



OVERVIEW OF THE STATUS AND TREND MONITORING NETWORKS

Jay Silvanima

Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection

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PRESENTATION OUTLINE

1. Division monitoring and water quality monitoring programs.
2. Watershed Monitoring Section.
3. Status and trend monitoring networks.
4. Uses of status and trends monitoring data and online resources.



DIVISION OF ENVIRONMENTAL ASSESSMENT AND RESTORATION (DEAR) WATER QUALITY MONITORING

Why Do We Sample Water?

Federal Requirements:

- To “Protect physical, chemical, and biological integrity.”
- Clean Water Act sections 303(d) and 305(b).
 - Produce Integrated Report and submit to U.S. Environmental Protection Agency (EPA) every two years.

Florida Legislation:

- Chapters 376 and 403, Florida Statutes (F.S.), authorizes DEP to monitor water quality through state programs.
- Chapters 62-302 and 62-303, Florida Administrative Code (F.A.C.), assess whether Florida waters meet water quality standards for designated uses.



DEAR

WATER QUALITY MONITORING

Programs with Monitoring Efforts

- Water Quality Monitoring Program – Sarah Noble.
- Water Quality Evaluation and TMDL Program – Kevin O'Donnell.
- Water Quality Restoration Program – Moira Homann.



DEAR WATER QUALITY MONITORING MONITORING NEEDS

Site-Specific Monitoring of Individual Waterbodies.

- Strategic monitoring used for determination of impairment.

Basin Management Action Plans (BMAPs) and Restoration Focus Areas (RFAs).

- Monitoring condition of watersheds containing impaired waters.

Statewide, Region-wide and Watershed Assessments.

- Status and Trend Monitoring for statewide and region-wide condition.



WATER QUALITY MONITORING PROGRAM

ADMINISTRATIVE STRUCTURE

Watershed Monitoring Section (WMS).

- Responsible for Status and Trend Monitoring Network Design and Implementation.

North Sampling Operations.

- DEP Northwest, Tallahassee and Northeast Regional Operation Centers (ROCs).
- Mike King manages North ROCs.

South Sampling Operations.

- Central, Southwest, Southeast and South ROCs.
- Sarah Meyer manages South ROCs.



WATERSHED MONITORING SECTION

STAFF

Section Administration.

- **Jay Silvanima.**

Quality Assurance.

- **Rachael Dragon.**

Project Managers.

- **Tom Seal:** Contracted sampling by NFWWMD, SJRWMD and Alachua County.
- **Vacant (previously Meghan Maly):** Northwest, Northeast and Tallahassee ROCs.
- **Lana Neff:** Central, South, Southeast and Southwest ROCs and the SFWMD under a memorandum of understanding (MOU).

Data Management and Analysis.

- **Stephanie Sunderman-Barnes:** Oversight and QA/QC.
- **Thomas Adams and Alisha Kadiri:** Data Management.
- **Rick Copeland and Lesette Campbell:** Data Analysis.

NFWWMD: Northwest Florida Water
Management District

SJRWMD: St. John's River Water
Management District

SFWMD: South Florida Water
Management District

QA/QC: Quality Assurance and
Quality Control



WATERSHED MONITORING SECTION

STATUS AND TREND MONITORING TEAMS

Department of Environmental Protection.

- Regional Operations Center Staff located in in Pensacola, Tallahassee, Jacksonville, Orlando, Tampa, Fort Myers and Fort Pierce.

External Partners.

- NFWFMD, SJRWMD, SFWMD and Alachua County.



WATERSHED MONITORING SECTION

The foundation for scientific sampling is solid quality assurance.

Need to be sure we are following the same protocols!

- Sampling protocols taught for Status and Trends (S&T) network.
- Required to attend course and pass exam, five-year renewal policy.
- QA Officer oversees training and follows up with field audits throughout the state.



STATUS AND TREND MONITORING NETWORKS

Both focus on statewide/region-wide assessments.

Status Monitoring Network Goals.

- Characterize statewide and region-wide water resource conditions.
- Infer percentage of each resource that meets standards for designated use (surface and groundwater) with known confidence.

Trend Monitoring Network Goals.

- Provide estimates of change in water quality at set stations over time.
- Determine correlations with Status Network monitoring results in the same region.
- Estimate basin-wide surface water pollutant loadings.



