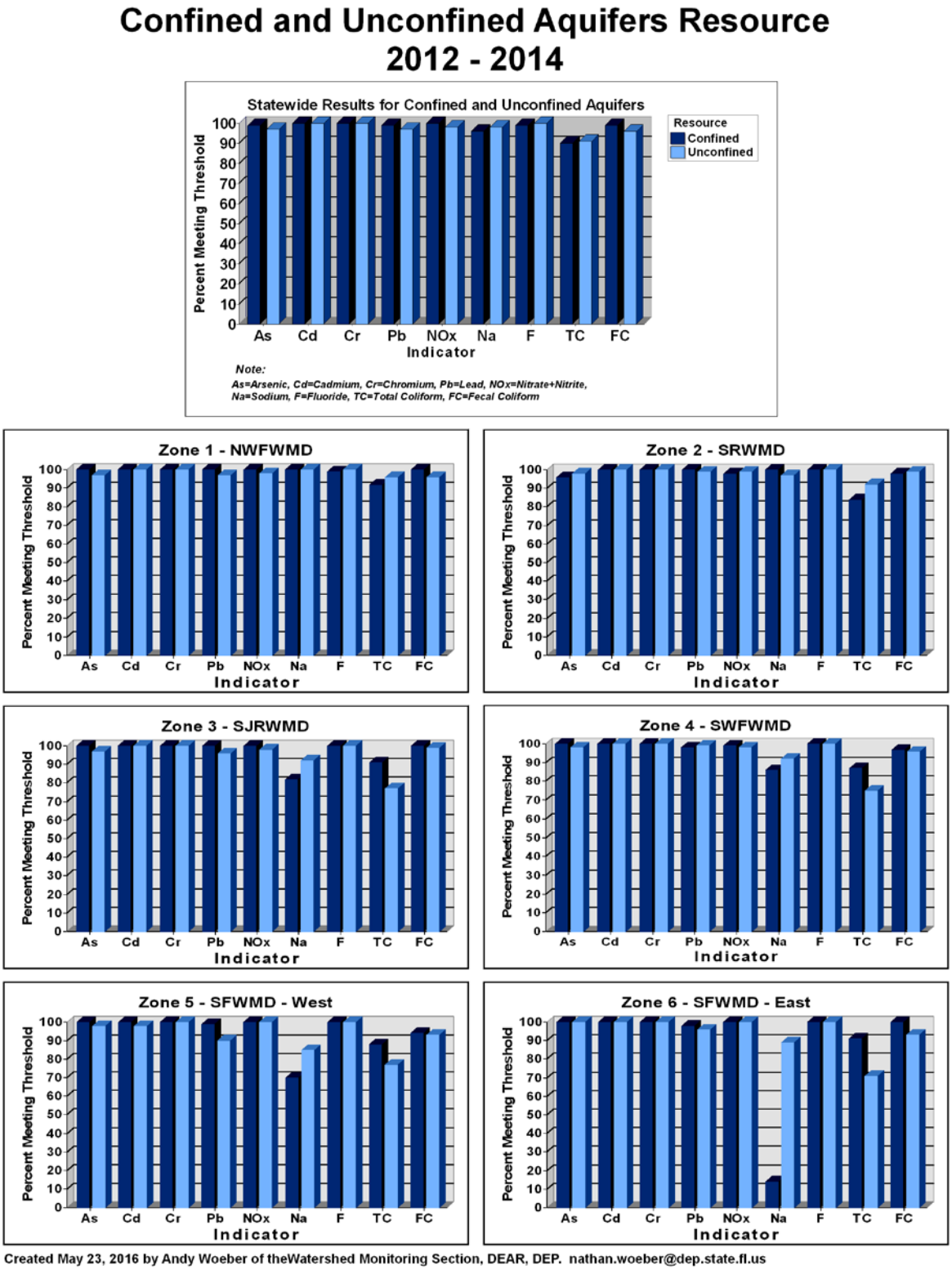


Figure 7. Percent of Confined and Unconfined Aquifers Meeting Indicator Thresholds



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Appendix A. Water Quality Indicators and Associated Thresholds

Surface Water

Table A1. Nutrient Indicators Used to Assess Lake Resources.

The nutrient (nitrogen and phosphorus) thresholds for lakes depend on the lake color, alkalinity, and whether the lake meets the applicable chlorophyll *a* threshold.

