

***SURFACE WATER QUALITY  
MONITORING IN  
ALABAMA***

***From The Mountains To The  
Sea.....***

# *FROM THE MOUNTAINS.....*



Coosa Basin

***TO THE SEA.....***



***Alabama Coast***

*AND EVERYTHING.....*



*Coosa River*



*IN.....*



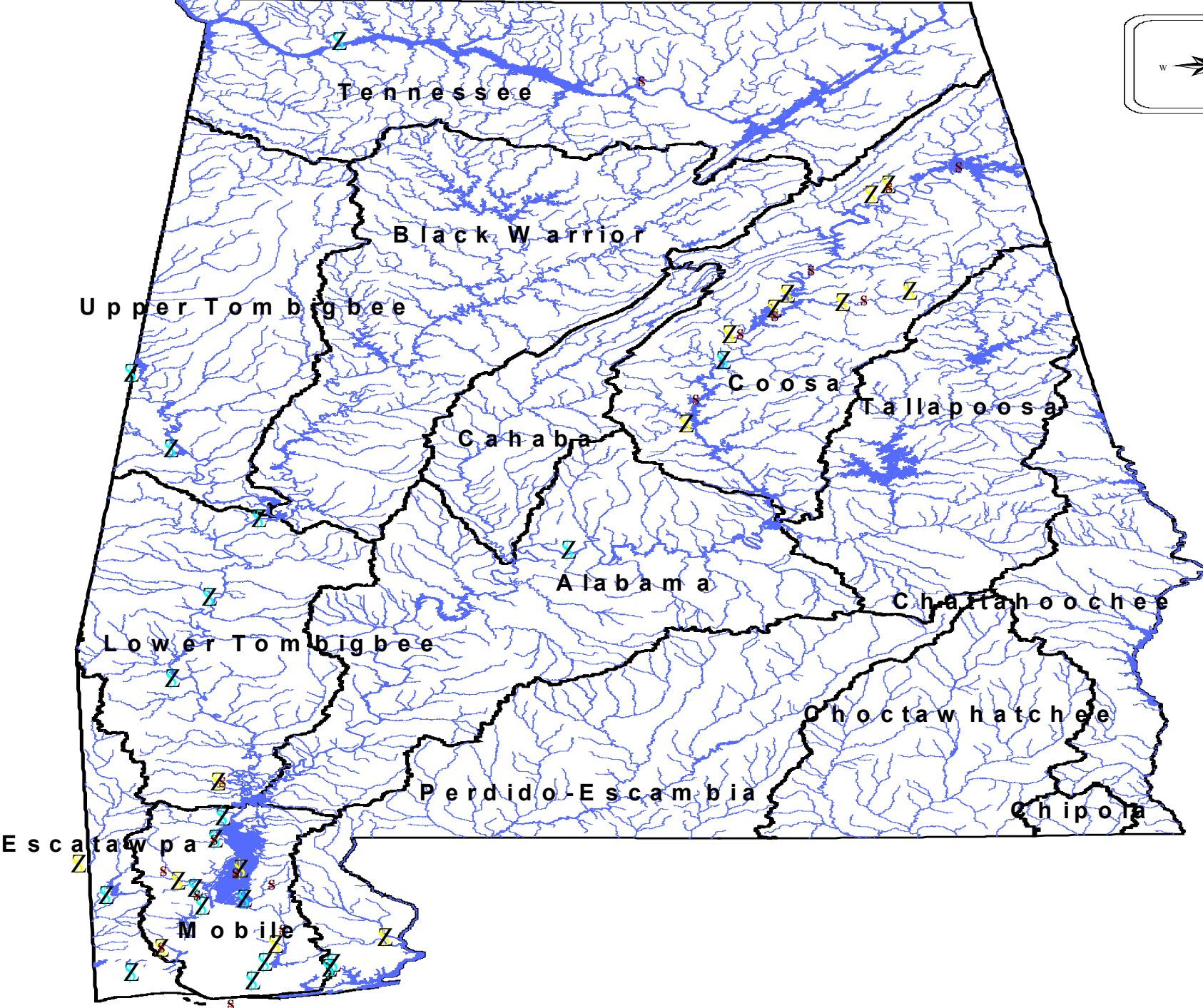
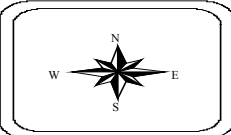
Bankhead: Warrior Basin

.....*BETWEEN.*



Martin: Tallapoosa Basin





# ***‘ASSESS’***

ADEM’s Strategy for Sampling  
Environmental indicators of Surface  
water quality Status

Finalized and made available in April 1997



# ***ASSESS*** Monitoring Strategy

- **Integrated Approach**
- **Focuses Effort on Rotational Basin**
- **Uses Environmental Indicators**
- **Develops Baseline Ecoregional References**
- **Identifies Most-Impaired Waterbodies**

# *Multifaceted Approach*

- **Stream Monitoring**
- **Reservoir Monitoring**
- **Fish Tissue Monitoring**
- **Coastal Monitoring**
- **NPDES Compliance Monitoring**





# *Rivers / Streams*

## *Water Quality Monitoring Program*

- *Reference Reach Program*
- *Ambient Trend Program*
- *ALAMAP Program*
- *Nonpoint Source Assessment Program*
- *CWA 303(d) Monitoring Program*



# Reference Reach Program

- **Least-Impacted Stream Segments**
- **Natural Range of Stream Conditions Within Level IV Ecoregions**
- **Develop Baseline Dataset to Evaluate Impairment of Study Stations**
  - **Physical Characteristics**
  - **Habitat Quality**
  - **Water Quality**
  - **Aquatic Macroinvertebrate and Fish Communities**

