

Summary of DEP monitoring programs

July 26, 2007

Florida Water Resources Monitoring Council



CAMA Monitoring (Matrix)

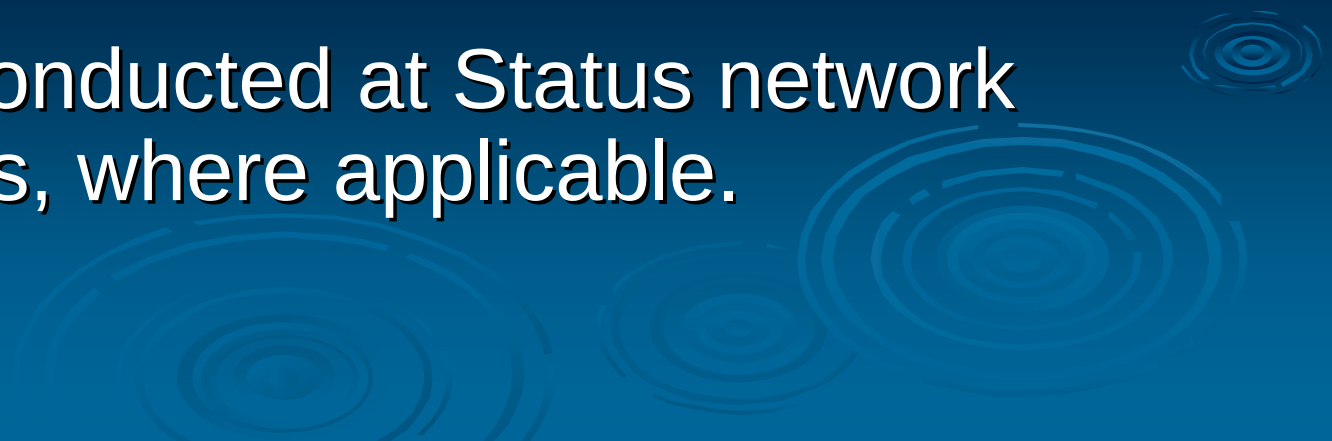
- Apalachicola Region
- Rookery Bay Region
- Florida Keys National Marine Sanctuary
- Biscayne Bay Region
- East Coast Region



Environmental Assessment Section



Current Biocriteria Development Sampling Efforts (2007)

- Phytoplankton and nutrient sampling monthly at 25 lakes in Florida. Lakes represent a variety of sizes and human disturbance levels.
 - Lake vegetation index (LVI) sampling once or twice per year at a subset of those lakes.
 - LVI also conducted at Status network small lakes, where applicable.
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QA Consistency Sampling

- As part of Quality Assurance activities, sample several streams and lakes each year to evaluate consistency between DEP teams
 - Stream Condition Index
 - Habitat Assessment
 - Lake Vegetation Index
 - Rapid Periphyton Survey

Mercury Monitoring



Mercury Section Cooperative Monitoring

- FFWCC is monitoring Hg in bass at about 18 long term sites in the state including about 8 in the Everglades.
- UF samples Hg in Great Egret feathers in the Everglades (ACE funded).

TMDL Strategic Monitoring Plan



Total Maximum Daily Loads

Group 1

Everglades West Coast
Lake Okeechobee
Ocklawaha
Ochlockonee – St. Marks
Suwannee
Tampa Bay

Group 2

Apalachicola – Chipola
Charlotte Harbor
Tampa Bay Tributaries
Lower St. Johns
Middle St. Johns
St. Lucie – Loxahatchee

Group 3

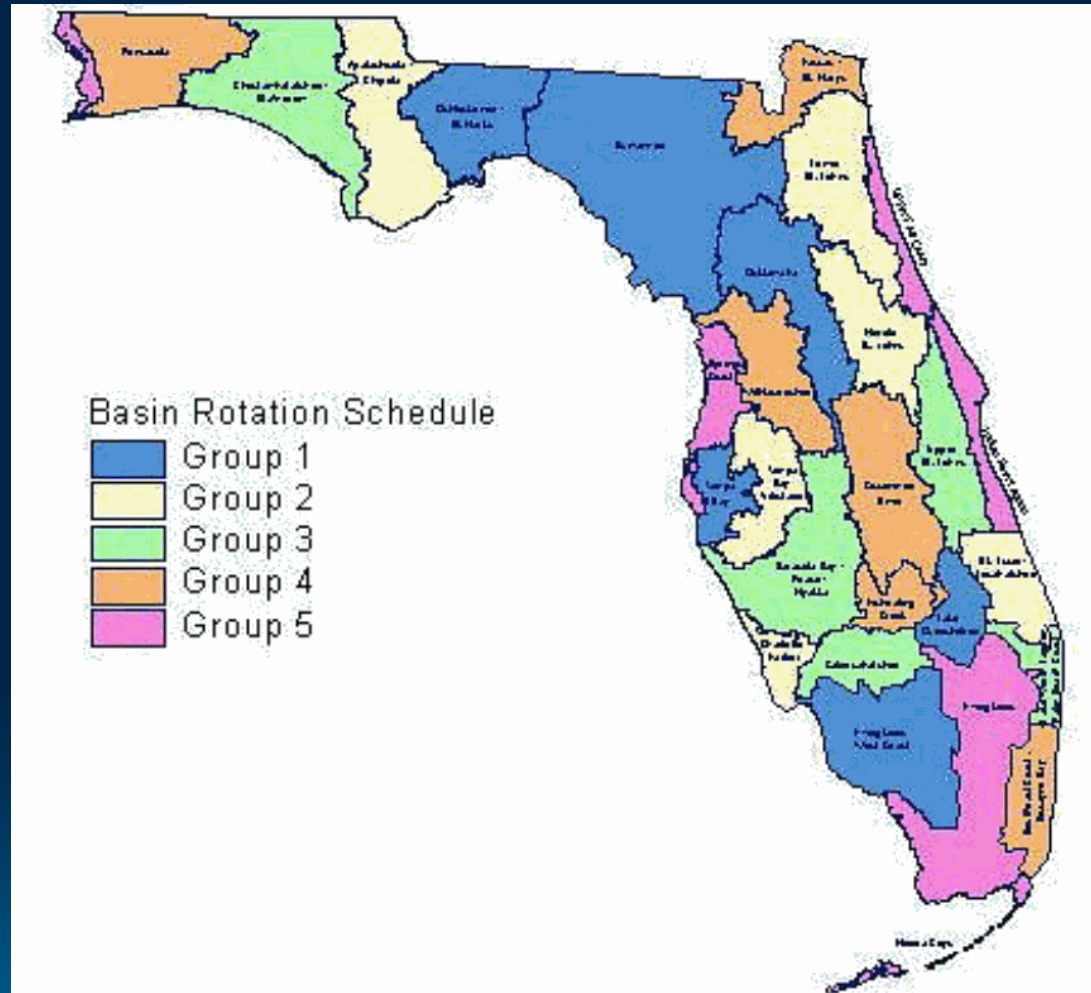
Caloosahatchee
Choctawhatchee – St. Andrews
Lake Worth Lagoon – Palm Beach Coast
Sarasota Bay – Peace – Myakka
Upper St. Johns

Group 4

Fish Eating Creek
Kissimmee River
Nassau - St. Mary's River
Pensacola
Withlacoochee
Southeast Coast

Group 5

Everglades
Florida Keys
Indian River Lagoon
Perdido
Springs Coast
Upper East Coast

