Lessons Learned: Florida's Status and Trend Surface and Groundwater Monitoring Programs

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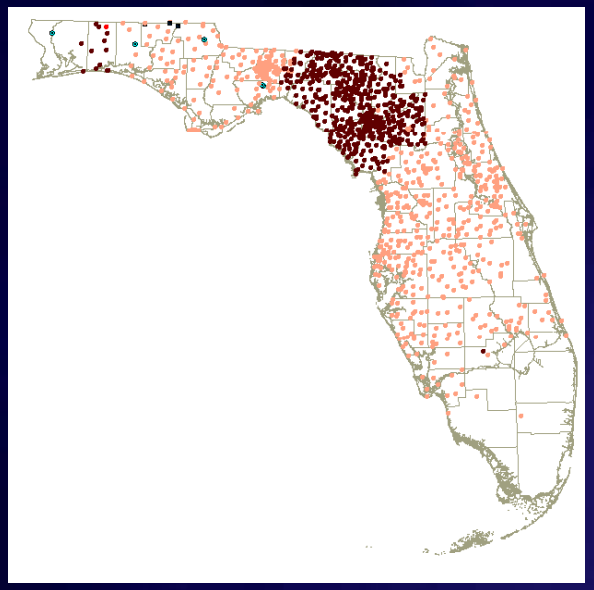
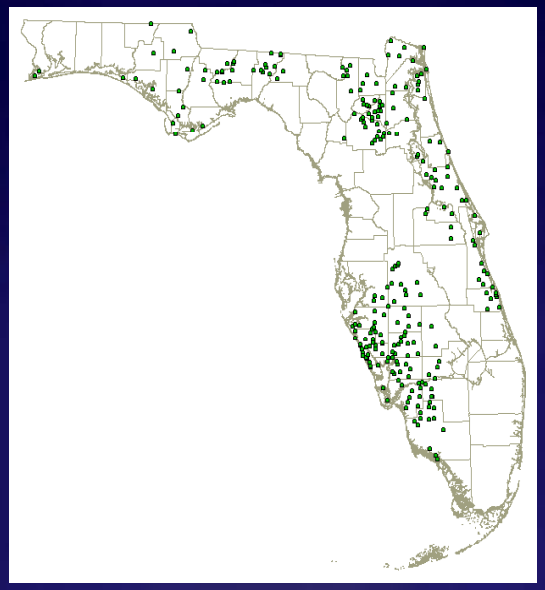
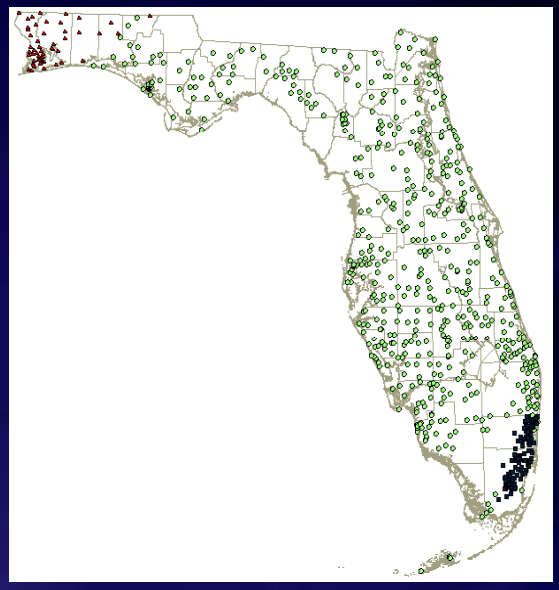


Floridan Aquifer System



Intermediate Aquifer System



Surficial Aquifer System

Distribution of Florida's GW Quality Monitoring (Background) Network (1986 – 1999)

Florida's Very Intensely Studied Area (VISA) Network (1986 -1999)

Figure 3. VISA Network

Florida DEP Monitoring History (1990s)