2.2.2000



# *Fixed Ambient Monitoring*

**Monitor Long-Term Water Quality Trends**

**Locate at Historic at Risk Sites**

**Collect Chemical/Physical/Bacteriological**

**Sample 3x/Year (Monthly at State-Line)**

**Over-Estimate the %-Impaired Waters**



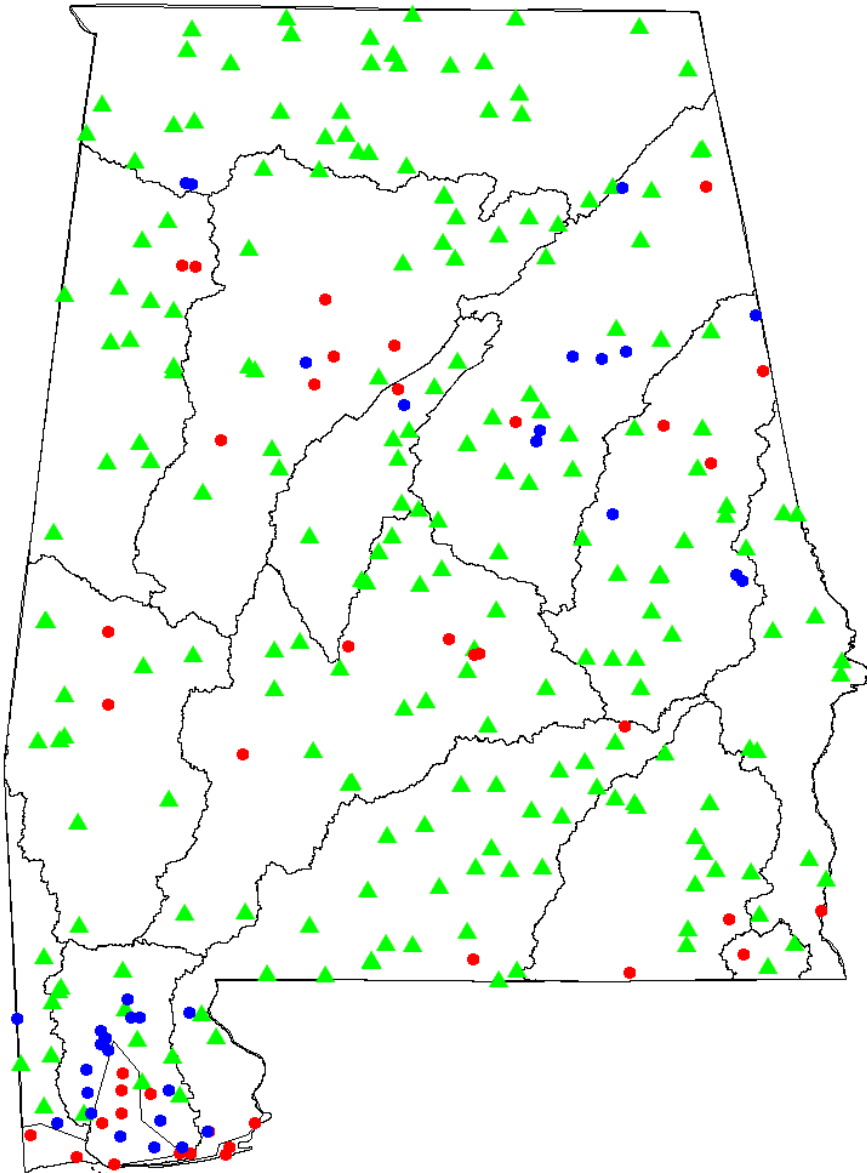


# *Probabilistic Monitoring Sites*

- 
- A photograph of two field researchers in a stream. One researcher on the left is wearing a white shirt, grey pants, and a large brown backpack. The other researcher on the right is wearing a white shirt, khaki pants, and a blue backpack. They are standing on a dirt path next to a stream, surrounded by dense green vegetation and trees. The text is overlaid on the image in a yellow, bold, sans-serif font.
- **Sample 250 Randomly-Selected Stream Sites 1X**
  - **Collect Phys., Chem., Bacteriological, & Habitat**
  - **Analysis by EPA of First 5 Years of Data**
  - **Results May Be Used To:**
    - Estimate Status of All Wadeable Streams
    - Increase Percentage of State Waters Assessed
    - Estimate NPS Problems on a Statewide Basis
    - Focus More Intensive Monitoring Efforts