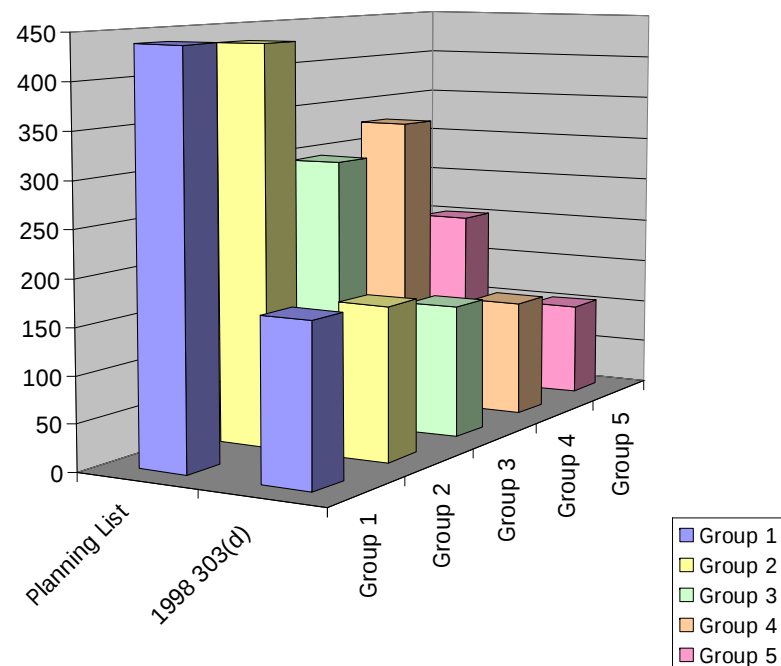


Causation and Impairment Potential

(2002) 303(d) Causes of Impairment (Percent of Reported)

- Oxygen Depletion – 27.51
- Nutrients – 26.83
- Pathogens – 18.20
- Turbidity – 10.14
- Metals (Other than mercury) – 8.64
- Mercury – 5.92
- Ammonia – 1.50
- Cause Unknown – 0.44
- Cause Unknown – Biological Integrity – 0.39
- Salinity/TDS/Chlorides – 0.15
- Dioxins – 0.10
- Toxic Inorganic – 0.10
- Pesticides – 0.04
- Color – 0.04

Quantity of water bodies listed for potential impairment.



Florida Water Body Standards

Florida Standards -- Water Body Classification

Class 1 - Potable Water Supply	Class 3M - Predominantly Marine	Class 5M - Marine Navigation, Utility
Class 2 - Shellfish Propagation	Class 4 - Agricultural Water Supply	
Class 3F - Predominantly Fresh Water	Class 5F - Fresh Navigation, Utility	

Florida Standards -- Parameters

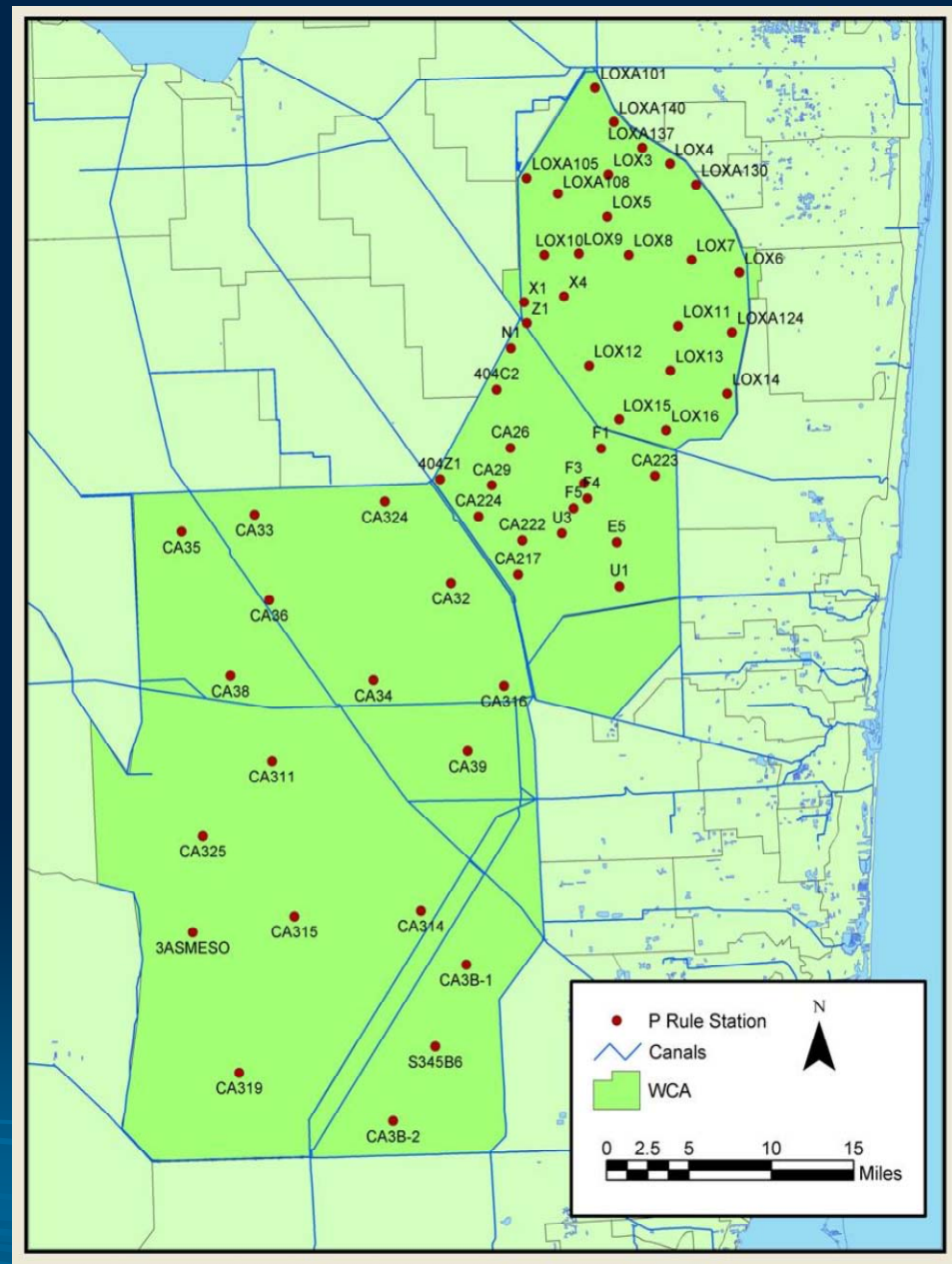
1122Tetrachloroethane	Chloride	Fluorene	PCB
246 Trichlorophenol	Chlorine	Fluoride	Pentachlorophenol
24D	Chlorodibromomethane	Gross Alpha	pH
24Dichlorophenol	Chloroform	Guthion	Phenol
24Dinitrophenol	Chlorophenol	Halomehtanes	Phthalate Esters
24Dinitrotoluene	Chromium3	Heptachlor	Pyrene
Acenaphthene	Chromium6	Hexachlorobutadiene	Radium
Aldrin	Conductance	Iron	Selenium
Alkalinity	Copper	Lead	Silver
Aluminum	Cyanide	Lindane	Silvex
Anthracene	DDT	Malathion	Tetrachloroethylene
Antimony	Demeton	Manganese	Thallium
Arsenic	Detergents	Mercury	Total Dissolved Gases
Barium	Dichloroethylene	Methoxychlor	Total Phenol
Benzene	Dieldrin	Methyl Chloride	Toxaphene
Berylium	Dissolved Oxygen	Methylene Chloride	Trichlorethylene
Beta BHC	Dissolved Solids	Mirex	Turbidity
Boron	Elemental Phosphorus	Nickel	Unionized Ammonia
Bromoform	Endosulfan	Nitrate	Zinc
Cadmium	Endrin	Oil/Grease	
Carbon Tetrachloride	Fecal Coliform	PAH	
Chlordane	Fluoranthene	Parathion	

