

MAPPING THE FUTURE OF ALABAMA WATER RESOURCES MANAGEMENT: Policy Options and Recommendations



A Report to
The Honorable Robert Bentley
Governor of Alabama
by the
Alabama Water Agencies Working Group
December 1, 2013

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TERMS AND ACRONYMS

Term/Acronym	Description
7Q10	The lowest 7-day average flow that occurs on average once every 10 years
AADF	Annual Average Daily Flow
ABA	American Bar Association
ACF	Apalachicola-Chattahoochee-Flint River Basin
ACT	Alabama-Coosa-Tallapoosa River Basin
ADAPT	Alabama Drought Assessment and Planning Team
ADCNR	Alabama Department of Conservation and Natural Resources
ADECA	Alabama Department of Economic and Community Affairs
ADEM	Alabama Department of Environmental Management
AEMA	Alabama Emergency Management Agency
AGI	Alabama Department of Agriculture and Industries
ALAWADR	Alabama Water-Quality Assessment & Monitoring Data Repository (Database)
Aquatic habitat	The place or environment where water-based plants and animals naturally or normally live and grow
Aquifer	A water-bearing stratum of permeable rock, sand, or gravel
ASCE	American Society of Civil Engineers
Assessment	To determine the quality or quantity of some resource
AWAWG	Alabama Water Agencies Working Group
AWRC	Alabama Water Resources Commission
Base flow	A stream's rate of flow that represents the transition between flow derived from surface runoff and flow derived from the contribution of groundwater
Basin	A broad area of the earth beneath which the strata dip usually from the sides toward the center
Biodiversity	Biological diversity in an environment as indicated by numbers of different species of plants and animals
Biological condition	A state of a biological community's fitness or health
Capacity-stress area	An area of the state designated by the Alabama Water Resources Commission where the Commission determines that the use of the waters of the state, whether groundwater, surface water, or both, requires coordination, management, and regulation for the protection of the interests and rights of the people of the state.
Certificate Of Use (COU)	A document issued by OWR to all public water systems and those individuals or entities with a capacity to withdraw, divert, or use more than 100,000 gallons per day for non-public and irrigation uses
CoCoRaHS	Community Collaborative Rain, Hail, and Snow public network
<i>Code of Alabama</i>	A systematic statement of Alabama's body of law
Compact	An agreement or covenant between two or more parties
CWA	Clean Water Act
Data quality standards	Rules established by authority for the measure of quantity, weight, extent, value, or quality of various water resources attributes
DEIS	Draft Environmental Impact Statement
DOI	United States Department of the Interior
Drought	A period of dryness especially when prolonged; specifically one that causes extensive damage to crops or prevents their successful growth
DWSRF	Drinking Water State Revolving Fund

Term/Acronym	Description
ELOHA	Ecological Limits of Hydrologic Alteration
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
Floodplain management	The skilled care and use of floodplains so as to diminish losses during flooding, improve natural biological functions, and allow for development compatible with these goals
Flow gauge	A hydrological instrument and method used to determine the rate and quantity of water moving past a specific point
GIS	Geographic Information System
Groundwater	Water located and(or) moving beneath the earth's surface
GSA	Geological Survey of Alabama
HOBO	Home owner/Boat owner
HUC	Hydrologic Unit Code
Hydraulic head	The surface elevation of water above a fixed point
Hydro	Water
Hydrologic	Pertaining to hydrology
Hydrology	Scientific discipline concerned with water, including its occurrence, distribution, and circulation via the hydrologic cycle, chemical and physical properties, and interactions with living things.
Interbasin transfer (IBT)	A man-made conveyance of water from one watershed to another
Instream flow	The amount of water in a stream channel required for public health, economic, environmental, and downstream needs
MGD	Million gallons per day
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NPDES	National Pollutant Discharge Elimination System
OWR	Office of Water Resources
Permeability	The degree to which water will diffuse through or penetrate aquifers
PJLCWPM	Permanent Joint Legislative Committee on Water Policy and Management of Alabama Legislature
Porosity	The ratio of the volume of interstices of an aquifer to the volume of its mass
Public Trust Doctrine	The principle that certain resources are preserved for public use, and that the government is required to maintain them for the public's reasonable use
Recharge	To restore anew water that has been removed from an aquifer
Riparian	Relating to or living or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater
RPA	Regional Planning Association, Council, or Commission
RRMWC	Regulated Riparian Model Water Code
Salt water intrusion	The forcible entry of salt water into an aquifer as water is removed by pumping, applicable in coastal areas
SCOTUS	Supreme Court of the United States
SEFPC	Southeastern Federal Power Customers
SRF	State Revolving Fund
Stakeholder	One who is involved in or affected by a course of action
STORET	EPA's STorage and RETrieval Data Warehouse

Term/Acronym	Description
Stratigraphic	Of or pertaining to stratigraphy, the science of rock form, distribution, lithologic composition, fossil content, and geochemical properties
Surface water	Water located and(or) flowing upon the surface of the earth
TMDL	Total maximum daily load—The amount of pollutants allowed in a stream to maintain its water quality standards
TVA	Tennessee Valley Authority
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
Water allocations	To apportion water for a specific purpose or to particular persons or things
Water availability	Water that is present or ready for immediate or future use
Water policy	The process that encompasses all efforts to define the rules, intent, and instruments with which government manages human uses of water, controls water pollution, and meets environmental water needs. It considers not only the legal and regulatory framework, but also the planning around water resource availability and the implementation practices by various agencies, water managers and other stakeholders in support of this process
Water quality	A particular physical, chemical, or biological characteristic, or other distinguishing attribute of water that is used to describe its level of purity or fitness for use
Water reuse	The use of reclaimed or recycled water
Water sustainability	The management and use of water in ways that assure the future integrity and availability of the resource
Water use	A quantity of water withdrawn, diverted, or used for any public or private purpose in accordance with state law
Watershed	A region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water
WMA	Watershed Management Authority
WMIA	<i>Water Management Issues in Alabama</i> report

EXECUTIVE SUMMARY

The Alabama Water Agencies Working Group (AWAWG) is comprised of five member agencies: the Alabama Office of Water Resources (a division of the Alabama Department of Economic and Community Affairs), the Alabama Department of Environmental Management, the Geological Survey of Alabama, the Alabama Department of Conservation and Natural Resources, and the Alabama Department of Agriculture and Industries. On April 18, 2012, Governor Bentley directed the AWAWG to:

- Create a comprehensive database of Alabama's water resources.
- Meet with stakeholders.
- Recommend a statewide water management action plan and timeline by December 1, 2013.

In response to the Governor's directive, the AWAWG took the following actions:

- Evaluated and analyzed Alabama's current water management strategies and issues. The results of this effort were summarized in a report released on August 1, 2012, entitled *Water Management Issues in Alabama* (WMIA).
- Compiled water resources data sources and identified additional data necessary to provide an understanding of the State's water resources.
- Reviewed the 1990 report, *Water for a Quality of Life*, and evaluated the implementation status of the report's recommendations.
- Solicited and evaluated stakeholder comments to the WMIA report.
- Recommended a process and action plan, the Alabama Water MAP Process, for moving toward an enhanced statewide water management plan.

The AWAWG has produced a number of documents and sought stakeholder input and comments via conference attendance and presentations, articles, the establishment of a dedicated website, and meetings with individuals and groups. One of the most important outcomes has been the stimulation of dialog between the Governor's Office, the Permanent Joint Legislative Committee on Water Policy and Management, water stakeholders, and water agencies. From this work, AWAWG developed this report in two parts. Part I presents AWAWG's response to Governor Bentley's directives and proposes the Alabama Water MAP Process as the State's mechanism for developing and implementing an initial comprehensive statewide water management plan. Part II presents discussion and policy options for the 12 water issue areas identified by AWAWG.

From the outset of the AWAWG, it was recognized that stakeholder input and participation in the discussion of water management issues was critical if the results were to be successfully translated into water resources policy and management. The public has had the opportunity to provide comments regarding the WMIA report since August 2012 and they have provided their views and opinions on the issues and the process pertaining

to water resources policy and management in the State. The AWAAG has given consideration to these comments during the preparation of this report and development of the recommendations for a water resources management action plan and timeline.

The WMIA report was sent to 248 stakeholders and stakeholder groups. Responses were received from 82 stakeholders through October 2013 who represented a broad range of interests in water resources and policy in the State.

All stakeholder comments to the WMIA report were evaluated by the AWAAG and several themes emerged:

Commonalities

- Water resource assessments, data collection systems, and database accessibility need to be expanded, completed, and used in the planning process.
- The process to develop a water management plan will be technically and politically difficult and must be transparent with broad collaborative participation by water users, stakeholders, and agencies for a successful outcome.
- Economic concerns about water resources policy and management were expressed throughout the comments with a noted desire for water resources planning to not be burdensome to the economy.
- The need to commit funding at a level commensurate with the task of developing water policy and a water management plan.

Divergences

- The most strongly divergent views were on the subject of water withdrawal permitting. Many of these views were expressed with respect to the efficacy of current riparian common law-based water management versus the need for management flexibility and resource predictability afforded by the Regulated Riparian Model Water Code.
- The importance of maintaining ecologically relevant instream flows was expressed by some stakeholders while others indicated that instream flow criteria should be clearly defined as part of an overall management mechanism.
- The need to regulate and permit interbasin transfers (IBTs) was highlighted by some groups since IBTs are fundamental to the operations of many water utilities. The use of IBTs as a first option strategy to supply future water demand was challenged by those who see the need to focus on efficiency, conservation, and water reuse.

As a result of stakeholder responses, review of past studies and reports, and deliberation by the AWAAG, many policy options and recommendations are proposed for the water issue areas discussed in Part II. In addition to the current assessment efforts, work on some of the other recommendations should begin soon and will be required for preparing an initial water resources management plan. They are summarized in the following list.