STATUS MONITORING NETWORK

SAMPLE SURVEY DESIGNS

- Consist of a random set of water samples selected from a target population. Used to infer the characteristics of the target population via a subset of the target population.
- Status target populations are the seven water resources as defined in the Watershed Monitoring Status (WMS) Monitoring Design Document.

http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Design_Docs/WMS-MonitoringDesignDocument.pdf

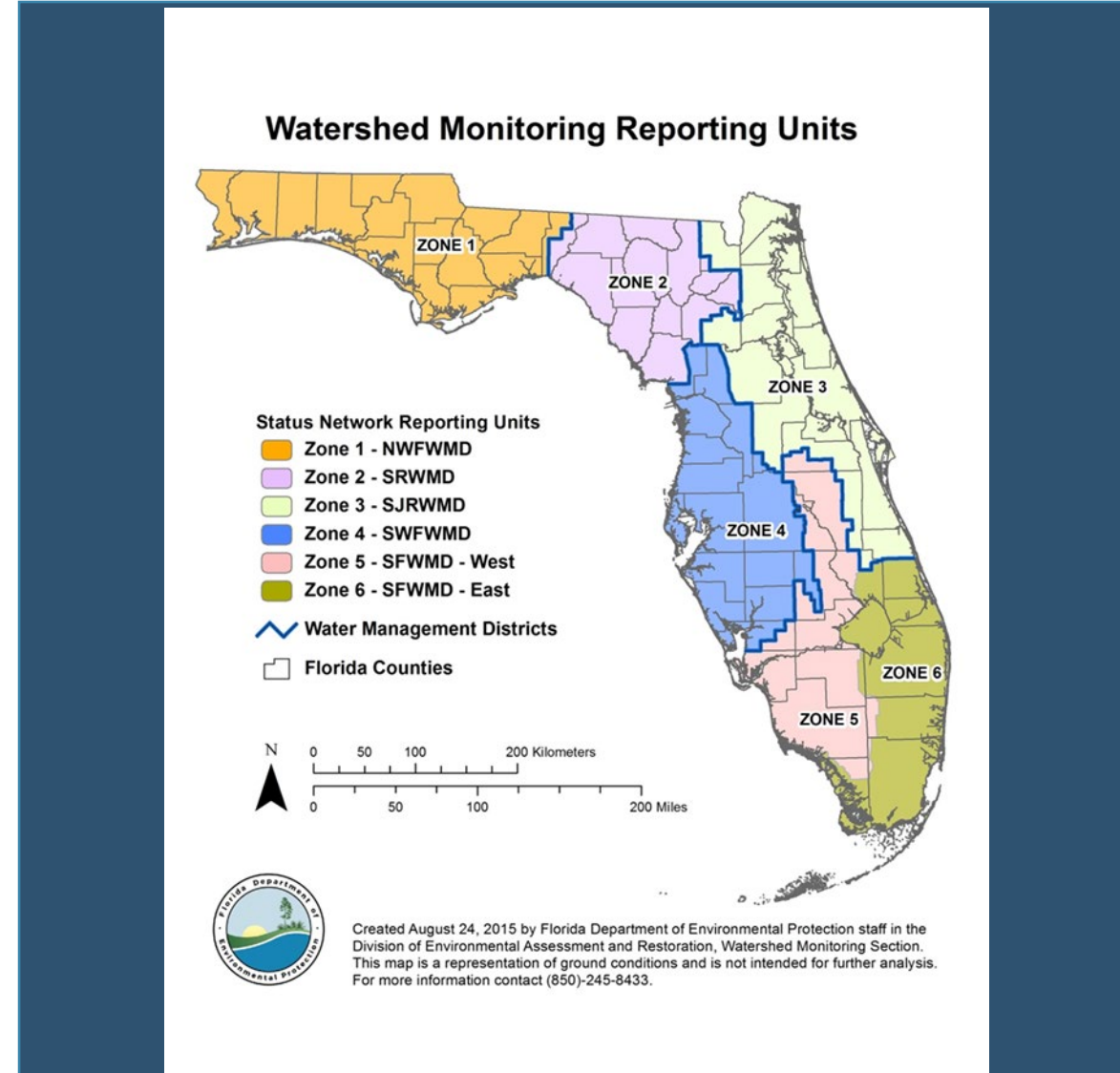


STATUS MONITORING NETWORK

STATUS NETWORK DESIGN

Six Regions/Zones and Seven Water Resources.

- 90 sites per year (15 per zone) sampled for each surface water resource, except for canals.
- 60 sites sampled for canals per year (15 each for zones 3, 4, 5 and 6).
- 120 wells sampled for each groundwater resource per year (20 per zone).