EPA TMDL Web Site: <http://www.epa.gov/owow/tmdl/>

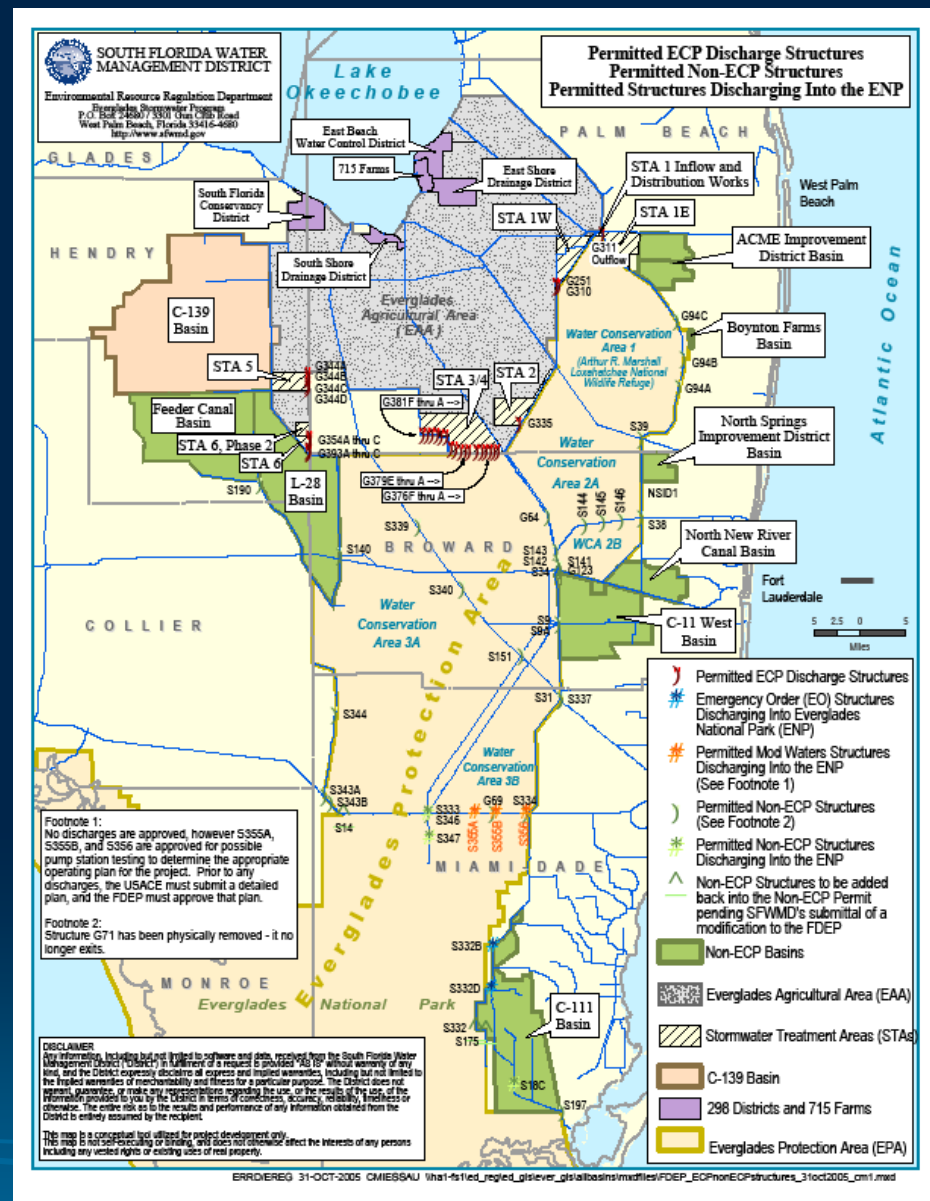
FDEP TMDL Web Site: <http://www.dep.state.fl.us/water/tmdl>

Everglades Section





Additionally, there is a canal monitoring network, where WQ is collected at SFWMD structures. DEP utilizes this information in the Everglades program.



Pennekamp State Park

- Seagrass restoration/assessments
(12 projects underway)
- Monitoring for Coral Damage (man-made
and natural)



Groundwater Protection Section



Floridan Aquifer Springs

- 18 large springs sampled, predominantly in State Parks
 - Wekiva, Wakulla, Silver, Ponce de Leon, Volusia Blue, Rock, Fanning, Manatee, etc.
- Sampled at least twice per year
- Parameters include nutrients, periphyton, invertebrates, habitat, field measurements

Ground Water/Surface Water Interaction Studies

➤ Ground Water Inflows to Lakes

- Important for developing TDMLs for impaired lakes
- Techniques
 - Natural radon tracers
 - Chemical tracers in surface water and pore water
 - Seepage meters
- Cooperative study of 6 central Florida lakes with FSU

Surface Water Sampling

Radon (survey and bottle samples)

Lab analytes (alkalinity, Ca, Mg, Chl a, phosphorus, ortho-P, $\text{NO}_2\text{-NO}_3$, enterococci, fecal coliform)

Physical parameters (DO, temperature, pH, conductance)

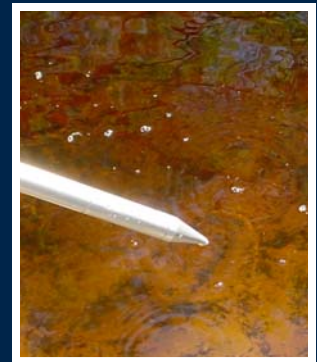


Pore Water Sampling

Radon

Physical parameters

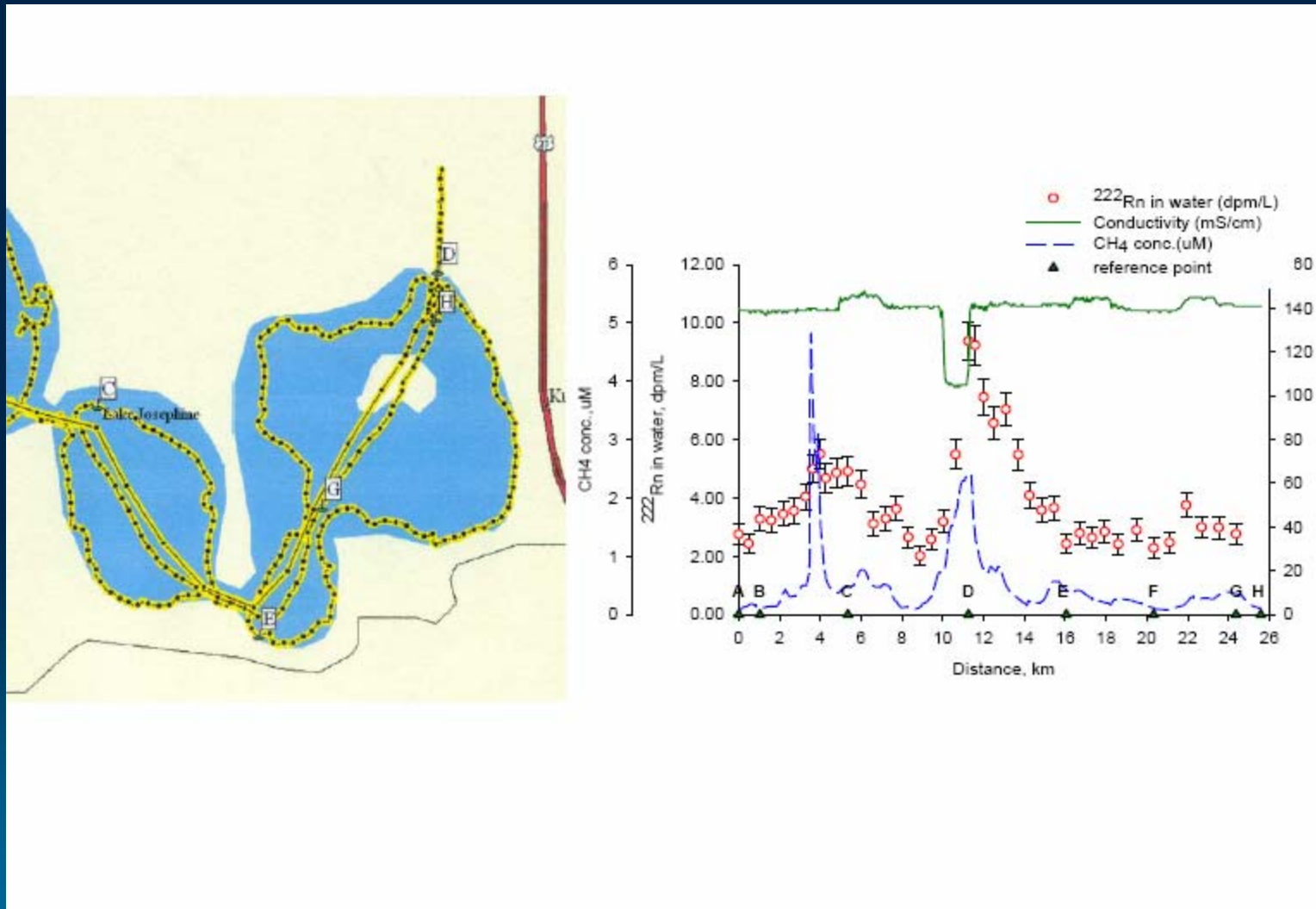
Lab analytes (alkalinity,
Ca, Mg, nitrite-nitrate,
phosphorus, ortho-P