Summary of Part II Issue Area Policy Options and Recommendations
Surface Water and Groundwater Availability Assessments
Continue funding for on-going assessments and monitoring efforts.
Provide funding and support to enhance on-going scientific assessments and data collection efforts.
Establish laws, policies, and regulations for surface and groundwater that are consistent with the MAP process.
Water Resources Management
Continue the AWAAG, under the direction of the Governor, as the coordinating body for statewide water management planning activities.
Direct the AWAAG, working with appropriate State agencies and with additional funding, after appropriate stakeholder input, to initiate the Alabama water management planning and implementation process using the proposed conceptual framework.
Water Resources Data
Continue integrated assessment of the State's surface and groundwater resources.
Provide resources and support for instream flow studies to evaluate existing flow tools and to determine an acceptable framework for implementing future instream flow requirements, if deemed appropriate.
Fund recommended monitoring activities described in this report.
Develop cost estimates for operating and maintaining the State's water data collection and reporting capabilities.
Establish a water resources data clearinghouse accessible by the public via a web portal.
Develop consistent and reliable data quality standards and protocols for the acquisition and management of water information.
Instream Flow
Create an Instream Flow Focus Panel.
Provide support and resources to investigate instream flow needs of Alabama's aquatic ecosystems and evaluate the utility of existing flow assessment tools for management purposes.
Water Conservation and Reuse
Create a Water Conservation, Efficiency, and Reuse Focus Panel.
Ensure that adequate local voluntary and mandatory water conservation measures are established during times of drought and are in accordance with the State's Drought Management Plan.
Support development of water reuse regulations to conserve water while being protective of human health and water quality and promote water reuse as a practical conservation measure.
Develop a public education program presenting the need for and benefits of water conservation and reuse.
Economic Development
The MAP process and any State water resources management plan should include policies and guidance for water resources development programs.
As water resource assessments are completed, communicate water capacity and availability information to industrial recruiters.
The Governor's economic development strategic planning process should include consideration of water resources implications in any efforts to focus Alabama's business and industry recruiting efforts.
The Governor should task the Inland Waterways and Intermodal Infrastructure Advisory Board to provide recommendations for water resource-related infrastructure projects that would provide direct benefits to economic recruiting efforts.
ADECA and ADEM should review federal and State water supply development funding programs (including state funded seed monies).
ADECA should create an information clearinghouse on their web site to summarize sources of potential funding for new water source development.
Public and Stakeholder Education and Outreach
Solicit the participation of stakeholders and the public. This would include maintaining contact information for all interested individuals and organizations.
Develop a media campaign with media outlets and other advertising venues to target individuals who may not already have a foundational knowledge of water resources.
Publicize and promote Alabama's water resources and the need to protect them for future generations.

Summary of Part II Issue Area Policy Options and Recommendations
Identify specific representatives from various stakeholder groups to facilitate more effective and efficient communication between policy makers and stakeholder groups. These distinct groups could include citizen-based environmental groups, universities, trade organizations, industrial sectors, public water systems, and various local/state/federal agencies.
Interbasin Transfers
Create a Certificates of Use, Permitting and Interbasin Transfer Focus Panel.
Riparian and Other Legal Issues
Create a Riparian and Other Legal Concerns Focus Panel.
Any proposed statutory or regulatory changes should take into consideration the results of the comprehensive assessment of surface and groundwaters of the state.
Consider the need to develop legislation establishing a Safe Dams Program in Alabama with appropriate funding.
Task the OWR with requesting advice from the Alabama Water Resources Commission, the Alabama Water Resources Council and other appropriate state agencies on how to address federal encroachment into water policy and its impacts on statewide water resources management in Alabama.
Drought Planning
Consistent with the MAP process, any comprehensive water resources management plan should fully integrate the <i>Alabama Drought Management Plan</i> and incorporate state-level drought response processes into any proposed actions and activities.
Enact Senate Bill 20/House Bill 49, the Alabama Drought Planning and Response Act, which has been pre-filed for the 2014 General Session.
The Governor and Legislature should provide adequate funding and staffing to State agencies conducting drought management and response activities.
Water efficiency mechanisms such as water conservation and reuse should be in the State's Drought Management Plan.
Enhanced Certificates of Use/Permitting
Create a Certificates of Use, Permitting and Interbasin Transfer Focus Panel.
Interstate Coordination Issues
Support staff efforts to maintain relationships with peers in neighboring states to improve coordination of activities relating to shared interstate watersheds, and maintain continuity and staff-level lines of communication if contentious issues arise between the states.
The Governor should continue to support agency activities that involve shared water resources.
Maintain a clearinghouse concerning interstate water issues.

The Alabama Water Resources Commission (AWRC) recommended a vision statement and a set of principles (as modified) that the AWAWG believes are valuable to use as a guide in developing an initial statewide water resources management plan.

Vision

It is the vision of the State of Alabama that all individuals and agricultural, commercial, and industrial activities will have the water that is needed both now and in the future for beneficial purposes without impairing the natural living resources of the State or future quality of life in Alabama. The general welfare of the people of the State and sustained economic development is dependent upon the beneficial use of our water resources to their fullest extent. In order to achieve this vision, we should promote the following principles for management of all of Alabama's water resources:

Principles

1. There is a fundamental need to provide significant additional State funding for data collection, water assessments, and development and implementation of statutory mandates including statewide water management planning and education.
2. There needs to be a comprehensive education and outreach process to ensure that Alabama citizens have a better understanding of the importance of water resources management for the State.
3. Water should be managed in consideration of hydrologic boundaries while recognizing existing political boundaries and legal entities.
4. Water management policies should be based on sound science.
5. Drought planning should be proactive and reflect local input and involvement on how any necessary water restrictions will be determined and imposed.
6. Management of surface and groundwater quantity and quality should be closely coordinated.
7. Water management decisions should be delegated to the lowest levels of government with appropriate State guidance on issues such as instream flow levels, interbasin transfer policies, regional infrastructure development incentives, etc.
8. Alabama should be sensitive to involvement of entities external to state jurisdiction in water policy and take proactive measures to ensure State sovereignty in the management decisions affecting its water resources.
9. The process of water resources planning involves dynamic factors and any policies and plans should have a periodic review component.

Alabama Water MAP: A Proposed Process for Development and Implementation of a Statewide Water Management Plan

Improving water resources policy and management is a long-term commitment that will require active participation by stakeholders, agencies, the Legislature, and the Governor's Office. A proposed process and approach that would lead to a statewide water management plan consists of four distinct tracks: Technical, Focus Panels, Stakeholder Outreach, and Process Support (Fig. 1). Work in these four tracks should be coordinated through the AWAAG with oversight by the Governor's Office. This effort will move toward the goal of developing an initial statewide water management plan and establishing an adaptive implementation process (the *Alabama Water MAP [Monitor, Assess, Plan] Process*). It is envisioned that this integrated implementation process may require new legislation, policies, and regulations.

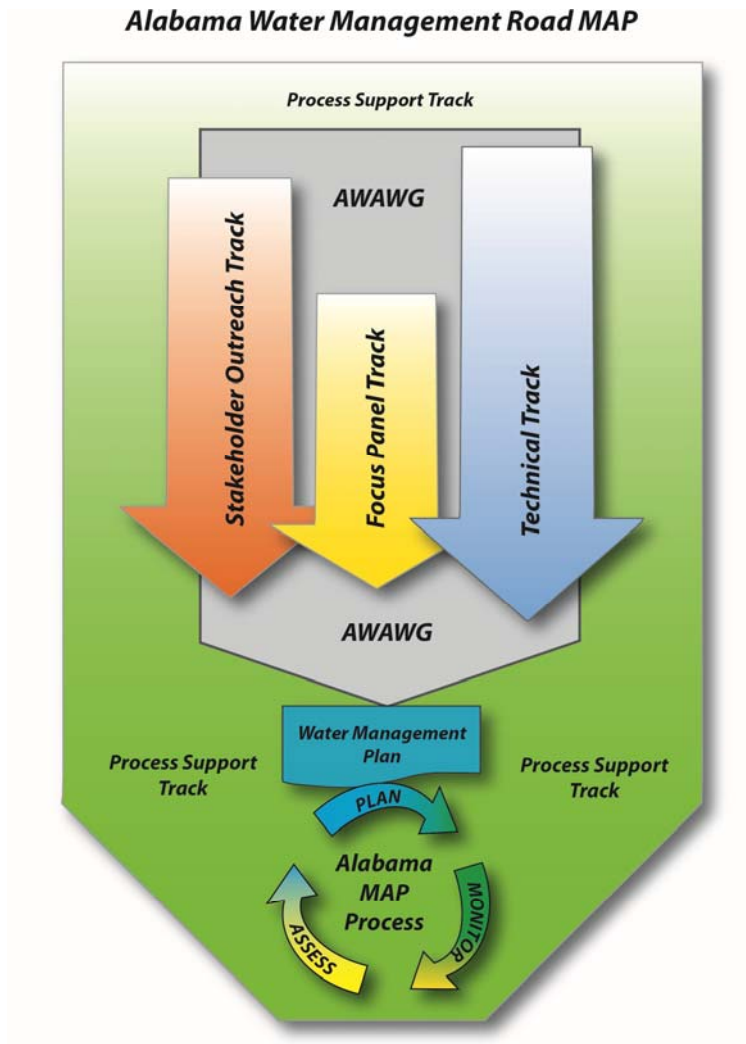


Figure 1. Alabama water management planning and implementation process overview.

The **Technical Track** consists of science and engineering activities related to improving the understanding of Alabama water resources and their uses:

- Surface and groundwater assessments
- Water use analysis and projections
- Integration of water quality and water quantity assessments
- Enhancing water resources data management systems
- Working on the technical issues in areas such as instream flow, interbasin transfers (IBTs), and certificates of use (COU)

The **Focus Panel Track** is envisioned to involve technical subject matter experts who will discuss and make recommendations with respect to the following water resource issues:

- Riparian and other legal concerns
- Instream flow
- Local/regional planning
- COU, permitting, and IBTs
- Water conservation, efficiency, and reuse

The **Stakeholder Outreach Track** is a process to educate and inform the public on the progress of water management planning and solicit their input and includes activities such as:

- Stakeholder surveys
- Regional workshops
- Water user meetings
- Alabama Water MAP Process website
- Participation at relevant conferences and meetings

The **Process Support Track** is included to:

- Recognize the funding and support requirements (i.e., administrative, travel, and staff) to accomplish work in all tracks
- Periodically update the Governor's Office and Legislature
- Support agency involvement in the technical as well as the stakeholder process
- Identify any needs for additional expertise to support this effort

Alabama Water MAP (Monitor, Assess, and Plan) Process

The AWAWG recommends an approach to implement statewide water resources management that consists of **Monitoring** data, technical **Assessments**, and periodic review of **Plans** and policies (Fig. 2). Two key lessons taken from the efforts of other states are the importance of basing water resources management on the best available science and data and creating an adaptive process that considers changing hydrologic

conditions, water uses, public health and safety, economic development needs, and monitoring data to shape reliable and sustainable water resources policies and programs. The Alabama Water MAP Process will require active participation by stakeholders, agencies, the Legislature, and the Governor's Office.