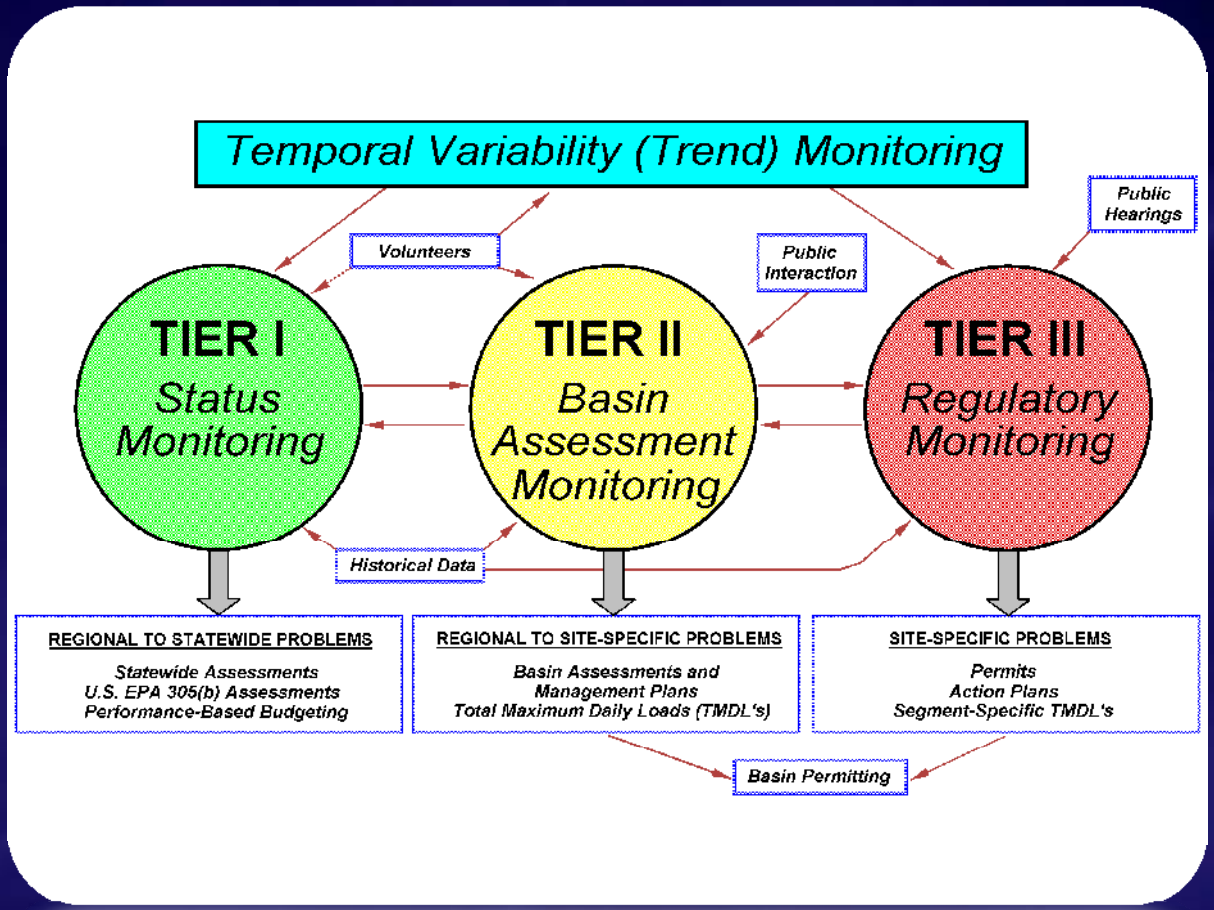
- Agency had surface and groundwater monitoring groups in Tallahassee and regional offices. Designs changed with policy and funding
- Through 1990s, 305 (B) produced with "found" data. 20-25% of statewide surface waters assessed. No comprehensive design
- Late 1990s, GW Quality Mon. Net. asked to address "Ecosystem Management": DEP tasked with establishing a statewide status and trend monitoring network for both ground and surface water

Sampling Design (2000 to present)