Seepage Meter Sampling



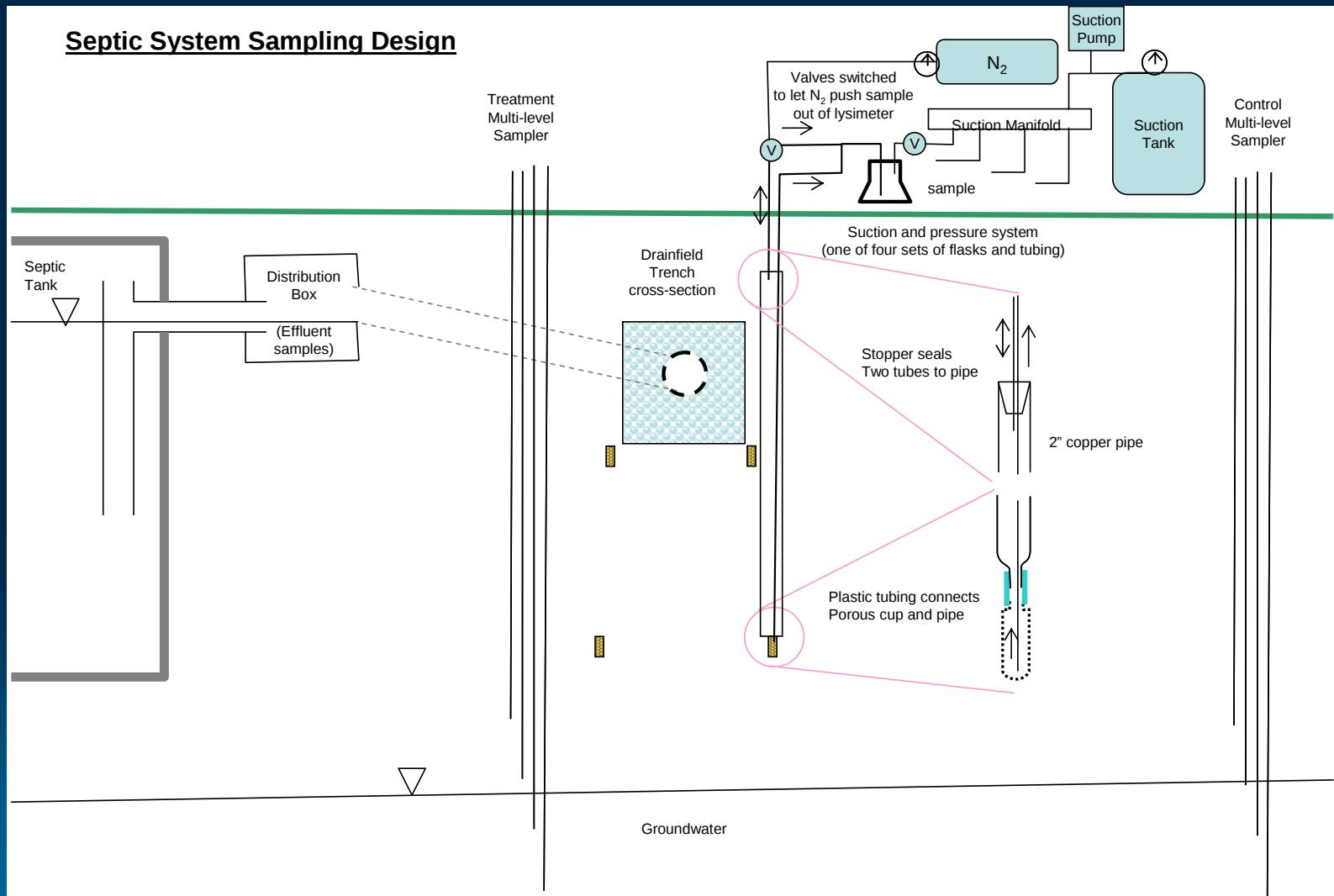
Radon survey results



Septic Tank Study

- “Fate of Nitrogen and Organic Wastewater Compounds in the Unsaturated Zone beneath Septic Tank Drainfields”
- 3 sites instrumented with lysimeters, multilevel ground water samplers and piezometers
- Dye trace study
- Monitoring for nutrients, emerging contaminants/organic waste constituents
- Cooperative study with USGS, FSU