Figure 2. The Alabama Water MAP Process.

- **Monitor** - Includes collecting, compiling, and analyzing both real-time and periodic measurements of rainfall, surface water, groundwater levels, water use, water quality, biological conditions, and soil moisture for use in future modeling and assessments to identify necessary modifications of the overall plan.
- **Assess** - Involves analysis of the State's surface water and groundwater availability and quality using monitoring data as well as comparison of current and future water use demands. A key aspect of this phase is understanding instream flow needs to provide water for habitat and biological diversity, other downstream needs, and future uses. Data to support this phase is provided through on-going monitoring programs. Statewide assessments of ground and surface water availability are underway to support the development of the state water resources management plan.
- **Plan** and implement - Information from the Assess phase will be used to review plans, policies, and programs, recommend changes where needed and establish implementation actions. The State water management plan will be periodically reviewed and updated to include an overview of the state's water resources, summaries of current water uses, identification of any projected water availability shortfalls, review of water quality assessments, and any additional policy needs.

The AWA WG recommends that Alabama use the following conceptual framework as a guide in developing the comprehensive statewide water resources management plan:

- Section I. Vision statement
- Section II. Principles
- Section III. Water resources overview
- Section IV. Water resources data
- Section V. Policy areas
- Section VI. Stakeholder education and outreach
- Section VII. Proposed legislative initiatives
- Section VIII. Funding needs and strategies
- Section IX. Alabama Water MAP Process

Following the development of an initial plan, the Alabama Water MAP Process is depicted as an on-going cycle in figure 2 to illustrate that Alabama's water management programs are adaptive and incorporate the best available science and information. An important aspect of this strategy consists of ongoing monitoring, formal assessments, and detailed reviews of plans and policies on a five-to-ten year rotational basis. Active involvement by the Governor's Office, Legislature, and stakeholders is essential for success.

MAPPING THE FUTURE OF ALABAMA WATER RESOURCES MANAGEMENT

INTRODUCTION

Alabamians expect that water resources will be available for their use in sufficient quantities to support public health and safety, facilitate commerce and transportation, help meet our energy needs, and provide recreation and wildlife habitat. This has indeed been the case since the beginning of statehood, but Alabama's water resources face an uncertain future due to several unfolding realities:

- The legal uncertainty of shared interstate watersheds
- Recurring drought
- The impacts of population and industrial growth on water availability and water quality, and
- the vagaries of riparian common law when there is increased demand placed on finite water resources.

In light of these realities, Alabama must better understand the ability of our State's water resources to meet the current and future needs. In addition, plans and processes must be in place to guide the development, use, and protection of our water resources. A statewide water management plan will also have implications for economic development, drought management, coordination with neighboring states on shared watersheds, and improving water quantity and quality assessments. The lack of adequate water resource management policies and a comprehensive statewide water management plan will place State water resources at risk of depletion and impairment, thereby inviting involvement of entities external to State jurisdiction.

Water management policies, plans, and programs are important to Alabama's water future in three significant areas:

- **Economic stability and quality of life**—Population growth without adequate water and infrastructure planning often results in economic uncertainty, increased risk of higher costs for water supply, and environmental degradation. Examples from other states demonstrate that “business-as-usual” with regard to water planning is not an effective business model, nor an effective economic development tool.
- **Water availability**—Water resources should be systematically and fairly allocated during water shortage periods. Only through a stakeholder-accepted statewide water resources management plan with appropriate legislative implementation can this be done in an economically feasible, environmentally acceptable, and legally binding manner.
- **Resource protection**—Maintaining and protecting the integrity and health of natural stream channels, floodplains and riparian zones, groundwater aquifers, and

aquatic biological resources is essential to a sustainable water resource future and is fundamental to any statewide water resources management plan.

Against this backdrop, Governor Robert Bentley created the Alabama Water Agencies Working Group (AWAWG) in 2011 to conduct an examination of water resource programs and policies and provide recommendations on how to improve planning and management activities of water resources in the State. The AWAWG was initially comprised of:

- The Alabama Office Water Resources (OWR) a division of the Alabama Department of Economic and Community Affairs (ADECA)
- The Alabama Department of Environmental Management (ADEM)
- The Geological Survey of Alabama (GSA)
- The Alabama Department of Conservation and Natural Resources (ADCNR)

After reviewing the Working Group's initial summary of water issues in Alabama, Governor Robert Bentley issued a new formal charge (Appendix A) to the agencies on April 18, 2012, with four objectives:

- "Continue the Alabama Water Agencies Working Group. Reconvene the working group, and undertake the actions provided further herein."
- "Create a comprehensive database of Alabama's water resources. Gather all existing data and let me [Governor Bentley] know about any additional data that needs to be collected to provide a full understanding of the State's water resources, the current uses of these resources, and the need for these resources (including, but not limited to, industrial, economic, public health and safety, and environmental needs.)"
- "Meet with stakeholders. Organize and conduct meetings with my staff, key legislators, and outside stakeholders from groups that represent—at a minimum—economic, industrial, utility, public drinking water supply, public safety, recreational, environmental, ecological, and agricultural interests."
- "Recommend a statewide water management plan by December 1, 2013. Recommend a statewide water management action plan and timeline that takes into account and equitably manages the various demands on the State's water. Create a plan that is science-based, data-driven, and that is in the best interest of the State of Alabama, but that also takes into account and protects proper existing uses of water. Include in your recommendation any proposed legislation necessary to implement such a plan."

Later, on June 11, 2012, the Governor added a fifth agency, the Alabama Department of Agriculture and Industries (AGI) to the AWAWG to provide insight on farming, irrigation and the agribusiness sector. The Governor's Office was an active participant in the AWAWG following the Governor's charge in April 2012.

While these state agencies have worked cooperatively for years on a number of water issues, the creation and tasking of this group provided an opportunity to focus on

developing specific recommendations to update water policies and advance water resource planning and management in Alabama. Many water-related issues were debated within the AWAAG and, while some differences of opinion existed, all parties recognized the need to identify future water needs of the State and improve water management by developing comprehensive water policies and a flexible statewide water resources management plan. The AWAAG recognizes that state agencies have extensive expertise and institutional knowledge to assist in this effort; however, we also understand that public input, review and transparency are a necessary component to this effort as well.

This report is organized into two parts. Part I discusses activities of AWAAG the past two years in response to the Governor's directive and presents a process for developing an initial statewide water resources management plan and a vision for implementing the plan. Part II presents detailed discussions of 12 water focus areas identified by AWAAG including comments by stakeholders, review of past studies and reports, and policy options developed by the AWAAG.

BACKGROUND

In the eastern United States the idea of water abundance is on a collision course with the reality of ecologic and economic limits of the resource. Alabama is not divorced from this reality in spite of its relatively ample water resources, having suffered through water shortages during times of recent drought since the 1980s. Exacerbating this situation is the continued saga of the tri-state water war between Georgia, Alabama, and Florida. The interwoven nature of the drought-water war couplet has a rich and long history (Appendix B) and has been the primary driver of water policy and water management efforts in Alabama the last 30 years. This situation has led to policies and management practices that tend to focus on the larger regulated systems and do not fully integrate all of the components necessary for effective statewide water resources management such as complete water resources assessments, groundwater management, interbasin transfers, instream flow, and stakeholder engagement. Incomplete statewide water resources policies and Alabama's location as a downstream state on most of its major rivers may have significant bearing on Alabama's future economic plans and activities. As such, the need for innovation and creativity in water law and policy within this state remains vital.

Historically, most states east of the Mississippi River established institutional frameworks and legal regimes that treated water as somewhat of a limitless resource. In Alabama, water quantity and water quality are currently the focus of considerable attention where industrialization and economic growth are inextricably linked to water availability. Located at the intersection of five major physiographic provinces (Highland Rim, Cumberland Plateau, Valley and Ridge, Piedmont, and Coastal Plain), Alabama has considerable geologic diversity and, accordingly, a wealth of natural resources. Perhaps preeminent among those resources are the State's generous and well-distributed waters. Alabama has more than 77,000 miles of streams and rivers in fourteen major river systems (ADEM, 1992). Only four major river systems the Warrior, Cahaba, Perdido-

Escambia, and the Choctawhatchee, originate within the State, emphasizing Alabama's vulnerability as a "downstream" state.

Although in general Alabama has adequate water resources at the present time, continued development and population growth will increase the demand on supplies. By the year 2020, total water withdrawal in Alabama is projected to average 33,600 million gallons per day (mgd), with a total consumptive use of 3,320 mgd (Putt, 1981-1982, p. 48-49). Furthermore, interstate and intrastate conflict has arisen in the Southeastern United States, giving rise to classic water wars (e.g., the tri-state water wars, caused by Georgia's attempts to allocate more water from the Alabama-Coosa-Tallapoosa (ACT) and the Apalachicola-Chattahoochee-Flint (ACF) River Basins), exacerbating potential water quantity and quality problems, increasing uncertainty about water availability, and replicating the legal dynamics played out in international water conflicts. All of the Southeastern states, with the exception of Alabama, have at least nominally pursued statewide water resources planning (Viessman and Feather, 2005; Moreau and Hatch, 2008; English and Arthur, 2010). All of the states bordering Alabama have actively engaged in water resources assessments and development of water policy.