STATUS MONITORING NETWORK

SURFACE WATER DESIGN

- Coverages of flowing waters and lakes are maintained in a geodatabase.
- Random site selections are made from each of the five surface water resources.
- Annually 15 primary selections + 135 alternate selections are made per zone.



STATUS MONITORING NETWORK

GROUNDWATER DESIGN

- List frame of confined and unconfined wells is maintained with input from the water management districts, U.S. Geological Survey (USGS), county/local governmental agencies and DEP programs.
- Random well selections are made from the list frame for confined and unconfined aquifer sampling.
- Annually 20 primary selections + 180 alternate selections are made per zone.



STATUS MONITORING NETWORK

STATUS NETWORK SITE SELECTION

| Resource Type | Site Selection Methodology |
|---|---|
| Confined & Unconfined Aquifers | Selected by well |
| Rivers, Streams and Canals | Selected by line work segments |
| Small Lakes ≥ 4 and < 10 hectares | Selected as centroid of single lake |
| Large Lakes ≥ 10 hectares | Selected by polygons of lake area – can have multiple stations in one lake |



STATUS MONITORING NETWORK

STATUS WATER QUALITY INDICATORS

2022 Sampling Manual pages 128 and 131.

Surface Waters.

- **Core indicators:** field and physical measurements, major ions, metals, nutrients and bacteria.
- **Resource specific indicators:** 1) habitat assessments for rivers and streams, and 2) lake vegetative index and sediment analyses for lakes.

Groundwater.

- **Core indicators:** field and physical measurements, major ions, metals, nutrients and bacteria.



STATUS MONITORING NETWORK

STATUS WATER QUALITY INDICATORS

2022 Sampling Manual pages 128 and 131.

Periodically incorporate analytes associated with DEP initiatives.

- In the past, have sampled for pesticides, wastewater tracers, additional trace metals, radiometrics and volatile organic compounds. These may be resource specific.

2024 calendar year Status Monitoring.

- Algal toxins in all Status surface water resources.



STATUS MONITORING NETWORK

STATUS RECONNAISSANCE / SITE EVALUATIONS

Exclusion Criteria found in 2022 Sampling Manual pages 135-136.

Are Alligators an Exclusion?

If determined to be a safety concern, Yes!



- Characterizing and tracking excluded sites is a challenging part of reconnaissance that carries over into data analysis.
- We have developed an in-house reconnaissance tracking tool to alleviate the problems of tracking information from the field – Generalized Water Information System (GWIS) Database Utilities.



