2010-2012 Status Network Statewide Results

Florida Department of Environmental Protection (FDEP)

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 water quality with a known statistical confidence. Because it is impossible to sample every waterbody in the state on an annual basis, the Network employs a statewide random-site monitoring design. In a random-site design, water sampling locations are chosen in an unbiased manner. The water samples are analyzed in the FDEP lab, and statistical models are run on these data to infer the conditions of the state as a whole. Thus, the Status Network provides a cost-effective way to produce statistically valid estimates of statewide water quality. The Network addresses statewide and regional (within Florida) questions; it is not designed to evaluate specific waterbodies or wells. This report summarizes the 2010-2012 Status Monitoring Network design and results.

Monitoring Design

The Status Monitoring Network categorizes Florida's fresh waters into six resource types. Four of these are surface water: small lakes, large lakes, rivers, and streams. The other two resources are ground water: unconfined and confined aquifers. Based on current annual sample sizes (90 samples from each surface water resource and 120 samples from each ground water resource) the design allows for reporting with a 95% confidence interval of approximately $\pm$ 12% for surface water resources and $\pm$ 9% for ground water resources. Therefore, we have 95% confidence that statewide surface water conditions are within 12% of the reported values, and similarly, statewide ground water conditions are within 9% of the reported values.

Each year, the resource coverages are updated to incorporate documented changes, deletions or additions. Not all randomly selected stations can be sampled for various reasons. Those that can be sampled are termed accessible. Those stations that cannot be sampled are considered either dry, inaccessible, or wrong resource. If a selected location does not represent the assigned resource, it is removed from the coverage and added to the proper resource for the following year's selections.

Reduced rainfall or periods of drought occur on a cyclical basis in many areas of 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 can potentially dilute concentrations of certain water quality parameters; therefore, knowledge of the yearly rainfall can assist in better understanding the overall water quality of Florida.

The following paragraphs provide further details on the resource types and monitoring design.

Lakes

Lakes are defined as natural or established reservoirs that are at least 1 meter deep and contain at least 1/4 acre of open water (free of emergent vegetation and trees). The Watershed Monitoring Section (WMS) has divided these lakes by size into two categories: small lakes of 10 to 25 acres and large lakes over 25 acres. The small lakes are treated as points and the large lakes are sampled based on area. This division allows a better characterization of the state's lake resources: if all lakes were in one category, the size of large lakes would skew site selection and cause small lakes to be under-represented. Based on this definition, the state of Florida has approximately 1,702 large and 2,129 small lakes.

Rivers and Streams

Rivers and Streams include linear waterbodies with perennial flow that are waters of the state (Chapters 373 and 403, Florida Statutes). There have been issues using traditional classification, commonly referred to 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 FDEP) to submit suggestions for the river resource. Based on these recommendations, the state has 2,740 linear miles of rivers. The remaining streams and tributaries are designated as the stream resource, totaling about 16,700 additional linear miles. The two resources can have different habitats and uses.

Aquifers

Aquifers are permeable layers of sand, gravel, or rock that contain water. 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 the downward flow of water. Water in confined aquifers usually filters slowly through sediment and rock layers, and is older and less affected by human activities. Ground water is monitored through wells in unconfined and confined aquifers.

Combining Yearly Data for Analysis

An increased sample size is desirable as sample size is related to confidence of reported values. All else remaining the same, increasing sample size has a positive effect on the confidence levels for the reported data, 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 data for the status monitoring network 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.

Sampling and Analysis

In total, sixty samples in 2010 and 2011 and 90 samples in 2012 from each surface water resource type, and 120 samples each year from both ground water resource types, were collected throughout the state in order to assess the conditions of each resource listed above. In addition to an overall statewide assessment, the water conditions in each of Florida's six zones were evaluated. Please see Figure 1 for locations of these zones.

Please see the 2012 Monitoring Design Document at the FDEP website for more information on the Status Network design.