Septic System Sampling Design







Integrated Water Resource Monitoring (IWRM) Network



Florida Department of Environmental Protection
Watershed Monitoring Section

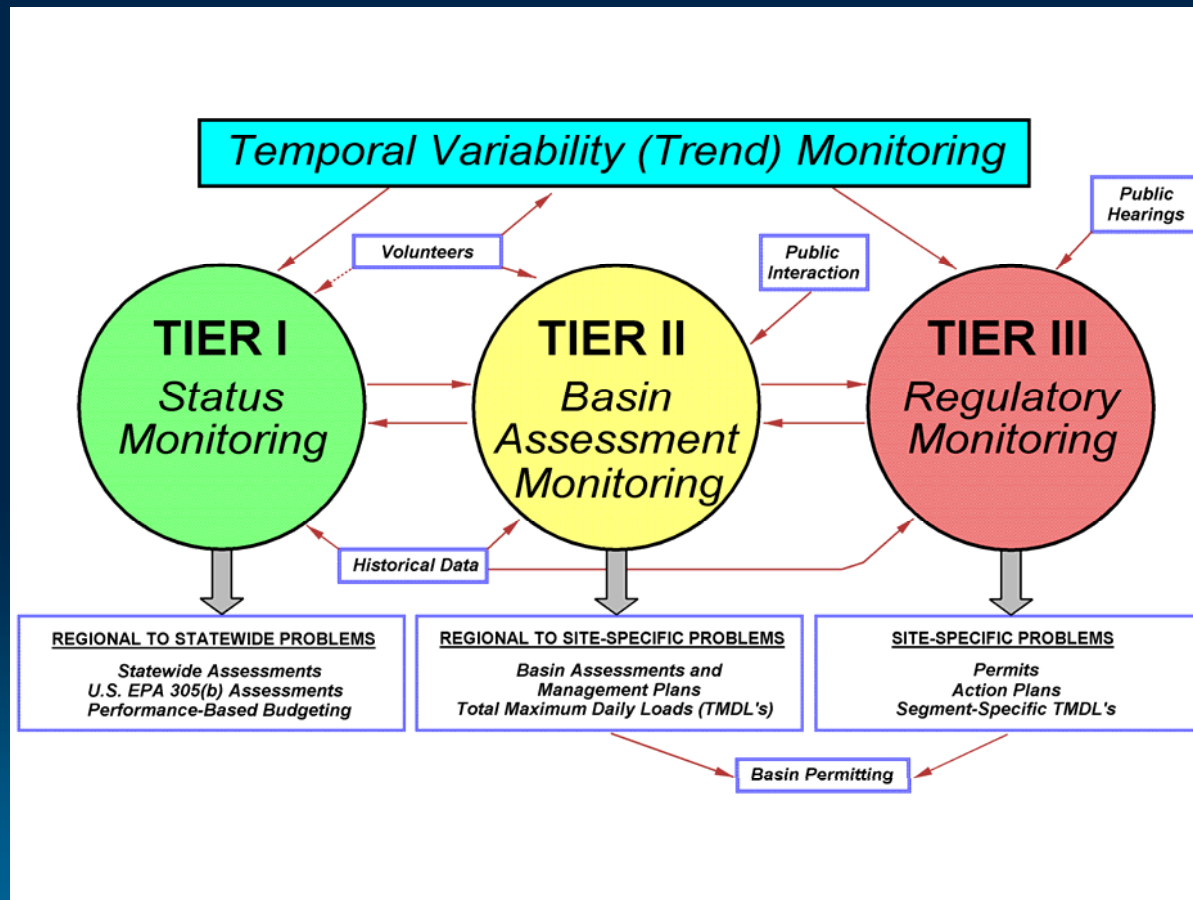
Monitoring Team

- Watershed Monitoring Group HQ-Tallahassee
- Field Monitoring Staff – DEP, WMDs, Counties
- Geographic Information
- Data Management (Jay Silvanima)
- Design and Analysis
- Biological Criteria development (Russ Frydenborg, i.e., Stream condition index)
- EPA Gulfbreeze, Florida and Corvallis, Oregon
(Kevin Summers, Virginia Engle, Tony Olsen)

Florida DEP Monitoring History

- No comprehensive design. Monitoring changed with funding and policy. 305 (B) produced with “found” data. 20-25% of state waters assessed.
- Mid 90’s, “Ecosystem Management”. DEP tasked with establishing a statewide status and trend monitoring network for both surface and ground water.
- Steering group: EPA, state and other government agencies, private industry to establish design.

Florida's Integrated Water Resource Monitoring Network (IWORM)



Status and Trends Monitoring

Temporal Variability (Trend or TV) Network:

Long term trend in surface and ground water at fixed stations. 75 surface water, 47 groundwater stations.

Status Network:

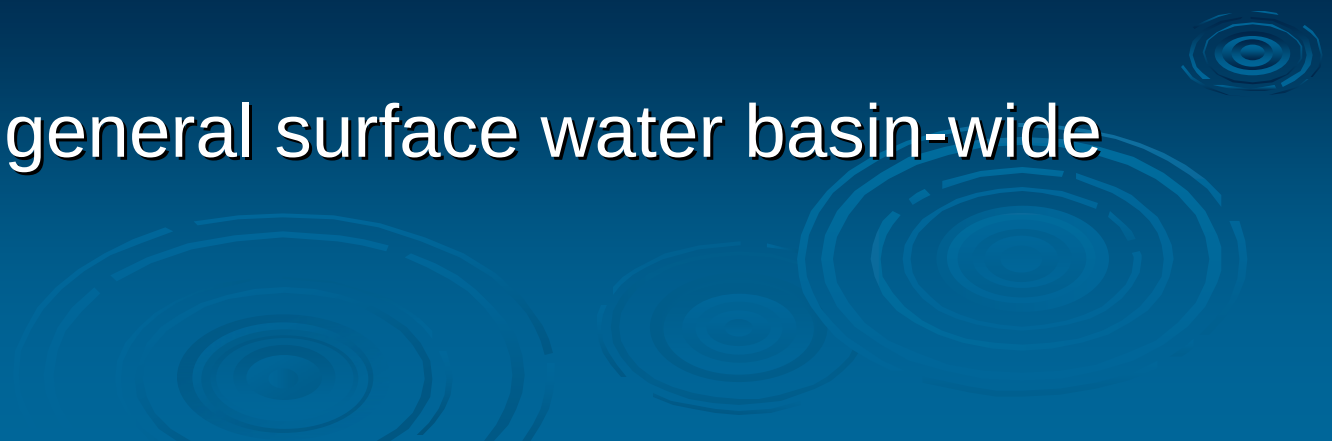
Report on statewide and basin condition for surface and ground water using freshwater indicators. Random stratified (Probabilistic GRTS) design.

Fish and Wildlife Research Institute:

Assess the coastal marine waters of Florida using coastal basin rotation and key ecological indicators

Temporal Variability Monitoring Network

➤ GOALS:

- Make estimates of changes in water quality at set stations over time;
 - Correlate surface water Status Network monitoring results in the same region;
 - Estimate general surface water basin-wide loading.
- 

Temporal Variability Monitoring Network

- Select sampling sites at lower end of watershed;
- Sampling stations also located near the state line on major rivers entering Florida from Georgia and Alabama;
- Collect flow data at or near sampling sites (recorder station or staff gauge);



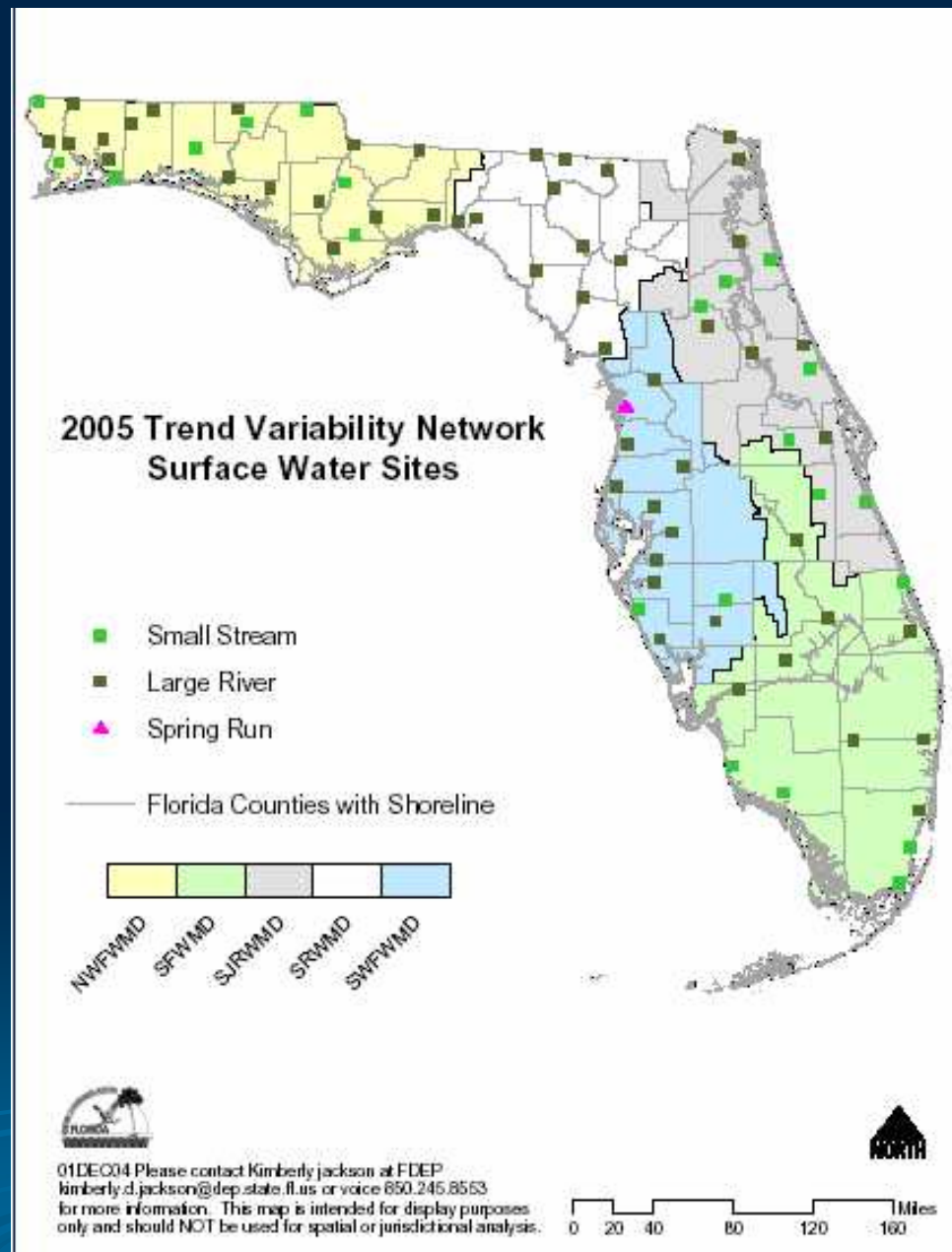
Surface Water Trend

- Collect suite of standard analytes at rivers and streams throughout the state.
- Added biological endpoint SCI on an annual basis for rivers and streams. SCI is collected only on non-tidal (less than 600 umhos conductivity) fresh water systems.