CURRENT STATUS OF WATER RESOURCES MANAGEMENT IN ALABAMA

The current status of water resources management in Alabama reflects the fact that water resources are managed through a series of policies, laws, and regulations under the jurisdiction of multiple agencies without an integrated management framework. The OWR has responsibilities for administering the Alabama Water Use Reporting Program, water planning, drought response planning, floodplain management, hydrologic modeling of rivers and reservoirs, coordination of federal water resources funding, and providing technical support to interstate water negotiations and litigation. The ADEM administers several water permitting, compliance, and enforcement programs, conducts water quality and biological monitoring and assessments, maintains a water quality and biological database, and coordinates a statewide stakeholder and public education and outreach effort focusing on water quality. The ADCNR has responsibilities for state land management as well as protection and enhancement of wildlife resources. They also serve as the lead natural resource trustee for the State. The GSA conducts water and other natural resources investigations, including but not limited to, surface-water hydrology and groundwater hydrogeology, water and biological resource assessments, and serves as the State groundwater trustee. The AGI provides regulatory control over product, business entities, movement, and application of goods and services for which applicable state and federal law exists and works to initiate and support economic development activities including the use of water in the extensive agribusiness sector. In addition, OWR, ADEM, ADCNR, and GSA have a statutory advisory role to the Permanent Joint Legislative Committee on Water Policy and Management.

Although state agencies have conducted water resource investigations for some time, the level of detail and statewide coverage of information regarding water resource availability is incomplete. State agencies, constrained by limited budgets, must prioritize activities to fulfill their respective missions. Accurate and meaningful water resource assessments are a continual process that depends on daily infusions of water resource

data (stream flows, groundwater levels, rainfall, water quality, water use). Declines in state and federal funding are placing additional pressure on state agency budgets thus reducing agency capacities for monitoring and assessments.

Creation of the Permanent Joint Legislative Committee on Water Policy and Management by the Alabama Legislature was a major step forward in evaluating and addressing water-related issues in the State. The meetings of this committee have been valuable and afforded the opportunity to further educate the Legislature and stakeholders about water issues and water management and allowed better coordination and communication between stakeholders and state agencies that deal with water. Future issues that the Committee identified in its 2009 report were as follows:

- Assessing the proper structure for a regionalized approach to water planning and management.
- Exploring the application and efficacy of the existing riparian doctrine as it relates to future water demand.
- Creating a statewide water conservation policy and program that is sensitive to regional parameters in its application and is based on sound scientific principles.
- Exploring water resource management technologies and developing appropriate legislative initiatives to support greater use of such technology.
- Examining and recommending appropriate flow dynamics [instream flows] for rivers and streams to support biological, recreational, and industrial/transportation needs and requirements.
- Assessing the progress of data collection and management strategies outlined under Act 2009-10.

PART I: RESPONSE TO THE GOVERNOR'S DIRECTIVE

RECONVENE AWAAG

Governor Bentley issued a directive (Appendix A) to the agencies on April 18, 2012. In response, the AWAAG developed a subcommittee structure to complete the various assigned tasks (Fig. 3). Six subcommittees were formed with the following duties and responsibilities.

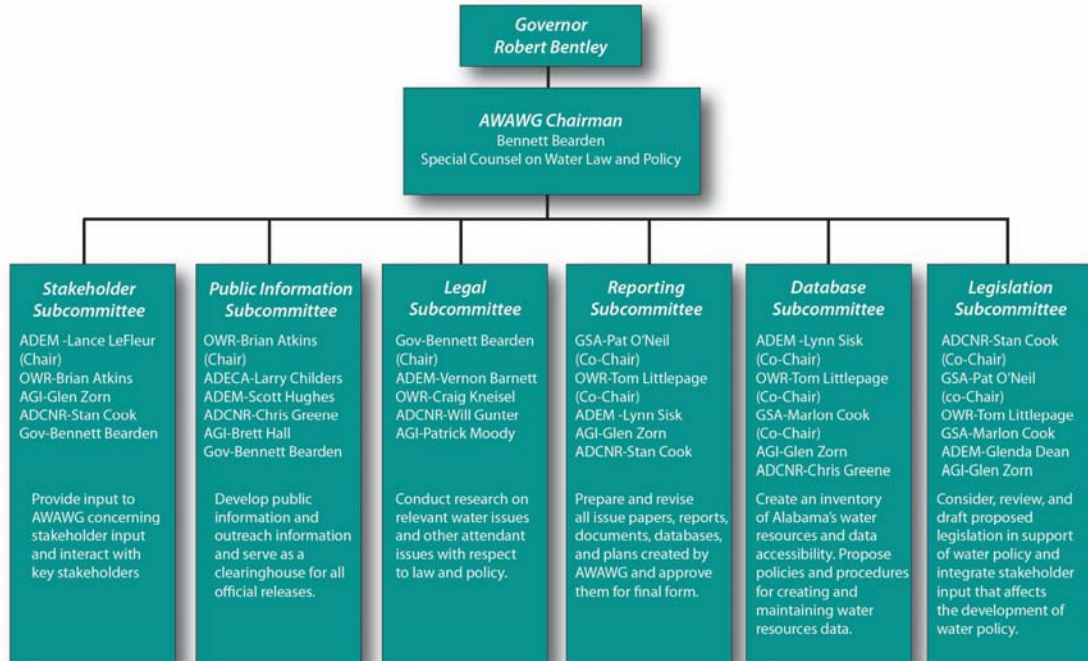


Figure 3. Organization chart for the Alabama Water Agencies Working Group.

Legal Subcommittee – The Legal Subcommittee shall advise and conduct research on relevant water resources and other attendant legal issues, laws, policy issues, or questions associated with the advisory role of the AWAAG and assist with drafting of any proposed legislation. The Legal Subcommittee is composed of attorneys from the five AWAAG agencies. The Legal Subcommittee reports to the AWAAG Chair.

Database Subcommittee – The Database Subcommittee shall create a comprehensive database of Alabama’s water resources. During this process, the Database Subcommittee is responsible for recommending policies, priorities, and procedures for creating and maintaining this database. The Database Subcommittee shall gather all existing data and assess the need for additional data, including, but not limited to, surface water, groundwater and instream flow/ecosystems data to develop a comprehensive, statewide assessment of Alabama’s water resources, water use, and water needs of the industrial, economic, agricultural, public health and safety, and environmental sectors. The Database Subcommittee reports to the AWAAG Chair.

Stakeholder Subcommittee – The Stakeholder Subcommittee shall organize and conduct meetings with outside stakeholders from groups that represent, at a minimum, economic, industrial, utility, public drinking water supply, public safety, recreational, environmental, ecological and agricultural interests, the AWAAG agency members, legislators and the Governor’s staff. One of the primary goals is to receive input from informed stakeholders regarding existing conditions, perspectives, and policy recommendations on water resources in Alabama. The Stakeholder Subcommittee reports to the AWAAG Chair.

Legislation Subcommittee – The Legislation Subcommittee was established to coordinate AWAAG policies related to State legislation. It shall consider, review, draft, and report back on proposed legislation in support of the AWAAG. The Legislation Subcommittee shall monitor, analyze, and recommend policy direction and advocacy strategies based on stakeholder input on legislative and regulatory matters on water resources issues that affect the development of a statewide water management plan for Alabama. In consultation with the AWAAG Legal Subcommittee, this Subcommittee shall assume a lead role in development and drafting of proposed legislation attendant to implementing a statewide water management plan. The Legislation Subcommittee shall consult with the Stakeholder Subcommittee and coordinate with the Public Information Subcommittee on all proposed legislation. The Legislation Subcommittee reports to the AWAAG Chair.

Reporting Subcommittee – The Reporting Subcommittee shall review and revise all issue papers, documents, reports, databases, legislation, and plans created by the AWAAG and approve them as to final form. The Reporting Subcommittee shall play a key leadership role, in consultation with the Legal and Legislation Subcommittees, in reviewing, revising, and finalizing the statewide water management action plan and any attendant proposed legislation developed by the AWAAG. The Reporting Subcommittee shall also assist the AWAAG Chair in keeping and memorializing the record of all AWAAG meetings. The Reporting Subcommittee reports to the AWAAG Chair.

Public Information Subcommittee – The Public Information Subcommittee shall develop public information materials and a website for the AWAAG. This Subcommittee shall draft recommendations for proactive and reactive media communications and forward recommendations to the Governor’s Policy Office for coordination with the Governor’s Press Office prior to any official release. This Subcommittee shall also make recommendations to the AWAAG and the Governor’s staff with respect to the planning and implementation of ongoing outreach to stakeholders and promotional activities aimed at fostering greater public awareness of the development and benefits of a statewide water management plan for Alabama. The Public Information Subcommittee reports to the AWAAG Chair.

Preparation of the “Water Management Issues in Alabama” Report

The report, *Water Management Issues in Alabama*, was prepared and delivered to the Governor in December 2011. This report reviewed the current status of water resources management in Alabama, summarized policy options, proposed building blocks for a future statewide water management plan, and presented summaries of what the

AWAWG agencies considered major water resource issue areas. These water resource issue areas were summarized and included:

- Surface water and groundwater assessments and availability
- Water resources management
- Water resources data
- Water conservation and reuse
- Instream flow
- Economic development
- Public and stakeholder education and outreach
- Interbasin transfers
- Riparian and other legal issues
- Drought planning
- Enhanced certificates of use/permitting
- Interstate coordination issues

Analysis of 1990 Study “Water for a Quality of Life” and Comparison to the 2012 WMIA Report

A report authored in 1990 by the Alabama Water Resources Study Commission, *Water for a Quality of Life*, formed the basis of the Alabama Water Resources Act and subsequent creation of the AWRC and OWR. In this foundational report many water-related issues were discussed and policy options and agency actions were offered for addressing water issues identified at the time. The AWRC undertook a study in early 2013 to examine policy options and recommendations made in 1990 with respect to the degree to which they have been implemented (Appendix C). Similarly, ADEM undertook an examination of both the 1990 report and the WMIA 2012 report to compare the policy options and recommendations between the two (Appendix D). The 1990 and 2012 reports were somewhat similar in the types of recommendations, issues, and policy options described. The evaluation of these reports informed the AWAWG of progress made to address water resources management issues identified in 1990. Some of the 1990 issues continue to be important with regard to water resource management – permitting, instream flow, and interbasin transfers. A review of the 105 recommendations presented in the 1990 report revealed the following:

Recommendations fully implemented	27 %
Recommendations partially implemented	46 %
Recommendations not implemented	27 %

Summary of AWAWG Activities

Results of the AWAWG effort can be viewed in four broad categories: documents, educational outreach, endorsed legislation, and stakeholder outreach. A timeline of AWAWG activities is presented in figure 4.