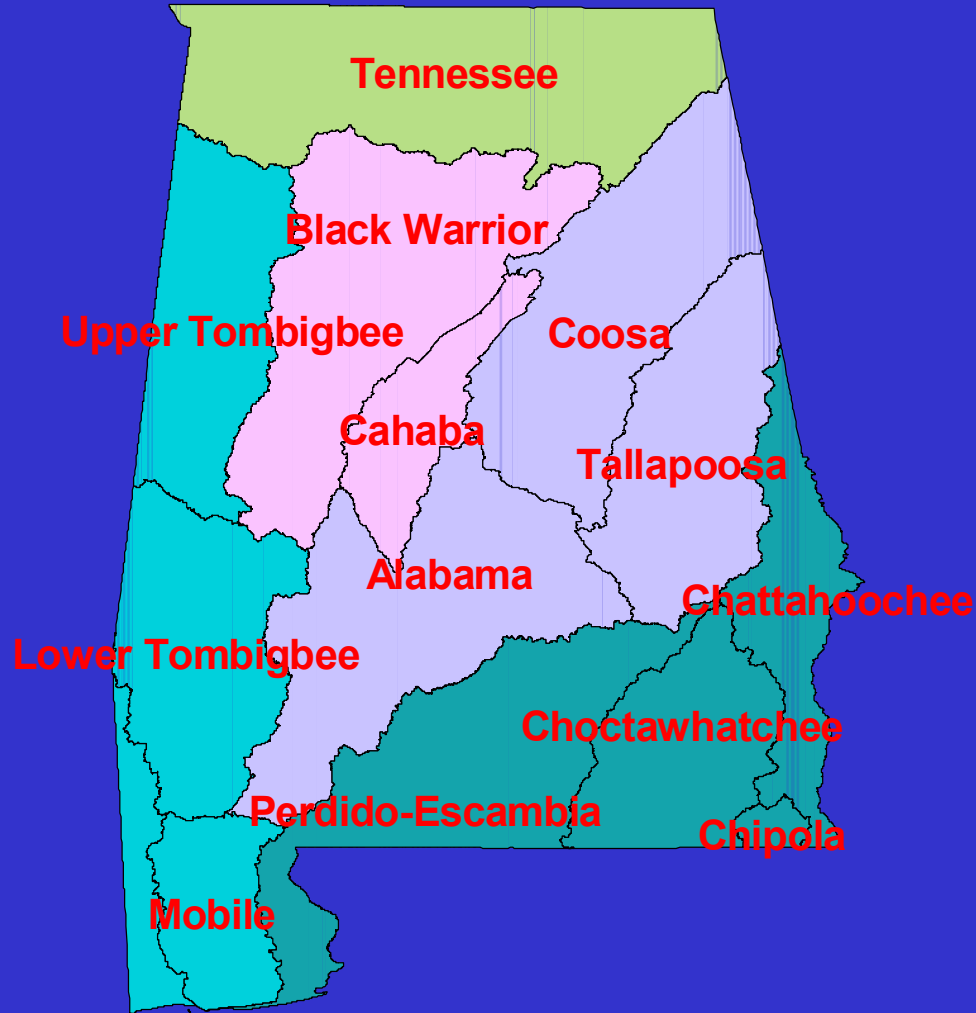


# *Ambient Monitoring Stations*



- Fixed Ambient Stations
- Historical Fixed
  - Current Fixed
  - ▲ Alamap Stations 1997-2001
- Basin Boundary
- State Boundary

# 5-Year Rotating Basin Schedule



# ***Nonpoint Source Assessments***

**Phased Stream Monitoring:**  
**Phase 1: Basin-Wide Screening**  
**Phase 2: Intensive Surveys**





# ***NPS Basin Screening Overview***

- **Effective Resource Targeting Tool**
- **Rotating Basin Schedule**
- **ID Most-Impaired Sub-Watersheds**
- **Major Non-Point Sources**
- **Target Int. Surveys or BMP's**

# *Aquatic Macroinvertebrate Assessments*





# *Fish Index of Biotic Integrity (IBI) Assessments*





A photograph of a stream flowing through a rocky, vegetated area. The water is dark and appears to be surrounded by green algae or moss on the banks. The stream is surrounded by dense green vegetation, including bushes and trees. The overall scene is a natural, somewhat overgrown waterway.

*CWA §303(d) Monitoring*



# ***303(d) Waterbody Monitoring***

- **ID Causes/Sources of Impairment**
- **Develop Comprehensive Watershed Water Quality Models for TMDLs**
- **Document Improvements in Water Quality After Implementation of Control Measures**





***ADEM***

***Reservoir Water Quality Monitoring  
Program***





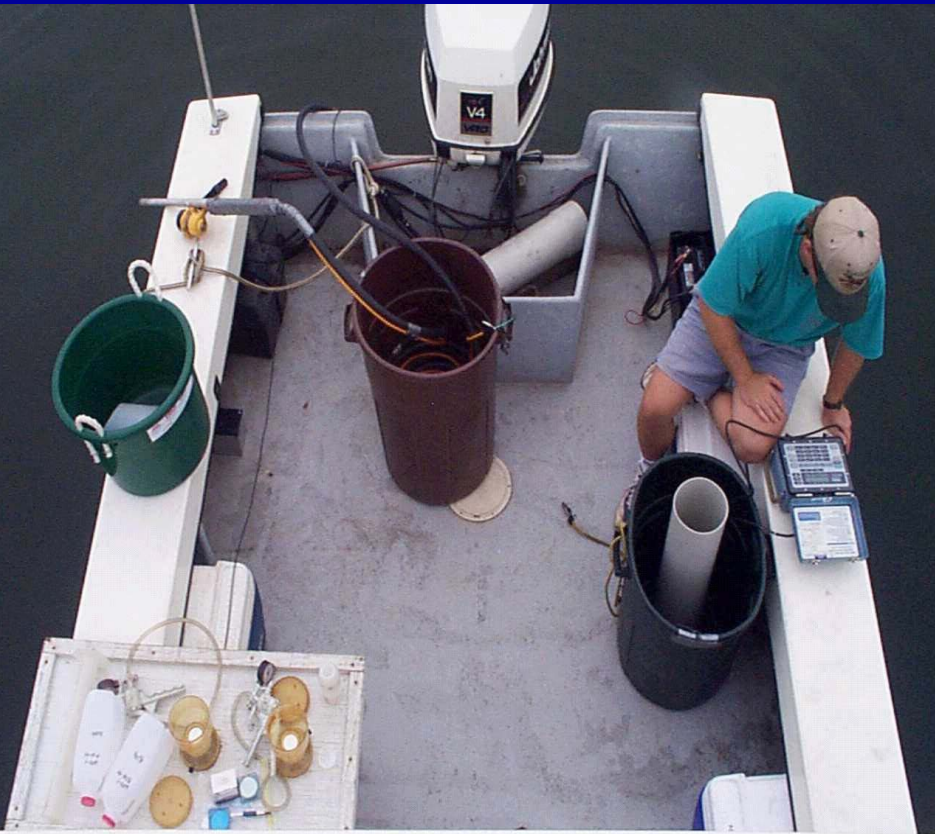
# *Reservoir Water Quality Monitoring Program*

- Publicly Accessible Lakes/Reservoirs
- Every Two Years During Critical Period
- Intensive Surveys: Five-Year Basin Rotation Schedule
- Compliance Monitoring