STATUS MONITORING NETWORK

STATUS SITE EVALUATIONS 2020 - 2022

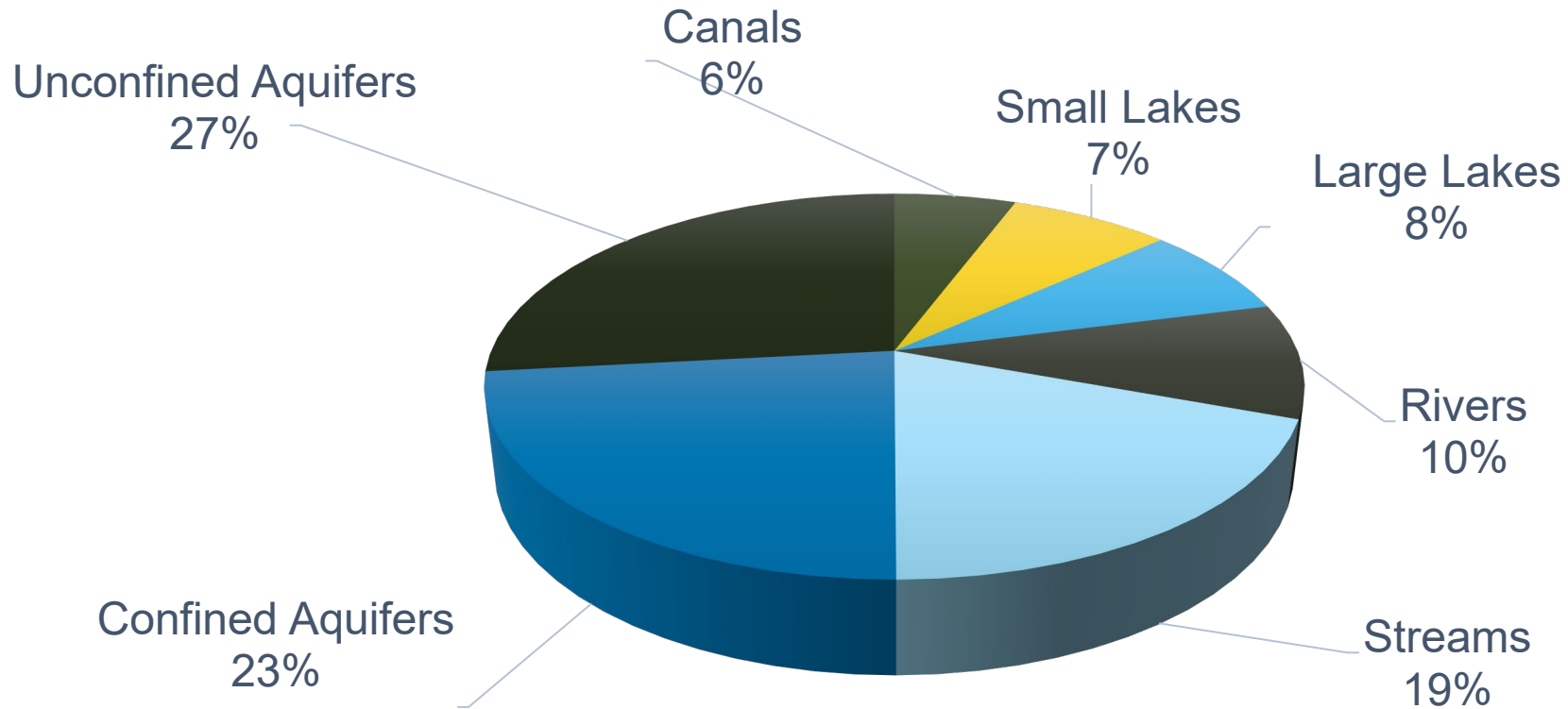
| Water Resource | Resource Size - Number in Population | Resource size - Length (miles) | Resource size - Area (acres) | Sites Assessed | Sites Sampled | (%) Sampled | (%) Dry | (%) Inaccessible | (%) Wrong Resource |
|---------------------|--------------------------------------|--------------------------------|------------------------------|----------------|---------------|-------------|---------|------------------|--------------------|
| Large Lakes | 1,684 | N/A | 934,109 | 323 | 268 | 83 | 3 | 13 | 1 |
| Small Lakes | 1,574 | N/A | 24,796 | 320 | 182 | 57 | 4 | 34 | 5 |
| Rivers | N/A | 2,616 | N/A | 405 | 263 | 65 | 7 | 27 | 1 |
| Streams | N/A | 15,065 | N/A | 815 | 203 | 25 | 8 | 61 | 6 |
| Canals | N/A | 2,370 | N/A | 242 | 180 | 74 | 4 | 22 | 0 |
| Unconfined Aquifers | 22,581 | N/A | N/A | 1126 | 343 | 30 | 1 | 67 | 2 |
| Confined Aquifers | 15,424 | N/A | N/A | 984 | 349 | 35 | 0 | 62 | 3 |