This is a five-column table. Column 1 lists the lake color and alkalinity, Column 2 lists the chlorophyll a *threshold, Column 3 lists the total phosphorus threshold, Column 4 lists the total nitrogen threshold, and Column 5 lists the designated use of the water.*

PCU – platinum cobalt units; $CaCO_3$ – calcium carbonate; µg/L – micrograms per liter; mg/L – milligrams per liter
[1] For lakes with color > 40 PCU in the West Central Nutrient Region (Figure A1), the Total Phosphorus threshold is 0.49 mg/L, regardless of the chlorophyll concentration.

Lake Color and Alkalinity	***Chlorophyll a Threshold (µg/L)***	***Total Phosphorus Threshold (mg/L)***	***Total Nitrogen Threshold (mg/L)***	***Designated Use***
Color > 40 PCU	≤ 20	≤ 0.16[1] if meets Chlorophyll threshold; ≤ 0.05[1] if it does not meet the threshold	≤ 2.23 if meets Chlorophyll threshold; ≤ 1.27 if it does not meet the threshold	Aquatic Life
Color ≤ 40 PCU and Alkalinity > 20 mg/L $CaCO_3$	≤ 20	≤ 0.09 if meets Chlorophyll threshold; ≤ 0.03 if it does not meet the threshold	≤ 1.91 if meets Chlorophyll threshold; ≤ 1.05 if it does not meet the threshold	Aquatic Life
Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L $CaCO_3$	≤ 6	≤ 0.03 if meets Chlorophyll threshold; ≤ 0.01 if it does not meet the threshold	≤ 0.93 if meets Chlorophyll threshold; ≤ 0.51 if it does not meet the threshold	Aquatic Life

Table A2. Nutrient Indicators Used to Assess River and Stream Resources.

The nutrient thresholds for rivers and streams depend on the Nutrient Region (Figure A1).

This is a four-column table. Column 1 lists the Nutrient Region, Column 2 lists the total phosphorus threshold, Column 3 lists the total nitrogen threshold, and Column 4 lists the designated use of the water.

mg/L – milligrams per liter
[1]No numeric threshold. The narrative threshold in paragraph 62-302.530(47) (b), F.A.C., applies.

Nutrient Region	***Total Phosphorus Threshold (mg/L)***	***Total Nitrogen Threshold (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[1]	N/A[1]	Aquatic Life

Figure A1. Nutrient Regions for River and Stream Resources.