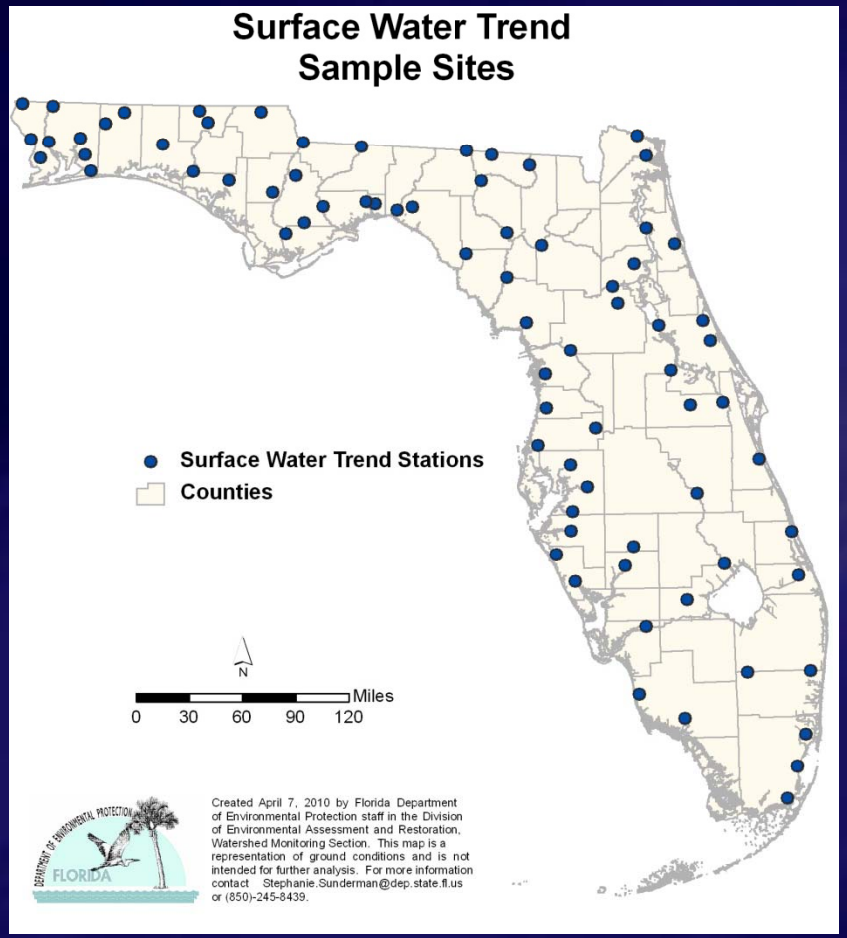
Objective

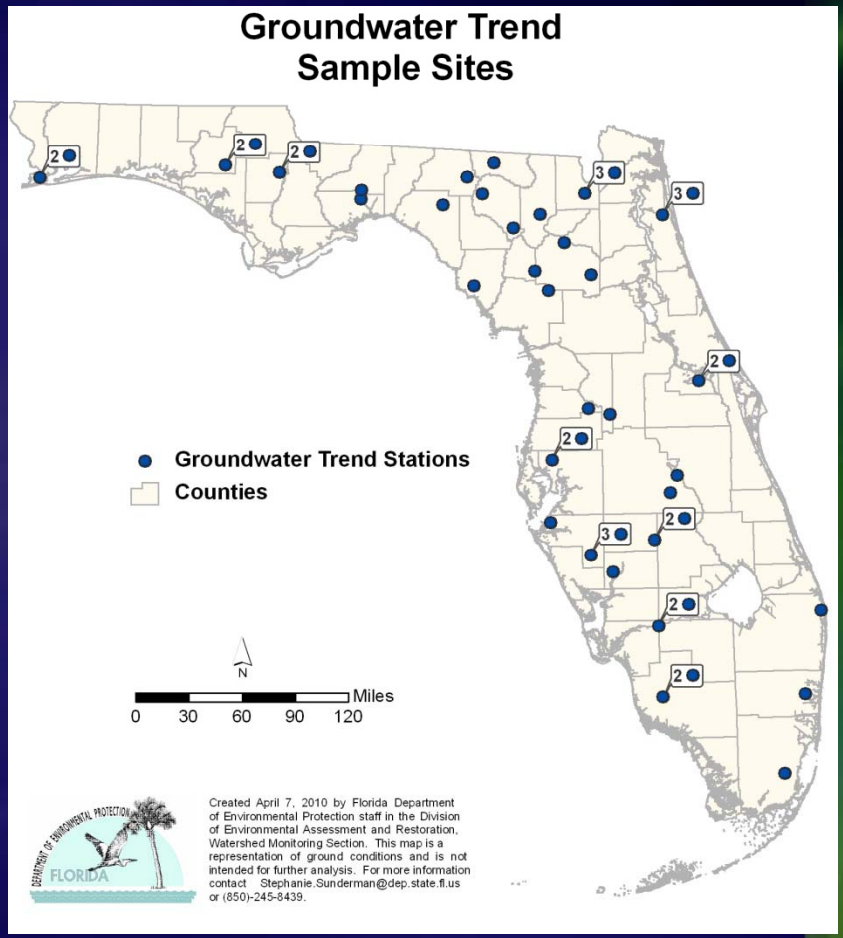
To provide scientifically defensible, statewide and watershed (basin) information on important chemical, physical and pertinent biological characteristics from surface waters and major aquifer systems in Florida.