STATUS MONITORING NETWORK

STATUS SITE EVALUATIONS 2020 – 2022

Percentage of All Sites Assessed



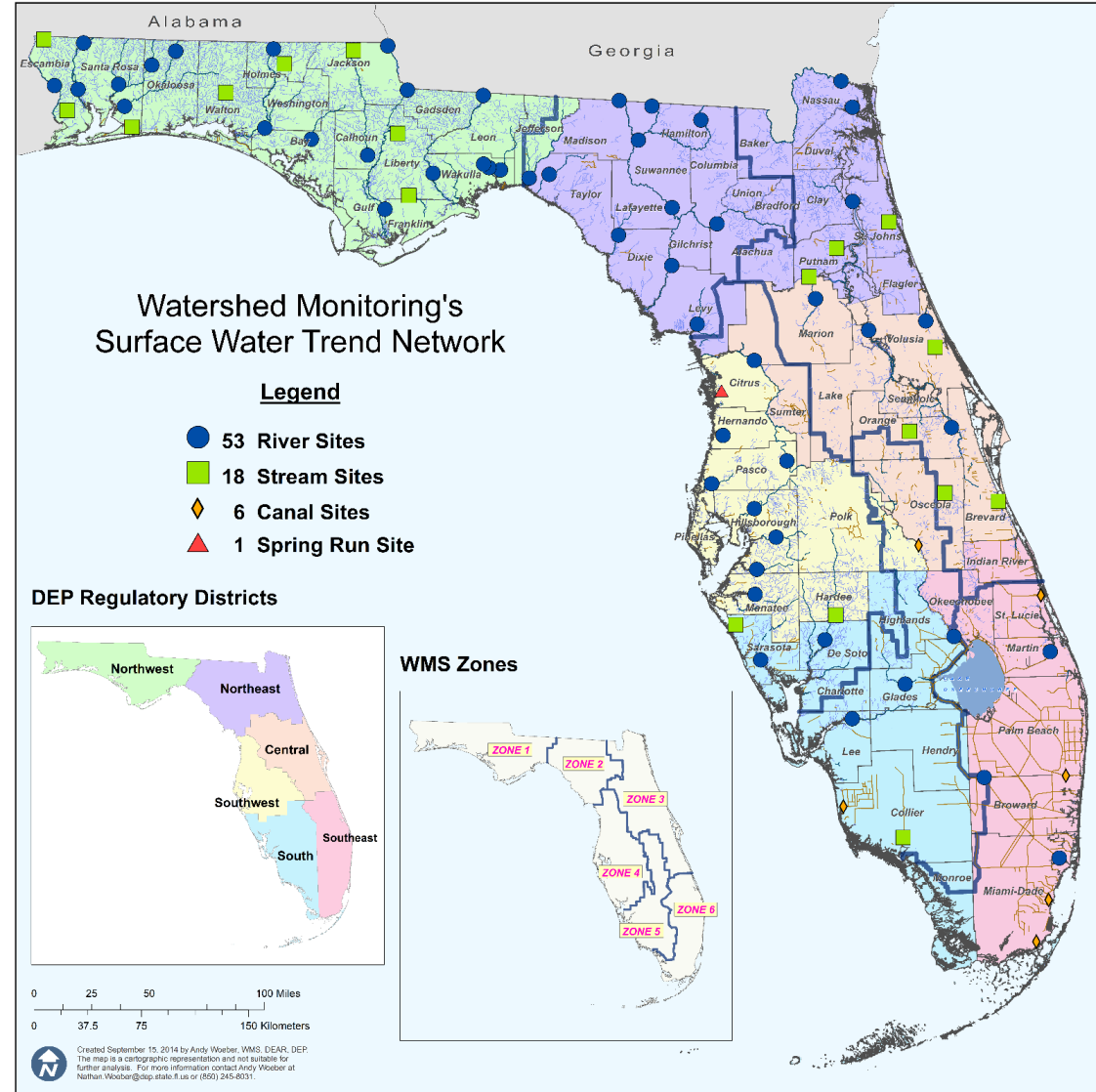
■ Canals ■ Small Lakes ■ Large Lakes ■ Rivers ■ Streams ■ Confined Aquifers ■ Unconfined Aquifers



TREND MONITORING NETWORK

SURFACE WATER TREND NETWORK

78 surface water fixed stations sampled monthly.





TREND MONITORING NETWORK

SURFACE WATER TREND WQ INDICATORS

2022 Sampling Manual page 131

- Standard suite of physical and chemical measurements monthly.
- Metals suite annually in April.
- Bioassessments (HA, SCI, RPS, LVS) attempted to be performed twice a year (at least four months apart) for sites deemed appropriate for the SCI. Refer to Page 140 figure 2 of the Sampling Manual.
 - HA = Habitat Assessment.
 - SCI = Stream Condition Index.
 - RPS = Rapid Periphyton Survey.
 - LVS = Linear Vegetation Survey.
- Additional analytes at specific sites may include metals, wastewater tracers and pesticides.