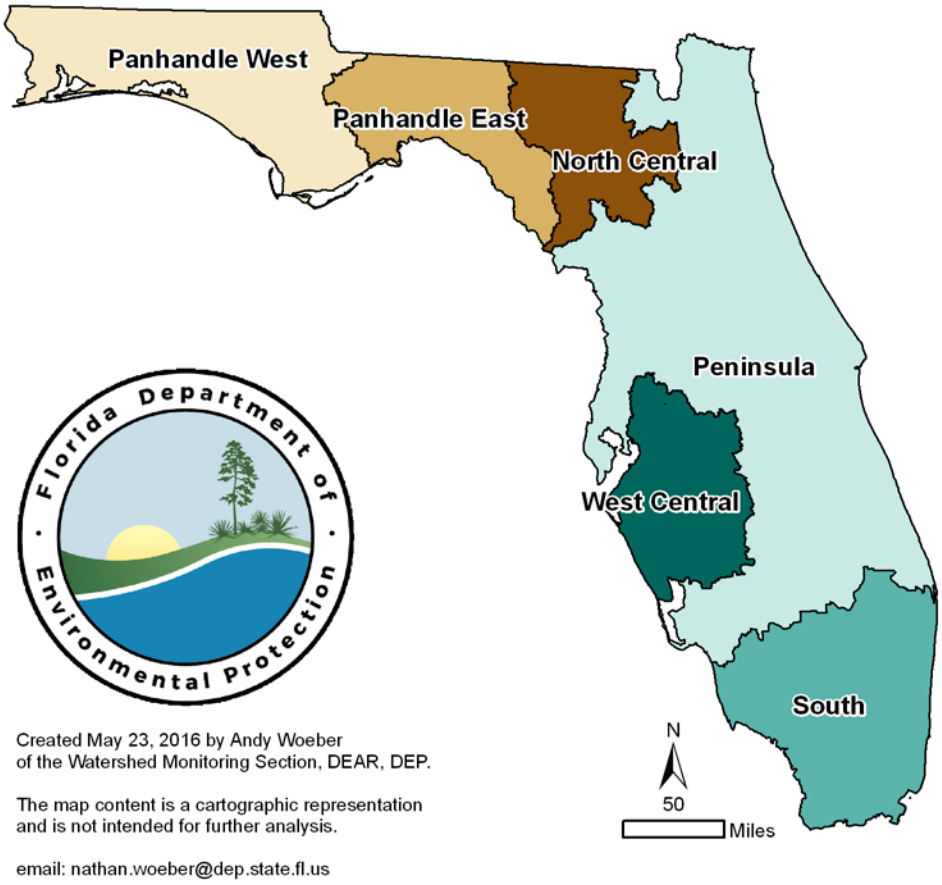

Table A3. Dissolved Oxygen (DO) Thresholds Used to Assess Surface Water Resources. The DO thresholds for lakes, rivers, and streams depend on the Bioregion (Figure A2). Additionally, Site Specific Alternative Thresholds (SSAC) exist in several areas of the state; however, these SSAC were not used in this report because of the reporting scale (statewide). Refer to the website link here - Alternate Surface Water Quality Standards Site Specific Alternative Thresholds for more information on SSAC and the locations of sites with these variances.

This is a three-column table. Column 1 lists the Bioregion, Column 2 lists the dissolved oxygen threshold, and Column 3 lists the designated use of the water.

Bioregion	***Dissolved Oxygen Threshold (% 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 A2. Bioregions for Lake, River, and Stream Resources.

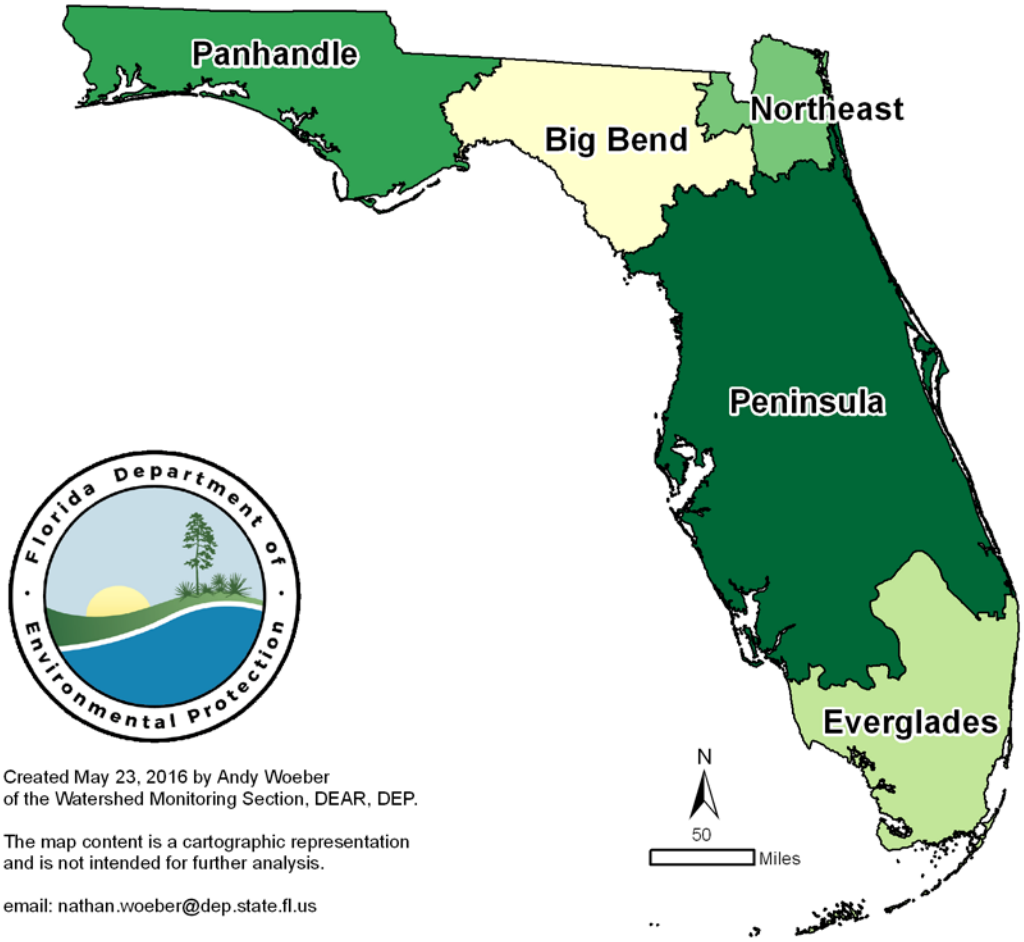

Table A4. Other Indicators Used to Assess Surface Water Resources.
Each indicator listed below was chosen because it has an applicable state threshold, found in *Thresholds for Surface Water Quality Classifications, Rules 62-302 and 62-303, F.A.C.* The same thresholds apply everywhere in Florida and for all surface waters, unless otherwise noted.