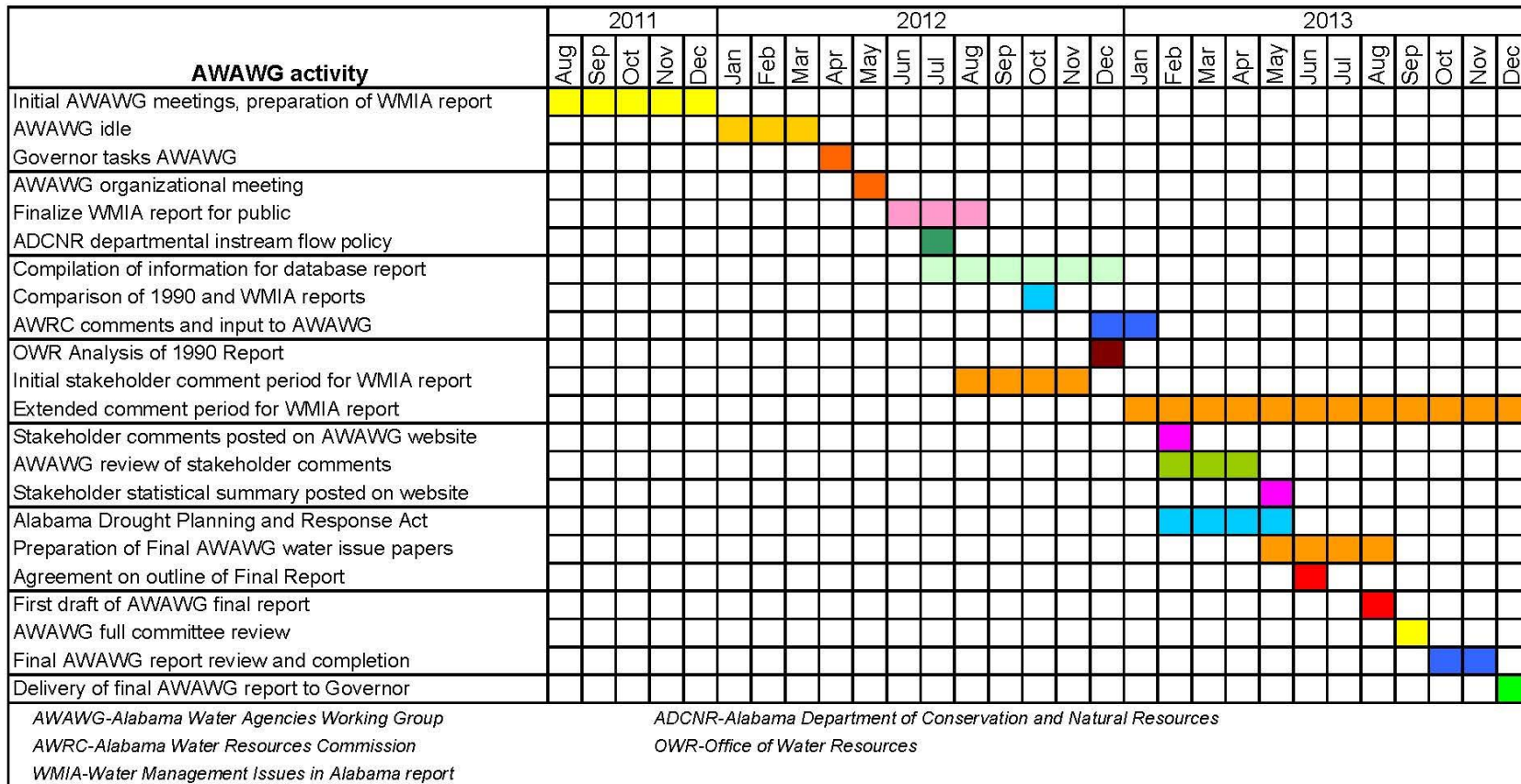


Figure 4. Timeline of AWAWG activities, August 2011-December 2013.

CREATE A COMPREHENSIVE DATABASE OF ALABAMA'S WATER RESOURCES

The Database Subcommittee worked through the fall of 2012 compiling sources and types of water resources data, the primary agencies or organizations responsible for the data, and availability of the data through respective agency data systems, internet sources, published reports, and hardcopy files. Various types of water resources data are collected by a number of agencies and organizations in the State. Sorting through this voluminous set of data to select the most pertinent sources to describe status and trends in water quality and availability was challenging. The subcommittee devised a list of specific topics with respect to water resources data and data needed to support comprehensive assessments. From this list, data sources were researched and cataloged. The report of this subcommittee can be found in Appendix E.

The data components include information on:

- Precipitation
- Drinking water and industrial supply
- Surface and groundwater quality
- Water use for hydropower and steam power electricity generation
- Irrigation withdrawals from surface and groundwater
- Navigation water needs
- Water needs for aquatic resources and recreation
- Interbasin water transfers
- Water returns through wastewater facilities
- Cooling water returns
- Water losses through evapotranspiration

STAKEHOLDER OUTREACH

Creation of AWAAG Website

The Public Information Subcommittee developed concepts for an AWAAG website, ADECA's Communication and Information Division constructed it, and the site launched on September 1, 2012. The site, www.adeca.alabama.gov/AWAAG, includes the following and will be periodically updated.

- A brief description of the AWAAG
- Copies of letters from Governor Bentley to the AWAAG agencies
- A description of the AWAAG subcommittees and listings of their members

- A link to the WMIA report
- Stakeholder comments submitted to AWAAG regarding the WMIA report
- A timeline chart of the AWAAG's progress

***Alabama Water Resources Commission Comments to the
WMIA Report and Input to AWAAG***

The Alabama Water Resources Commission is a statutorily created body consisting of 19 voting members selected by the Governor, the Lieutenant Governor, and the Speaker of the House of Representatives. A key aspect of the charge given to the water commission under the Alabama Water Resources Act is to advise the Governor and Legislature on all matters related to the waters of the state. In this capacity, the AWRC provided comments on the WMIA report. They added funding as an issue and suggested the following order on how to proceed with the water resource management issues listed in the WMIA report:

- Funding
- Key stakeholder and public education and outreach
- Water resources management
 - Watershed based approach
 - Governance
 - Drought planning
- Surface water and groundwater availability
 - Water resources data
- Enhanced certificates of use/Permitting
 - Water conservation
 - Instream flow
 - Interbasin transfers
- Economic development
- Interstate coordination

In March 2013 the AWRC provided further input to the AWAAG in the form of Vision and Principles statements to facilitate future discussions of water resource management in Alabama. The Vision and Principles Statements read as follows:

Vision

It is the vision of the Alabama Water Resources Commission that every individual and agricultural, commercial, and industrial activities will have the water that is needed both now and in the future for beneficial purposes without impairing the natural living resources of the state or future quality of life in

Alabama. The general welfare of the people of the State and sustained economic development is dependent upon the beneficial use of our water resources to their fullest extent. In order to achieve this vision, we should promote the following principles for management of all of Alabama's water resources:

Principles

1. There is a fundamental need to provide significant additional State funding for data collection, water assessments, and development and implementation of statutory mandates including statewide water management planning and education.
2. There needs to be a comprehensive education and outreach process to ensure that Alabama citizens have a better understanding of the importance of water resources management for the State.
3. Water should be managed in consideration of hydrologic boundaries while recognizing existing political boundaries and legal entities.
4. Water management policies should be based on sound science to the maximum degree possible.
5. Drought planning should be proactive and reflect local input and involvement on how any necessary water restrictions will be determined and imposed.
6. Surface and groundwater should be managed in a closely coordinated fashion.
7. The management of water quantity and quality should be closely coordinated.
8. Water management decisions should be delegated to the lowest levels of government with appropriate State guidance on issues such as instream flow levels, interbasin transfer policies, regional infrastructure development incentives, etc.
9. Alabama should be sensitive to federal encroachment and take proactive measures to ensure State sovereignty in the management decisions on the State's water resources.
10. The process of water resources planning involves dynamic factors and any policies and plans should have a periodic review component.

Review of Stakeholder Comments

The WMIA report was delivered to 248 stakeholders during August 2012 with an initial deadline for comments by November 1, 2012, which was extended to December 1, 2013. Eighty-two written comments were received by October 2013. The stakeholder comments were posted on the AWAAG website which has been periodically updated as new comments were received.

From February through April 2013 the AWAAG dedicated several meetings to reviewing stakeholder comments with reference to the water resource management issues outlined in the WMIA report. All stakeholder comments were evaluated and summarized. An abstract of stakeholder comments is presented in Appendix F and a matrix of stakeholder responses is found in Appendix G.

Statistical Summary of Stakeholder Comments

Over one-third (37 %) of responses were from the environmental and business-industry communities, 28 % from government agency and academic institutions, 22 % from citizens and lake home owner-boat owner (HOBO) groups, and 13 % from the public water utility, water utility association, and watershed-recreation sectors (Table 1).

Table 1. Frequency distribution of stakeholder groups responding to the WMIA report.

Stakeholder Group	Number	Percent
Citizen	10	12
Water Utility	4	5
Federal Agency	9	11
State Agency	8	10
Academic	6	7
Business-Industry	12	15
Environmental	18	22
Water Utility Associations	5	6
Watershed-Recreation	2	2
Lake HOBO	8	10

The percentages listed below reflect the stakeholder response rate to water management issues indicating only that a comment was made on a particular issue or topic. Neither support nor opposition for a topic or issue is reflected in the percentages. The issue of water resources management was referenced the most by stakeholders while interstate coordination was referenced the least.

- 52 % - Water resources management
- 42 % - Water resources data collection
- 40 % - Surface and groundwater assessments
- 40 % - Instream flow
- 39 % - Water conservation and reuse
- 35 % - Economic development
- 34 % - Stakeholder education and outreach
- 28 % - Interbasin transfers
- 26 % - Public education and outreach
- 26 % - Riparian and other legal issues
- 20 % - Drought planning
- 17 % - Enhanced Certificates of Use (COU)/permitting
- 16 % - Interstate coordination

Additional water-related themes were mentioned by stakeholders and are listed below:

- 45 % of stakeholders had general water resource management concerns not easily classified into the designated issues. These concerns generally were with

maintaining water for citizens, protecting the environment, and making sure any new policies were fair and equitable.