Watershed Monitoring Reporting Units

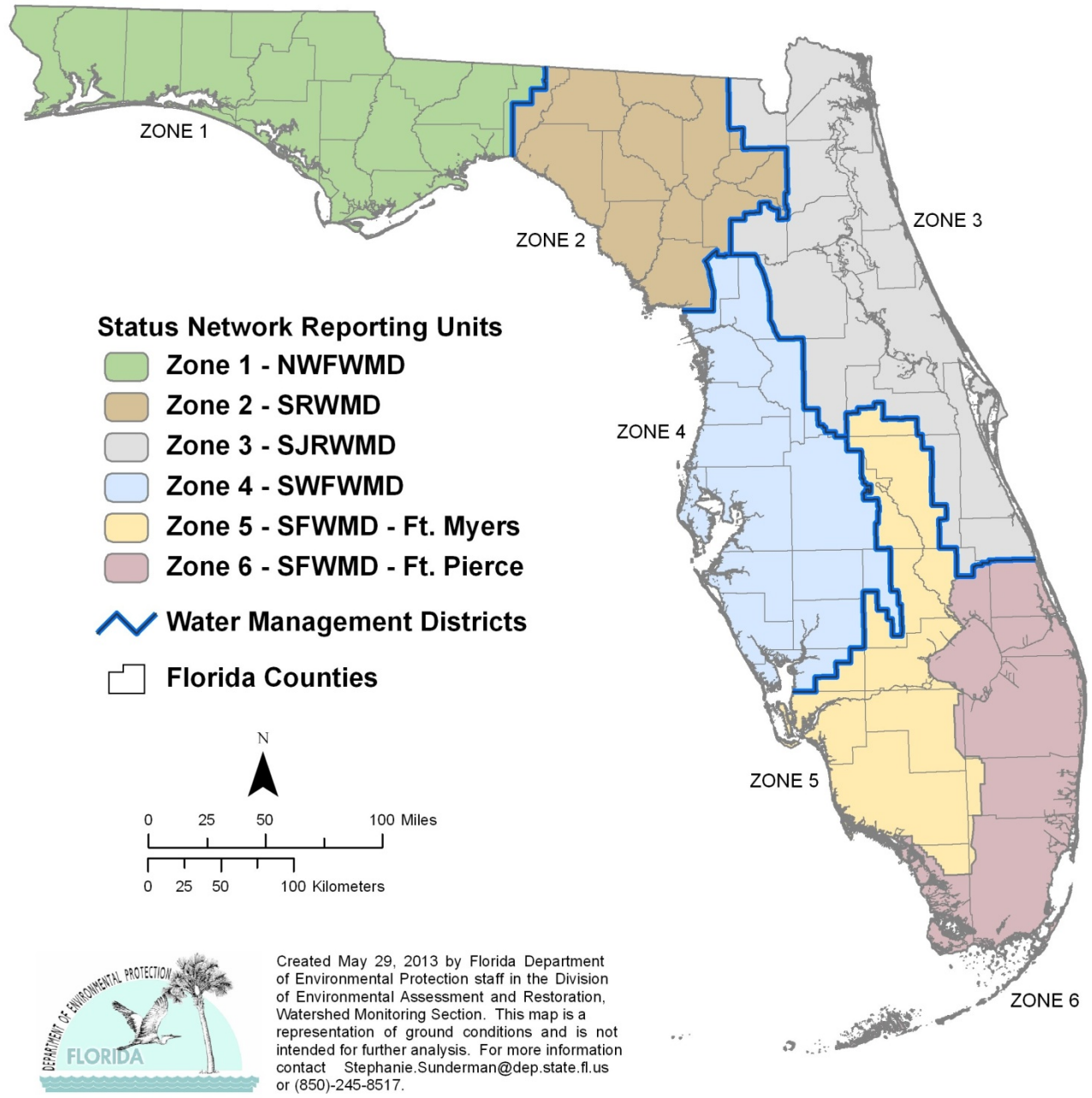


Figure 1.

Summary of Resources Assessed

The table below shows the statewide extent of each of the six water resources assessed, and the number of samples collected in each water resource used to infer the water quality results. The average annual precipitation for 2010-2012 was comparable with the 30-year annual average (51.23 versus 55.25 inches, respectively).

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 2010 - 2012.

Water Resource	Resource Size (number/area/length)	Number of Samples
Large Lake (≥ 25 acres)	1,702 lakes (1,577 square miles)	209
Small Lake (10-25 acres)	2,129 lakes (50 square miles)	176
River	2,740 miles	190
Stream	16,700 miles	195
Confined Aquifer	10,181 wells	324
Unconfined Aquifer	10,920 wells	346

Results

The data reported are the results of statistical models designed to infer statewide or zone-wide water quality conditions based on the data collected at sampled locations. For example, the data collected from 209 large lake sampling locations throughout the state were used to construct a statistical model which indicated that 99.0±0.9% of the state's large lakes have fecal coliform levels that meet the criteria described in Appendix A.

Bar charts showing the percentages of waterbodies attaining water quality standards are provided below in Figures 2 through 4. Appendix A lists the definitions and numeric standards for water quality indicators. Tables providing the results are given in Appendix B. For a given resource type, typically at least 26 samples are needed to obtain a margin of error within ± 20%. Therefore if a sample size consisted of < 26 samples, then insufficient data (ISD) was reported. The regional and statewide 95% confidence intervals varied to a maximum of ± 6.3% for ground water indicators and a maximum of ± 7.8% for surface water indicators.

Surface Water

A lower frequency of attainment of chlorophyll-a criteria was noted for large lakes compared to small lakes for Zones 1, 3, and 5; whereas in Zone 2 the frequency to attain chlorophyll-a criteria was greater for large versus small lake resources. Only about 45 percent of the large lakes in Zone 5 attained the chlorophyll-a criteria. Attainment of dissolved oxygen criteria was 94 percent or better statewide for both large and small lakes. Fecal coliform criteria attainment was greater than 90 percent statewide for both large and small lakes. Total phosphorus criteria attainment for Zone

6 large lakes was lower than all other zones. Due to the reduced sample size for small lakes in Zone 6, no comparison could be made with other Zones in the study.

A lower frequency of attainment of chlorophyll-a criteria was noted for rivers compared to streams in Zone 3 and Zone 5. About 70 percent of the rivers in Zone 5 attained chlorophyll-a criteria. Only about 50 percent of streams in Zone 2 attained total nitrogen or total phosphorus criteria. The lowest frequency of attainment for total phosphorus criteria in streams (21%) was observed in Zone 6.