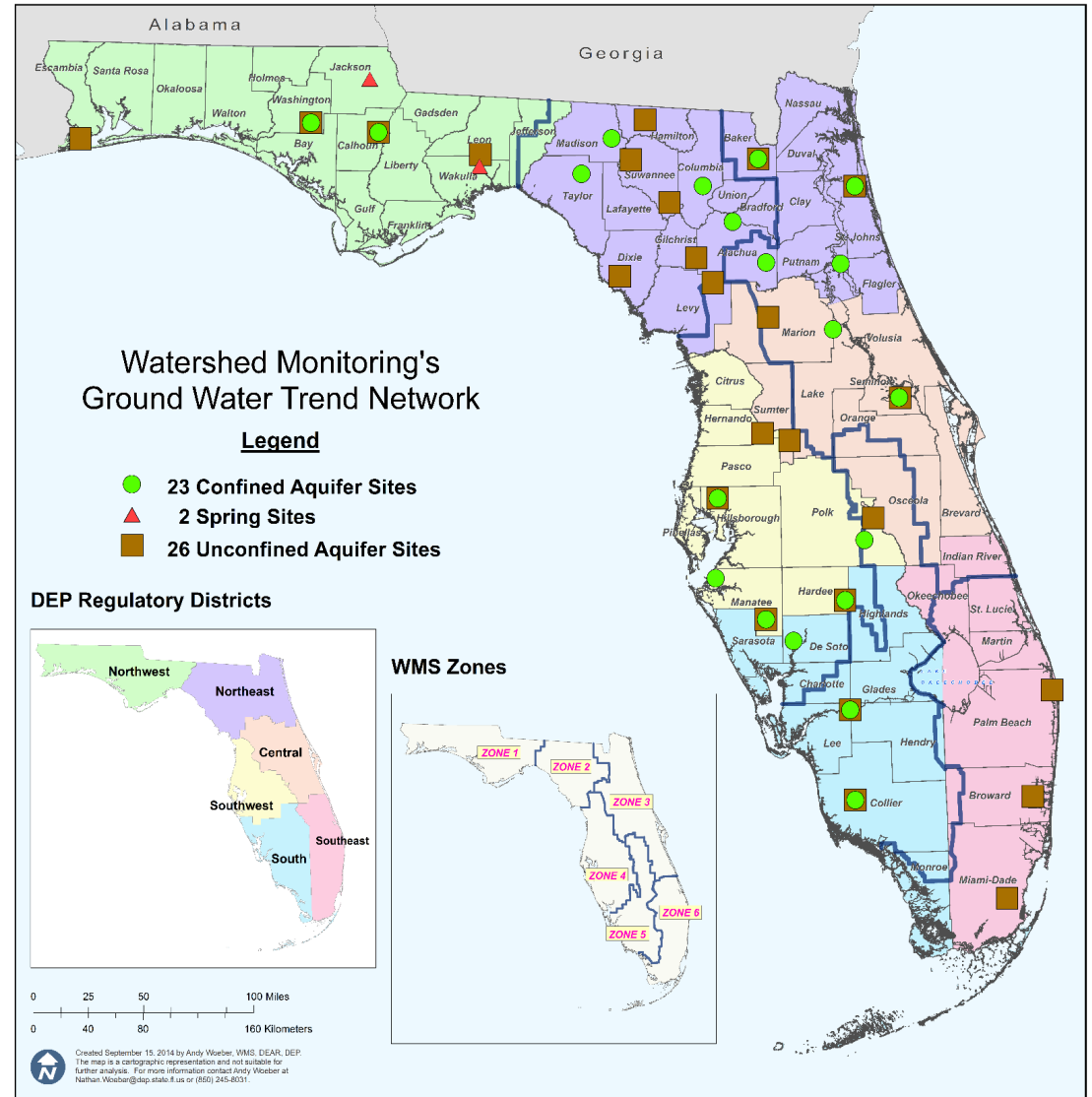
TREND MONITORING NETWORK

GROUNDWATER TREND NETWORK

51 Trend Stations

Confined aquifers sampled four times per year for **in situ** measurements and water quality sample collection.

Unconfined aquifers 12 times per year for **in situ** measurements, four times per year for water quality sample collection.





TREND MONITORING NETWORK

GROUNDWATER TREND WATER QUALITY INDICATORS

2022 Sampling Manual page 131

- Onsite measurements monthly at unconfined aquifer wells and quarterly at confined aquifer wells.
- Standard suite of lab analytes quarterly.
- Metals collected during October quarterly sampling.



USES OF STATUS AND TREND DATA

- Report for Clean Water Act Section 305(b).
- Supply data for the determination of Impairment.
- Create Statewide and Region-wide (Zone) Reports for the public and other members of DEP.
- Support for DEP and other water quality monitoring programs.
<https://floridadep.gov/dear/water-quality-assessment/content/reports-documents-sops-and-links>.



USES OF STATUS AND TREND DATA

2024 INTEGRATED REPORT

Statewide percentage of 2020-2022 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 | 15066 | 203 | 100 | 100 | 2020-2022 |
| TN | 15066 | 193 | 71.1 | 64.0-78.2 | 2020-2022 |
| TP | 15066 | 194 | 78.7 | 73.0-84.4 | 2020-2022 |
| Chlorophyll a | 15066 | 203 | 95.7 | 92.9-98.6 | 2020-2022 |
| E. coli bacteria | 15066 | 202 | 68.9 | 61.6-76.2 | 2020-2022 |
| DO | 15066 | 203 | 76.1 | 69.3-82.8 | 2020-2022 |
| pH ¹ | 15066 | 203 | 52.3 | 45.1-59.5 | 2020-2022 |
| HA | 15066 | 190 | 86.9 | 82.0-91.9 | 2020-2022 |

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.