This is a three-column table. Column 1 lists the indicator, Column 2 lists the threshold, and Column 3 lists the designated use of the water.

mL – milliliters; mg/L – milligrams per liter; SU – standard units; µg/L – micrograms per liter
[1]Applies to rivers, streams, and canals. See Table A1 for the chlorophyll thresholds for lakes.

Indicator	*Threshold*	*Designated Use*
Fecal Coliform Bacteria	< 400 counts/100 mL	Recreation
Un-ionized Ammonia	≤ 0.02 mg/L	Aquatic Life
Chlorophyll *a*[1]	≤ 20 µg/L	Aquatic Life
Lake Vegetation Index (LVI)	LVI Score ≥ 43	Aquatic Life
Habitat Assessment (HA)	HA Score ≥ 80	Aquatic Life

Fecal coliform bacteria: The single-sample threshold for fecal coliform is less than 400 counts per 100 milliliters of water. These bacteria can enter water through the discharge of waste from

mammals and birds, agricultural and storm water runoff, and untreated human sewage. The presence of fecal coliform bacteria may indicate that the water is contaminated by disease-causing organisms.

Dissolved oxygen (DO): See **Table A3** for the DO thresholds. Algae and plants produce oxygen through photosynthesis. Oxygen also is dissolved in water by wind and wave action. Discharges of wastewater, storm water runoff from urban streets or farmland, and failing septic tanks consume oxygen. Natural conditions—such as respiration by aquatic animals, ground water from springs, water from swamps/wetlands, higher water temperatures, and calm and cloudy weather—can lead to reduced DO levels in waterbodies.

Un-ionized ammonia: The threshold for un-ionized ammonia is a maximum of 0.02 milligrams per liter (mg/L). This calculation is based on total ammonia and is adjusted for temperature, salinity, and pH. Aquatic systems can contain ammonia in different forms depending on these conditions and it can be toxic to fish and invertebrates.

Chlorophyll *a*: The threshold for chlorophyll-*a* in rivers, streams, and canals is a maximum of 20 micrograms per liter (µg/L). See **Table A1** for the chlorophyll thresholds in lakes. Chlorophyll is the pigment that allows algae and plants to convert sunlight into energy during photosynthesis. High concentrations of chlorophyll may indicate an overabundance of algae, which can reduce water clarity and limit the light available to shallow-water ecosystems.

Lake Vegetation Index (LVI): The Lake Vegetation Index (LVI) is a multi-metric tool that assesses lake health based on plant community structure. Data generated on the presence of plant species is used to calculate four biological metrics, each of which has been shown to respond to human disturbance (DEP SOP LVI 2200). Values less than the established threshold of 43 are not considered to support aquatic life use.

Habitat Assessment: The purpose of the habitat assessment is to collect key physical data components that can assist in interpreting biological community results. The procedure for conducting a habitat assessment in rivers and streams is described in DEP SOP FT 3100. Characteristics including substrate diversity, substrate availability, habitat smothering, water velocity, artificial channelization, bank stability, riparian zone buffer width and riparian zone vegetation quality are assessed and used to produce an overall habitat assessment score for the river or stream. A habitat assessment score less than 80 is not considered sufficient to support aquatic life use. Although the habitat assessment tool was not calibrated for or initially designed for assessment of canals, it is currently conducted to establish the expected conditions for canals in Florida.

Total nitrogen and total phosphorus: See **Tables A1** and **A2** for the total nitrogen and phosphorus thresholds. These elements are essential nutrients for living organisms. They occur naturally and also can be found in fertilizers. An overabundance of nutrients in water can cause adverse health and ecological effects, including excessive plant and algae growth. These organisms use up oxygen as they decompose and can block light to deeper waters, leading to reductions in animal and plant diversity.

Ground Water

Table A5. Indicators Used to Assess Ground Water Resources.