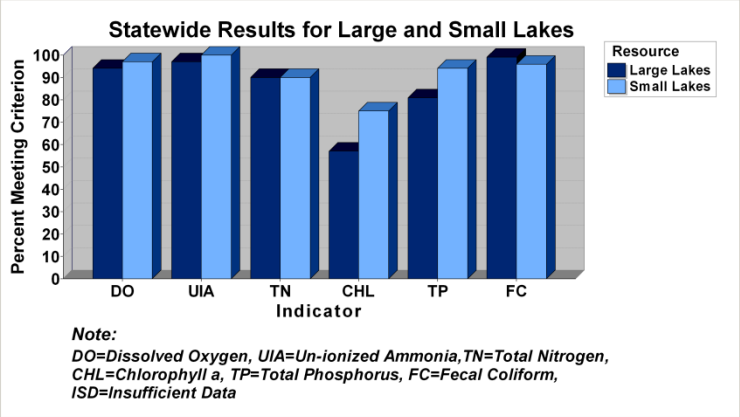
The low frequency of attainment of chlorophyll-a criteria in large lakes and of total nitrogen and total phosphorus criteria in rivers and streams statewide support the Department's recognition that nutrients are a primary concern with regard to water quality in the state.

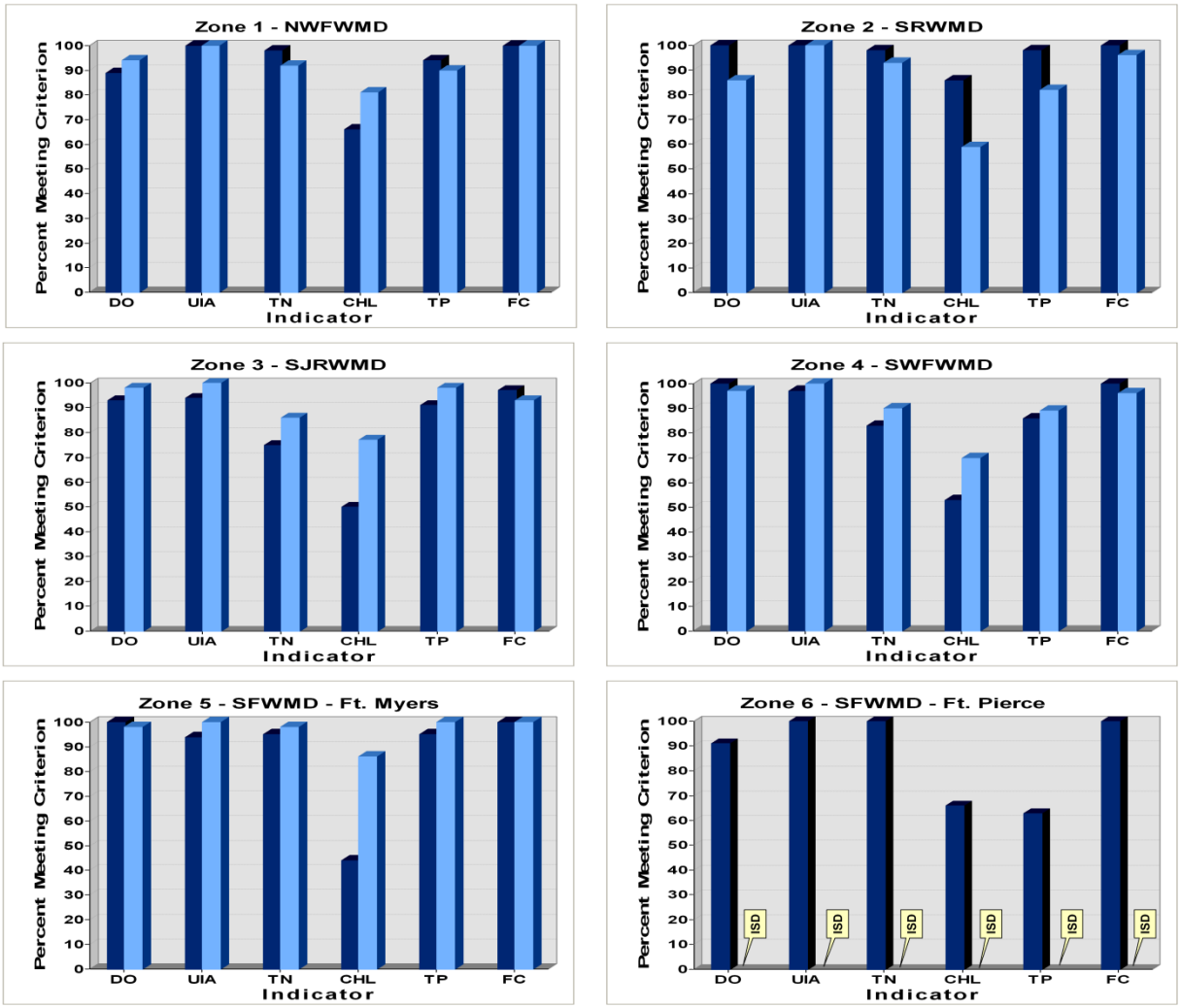
Ground Water

A lower frequency of attainment of sodium was noted for confined versus unconfined aquifers in Zones 5 and 6. Frequency of total coliform criteria attainment was lowest for unconfined aquifers in Zone 5 and 6, compared to the other zones in the study.