# *Reservoir Monitoring*

Vertical Profiles  
Nutrient Samples

Chlorophyll a  
Bacteriological





# *Fish Tissue Monitoring Program*



12. 6. 1999



# Current Program

- **Cooperative Effort**
  - **ADEM < > ADPH < > ADCNR < > TVA**
- **Goals: Multi-faceted**
- **State Fishing Lakes**
- **Data evaluation by ADPH**
  - **For issuance of advisories**

# ***Fish Tissue Monitoring Program***

## **Goals:**

- **sampling locations throughout the focus basin;**
- **repetitive sampling of sites where the ADPH has determined that FDA limits have been exceeded;**
- **sampling of sites in southern Alabama that have not been sampled in several years; and,**
- **sampling remaining areas in south Alabama where fish have not been collected for the FTMP.**



# Site Selection

- **Focus basins each year**
- **ADPH priority areas**
- **ADCNR and TVA priority areas**
- **Dioxin monitoring**
- **Approximately 30 - 40+ sites per year**

# *Monitoring Coastal Waters*



- **National Coastal Assessment Program**
- **Coastal Watershed Survey Program**
- **Coastal Recreational Monitoring Program**



# ***Nat'l Coastal Assessment Program***


- **Created Multi-Year, Multi-State Partnership**
- **Aggregated Data Throughout Coastal Area**
- **Created National Coastal Assessment (NCA)**
- **Combined Resources of ADEM and ADCNR**
- **Sampled 50 Probabilistic Alabama NCA Sites**

# ***Coastal Watershed Survey Program***

- **Small Sub-Watersheds: Baldwin and Mobile Counties**
- **Seasonal, Storm Event Sampling**
  - **Water Column and Sediment Analysis**
- **Report Focus:**
  - **Sources of Adverse Impacts**
  - **Stream Segments at Risk**



# *Coastal Beach Monitoring Program*

- **Cooperative Effort between ADEM & ADPH**
  - **Increase Public Awareness**
  - **Bacteriological Sampling**
    - **2X Per Week During Summer Months**
    - **1X During Cooler Months**
    - **Used As Indicators Of Potential Contamination**
  - **Advisories Posted on ADEM Web Site**
  - **ADPH Issues Swimming Advisories**
- 



***NPDES Compliance  
Monitoring***



# ***NPDES Compliance Monitoring***

- **NPDES Permits**
  - **Industrial Permitted Facilities**
  - **Municipal Permitted Facilities**
  - **Mining Facilities**
  - **Construction Sites**
  - **AFO/CAFO Facilities**

# *NPDES Compliance*

- Routine Inspections
- Compliance Sampling Inspections
- Complaint Response
- Spills (Emergency Response)
- Toxicity Tests (Bioassays)
- Water Quality Demonstration Studies
- Waste Load Allocations

12.13.1



# *What Would We Improve?*

- *Quality Assurance*
- *Data Management*
- *Data Analysis/Assessment*
- *Reporting*

*What Do We Need?*



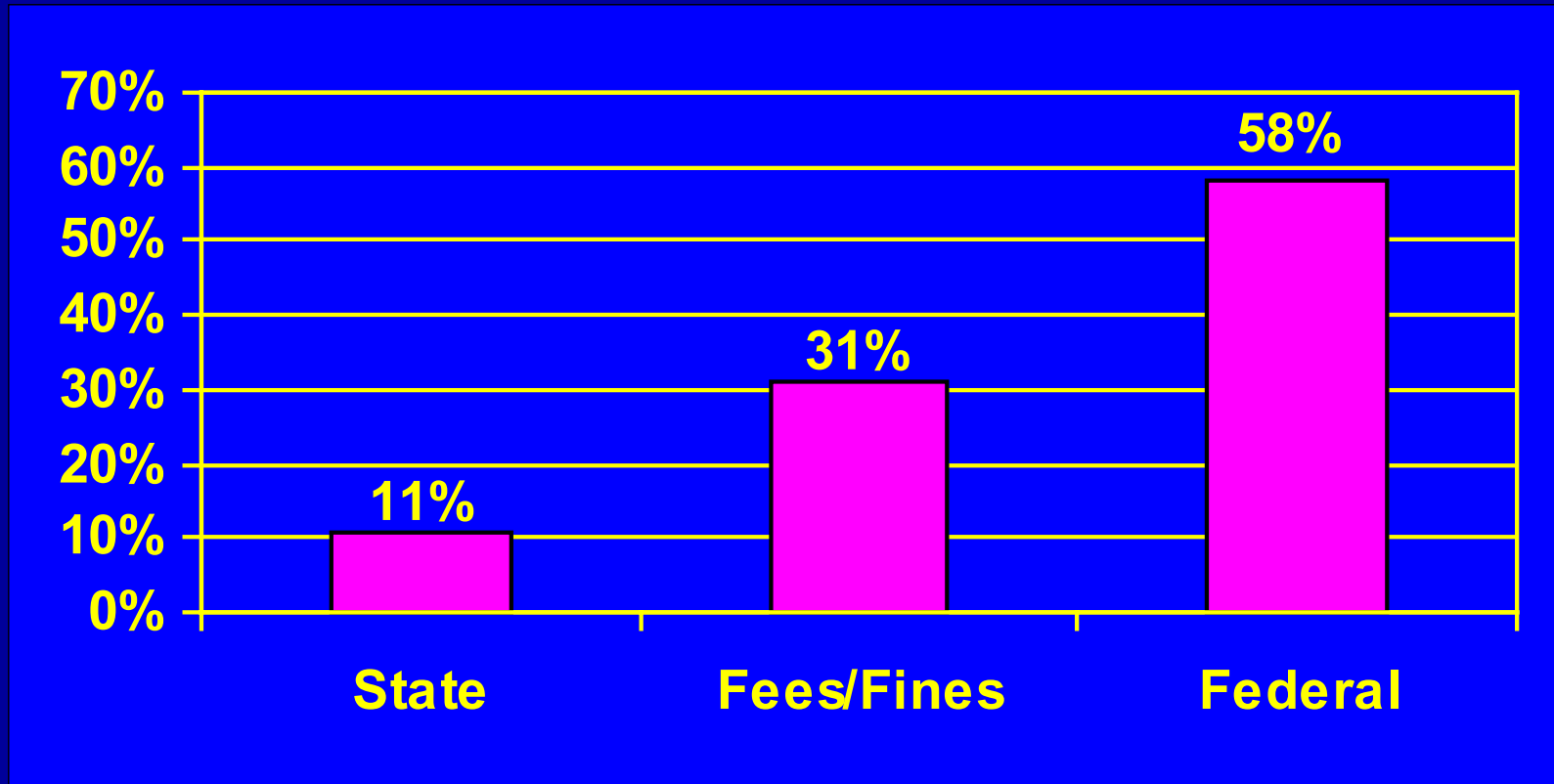
\$\$\$\$\$\$!!!