Florida's Tiered Approach



Trend Monitoring – a foundation



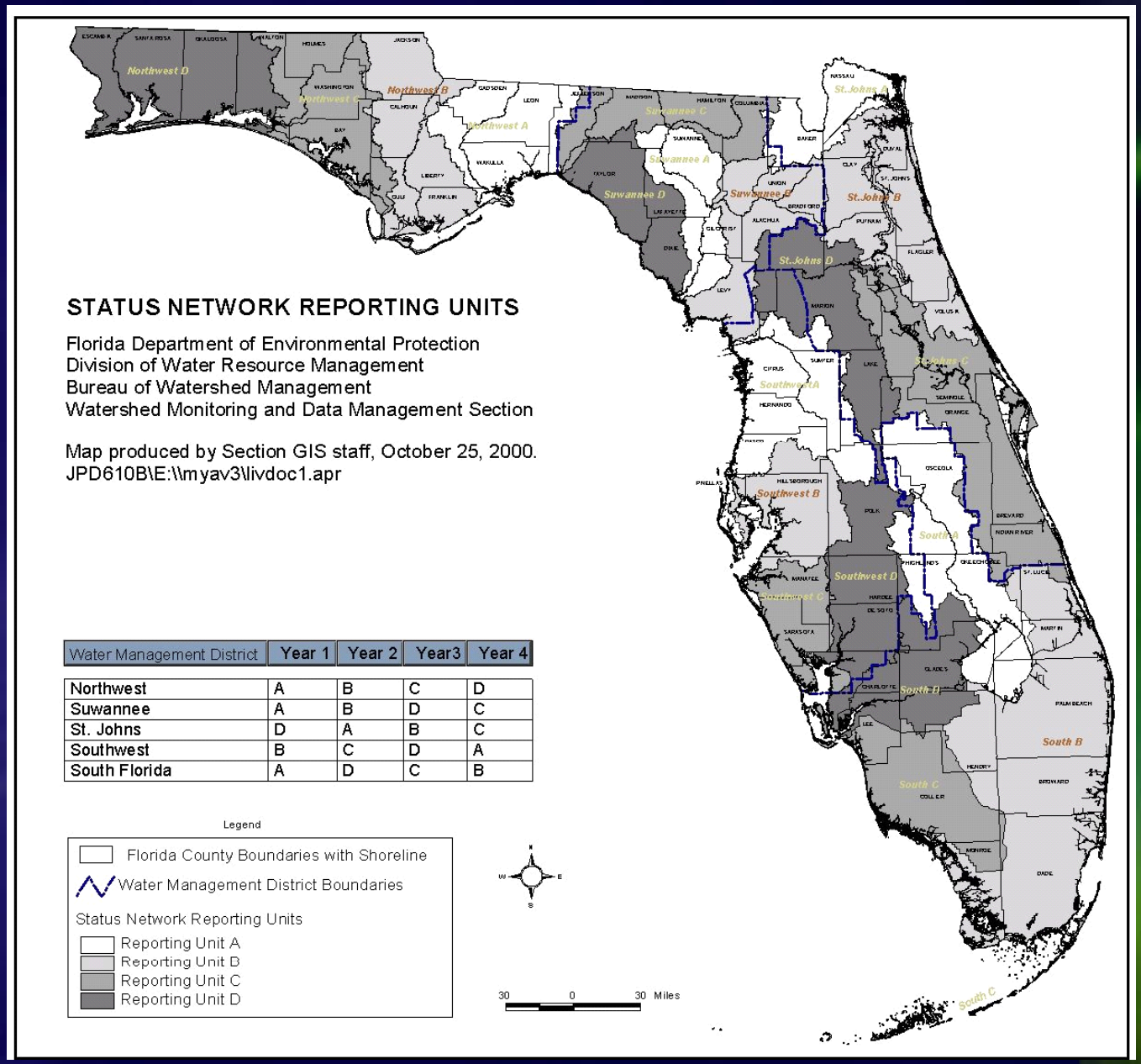


1st Cycle (2000-03)