For more information, contact:
Florida Department of Environmental Protection, Watershed Monitoring Section, MS 3525
2600 Blair Stone Road, Tallahassee, FL 32399
(850) 245–8433; Watershed Monitoring

Lakes Resource
2010 - 2012

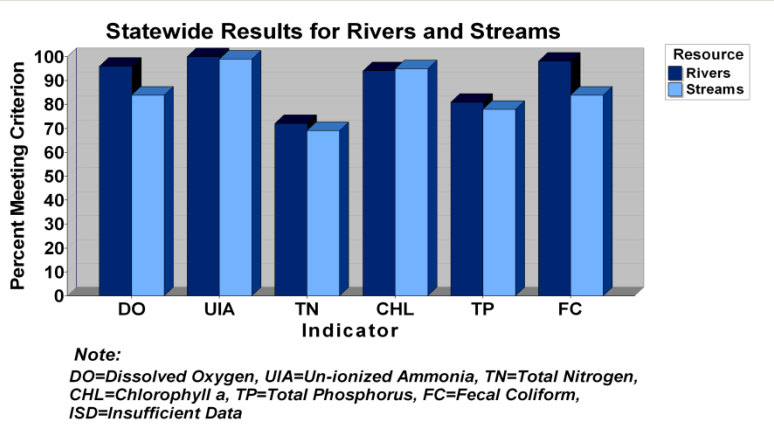


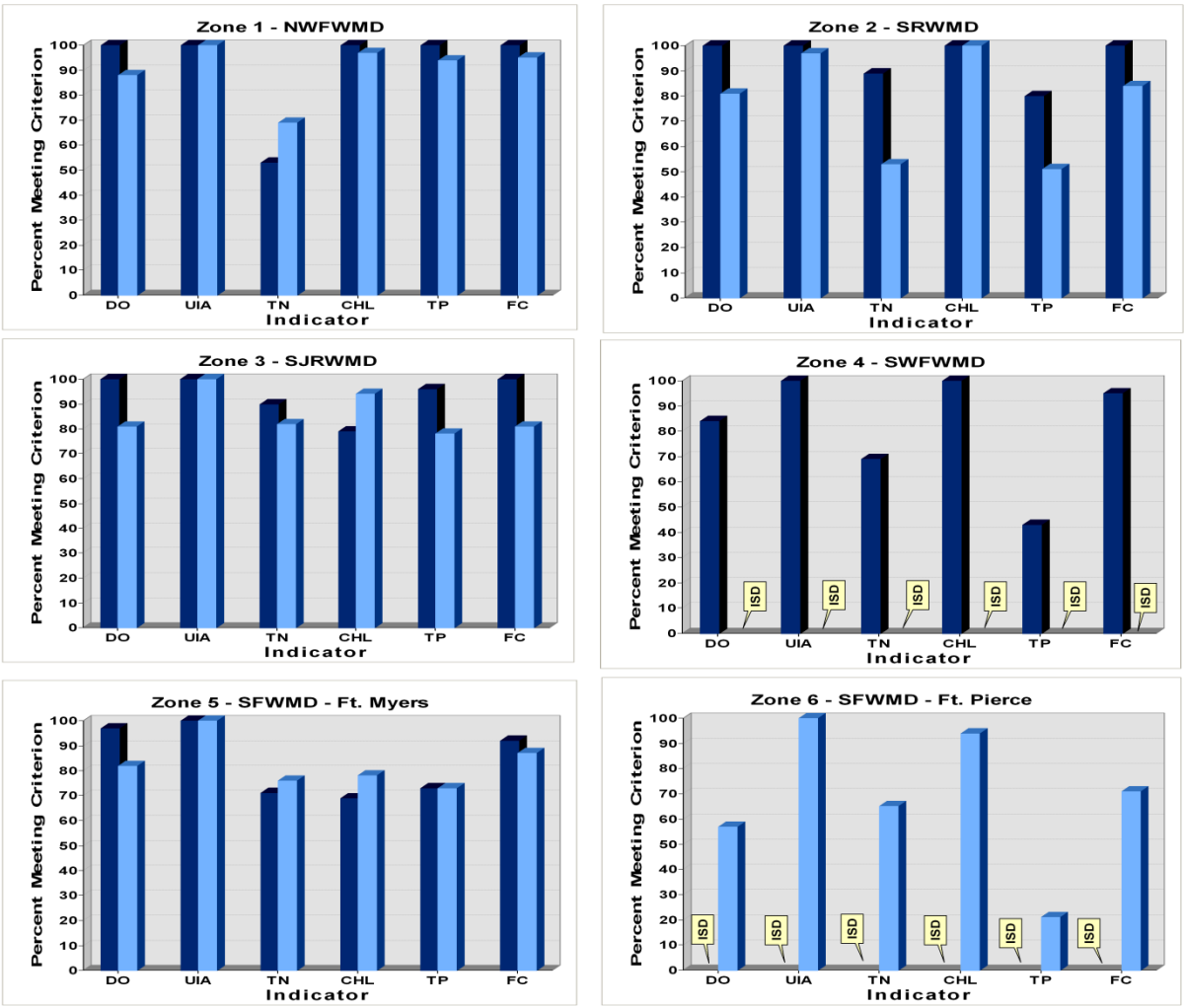


Created March 4, 2014 by Andy Woeber of the Watershed Monitoring Section, DEAR, FDEP. nathan.woeber@dep.state.fl.us

Figure 2.