USES OF STATUS AND TREND DATA

2024 INTEGRATED REPORT

**Statewide percentage of 2020-2022
flowing waters (streams, river and canals) meeting threshold values.**

| Analyte | Target Population (miles) | Number of Samples | % Meeting Threshold | Meeting Threshold 95% CB | Assessment Period |
|-----------------------|---------------------------|-------------------|---------------------|--------------------------|-------------------|
| TAN | 20064 | 645 | 100 | 100 | 2020-2022 |
| TN | 20064 | 576 | 73.1 | 67.5-78.7 | 2020-2022 |
| TP | 20064 | 577 | 81.0 | 76.8-85.2 | 2020-2022 |
| Chlorophyll a | 20064 | 641 | 93.4 | 91.2-95.5 | 2020-2022 |
| E. coli bacteria | 20064 | 563 | 75.6 | 70.3-80.8 | 2020-2022 |
| DO | 20064 | 646 | 79.5 | 74.6-84.3 | 2020-2022 |
| pH ¹ | 20064 | 645 | 62.7 | 57.6-67.7 | 2020-2022 |
| TN_TP_DO ² | 20064 | 576 | 53.4 | 47.5-59.3 | 2020-2022 |

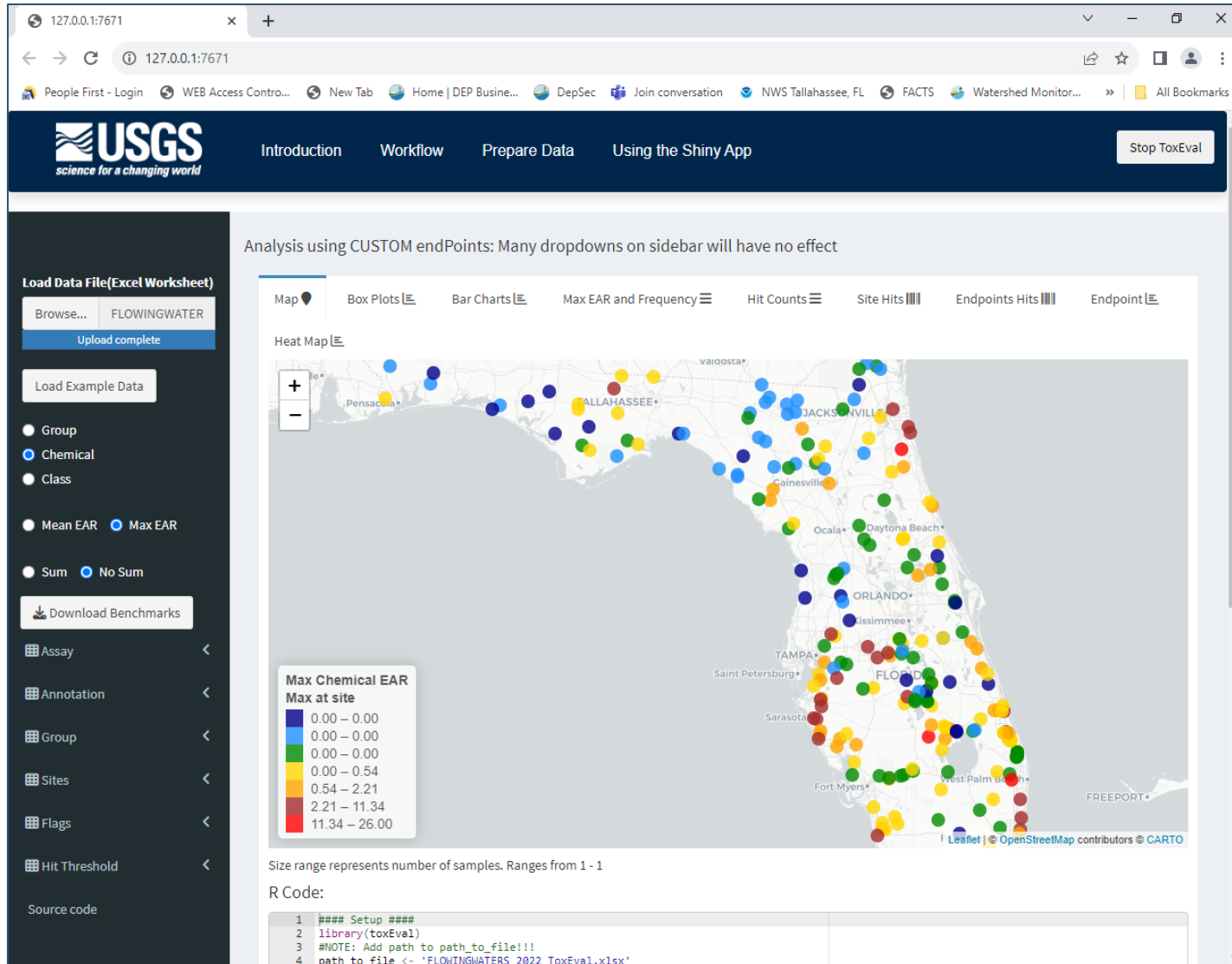
CB = Confidence bounds; TAN = Total ammonia nitrogen; TN = Total nitrogen; TP = Total phosphorus; E. coli = Escherichia coli; DO = Dissolved oxygen; HA = Habitat Assessment. ¹ 95/645 failures were below the pH threshold; 4/645 failures were above the pH threshold.