Design:

Stratified Random

- **Five basins**
- **Four reporting units per basin with randomly assigned rotation**
- **1 repeat year**
- **30 samples per 6 resource types**
- **Strahler Stream Order**
- **Water chemistry**



Water Management District	Year 1	Year 2	Year3	Year 4
Northwest	A	B	C	D
Suwannee	A	B	D	C
St. Johns	D	A	B	C
Southwest	B	C	D	A
South Florida	A	D	C	B

2003: Changes in Attitudes

Changes in agency mission toward TMDLs

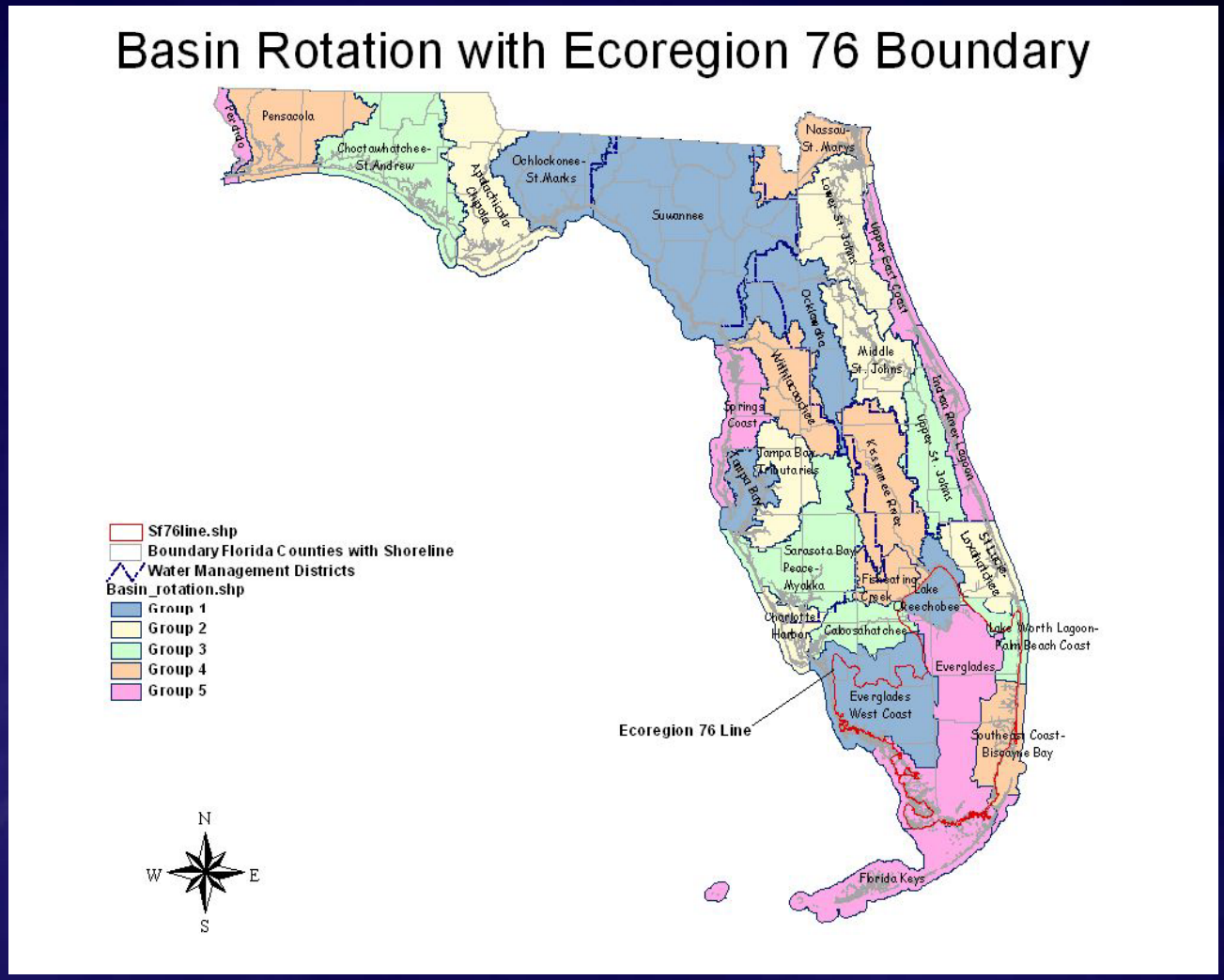
- Tweaking to realign network. Decided to drop the repeat year and focus on a major overhaul of the Status network
- Major redesign includes shift from 20 basins to 29 TMDL basins, GIS coverage to 1:100,000 rNHD with separate river and steam selections, changed core and supplemental indicators for all resources to better reflect designated use
- Eliminate Strahler stream order – didn't work on 100 K coverage – hard to determine precise stream order