Rivers and Streams Resource
2010 - 2012

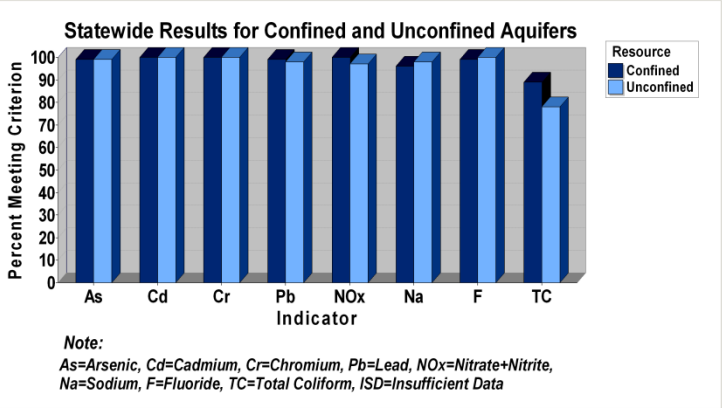


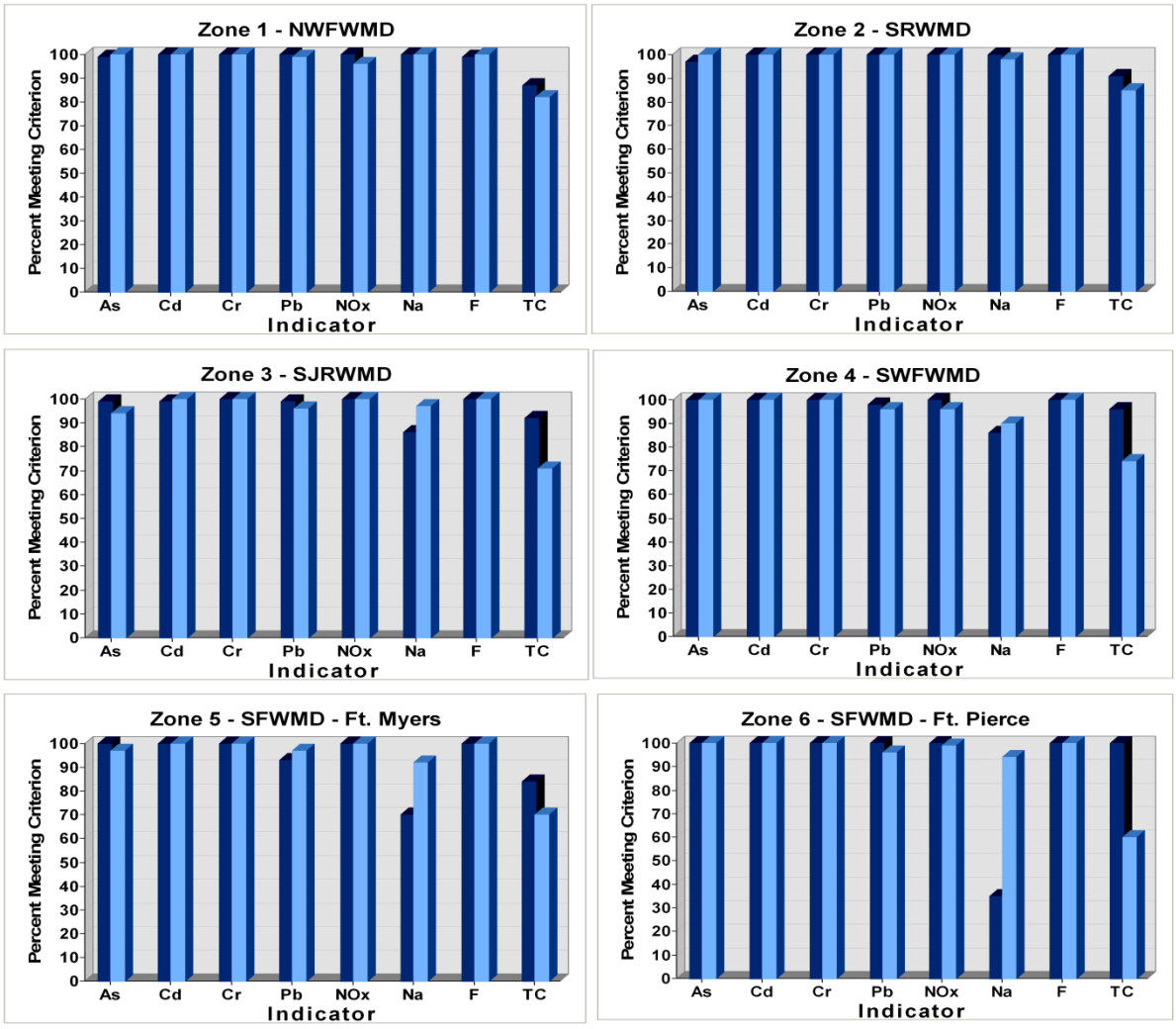


Created March 4, 2014 by Andy Woeber of the Watershed Monitoring Section, DEAR, FDEP. nathan.woeber@dep.state.fl.us

Figure 3.

Confined and Unconfined Aquifers Resource
2010 - 2012





Created March 4, 2014 by Andy Woeber of the Watershed Monitoring Section, DEAR, FDEP. nathan.woeber@dep.state.fl.us

Figure 4.

Appendix A. Water Quality Indicators and Associated Criteria

Surface Water

Table A1. Nutrient Indicators Used to Assess Lake Resources.

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

This is a five-column table. Column 1 lists the lake color and alkalinity, Column 2 lists the chlorophyll a *criterion, Column 3 lists the total phosphorus criterion, Column 4 lists the total nitrogen criterion, 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

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

[1] For lakes with color > 40 PCU in the West Central Nutrient Region (Figure A1), the Total Phosphorus criterion is 0.49 mg/L, regardless of the chlorophyll concentration.

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

The nutrient criteria 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 criterion, Column 3 lists the total nitrogen criterion, and Column 4 lists the designated use of the water.

mg/L – milligrams per liter

Nutrient Region	Total Phosphorus Criterion (mg/L)	Total Nitrogen Criterion (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

[1]No numeric criterion. The narrative criterion in paragraph 62-302.530(47)(b), F.A.C., applies.