- 51 % directly stated in their comments that they support efforts to develop a statewide water management plan and(or) begin the process of developing a plan. Many other responders hinted at this support without directly stating so in their comments.
- 31 % specifically indicated water quality concerns throughout their comments while 18% responded directly that it is important that water quality and water quantity be considered conjunctively in any new policy development.
- 22 % of stakeholders directly expressed the need for additional funding to support water resources data collection, water resources assessments, and implementation of a water resources management plan.
- 16 % responded that water-based recreation was an important issue for the state to consider in future water planning.
- 10 % indicated that the economic viability of financial investments was extremely important and should not be impacted by future water resource planning activities.
- 10 % stated that holistic watershed-based water resource management was important to future planning activities.
- 5 % of stakeholders referenced the need to consider land management as part of water quantity management.
- 5 % mentioned that a safe dams program should be implemented.
- 5 % had concerns about the statutory overlap among the State's water agencies.
- 5 % stated concerns about federal intervention in State water policy and management issues.

DOCUMENTS, EDUCATIONAL OUTREACH AND ENDORSED LEGISLATION

Documents

- WMIA report to the public and a call for stakeholder comments.
- ADEM Comparison of 1990 *Water for a Quality of Life* report to the WMIA report (Appendix D).
- Stakeholder comments notebook
- OWR analysis of 1990 *Water for a Quality of Life* report for implementation status (Appendix C).
- Database Subcommittee Interim Report (Appendix E).
- Initial stakeholder comments posted to AWAWG web site. Subsequent stakeholder comments added to website as received.
- Completion of summary stakeholder comments analysis (Appendix G).

- Suggested Alabama water resources management plan conceptual framework (Appendix H).
- Final report, *Mapping the Future of Alabama Water Resources Management: Policy Options and Recommendations* to Governor Bentley.

Educational Outreach

- Provided presentations of AWAAG activities at:
 - Alabama Water Resources Conference, September 7, 2012
 - Alabama Nonpoint Source Pollution Conference, January 17, 2013
 - Alabama Water Resources Conference, September 5, 2013
- AWAAG contributed four articles to a water resource association publication, *The WAVE*, about their progress and work.
 - Water Policy and Law Update: The Alabama Water Agencies Working Group, Fall 2012 issue.
 - Water Policy in Alabama , Spring 2013 issue
 - The Alabama Water Agencies Working Group Legislation and Public Information Subcommittees, Summer 2013 issue
 - The Alabama Water Agencies Working Group Database Subcommittee Update (In press)
 - The Alabama Water Agencies Working Group Reporting Subcommittee (Submitted)
- AWAAG participated in six regional water policy symposiums.

Endorsed Legislation

- Drought Planning and Response Bill - The legislation was developed by OWR under the direction of the Permanent Joint Legislative Committee on Water Policy and Management. It was reviewed and endorsed by AWAAG in 2013 and again for the 2014 session. It has been pre-filed as Senate Bill 20 / House Bill 49 in the 2014 Legislative session.

ALABAMA WATER MAP: A PROPOSED PROCESS FOR DEVELOPMENT AND IMPLEMENTATION OF A STATEWIDE WATER MANAGEMENT PLAN

The AWA WG proposes a pathway to an initial statewide water management plan and implementation process, consisting of four distinct tracks: Technical, Focus Panels, Stakeholder Outreach, and Process Support followed by the Alabama Water MAP Process (Fig. 5). Available information will guide individual work elements and schedules within each track. AWA WG will provide oversight and coordination for the four tracks and serve as the facilitator for preparing the state water management plan and coordinating all activities to accomplish this goal.

The **Technical Track** focuses on surface and groundwater assessments, water quality assessments and monitoring, water use analysis and projections. It also includes developing data and information in support of water management planning and policy needs. This track also entails new work by:

- Expanding the surface and groundwater assessment efforts and producing a complete statewide assessment
- Enhancing water resources data systems
- Expanding water resource monitoring networks (including streamflow and groundwater levels, precipitation, soil moisture, etc.)
- Analyzing technical issues in areas such as instream flows, IBTs, and expanded certificates of use/permitting

A key aspect will be the integration of water quality assessments with water quantity assessments. This task was identified by stakeholders and the AWA WG agencies as critical to creating a statewide water management plan.

The **Stakeholder Outreach Track** reflects a strategy to inform the public as to the progress of water management planning and a way to solicit their input. Stakeholder and public outreach can include tools such as stakeholder surveys, regional workshops, meetings with major water users, and social media. Outreach should also include coordination with entities such as the Permanent Joint Legislative Committee on Water Policy and Management, the Alabama Water Resources Commission, and the Alabama Environmental Management Commission.

The **Process Support Track** is a crucial part of this effort and will extend through the Alabama Water MAP Process and highlights the importance of funding and policy support from the Governor's Office and Legislature. The AWRC and many stakeholders have commented on the importance of providing additional administrative support and funding to support this initiative. Technical aspects of the plan will also require on-going dedicated legislative support to maintain the data acquisition and monitoring functions needed to implement enhanced water resources management.

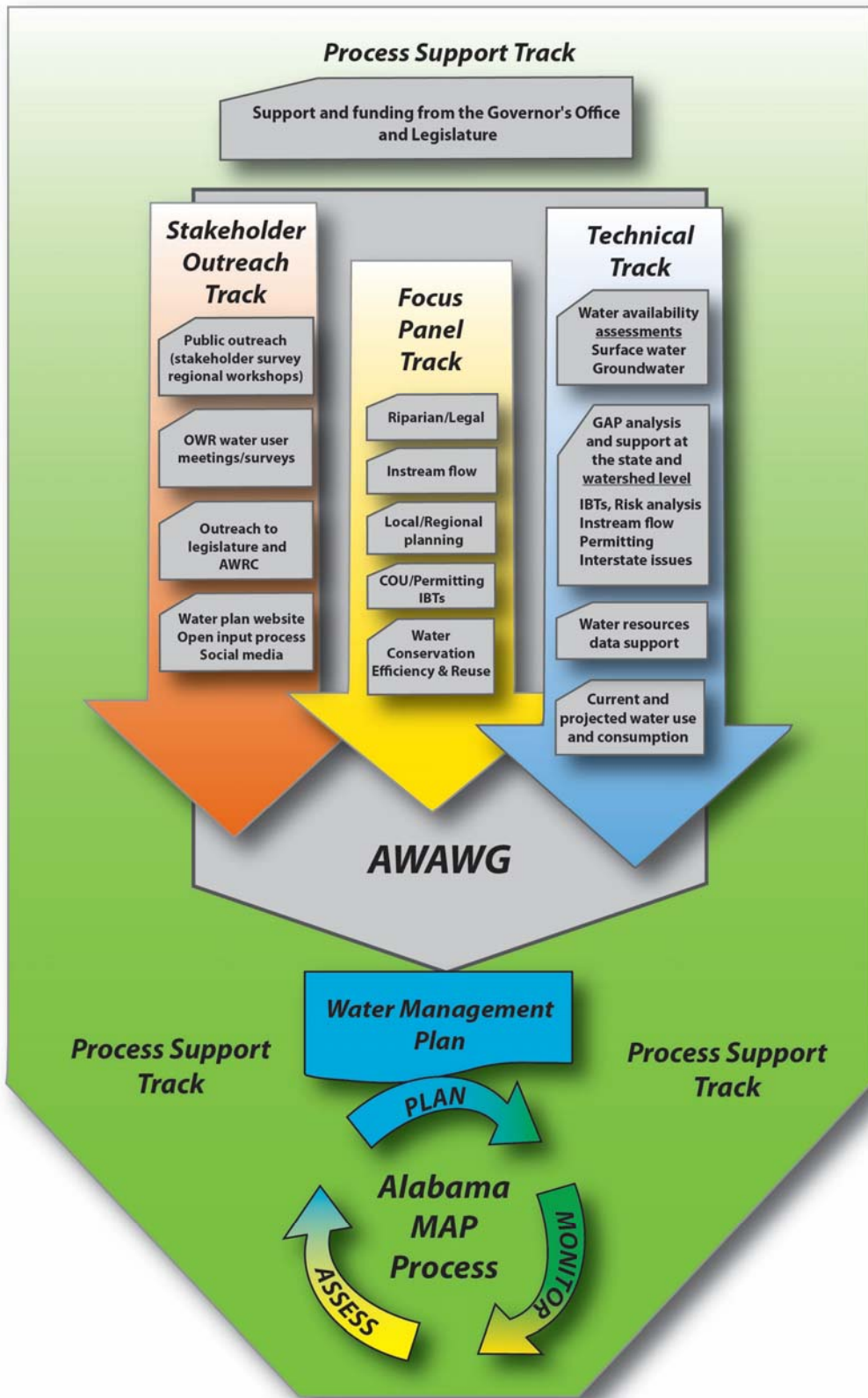


Figure 5. The Alabama water resources management planning and implementation process.

The **Focus Panel Track** involves analysis of the more technical issues of water management utilizing consensus-building techniques to establish common goals and recommendations. The panels will be comprised of subject matter experts who discuss core water resource issue areas including riparian and legal details, instream flow, local/regional planning units, COUs and permitting, and IBTs. It is recommended that meetings of the stakeholders groups and focus panels be guided by facilitators who are independent of the AWAAG and stakeholder groups. As a starting point of discussion the focus panels should consider the following questions:

Riparian and other legal concerns

- Given the passage of time, changes in circumstances, new case law, and Attorney General's Opinions since the Alabama Water Resources Act was enacted in 1993, are changes in the Act needed to accommodate current conditions?
- If changes in the Act are needed, what are they and what model, if any, should be followed in making any necessary changes?
- Water quantity and water quality are closely connected. How should this connection be better emphasized at the State level?
- What role, if any, should the federal government have in the development of a water resources management plan for Alabama?
- Most, if not all states other than Alabama, have a Safe Dams program which evaluates the risk and safety of dams within the state. What actions are needed, if any, to address this risk?