This is a three-column table. Column 1 lists the indicator, Column 2 lists the threshold, and Column 3 lists the designated use of the water.

µg/L – micrograms per liter; mg/L – milligrams per liter; mL – milliliters

Indicator	*Threshold*	*Designated Use*
Arsenic	≤ 10 µg/L	Potable Water
Cadmium	≤ 5 µg/L	Potable Water
Chromium	≤ 100 µg/L	Potable Water
Lead	≤ 15 µg/L	Potable Water
Nitrate + Nitrite	≤ 10 mg/L	Potable Water
Sodium	≤ 160 mg/L	Potable Water
Fluoride	≤ 4 mg/L	Potable Water
Total Coliform Bacteria	≤ 4 counts/100 mL	Potable Water
Fecal Coliform Bacteria	Presence/Detected	Potable Water

Arsenic, cadmium, chromium, and lead are naturally occurring metals in the earth's crust. These and other metals are used in manufacturing and can be found in pesticides, preservatives, and industrial operations. They may enter water as a pollutant. Florida has primary standards (thresholds) for these metals to protect human health. Excess levels in drinking water can cause adverse health effects.

Nitrate and nitrite are used in fertilizer and are found in human and animal waste. Florida's drinking water threshold is a maximum of 10 mg/L for nitrate and a maximum of 1 mg/L for nitrite. Toxicity of nitrate and nitrite is additive, therefore the sum of nitrate and nitrite concentrations must be less than or equal to 10 mg/L. In the long term, nitrates and nitrites have the potential to cause serious adverse effects in humans.

Sodium (salt) has a drinking water standard to protect individuals who are susceptible to sodium-sensitive hypertension or diseases that cause difficulty in regulating body fluid volume. Sodium is monitored so that individuals on sodium-restricted diets may take into account the sodium in their water. Drinking water contributes less than 10% of an individual's overall sodium intake.

Fluoride is a natural element added to drinking water systems to reduce dental cavities. Prolonged exposure to levels above 4 mg/L may result in skeletal fluorosis, a serious bone disorder. At lower levels, children may develop dental fluorosis. In its moderate and severe forms, dental fluorosis is a brown staining and/or pitting of the permanent teeth.

Total coliform bacteria are common in the environment and generally are not harmful. The presence of these bacteria in drinking water, however, indicates that disease-causing organisms may be present. To reduce the risk of adverse health effects, the U.S. EPA and the State of Florida have set a single-sample maximum of 4 coliform counts per 100 milliliters of fluid. Drinking water that meets this standard is considered safe.

Fecal coliform bacteria: These bacteria can enter water through the discharge of waste from mammals and birds, agricultural and storm water runoff, and untreated human sewage. The presence of fecal coliform bacteria may indicate that the water is contaminated by disease-causing organisms. Currently the state of Florida has no specific ground water standard for fecal coliform bacteria; however, for this report we are using detection of fecal coliform as the threshold.

This survey does not represent a comprehensive analysis of any individual waterbody. FDEP also analyzes for other indicators that do not have numeric thresholds. For a list of all analytes see the 2014 Monitoring Design Document.

Appendix B. Tables of Results from 2012-2014

Table B1. Percent Attainment in Large Lakes.

This is a nine-column table. Column 1 lists the Zone; Columns 2-8 list the percent ± confidence interval of large lakes that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – total nitrogen, CHL – chlorophyll a, TP – total phosphorus, LVI – Lake Vegetative Index, and FC - fecal coliform. Column 9 lists N - the number of large lake samples analyzed from 2012-2014.

ISD – Insufficient data, fewer than 27 samples; statewide results include data from zones categorized as ISD
[I] – Based on 115 lakes statewide, 27 for Zone 3, and 33 for Zone 4

Zone	DO	UIA	TN	CHL	TP	LVI[I]	FC	N
1	87.4±4.9	100	97.9±1.8	80.3±4.8	92.9±3.4	ISD	100	45
2	100	100	100	82.0±7.4	93.2±5.6	ISD	100	45
3	100	94.2±4.4	87.8±6.1	45.6±9.9	94.3±4.5	88.9±9.2	100	45
4	92.4±3.9	100	85.6±5.8	39.3±9.6	80.6±8.1	36.2±15.9	100	45
5	100	100	72.9±7.6	16.4±6.0	77.3±6.1	ISD	100	45
6	100	100	100	60.1±15.9	60.1±15.4	ISD	100	45
Statewide	98.5±0.5	98.3±1.3	90.3±2.3	47.8±6.6	77.6±5.9	65.6±8.3	100	270

Table B2. Percent Attainment in Small Lakes.