2nd Cycle (2004-2008)

Design:

GRTS

- **29 TMDL Basins**
- **6 resources**
- **30 samples per resource type**
- **One index period per year for each resource type**



Cycle 2 Design Strengths/Limitations

+ Results of Basin were robust enough to make basin assessments as well as statewide assessments
+ Produced a significant amount of data to assist in 303(d) analysis
– Challenge to concept of one index period to capture representative results – no repeat sampling at random sites to capture seasonality in surface waters
– Challenge about statewide assessment capturing changes during 5 year sampling cycle – wet years vs. drought periods, and accuracy when reporting

2008: Changes in Attitudes: again

- Changes in agency mission, ergo, "tweaking" network: (meaning another major overhaul of the Status network) to produce annual estimate of condition
- Major redesign includes shift from 29 TMDL basins to six zones
- Challenges to program design – revise surface water index periods to 2X year – to evaluate whether it will provide better, or different results than 1X annually
- Used update 1:24,000 NHD line work for realistic reconnaissance and sampling

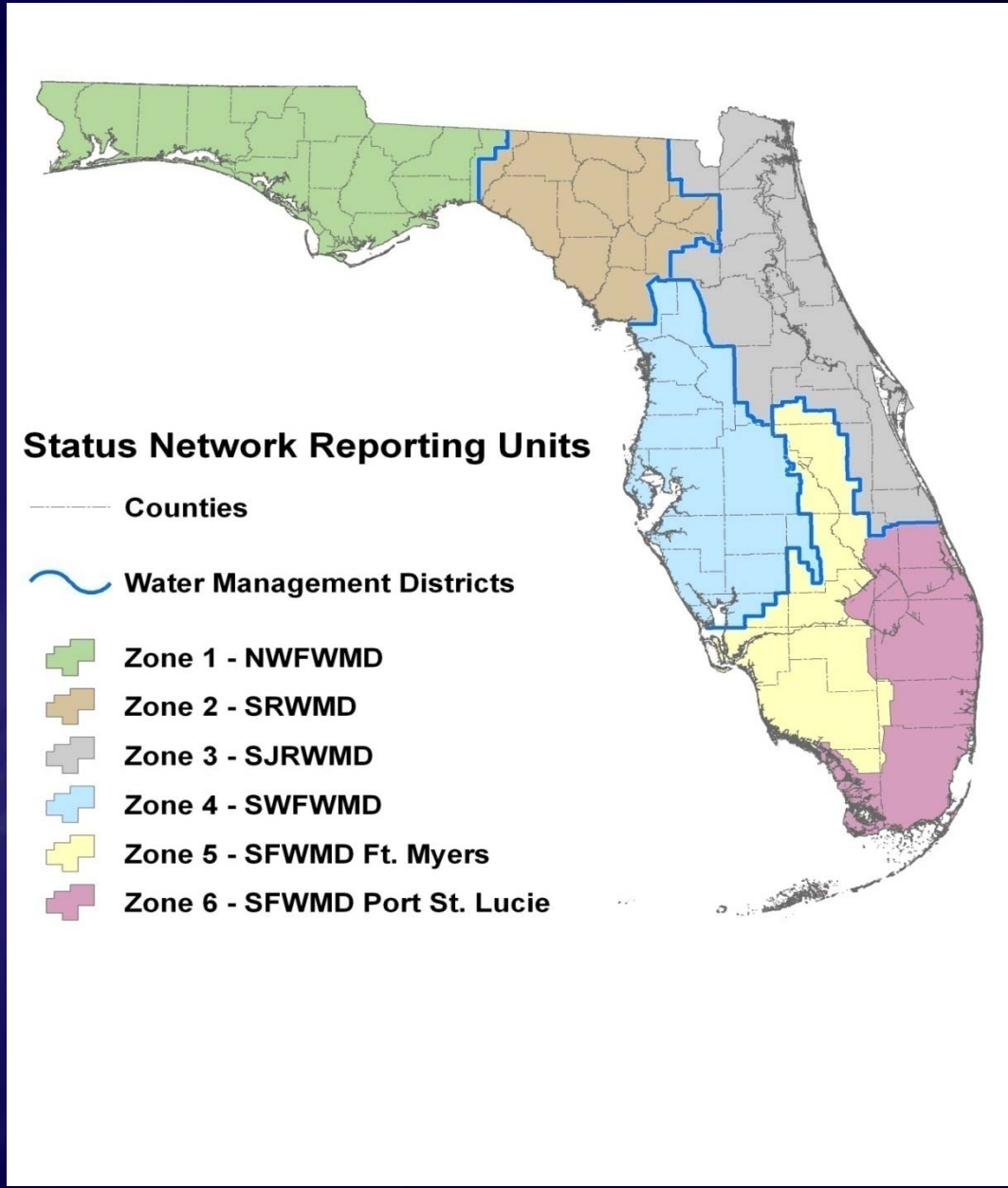
Cycle 3 and Beyond…. (for now)