# *Elements of a State Monitoring Program*

- *Monitoring Program Strategy*
- *Monitoring Objectives*
- *Monitoring Design*
- *Core and Supplemental WQ Indicators*
- *Quality Assurance*
- *Data Management*
- *Data Analysis/Assessment*
- *Reporting*
- *Program Evaluation*
- *Support & Infrastructure Planning*



# ADEM Funding FY03



# *Current Future Issues*

- ADEM Funding
  - General Fund Reduction
  - 20% Decline in Last 10 Years
  - Reduction in Federal Funding
- TMDL Sampling
  - Priority
  - May delay permit modeling, water quality standards



# *Nutrient Criteria*

- **Lakes**
  - **Currently underway**
- **Streams**
  - **Workgroups developed**
- **Wetlands**
  - **Pending**
- **Estuaries**
  - **Pending**
  - **Nutrient Pilot Project Mississippi Sound**

# Questions?



End Presentation Here



# Big Cat!



# ***Basin Screening Methods***

- **Review Historical Data**
- **Subwatershed Screening w/ SWCD Data**
- **Select Subwatersheds: Highest Impairment Potential**
- **Field Reconnaissance**
- **Macroinvertebrate Assessments**
- **Habitat Assessments**
- **Chemical / Physical Assessments**
- **Fish Community IBI Assessments**

# ***Intensive Watershed Assessment***

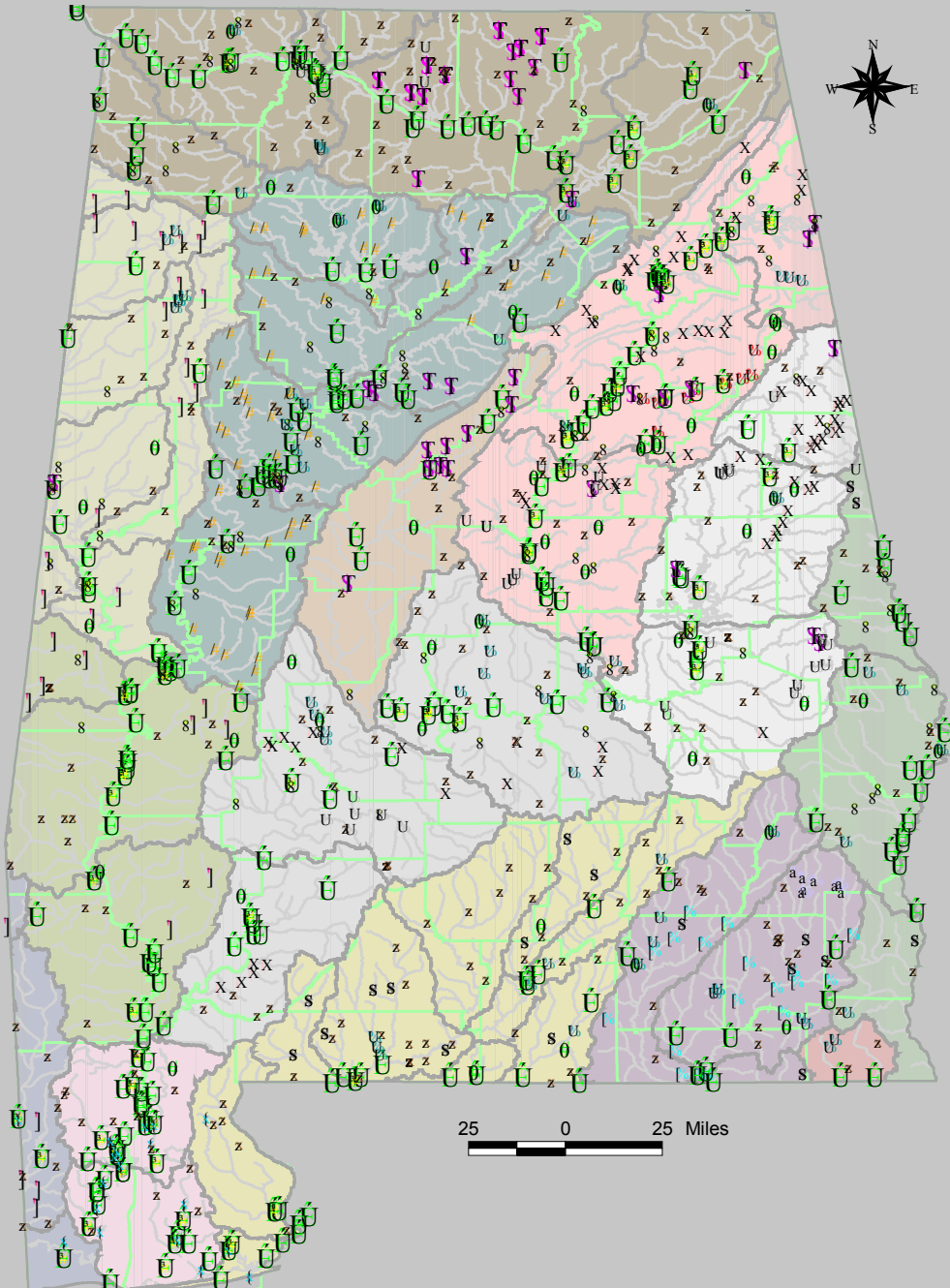
- **Physical/Chemical/Bact/Habitat - Monthly/Quarterly**
- **Macroinvertebrate & Fish Community Assessments - Annual**
- **Reference Reach Data**
- **Evaluate Trends Over Time**
- **Final Report**