Local/Regional Planning

- What water resource related entities exist under current state law and what are their specific functions? (Such as Watershed Management Authorities, Soil and Water Conservation Districts, Regional Planning Commissions, Irrigation Districts)
- What type of local governance should be used to provide input into water quantity planning?
- What are appropriate local/regional level activities needed to support statewide water resource planning and management and what is the appropriate organizational model for these activities?
- What is the appropriate geographic scale for local/regional planning?

Water Conservation, Efficiency, and Reuse

- What is the State's role, if any, in establishing standards of water efficiency?
- What role, if any, should the State have in determining water conservation practices and implementation procedures for local water supply utilities?

- What incentives could local water supply utilities consider to encourage water conservation without adversely impacting the quality of service or the cost of water delivery?
- What role, if any, could water reuse play in water conservation?

Certificates of Use, Permitting, and Interbasin Transfers

- What information is required to determine whether a more formal regulatory system is needed to manage water use?
- What is the appropriate level of water management registration/permitting needed for the present? Is something different needed in the future?
- Should this level be adaptive and vary with water capacity conditions?
- How could a regulatory process work in combining the consideration of water use, interbasin transfers, and instream flow?
- If IBTs are regulated, what is the appropriate basin scale?

Instream Flow

- Clearly define the term "instream flow" and what the implications are for water resources management and water users.
- What is the appropriate strategy for implementing instream flow criteria?
- How could an established process be used to determine flow targets and implement those targets into the water resource management process?
- What changes in the current State water management structure are needed to effectively implement instream flow targets/criteria?

The size of these panels should be kept manageable and membership would be determined by the Governor's Office. Possible membership would include representatives from the five AAWWG water agencies, business and industry, agribusiness/forestry, environmental, water utilities, water-based recreation, citizen, academic, lake HOBO groups, and non-AAWWG state agencies. A findings report would be prepared by each panel and submitted to AAWWG.

Panel reports and products from the other tracks will be used to develop the vision, goals, technical summaries, and recommendations for water resources management in Alabama. Figure 6 provides the proposed themes and topics for the plan in accordance with the conceptual framework outlined in Appendix H. The draft final plan will be made available to the Governor's Office, the Legislature, the Alabama Water Resources Commission, the Alabama Environmental Management Commission, stakeholders, and the public for review.

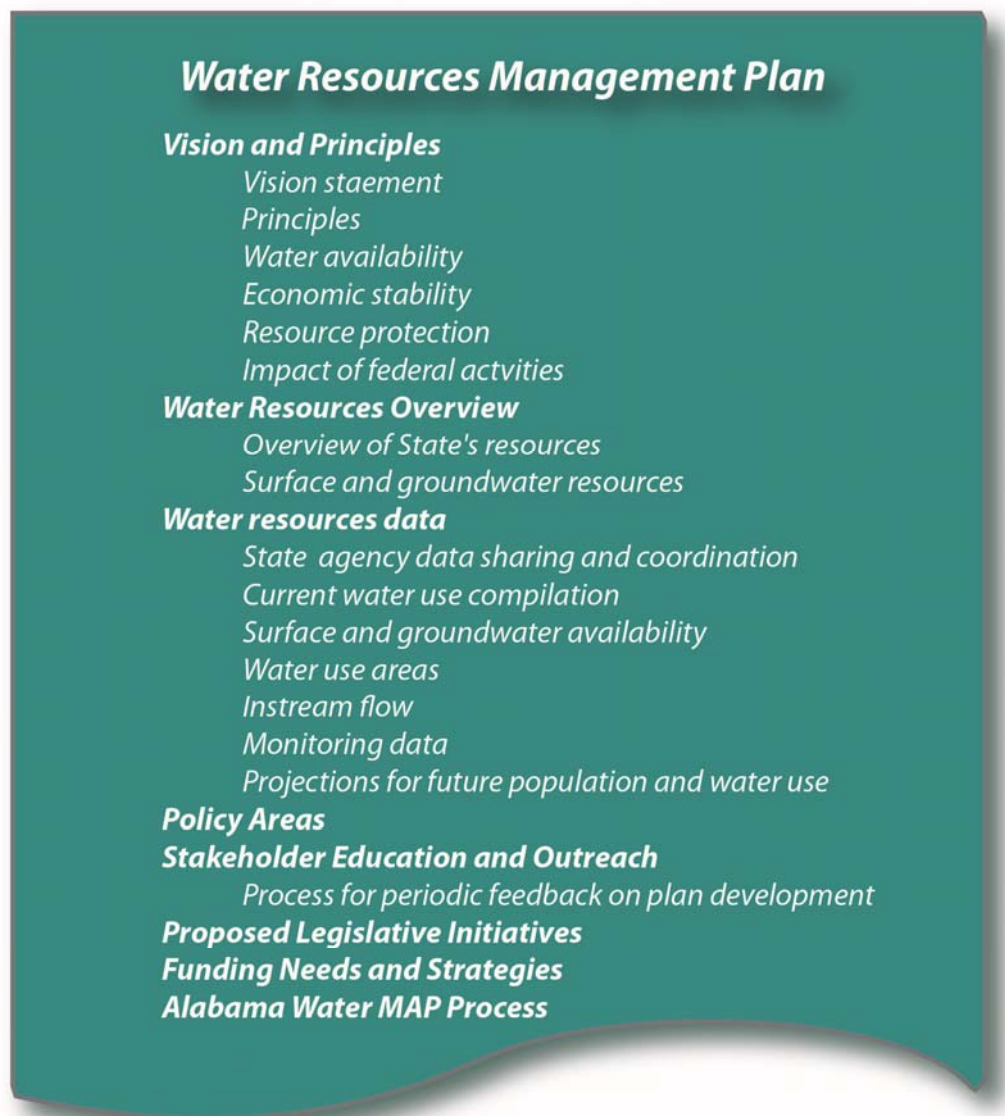


Figure 6. Proposed Alabama water resources management plan themes and topics.

Alabama Water MAP (Monitor, Assess, and Plan) Process

Following the development of an initial statewide comprehensive water resources management plan, the AAWWG recommends an adaptive approach (Fig. 7) shaped by **Monitoring** data, technical **Assessments**, and periodic review of **Plans** and policies. Two key lessons taken from the efforts of other states are the importance of basing water resources management on the best available science and data and creating an adaptive process that considers changing hydrologic conditions, water uses, public health and safety, economic development needs, and monitoring data to shape reliable and sustainable water resources policies and programs. The Alabama Water MAP Process

will require active participation and commitment by the Governor's Office, the Legislature, stakeholders, and agencies. It is envisioned as a cyclic process to ensure that Alabama's water management programs are both reflective of current hydrologic conditions and are adaptable to provide for the water needs of future generations.

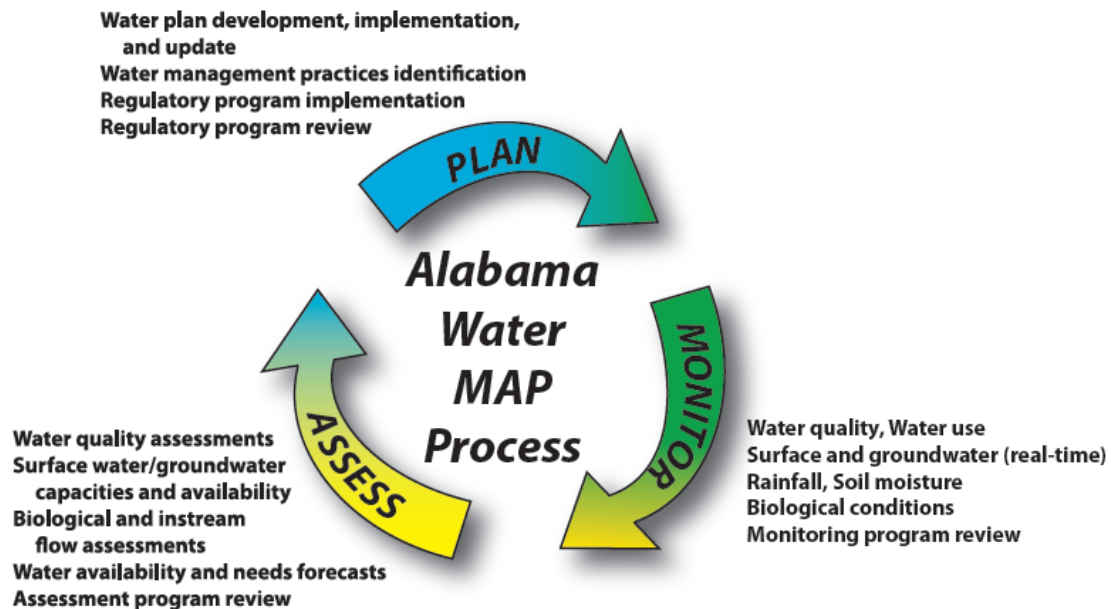


Figure 7. Alabama Water MAP Process.

- The **Monitor** phase includes collecting, compiling, and analyzing both real-time and periodic measurements of rainfall, surface water, groundwater levels, water use, water quality, biological conditions, and soil moisture for use in future assessments to identify necessary modifications of the overall plan.
- The **Assess** phase involves the detailed analysis of surface and groundwater availability and quality. It also involves the comparison of current and future water use demands. A key aspect of this phase is an understanding of the instream flow needs to provide water for ecological habitat, other downstream needs and future uses. Data to support this phase is provided through on-going monitoring programs discussed in the Monitor phase. Statewide assessments of ground and surface water availabilities are underway to support the development of the state water resources management plan
- The **Plan** and implement phase utilizes information from the Assess phase to review plans, policies, and programs; recommend changes where needed; and establish implementation actions. The State water management plan will be periodically reviewed and updated to include an overview of the state's water resources, summaries of current water uses, identification of any projected water availability shortfalls, review of water quality assessments, and any additional policy needs. The AWA WG recommends that Alabama use the conceptual framework (Appendix H) as a guide in developing the comprehensive statewide water resources management plan as directed by the Governor.

Alabama Water MAP Action Plan and Matrix

The AWAAG agencies are in unanimous agreement with the concepts embodied in this report:

- A commitment to basing statewide water resources plans and policies on the best available data.
- Active solicitation and involvement of stakeholders.
- Support for the proposed four-track process leading to the initial statewide water resources management plan followed by an on-going commitment to the Alabama Water MAP Process to periodically review and update assessments and plans.
- Support by the Governor and Legislature for the policy guidance and funding needed to implement the Alabama Water MAP Process.