This is a nine-column table. Column 1 lists the Zone; Columns 2-8 list the percent ± confidence interval of small lakes that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – total nitrogen, CHL – chlorophyll a, TP – total phosphorus, LVI – Lake Vegetative Index, and FC - fecal coliform. Column 9 lists N - the number of small lake samples analyzed from 2012-2014.

ISD – Insufficient data, fewer than 27 samples; statewide results include data from zones categorized as ISD
[I] – Based on 172 lakes statewide, 31 for Zone 1, 31 for Zone 2, 38 for Zone 3, 28 for Zone 4, and 42 for Zone 5

Zone	DO	UIA	TN	CHL	TP	LVI[I]	FC	N
1	70.5±4.9	100	89.7±3.8	61.6±6.1	87.3±4.6	100	100	45
2	59.1±6.8	100	91.7±4.5	44.9±6.7	80.3±4.7	83.3±6.5	95.2±4.0	45
3	93.4±3.2	100	91.0±3.4	53.8±6.2	97.8±1.9	64.3±6.4	97.9±1.8	45
4	85.5±4.8	100	92.6±3.4	47.2±6.2	80.0±5.1	28.7±7.4	100	44
5	98.2±1.5	100	93.7±3.2	77.0±4.8	95.5±2.8	71.0±6.2	95.4±2.8	45
6	ISD	ISD	ISD	ISD	ISD	ISD	ISD	7
Statewide	86.2±2.2	100	91.4±1.9	54.8±3.4	89.6±2.0	60.2±3.5	98.7±0.7	231

Table B3. Percent Attainment in Rivers.

This is a nine-column table. Column 1 lists the Zone; Columns 2-8 list the percent ± confidence interval of rivers that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – total nitrogen, CHL – chlorophyll a, TP – total phosphorus, HA – Habitat Assessment, and FC – fecal coliform. Column 9 lists N - the number of river samples analyzed from 2012-2014.

Zone	DO	UIA	TN	CHL	TP	HA	FC	N
1	91.2±3.4	100	52.3±4.7	100	95.5±2.7	48.3±6.2	95.5±2.5	45
2	100	100	88.9±3.6	100	86.7±4.4	88.9±3.7	100	45
3	97.8±1.8	100	73.3±4.4	71.1±4.6	95.6±2.7	70.3±5.2	95.5±2.2	45
4	95.6±2.7	100	77.8±5.4	95.6±2.8	64.4±4.4	80.0±5.5	88.9±4.2	45
5	97.8±1.8	100	75.6±4.0	68.9±5.5	82.2±4.4	75.0±4.1	100	45
6	95.8±2.5	100	95.8±2.6	89.1±3.8	59.7±4.2	93.8±3.8	100	45
Statewide	95.5±1.3	100	70.6±2.3	91.7±1.1	85.5±1.7	69.3±2.7	95.2±1.3	270

Table B4. Percent Attainment in Streams.

This is a nine-column table. Column 1 lists the Zone; Columns 2-8 list the percent ± confidence interval of streams that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – total nitrogen, CHL – chlorophyll a, TP – total phosphorus, HA – Habitat Assessment, and FC – fecal coliform. Column 9 lists N - the number of stream samples analyzed from 2012-2014.

Zone	DO	UIA	TN	CHL	TP	HA	FC	N
1	75.6±4.3	100	68.8±4.7	97.8±1.9	93.4±3.0	68.9±6.2	88.9±4.0	45
2	86.6±4.5	100	55.2±5.6	97.8±1.9	55.6±5.3	55.2±5.6	89.0±3.3	45
3	73.3±5.9	100	82.2±4.9	95.6±2.6	57.8±6.0	86.2±5.7	68.2±5.7	45
4	77.8±5.4	100	55.6±5.9	91.1±3.6	53.3±6.6	55.0±6.6	55.6±6.7	45
5	84.7±4.6	100	59.1±5.6	80.4±5.0	74.3±4.9	60.9±6.0	74.3±5.1	46
6	90.7±3.8	100	67.8±4.5	91.3±3.8	13.7±3.5	71.3±7.1	53.5±4.5	45
Statewide	77.1±2.6	100	67.3±2.8	95.4±1.2	74.9±2.2	68.0±3.5	78.4±2.6	271

Table B5. Percent Attainment in Canals.

