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

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Acknowledgements

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(Tony Olsen; Virginia Engle, Kevin Summers)

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Distribution of Florida’s GW Quality Monitoring (Background) Network (1986 – 1999)
Agency had surface and groundwater monitoring groups in Tallahassee and regional offices. Designs changed with policy and funding.

Through the 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

Temporal Variability (Trend) Monitoring

**TIER I**
Status Monitoring

**TIER II**
Basin Assessment Monitoring

**TIER III**
Regulatory Monitoring

- Volunteers
- Public Interaction
- Historical Data
- Public Hearings

**REGIONAL TO STATEWIDE PROBLEMS**
- Statewide Assessments
- U.S. EPA 305(b) Assessments
- Performance-Based Budgeting

**REGIONAL TO SITE-SPECIFIC PROBLEMS**
- Basin Assessments and Management Plans
- Total Maximum Daily Loads (TMDL’s)

**SITE-SPECIFIC PROBLEMS**
- Permits
- Action Plans
- Segment-Specific TMDL’s

Basin Permitting
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

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**STATUS NETWORK REPORTING UNITS**

Florida Department of Environmental Protection
Division of Water Resource Management
Bureau of Watershed Management
Watershed Monitoring and Data Management Section

Map produced by Section GIS staff, October 25, 2000.
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<table>
<thead>
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<th>Water Management District</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
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<tbody>
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<td>D</td>
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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 probabilistic network makes data useful for many different programs
- Very important to **get agency backing**
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

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<td>Support and Infrastructure</td>
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Plan to spend some time here
Not to worry...

Trials and Tribulations
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- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX
- XXXXXXXXXXXXXXXX

Successes
- XXXXXX
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