# ***303(d) Intensive Surveys***

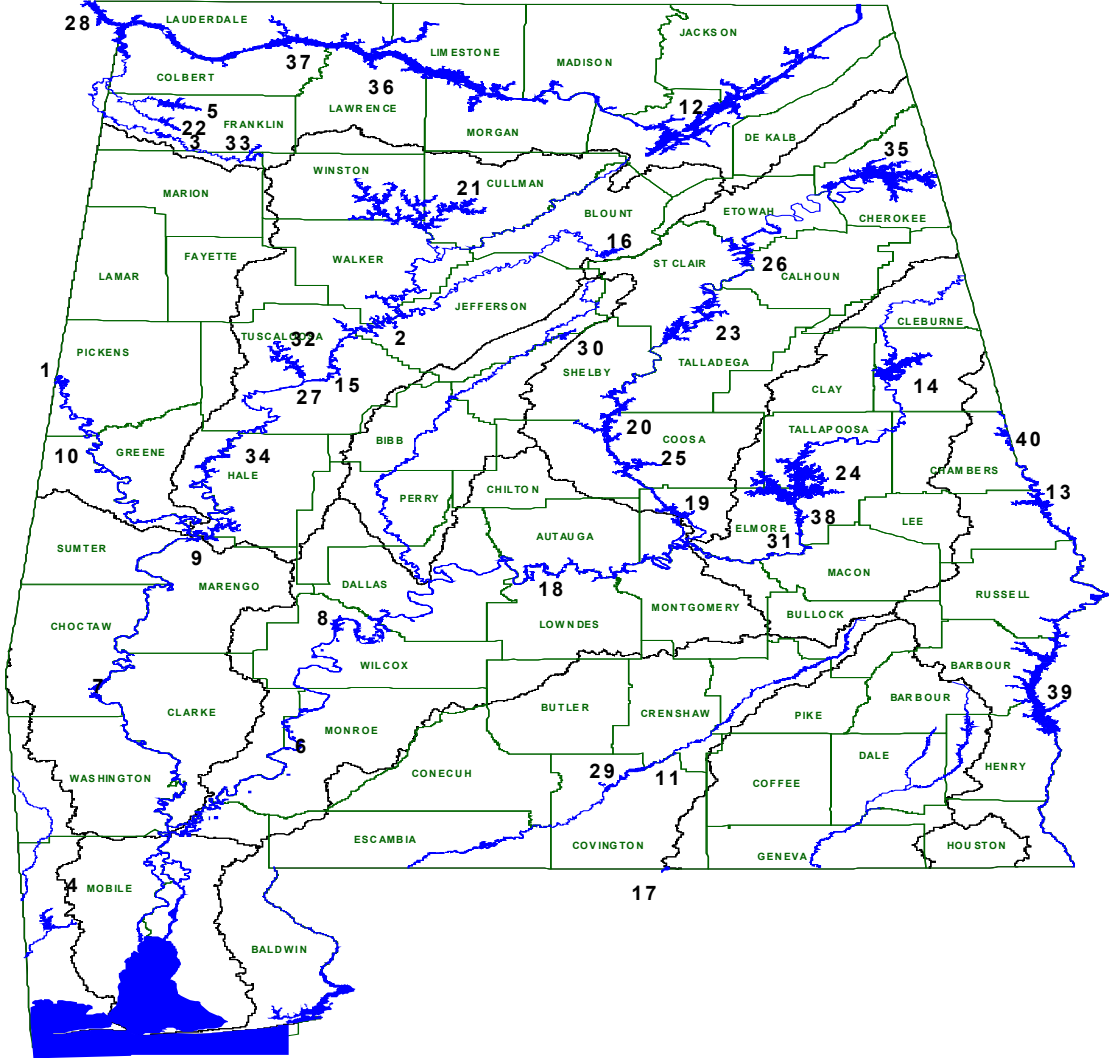
- Determine If Meeting Designated *Water Use Classification***
  - Multiple Sampling Events Over A Year**
  - Water Chemistry Data**
  - Bacteriological Sampling**
  - Habitat Quality Assessments**
  - Macroinvertebrate Screening Assessments**