Figure A1. Nutrient Regions for River and Stream Resources.

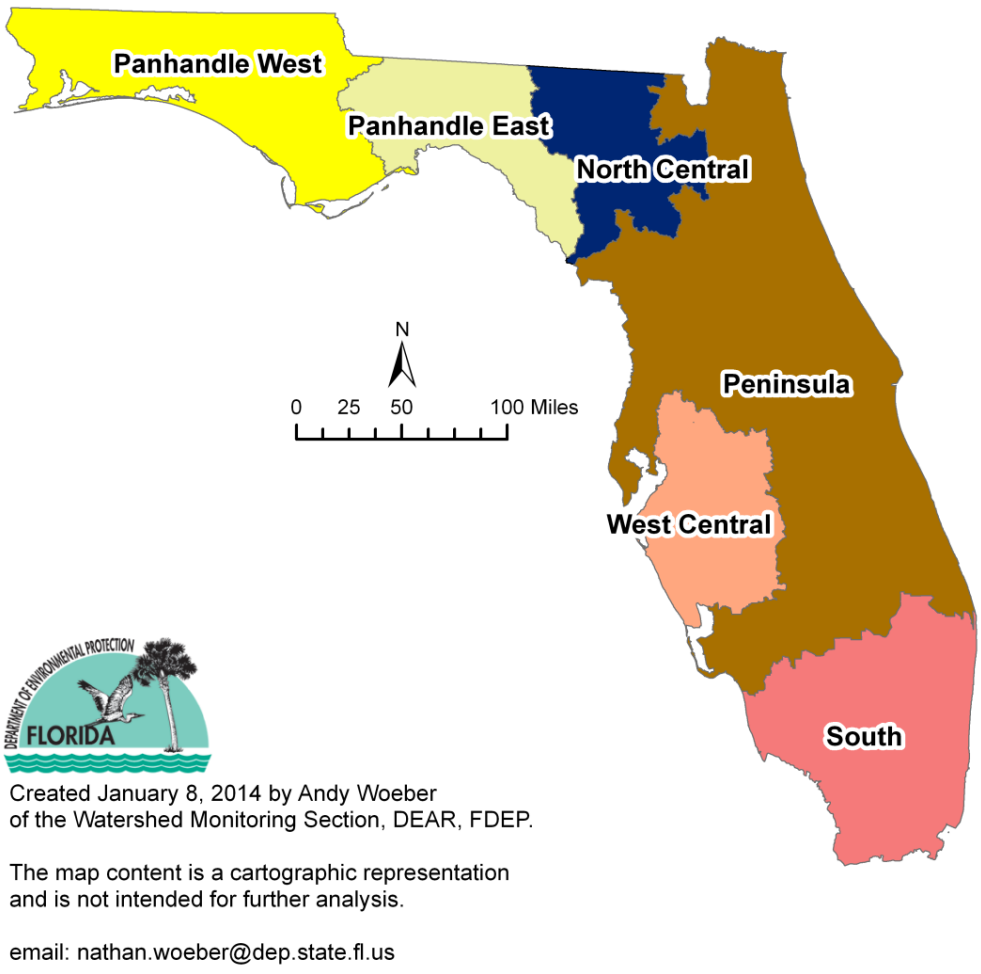


Table A3. Dissolved Oxygen (DO) Criteria Used to Assess Surface Water Resources.
The DO criteria for lakes, rivers, and streams depend on the Bioregion (Figure A2). The DO criterion for the protection of aquatic life in canals is ≥ 5.0 mg/L. Additionally, Site Specific Alternative Criteria (SSAC) exist 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 Criteria 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 criterion, and Column 3 lists the designated use of the water.

Bioregion	Dissolved Oxygen Criterion (% 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.