This is a nine-column table. Column 1 lists the Zone; Columns 2-8 list the percent ± confidence interval of streams that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – total nitrogen, CHL – chlorophyll a, TP – total phosphorus, HA – Habitat Assessment, and FC – fecal coliform. Column 9 lists N - the number of canal samples analyzed from 2012-2014.

ND-No data, canals are not sampled in zones 1 and 2
ISD-Insufficient data, there are fewer than 27 samples; statewide results include data from zones categorized as ISD

Zone	DO	UIA	TN	CHL	TP	HA	FC	N
1	ND	ND	ND	ND	ND	ND	ND	0
2	ND	ND	ND	ND	ND	ND	ND	0
3	82.2±4.5	100	62.2±4.0	88.9±3.8	73.3±5.4	52.4±6.3	73.3±5.2	45
4	83.7±4.9	100	67.4±5.2	65.1±6.0	88.4±4.4	17.2±6.3	81.4±4.9	43
5	97.8±2.0	100	ISD	86.7±3.8	ISD	14.3±5.0	93.3±3.3	45
6	96.1±1.7	100	ISD	78.7±4.4	ISD	18.9±3.3	96.1±1.8	74
Statewide	93.0±1.3	100	81.2±3.9	80.5±2.5	92.2±2.2	22.7±2.4	90.3±1.5	207

Table B6. Percent Attainment in Confined Aquifers.

This is an eleven-column table. Column 1 lists the Zone; Columns 2-10 list the percent ± confidence interval of confined aquifer wells that attains target levels of arsenic, cadmium, chromium, lead, nitrate-nitrite, sodium, fluoride, total coliform, and fecal coliform, respectively; Column 11 lists "N", the number of confined aquifer samples analyzed from 2012-2014.

Zone	Arsenic	Cadmium	Chromium	Lead	Nitrate-Nitrite	Sodium	Fluoride	Total Coliform	Fecal Coliform	N
1	100	100	100	100	100	100	98.9±0.9	92.3±3.5	100	57
2	96.3±3.3	100	100	100	97.5±2.0	100	100	84.3±5.0	98.1±1.5	60
3	100	100	100	100	100	82.2±4.3	100	90.5±3.8	100	60
4	100	100	100	98.2±1.5	98.8±1.0	86.1±3.7	100	87.2±3.8	96.7±2.1	60
5	100	100	100	99.0±0.8	100	69.5±4.6	100	87.5±3.9	94.2±2.8	60
6	100	100	100	97.6±1.9	100	14.3±3.3	100	90.6±3.9	100	47
Statewide	99.3±0.6	100	100	99.8±0.1	99.5±0.4	96.4±0.5	99.3±0.6	90.2±2.4	99.3±0.3	344

Table B7. Percent Attainment in Unconfined Aquifers.

This is an eleven-column table. Column 1 lists the Zone; Columns 2-10 list the percent ± confidence interval of unconfined aquifer wells that attains target levels of arsenic, cadmium, chromium, lead, nitrate-nitrite, sodium, fluoride, total coliform, and fecal coliform, respectively; Column 11 lists "N", the number of unconfined aquifer samples analyzed from 2012-2014.

Zone	*Arsenic*	*Cadmium*	*Chromium*	*Lead*	*Nitrate-Nitrite*	*Sodium*	*Fluoride*	*Total Coliform*	*Fecal Coliform*	*N*
1	96.9±2.7	100	100	96.9±2.8	98.0±1.8	100	100	95.9±2.3	96.2±2.3	60
2	98.2±1.6	100	100	98.6±1.3	98.6±1.3	97.1±1.5	100	92.0±3.7	98.6±1.3	60
3	96.8±2.0	100	100	96.2±2.3	98.3±1.4	92.4±2.4	100	76.8±4.7	98.5±1.3	60
4	97.7±1.4	100	100	98.9±1.0	97.7±1.3	92.0±4.7	100	74.8±6.2	95.5±1.9	58
5	97.5±1.7	97.9±1.8	100	89.7±1.0	100	84.5±2.0	100	77.0±5.1	93.1±2.9	59
6	100	100	100	96.0±2.5	100	89.3±3.9	100	70.8±5.9	93.2±3.5	46
Statewide	97.4±1.8	99.9±0.1	100	96.9±1.8	98.3±1.2	97.8±0.5	100	90.8±1.7	96.3±1.5	343