Surface Water Temporal Variability (Trend) Network

75 surface
water fixed Sites
sampled on a
monthly basis



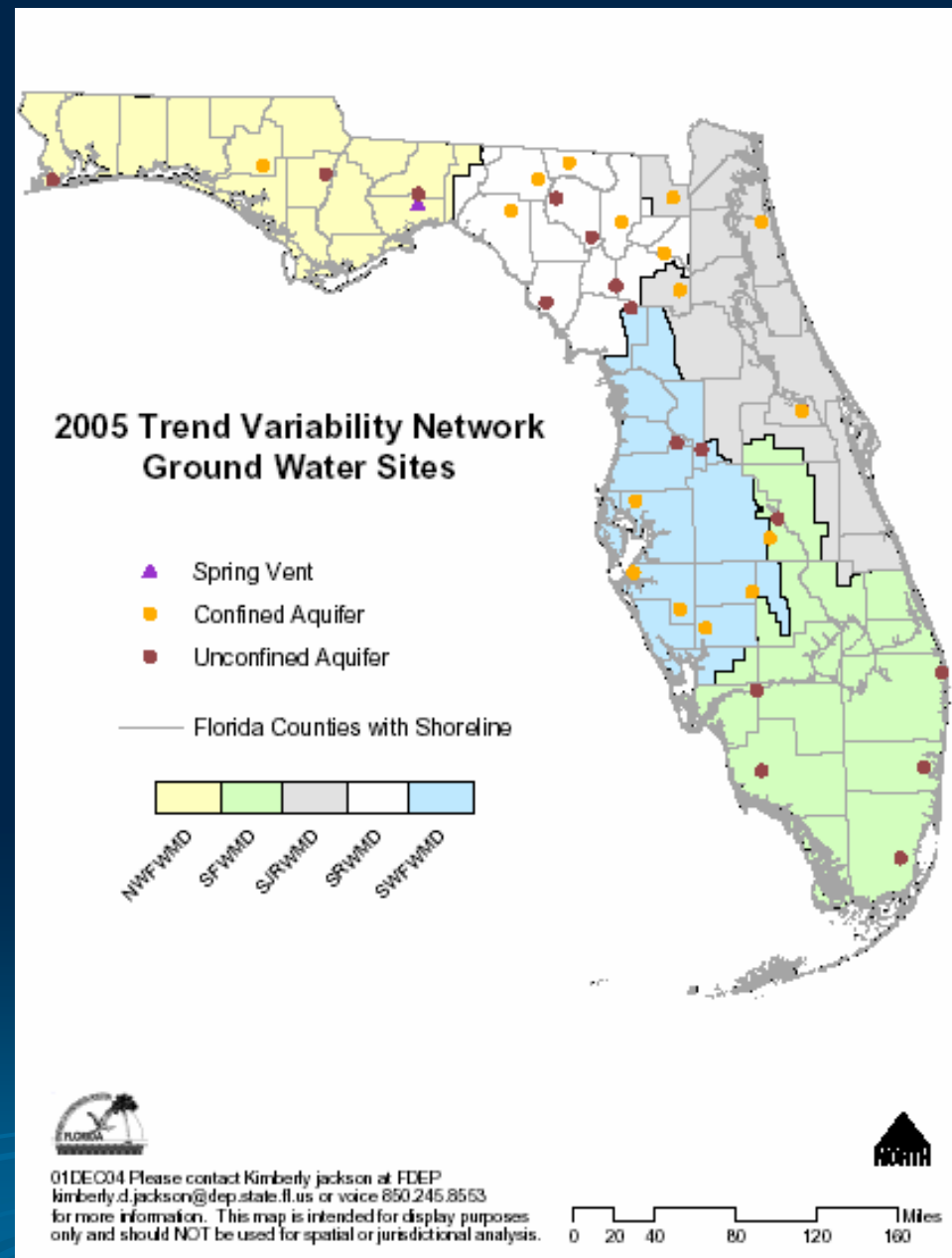
Ground Water Trend

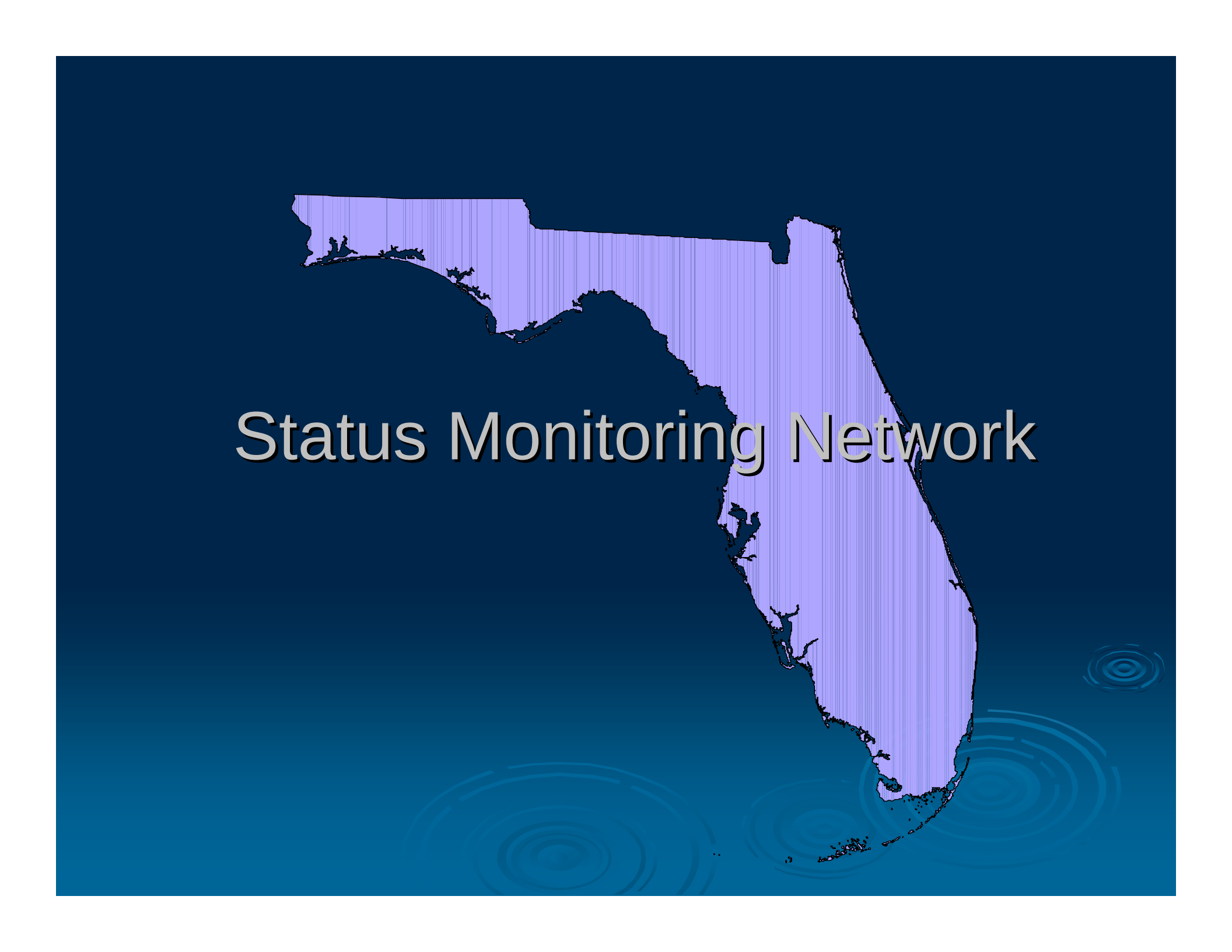
- Collect suite of standard analytes.
- Collect metals at ground water sites 1 time per year.