6 zones

6 resource types

60 samples statewide for surface water, (with repeat)

120 for groundwater



Cycle 3 Design Strengths/Limitations

+ Annual Assessment
+ Addresses challenges to concept of one index period to capture representative results – limited preliminary analysis shows insignificant differences in estimates of condition – important info for future designs
+ Also addresses challenge about statewide assessment capturing changes during rotating basin sample collection
– Inadequate samples to make basin or regional assessments
– Produces limited amount of data to assist in 303(d) analysis

Status and Trend Network "Bonus" Projects

- Status and Trend Network data incorporated in state nutrient and other criteria development, designated use assessments, stressor identification projects and Mercury TMDL development
- Groundwater Arsenic results have led to special studies to determine causes and sources of high levels in drinking water supply
- Status and Trend Network data used in validating new Biocriteria tools: Stream Condition Index, Lake Vegetation Index, Periphyton assessment

A few of the Lessons Learned:

- Continually evaluate program goals and objectives
- Keep some indicators to transition between cycles, add more long-term integrators such as biology and sediment metrics
- Always support other agency programs – Random design of probablistic network makes data useful for many different programs
- Very important to get agency backing

Lessons, continued

- Define your population taking multiple factors under consideration:
  - Make certain you can apply selected indicators for analysis of results; are these waters of the state (nation) where standards or criteria apply?
  - Changing designated uses affects resources, for example canals in Fla., will need to add 7th resource
  - Ensure indicators are appropriate for water types, we had to adjust use of biological measurements in streams
  - Use best available GIS coverage, review before making primary and oversample selections

A few more of the Lessons Learned:

- VIP to develop design document following 10 elements guidance – it lays out fundamentals (!)
- Always engage your entire team in developing program – your people are the most important resource, it gives ownership of the program, as well as the importance of their contribution
- Change is inevitable…. And
- Never underestimate the time it will take to do it well

EPA: Ten Elements for State Water-Quality Monitoring Programs

- Monitoring Program Strategy
- Monitoring Objectives
- Monitoring Design
- Core & Supplemental Indicators
- Quality Assurance
- Data Management /Review
- Data Analysis /Assessment
- Reporting
- Review of Program
- Support and Infrastructure

Plan to spend some time here

Not to worry…

- Trials and Tribulations

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- Successes

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