# Alabama's Surface Water Monitoring Programs- Recent Stations



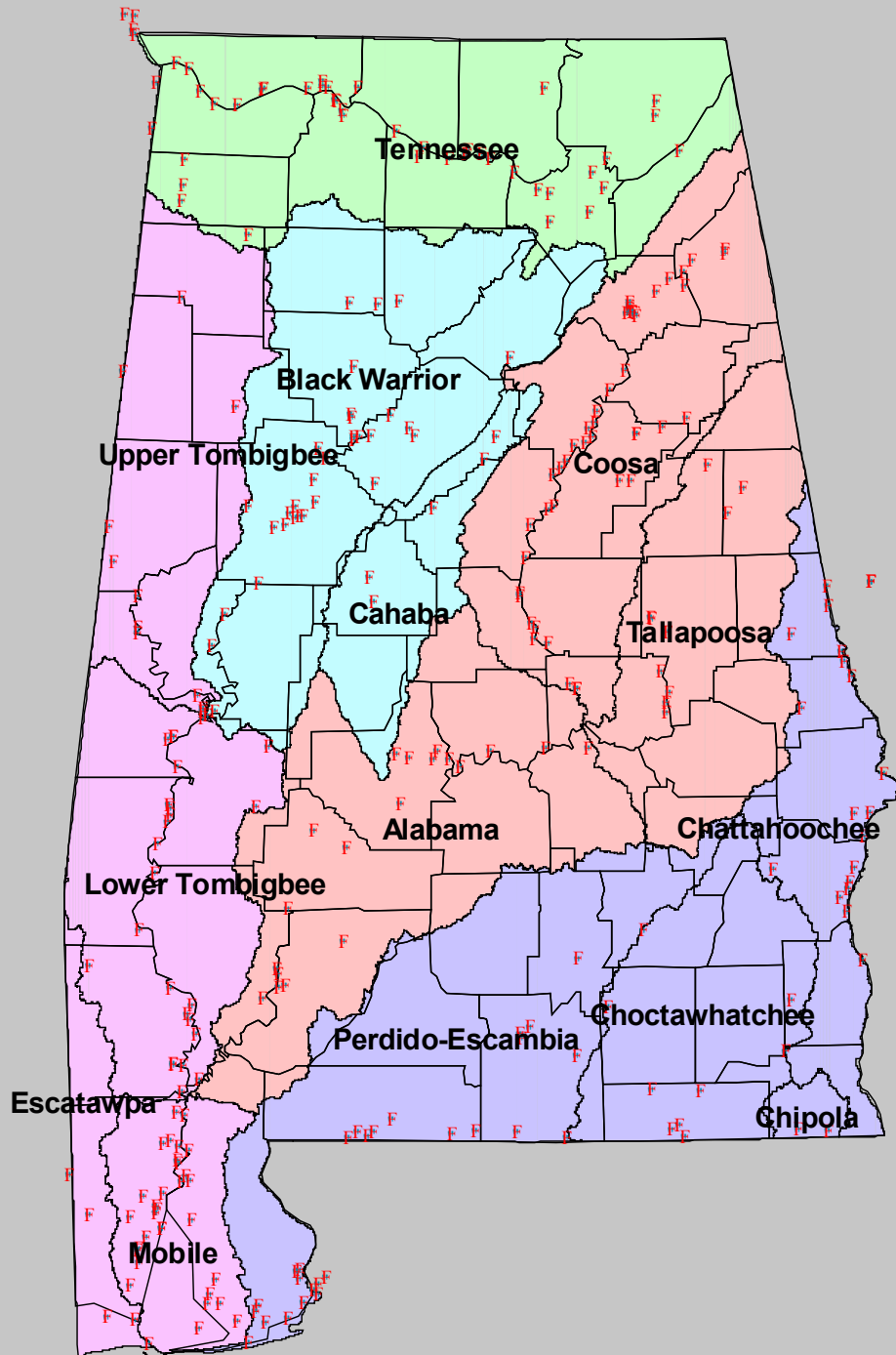
*Statewide  
Waterbody  
Monitoring  
Locations  
from  
1996-2001*

# Alabama Publicly Accessible Reservoirs





***ADEM's  
Fish Tissue  
Monitoring  
Program  
Sampling  
Locations***



# *Quality Assurance*

- Quality Assurance Management Plan (QAMP)
- Standard Operating Procedures Manuals (SOP)
- Field Quality Control
- Laboratory Quality Control
- Training

# ***Data Management / Storage***

- **Vital to a Comprehensive Monitoring Effort**
- **Departmental Databases**
- **GIS Data Layers**
- **Data Available for Multiple Uses**
- **QA/QC**



# Surface Water Quality Database

## **Goal 1: Provide “One-Stop” for SWQ Data**

- In-house *Oracle* Database Module
- Stores All WQ Data & Assoc. Meta-Data

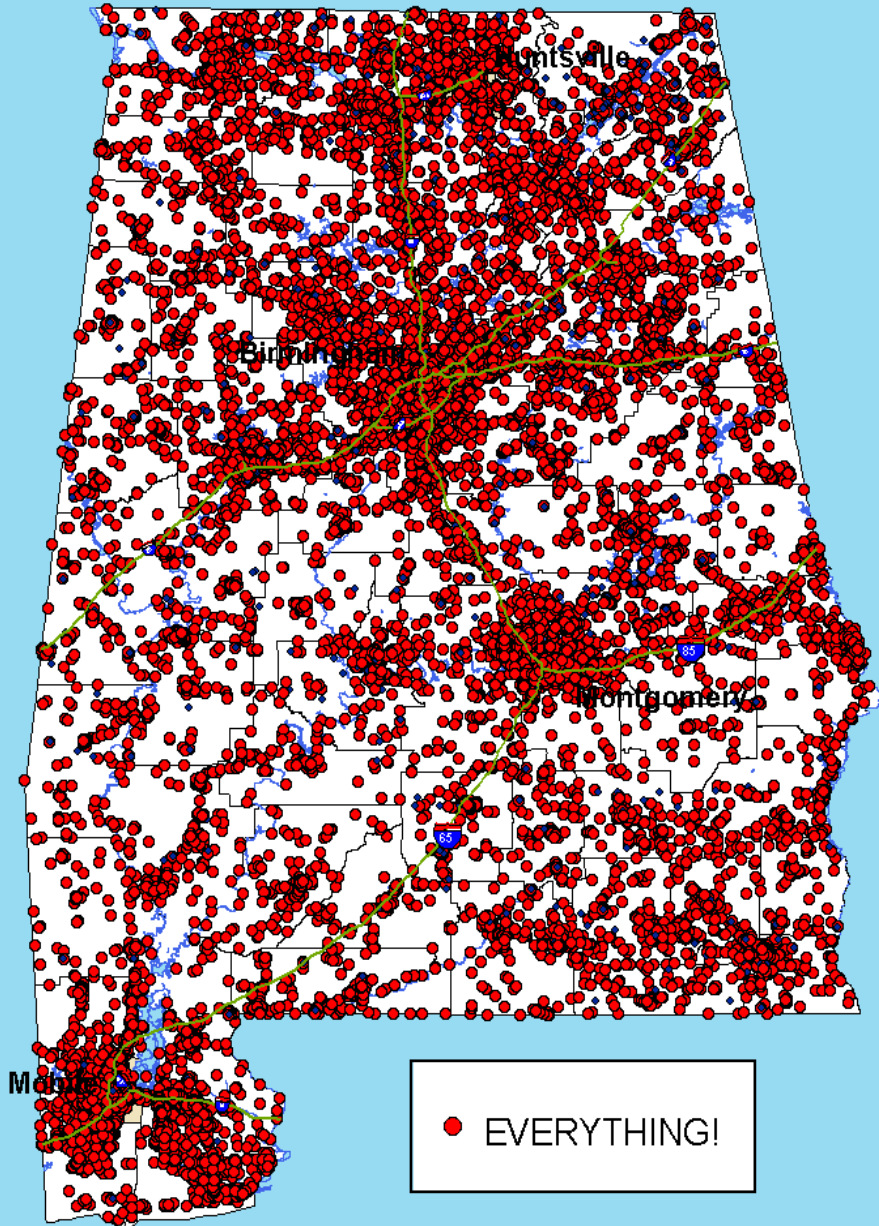
## **Goal 2: Improve Data Generation Efficiency and Quality**