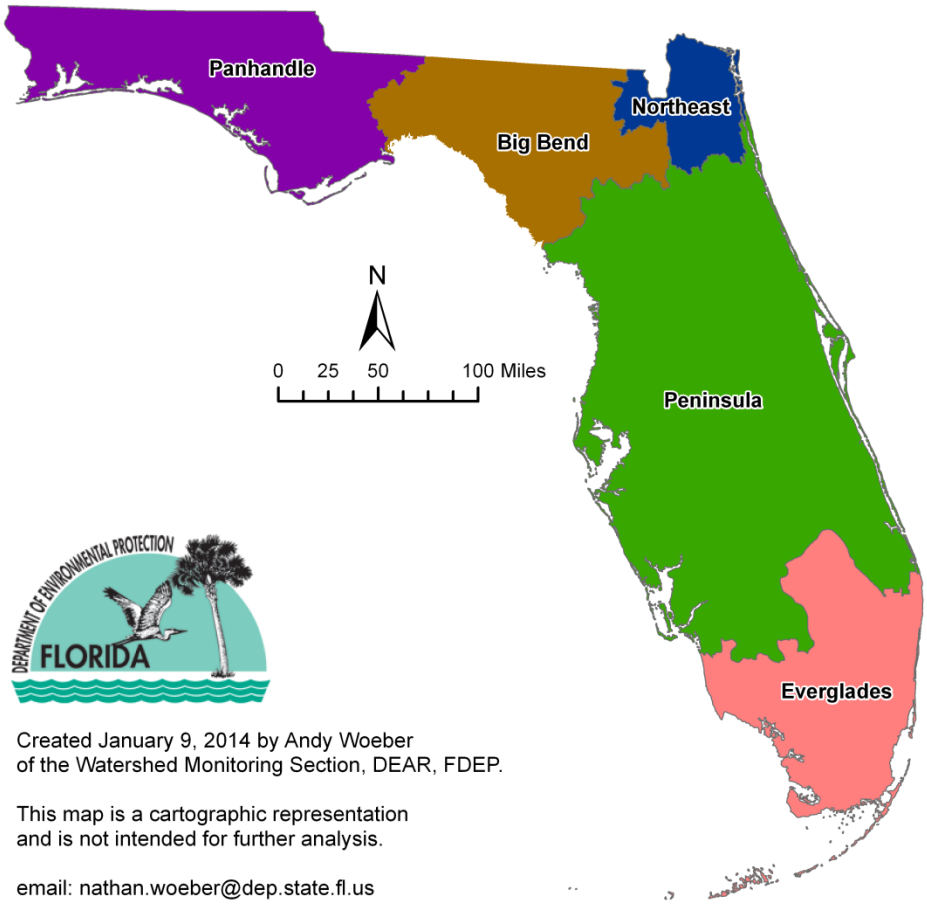


Table A4. Other Indicators Used to Assess Surface Water Resources.
Each indicator listed below was chosen because it has an applicable state criterion, found in *Criteria for Surface Water Quality Classifications, Rules 62-302 and 62-303, F.A.C.* The same criteria apply everywhere in Florida and for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

This is a three-column table. Column 1 lists the indicator, Column 2 lists the criterion, 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

Indicator	Criterion	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

[1]Applies to rivers, streams, and canals. See Table A1 for the chlorophyll criteria for lakes.

Fecal coliform bacteria: The single-sample criterion 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 stormwater runoff, and untreated human sewage. The presence of fecal coliform bacteria may indicate that the water is contaminated by other disease-causing organisms.

Dissolved oxygen (DO): See Table A3 for the DO criteria. Algae and plants produce oxygen through photosynthesis. Oxygen 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 criterion for un-ionized ammonia is a maximum of 0.02 milligrams per liter. This is calculated from total ammonia and is adjusted for temperature, salinity, and acidity or alkalinity of the solution. Depending on temperature and the acidity or alkalinity of the water, ammonia can exist in different forms at a given time within an aquatic system. Un-ionized ammonia can be toxic to fish and invertebrates.

Chlorophyll *a*: The criterion for chlorophyll *a* in rivers, streams, and canals is a maximum of 20 micrograms per liter. See Table A1 for the chlorophyll criteria 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.

Total nitrogen and total phosphorus: See Tables A1 and A2 for the total nitrogen and phosphorus criteria. These elements are essential nutrients for living organisms, and are found in fertilizers. However, 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. This can lead 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 criterion, and Column 3 lists the designated use of the water.

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

Indicator	Criterion	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

Arsenic, cadmium, chromium, and lead are all 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 (criteria) for these metals to protect human health. Excess levels in drinking water can cause adverse health effects.

Nitrate–nitrite is used in fertilizer and is found in human and animal waste. Florida's drinking water criterion for nitrate is a maximum of 10 milligrams per liter (mg/L) 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, a natural element, is added to drinking water systems to reduce dental cavities. Prolonged exposure to levels above 4 milligrams per liter may result in crippling skeletal fluorosis, a serious bone disorder. Lower levels may cause dental fluorosis when children are developing teeth. 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 usually not associated with a health risk from disease-causing bacteria and is considered safe.

This survey does not represent a comprehensive analysis of any individual waterbody. FDEP also analyzes for other indicators that do not have numeric criteria. For a list of all analytes see the 2012 Monitoring Design Document.

Appendix B. Tables of Results from 2010-2012

Table B1. Percent Attainment in Large Lakes.

This is an eight-column table. Column 1 lists the zone; Columns 2-7 list the percent of large lakes that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – Total Nitrogen, CHL – Chlorophyll a, TP – Total Phosphorus, and FC - fecal coliform. Column 8 lists N - the number of large lake samples analyzed from 2010-2012.

Zone	DO	UIA	TN	CHL	TP	FC	N
1	89.3±4.8	100	97.7±2.0*	71.9±3.5	93.9±3.7*	100	34
2	100	100	97.8±2.0	90.1±5.0	97.8±2.0	100	35
3	93.2±3.5	93.8±4.1	75.6±5.7	50.5±6.5	90.7±3.7	96.8±2.9	35
4	100	97.5±4.1	83.0±5.2	64.3±7.0	85.9±4.2	100	35
5	100	94.1±4.7	95.4±2.9	44.6±4.8	95.4±2.9	100	35
6	91.5±6.9	100	100	62.9±10.6	63.0±10.0	100	35
Statewide Average	94.4±2.7	96.9±1.4	89.9±1.9	57.4±4.4	81.2±3.8	99.0±0.9	209

*** Based on 33 samples**

Table B2. Percent Attainment in Small Lakes.

This is an eight-column table. Column 1 lists the zone; Columns 2-7 list the percent of small lakes that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – Total Nitrogen, CHL – Chlorophyll a, TP – Total Phosphorus, and FC - fecal coliform. Column 8 lists N - the number of small lake samples analyzed from 2010-2012.