² Combined metric representing extent of resource expected to fail any of the three metrics for TN, TP or DO.



USES OF STATUS AND TREND DATA

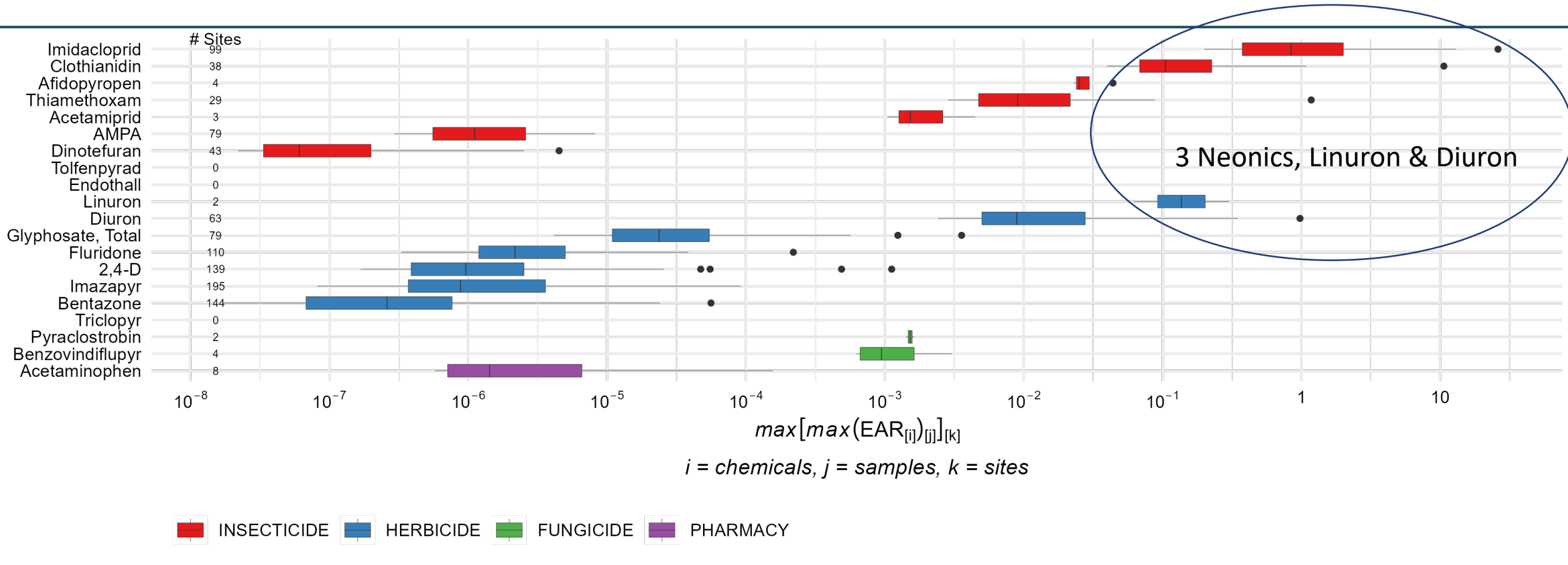
2022 STATUS FLOWING WATERS - TOXICITY QUOTIENTS





USES OF STATUS AND TREND DATA

2022 STATUS FLOWING WATERS - TOXICITY QUOTIENTS





QUESTIONS?

Jay Silvanima

Division of Environmental Assessment and
Restoration/Water Quality Monitoring Program
Florida Department of Environmental Protection

Contact Information:

850-245-8507

James.Silvanima@FloridaDEP.gov