- Maximize Electronic Data Transfer/Minimize Duplication of Reporting
- Incorporating QC activities for data entry

## **Goal 3: Facilitate QC Tracking of Collection & Reporting**

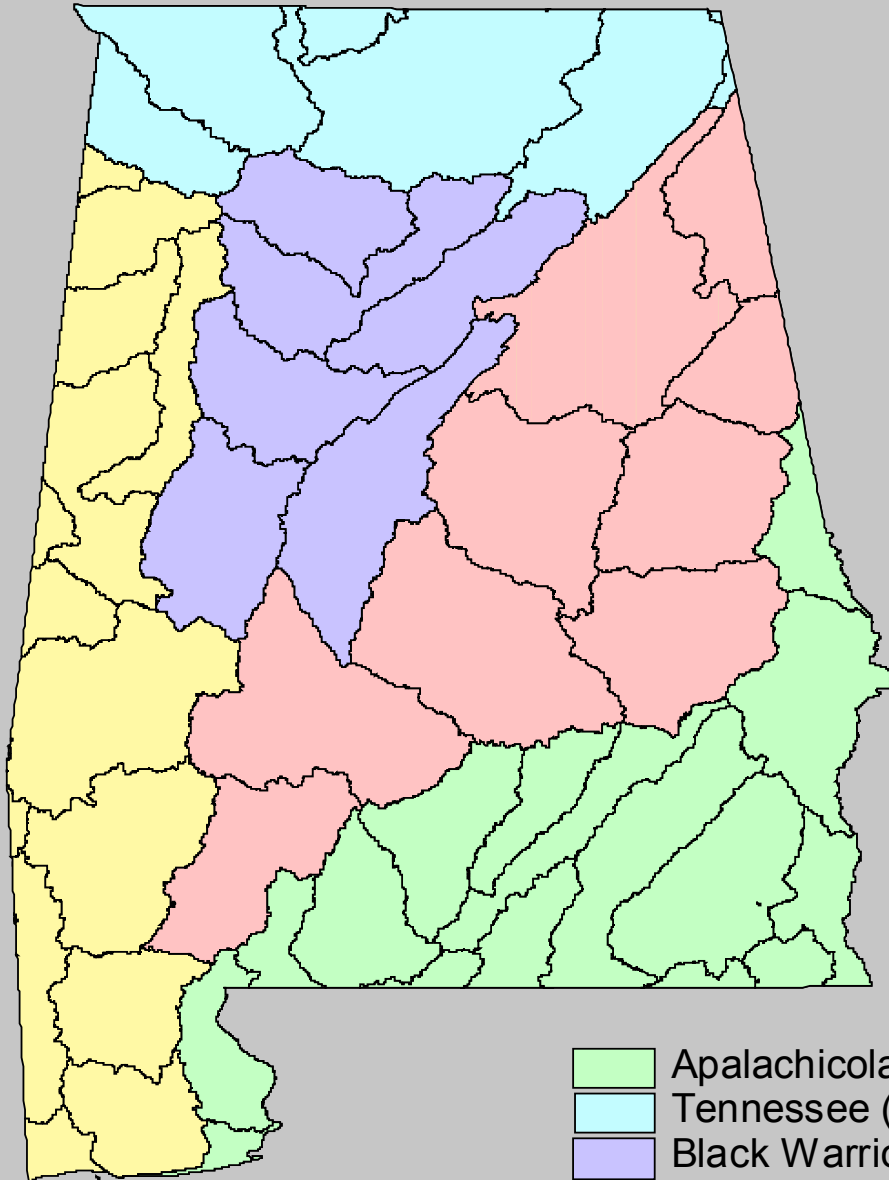
- Includes entry of Replicates and Blanks
- Provides Standardized QA Reports






*Statewide  
Regulated and  
Permitted  
Activities*



*(as of 11/02)*

## ***Alabama 5 Year Rotating Basin Schedule***



-  Apalachicola, Choctawhatchee/Escambia (2004)
-  Tennessee (2003)
-  Black Warrior, Cahaba River (2002)
-  Alabama, Coosa, Tallapoosa (2000)
-  Upper & Lower Tombigbee (2001)