Zone	DO	UIA	TN	CHL	TP	FC	N
1	94.6±3.1	100	92.3±3.9	80.8±6.3	90.5±4.8	100	35
2	85.7±5.3	100*	93.1±3.5*	58.7±8.7*	81.8±6.7*	96.2±3.3*	35
3	97.9±1.7	100	85.7±5.0	76.3±6.8	97.8±2.0	92.6±4.6	35
4	97.0±2.5	100	90.4±4.7	70.5±6.9	88.6±4.5	96.0±3.5	35
5	98.6±1.3	100	98.6±1.2	85.7±5.7	100	100	31
6	ISD	ISD	ISD	ISD	ISD	ISD	5
Statewide Average	97.0±1.1	100	90.0±2.4	74.7±3.6	93.8±1.7	95.8±2.1	176

*** Based on 32 samples**
ISD – Insufficient Data

Table B3. Percent Attainment in Rivers.

This is an eight-column table. Column 1 lists the zone; Columns 2-7 list the percent of rivers that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – Total Nitrogen, CHL – Chlorophyll a, TP – Total Phosphorus, and FC – fecal coliform. Column 8 lists N - the number of river samples analyzed from 2010-2012.

Zone	DO	UIA	TN	CHL	TP	FC	N
1	100	100	53.3±5.4	100	100	100	35
2	100	100	88.9±4.1	100	80.0±5.7	100	35
3	100	100	89.8±2.9	78.8±4.7	96.5±3.1	100	34
4	84.5±5.3	100	69.0±6.1	100	42.9±5.9	95.2±2.9	33
5	96.9±2.6	100	71.2±6.9	69.0±7.4	73.3±3.2	91.9±4.7	28
6	ISD	ISD	ISD	ISD	ISD	ISD	25
Statewide Average	96.3±1.2	100	71.7±2.5	93.8±1.0	80.7±1.8	98.3±0.7	190

ISD – Insufficient Data

Table B4. Percent Attainment in Streams.

This is an eight-column table. Column 1 lists the zone; Columns 2-7 list the percent of streams that attains target levels of DO - dissolved oxygen, UIA - un-ionized ammonia, TN – Total Nitrogen, CHL – Chlorophyll a, TP – Total Phosphorus, and FC – fecal coliform. Column 8 lists N - the number of stream samples analyzed from 2010-2012.

Zone	DO	UIA	TN	CHL	TP	FC	N
1	87.8±4.6	100	68.9±6.8	96.7±2.8	94.4±3.4	95.6±2.8	35
2	81.1±6.4	96.7±2.9	53.3±6.9	100	51.1±7.1	84.4±5.4	35
3	81.1±5.7	100	82.2±5.9	94.4±3.2	77.8±6.3	81.1±5.5	35
4	ISD	ISD	ISD	ISD	ISD	ISD	24
5	82.0±6.0	100	76.4±6.5	78.2±6.2	73.4±7.3	87.5±4.3	35
6	56.7±7.8	100	65.6±6.9	94.3±3.6	20.6±6.8	71.6±6.5	31
Statewide Average	84.1±2.8	98.8±0.8	68.7±3.9	94.7±1.8	78.1±2.7	84.5±2.3	195

ISD – Insufficient Data

Table B5. Percent Attainment in Confined Aquifers.

This is a ten-column table. Column 1 lists the zone; Columns 2-9 list the percent of confined aquifer wells that attains target levels of arsenic, cadmium, chromium, lead, nitrate-nitrite, sodium, fluoride, and total coliform, respectively; Column 10 lists the number of confined aquifer samples analyzed from 2010-2012.

Zone	Arsenic	Cadmium	Chromium	Lead	Nitrate-Nitrite	Sodium	Fluoride	Total Coliform	Number of Samples
1	98.7±1.1	100	100	100	100	100	99.0±0.9	87.4±5.3*	59
2	97.4±1.1	100	100	100	100	100	100	90.6±3.7	59
3	98.9±1.0	98.9±1.0	100	98.9±1.0	100	86.4±3.0	100	91.9±3.7	60
4	98.8±1.0	100	100	98.1±1.6	100	86.4±3.0	100	95.7±2.2	60
5	100	100	100	93.3±2.9	100	70.2±4.9	100	84.0±4.6*	60
6	100	100	100	100	100	34.6±4.8	100	100	26
Statewide Average	98.7±0.8	99.9±0.1	100	99.5±0.2	100	96.3±0.5	99.3±0.6	88.8±3.9	324

*** Based on 58 samples**

Table B6. Percent Attainment in Unconfined Aquifers.

This is a ten-column table. Column 1 lists the zone; Columns 2-9 list the percent of unconfined aquifer wells that attains target levels of arsenic, cadmium, chromium, lead, nitrate-nitrite, sodium, fluoride, and total coliform, respectively; Column 10 lists the number of unconfined aquifer samples analyzed from 2010-2012.

Zone	Arsenic	Cadmium	Chromium	Lead	Nitrate-Nitrite	Sodium	Fluoride	Total Coliform	Number of Samples
1	100	100	100	99.1±0.8	96.1±2.6	100	100	81.9±5.5	55
2	100	100	100	100	100	97.8±1.3	100	84.9±5.0	60
3	94.6±2.6	100	100	96.2±2.3	100	96.8±2.1	100	70.8±5.3	60
4	100	100	100	96.4±1.8	96.4±1.5	90.2±5.8	100	74.3±6.3	56
5	97.5±1.6	100	100	97.6±1.5	100	92.2±2.5	100	70.0±5.6	58
6	100	100	100	96.0±2.5	98.7±1.2	93.8±2.4	100	60.2±5.1	57
Statewide Average	99.5±0.2	100	100	98.4±0.6	97.0±1.8	98.1±0.5	100	78.1±3.8	346