Ground water Temporal Variability (Trend) Network

47 ground
water fixed
Sites sampled
on a monthly
basis



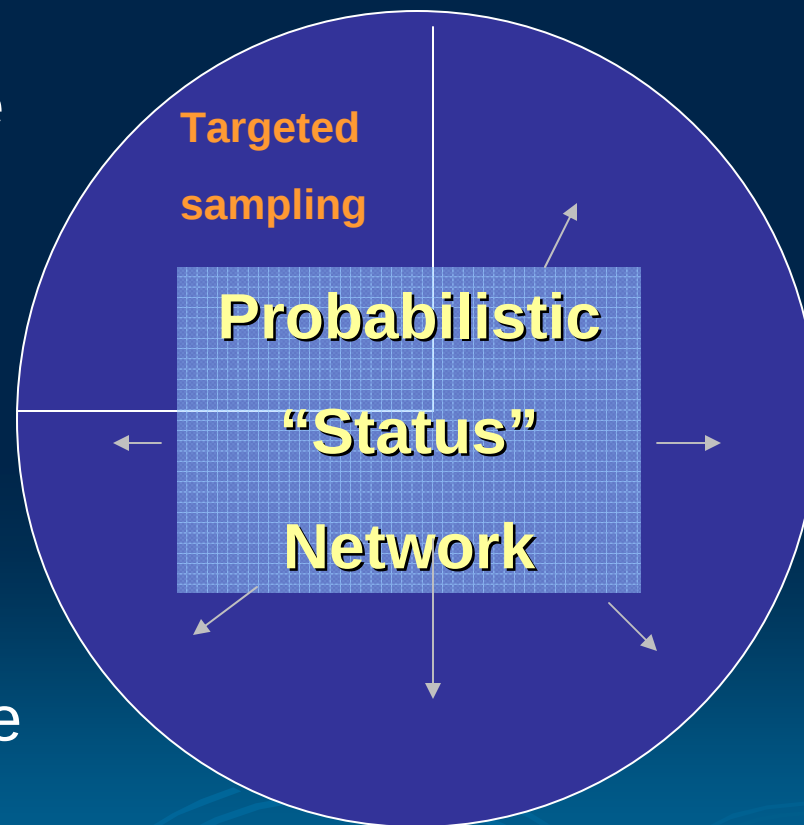
The background of the slide is a dark blue gradient. A white outline of the state of Florida is positioned on the right side. The bottom of the slide features several concentric white circles, resembling ripples in water. The text "Status Monitoring Network" is centered over the Florida map.

Status Monitoring Network

What is the function of a Statewide Status Network?

20-25% of waters may be reported each year in 303(d) and 305(b) reports.

What is the condition of the rest?



Population estimate

Probabilistic Monitoring
(random sample design)

Gives estimate of condition for 100% of the sampleable
Statewide Water Resources

Status Monitoring Network

2000-2008

Objectives:

- 1) Characterize regional and statewide water resource conditions, using a rotating basin, multi-year probabilistic sampling approach;
- 2) Determine percentage of each resource within each basin which meets standards or designated use (surface & ground water) using core and supplemental indicators.

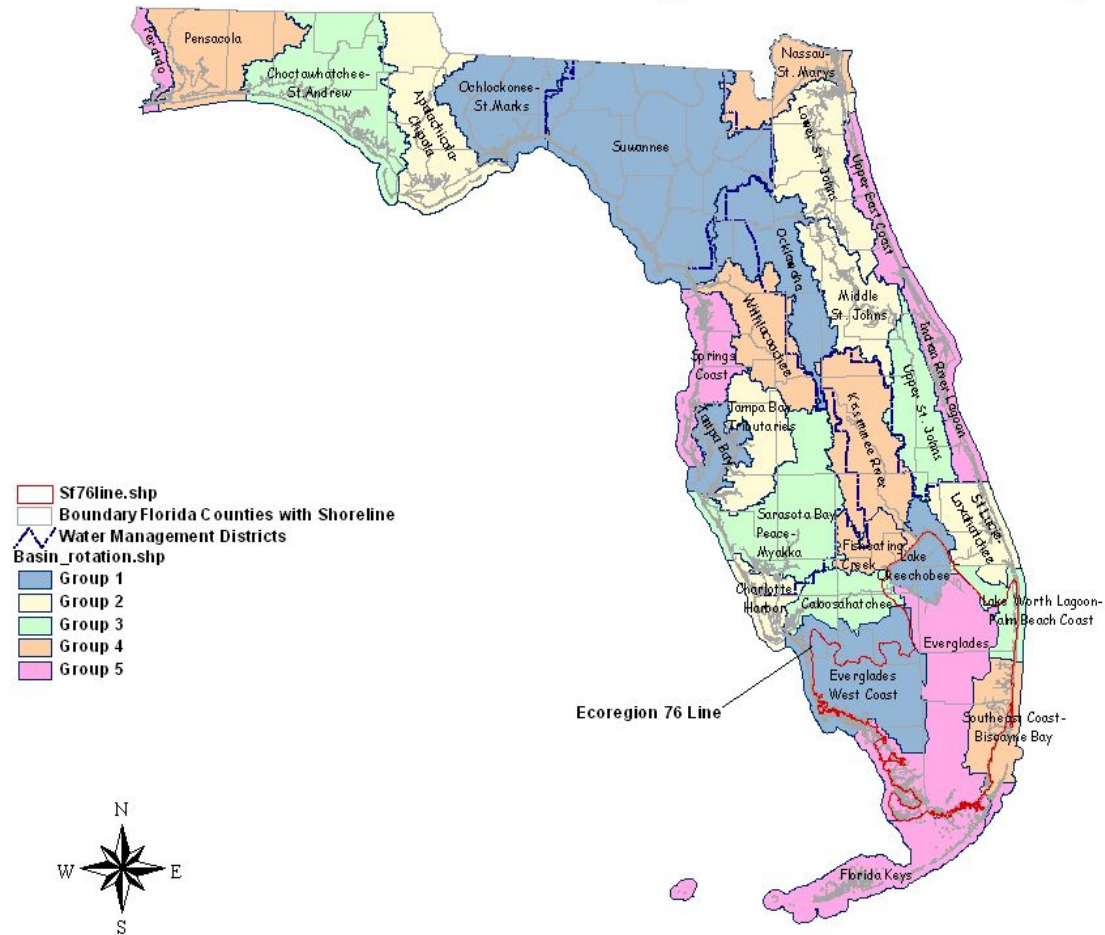
Generalized Random Tessellation Stratified

(GRTS)

29 TMDL Basins

- 6 resources
- 30 samples per resource type
- Basin rotation

Basin Rotation with Ecoregion 76 Boundary



Status Network: Cycle 2

Core and Supplemental Indicators: Ground Water

Confined/ Unconfined Aquifers

Standard nutrients and water chemistry

Metals: Primary standards

Bacti: Total and Fecal Coliforms

NO FILTERING



Status Network: Cycle 2

Core and Supplemental Indicators: Surface Water

Standard nutrients and water chemistry

Rivers and Streams:

- Stream Condition Index

Large and Small Lakes:

- Sediments

Bacti's:

- Enterococci
- Fecal
Coliform

Small lakes:

- Phytoplankton
community
- Trophic state
index
- Macrophyte
community

Data Analysis and Reporting

Responsible to:

Public: Education, Information

WMD/DEP partners

EPA: 305 B/303D reporting



Status Monitoring Activities for a Basin Group

Cycle 2 basin rotation
begins for Status
Network

**Cycle 2 Basin
Rotation
Program:
Phase 1 Group 1
Begins**



Jan. 2003 July 2003 Jan. 2004 July 2004 Jan. 2005 July 2005

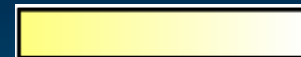


Site Selection & Reconnaissance

Contract Execution

Sampling

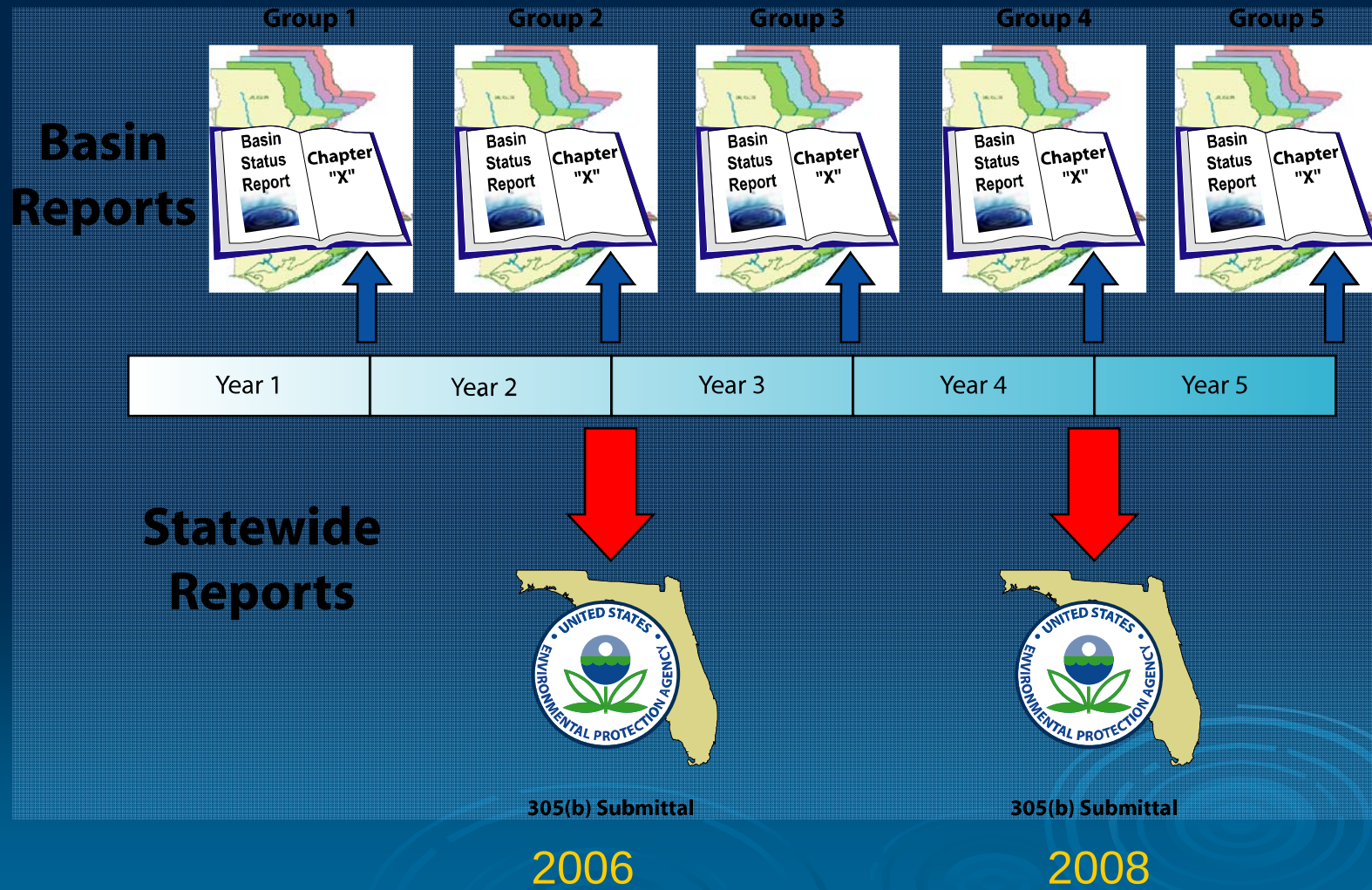
Data Management, Analysis & Reporting



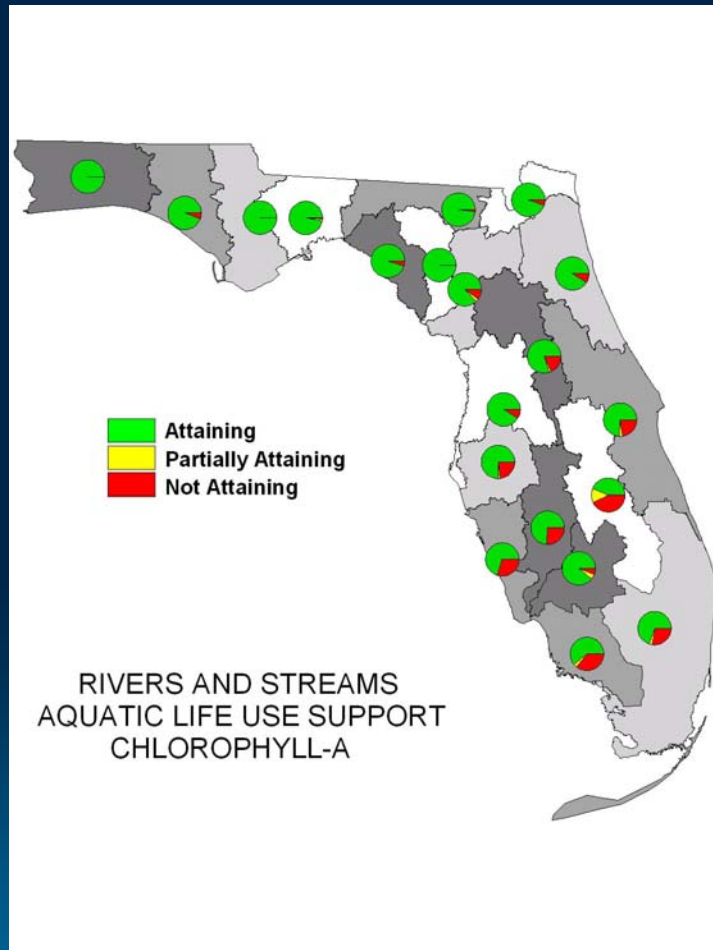
2004 Contract Execution



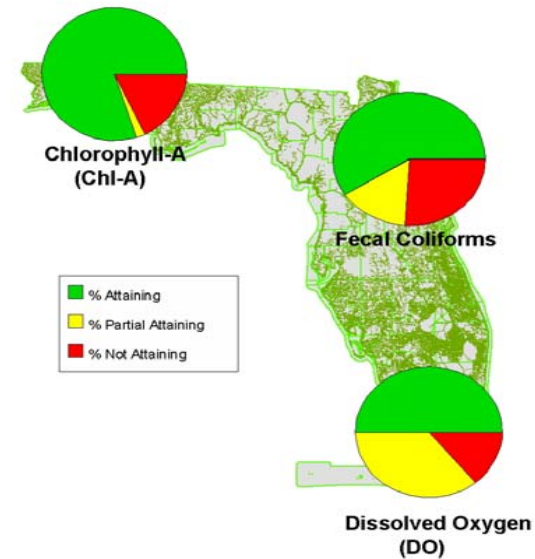
Reports from Status Monitoring For a Rotating Basin Cycle



River and Streams Results



Summary of Statewide Condition for Rivers and Streams



Other uses of probabilistic data

- DEP Nutrient Criterion development using status network data
- Environmental Assessment section using information for biological tools refinement
- Mercury Assessments looking at organic carbon constituents as well as pH, other surface water data



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Division Of Water Resource Management**

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