These concepts are vital to the development of an initial statewide water resources management plan and the ongoing Alabama Water MAP Process to ensure Alabama's water resources are available to meet current and future demands.

The policy options listed in the Action Plan matrix (Table 2) were taken directly from the 12 water issue papers (Part II) and provide information with respect to implementation time frame, categorical cost of each specific policy option and recommendation, and a relative initiation time for the activity. Each of the policy options is referenced with respect to:

- The entity (Governor's Office, Legislature, Agencies, or Stakeholders) that will be involved in implementing the policy or activity.
- The projected cost presented in categorical terms (***Low***—less than \$1M (million) dollars, ***Medium***—\$1-3M, and ***High***—more than \$3M).
- The starting date priority (***Low***—start much later in the process, ***Moderate***—start within one to two years, ***High***—start immediately or within one year) and the estimated completion schedule for a policy activity (***Short***—less than one year to complete, ***Mid***—from one to five years to complete, ***Long***—more than five years to complete, ***Annual***—activity will be an annually occurring need).
- Comments indicating within which part of the Alabama Water MAP Process the policy option or recommendation falls.

Once the process to prepare the initial statewide water resources management plan begins, then the cost estimates presented in Table 2 could be further refined and integrated into agency budgeting procedures.

Table 2. The AWAAG Action Plan Matrix.

<u>Issue Area Policy Options and Recommendations</u>	<u>Involvement</u> Governor Legislature Agencies Stakeholders	<u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M	<u>Start Priority</u> Low Moderate High	<u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr	<u>Comments</u>
Surface water and Groundwater Availability Assessments					
Continue funding for on-going assessments and monitoring efforts.	Governor Legislature Agencies	Medium	High	Mid	MAP Component - Assess
Provide funding and support to enhance on-going scientific assessments and data collection efforts. This should also include <ul style="list-style-type: none"> ○ State funding to match federal dollars for the USGS monitoring network. The federal water agencies should be strongly encouraged by the Governor to adequately support this program with federal funding to leverage available state resources. ○ Expansion and support of the statewide, real time groundwater level monitoring network currently being implemented by the GSA. ○ Ensure that the groundwater monitoring network includes groundwater quality where needed. ○ Assessments and data collection efforts should provide opportunities for stakeholder involvement. 	Governor Legislature Agencies Stakeholders	Medium	Moderate	Annual	MAP Component - Monitor
Establish laws, policies, and regulations for surface and groundwater that are consistent with the MAP process including: <ul style="list-style-type: none"> ○ Identification of priority surface and groundwater uses; ○ Preservation and protection of aquifer recharge areas; ○ Determination of proper well spacing; ○ Determination of maximum well production rates; and ○ Determination of maximum water withdrawals. 	Governor Legislature Agencies Stakeholders	Low	Low	Long	MAP Component - Plan

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p align="center"><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p align="center"><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p align="center"><u>Start Priority</u> Low Moderate High</p>	<p align="center"><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p align="center"><u>Comments</u></p>
Water Resources Management					
<p>Continue the AWAAG, under the direction of the Governor, as the coordinating body for statewide water management planning activities.</p>	<p>Governor Agencies</p>	<p>Low</p>	<p>High</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>Direct the AWAAG, working with appropriate State agencies, and with additional funding, after appropriate stakeholder input, to initiate the Alabama water management planning and implementation process using the proposed conceptual framework (Appendix H), consistent with the Alabama Water Resources Act, that:</p> <ul style="list-style-type: none"> ○ Addresses the impacts on the State's water resources from water use, changing land use patterns, population growth trends, climate change, economic development, hydrologic extremes (both floods and droughts), and hydrologic alterations; ○ Delineates the roles between State and local entities by reviewing options for local roles in water resources management activities including but not limited to Regional Planning Councils (RPC), Watershed Management Authorities (WMA), Soil and Water Conservation Districts, and Irrigation Districts; ○ Considers and incorporates, as appropriate, the recommendations for statewide water resources management from the 1990 study of Alabama’s water resources entitled, <i>Water for a Quality of Life</i>; ○ Investigates and provides recommendations on how to best coordinate state water quantity and water quality matters; ○ Involves the Governor's Office, the Legislature, stakeholders, and the public, along with the AWRC and the AEMC, in the MAP process and the development of a statewide water resources management plan; and ○ Adopts the Vision Statement and Guiding Principles proposed by the Alabama Water Resources Commission (AWRC), modified by the AWAAG. 	<p>Governor Legislature Agencies Stakeholders</p>	<p>Medium (Annual for 5 yrs)</p>	<p>High</p>	<p>Mid</p>	<p>MAP Component - Plan</p>

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p align="center"><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p align="center"><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p align="center"><u>Start Priority</u> Low Moderate High</p>	<p align="center"><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p align="center"><u>Comments</u></p>
Water Resources Data					
Continue integrated assessment of the State’s surface and groundwater resources that are central to the statewide water management process.					See Issue Area SW an d GW Assessments
Provide resources and support for instream flow studies to evaluate existing flow tools and for determining an acceptable framework for implementing future instream flow requirements, if deemed appropriate.					See Issue Area - Instream Flow
Fund key monitoring activities to include: <ul style="list-style-type: none"> ○ Continue working to enhance the State’s groundwater monitoring system to ensure coverage in all aquifers and include the collection of groundwater quality data (related to PJLCWPM Subcommittee 2008 report; Recommendation 4). ○ Evaluate Alabama’s existing stream gauge network and identify improvements needed to support the MAP process (related to PJLCWPM Subcommittee 2008 report; Recommendation 3). ○ Enhance Alabama’s ambient water quality monitoring network. ○ Enhance Alabama’s rainfall and soil moisture monitoring networks to support the MAP process. This activity should be coordinated through the State Climatologist and in conjunction with the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) public network (related to PJLCWPM Subcommittee 2008 report; Recommendations 1 and 2). 	Governor Legislature Agencies	Medium	Moderate	Annual	MAP Component - Monitor
Develop cost estimates for operating and maintaining the State’s water data collection and reporting capabilities. Utilize the Water Resources Data Technical Advisory Committee established by the PJLCWPM to communicate these needs and data results, and to make recommendations on needed enhancements in data collection efforts. <ul style="list-style-type: none"> • The Water Resources Data Technical Advisory Committee should consider the need for a formal process to coordinate state monitoring activities. 	Agencies	Low	High	Short	MAP Component - Monitor
Establish a water resources data clearinghouse accessible by the public via a web portal (related to PJLCWPM Subcommittee 2008 report; Recommendation 5).	Agencies	Medium	High	Mid	MAP Component - Monitor
Develop consistent and reliable data quality standards and protocols for the acquisition and management of water information. Apply these standards to all data collected and stored that is used to assess, monitor, and allocate water resources (related to PJLCWPM Subcommittee 2008 report; Recommendation 6).	Agencies	Low	High	Short	MAP Component - Monitor

<u>Issue Area Policy Options and Recommendations</u>	<u>Involvement</u> Governor Legislature Agencies Stakeholders	<u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M	<u>Start Priority</u> Low Moderate High	<u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr	<u>Comments</u>
Instream Flow					
As discussed under the MAP process, AWAWG recommends the creation of an Instream Flow Focus Panel. The initial charge to the panel should be to: <ul style="list-style-type: none"> ○ Research scientific approaches, including those used in other states, to assess concepts and criteria for statewide instream flow management; ○ Recommend a study approach for evaluating instream flow. These efforts would consider, at a minimum, assessments and demonstration studies of streams with hydrologic alterations and establishing an instream flow monitoring network for tributary systems; and ○ Recommend implementation strategies. 	Governor Agencies Stakeholders	Low	High	Short	MAP Component - Assess
Provide support and resources for the appropriate water resource agencies to continue investigation of the instream flow needs of Alabama’s aquatic ecosystems and for evaluating the utility of existing flow tools for management purposes.	Governor Legislature	Medium	Moderate	Mid	MAP Component - Assess
Water Conservation and Reuse					
As discussed under the MAP process, AWAWG recommends the creation of a Water Conservation, Efficiency, and Reuse Focus Panel. The initial charge to the panel should be to recommend components of a statewide water management plan that: <ul style="list-style-type: none"> ○ Evaluate potential water conservation and efficiency incentives that can be implemented by public utilities with consideration for the quality of service and the cost of water delivery. ○ Evaluate the state’s role in establishing water efficiency standards and methods to measure conservation and efficiency. ○ Evaluate the role of water reuse, if any, in water conservation efforts. 	Governor Agencies Stakeholders	Low	Low	Mid	MAP Component - Plan
Ensure that adequate local voluntary and mandatory water conservation measures are established during times of drought and are in accordance with the State's Drought Management Plan.	Agencies Stakeholders	Low	High	Short	MAP Component - Plan
Support development of water reuse regulations to conserve water while being protective of human health and water quality and promote water reuse as a practical conservation measure.	Agencies Stakeholders	Low	High	Short	MAP Component - Plan
Develop a public education program presenting the need for and benefits of water conservation and reuse.	Agencies Stakeholders	Low	Medium	Short	MAP Component - Plan

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p align="center"><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p align="center"><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p align="center"><u>Start Priority</u> Low Moderate High</p>	<p align="center"><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p align="center"><u>Comments</u></p>
Economic Development					
<p>The MAP process and any State water resources management plan should include policies and guidance for water resources development programs. These should:</p> <ul style="list-style-type: none"> ○ Be consistent with the <i>Accelerate Alabama</i> economic development strategic plan. ○ Encourage regional planning in water source development. ○ Evaluate the role that reservoir development could play in economic development. ○ Encourage the development of off-stream storage for water supply needs to minimize impacts to major rivers and streams. ○ Encourage the exploration of public/private partnerships. ○ Include tourism, outdoor recreation, and recreational angling as significant drivers of economic development in the water resources arena. ○ Estimate future production support requirements (10-year minimum) for existing industries giving consideration to projected expansions. ○ Identify water infrastructure needs to support economic development and encourage a multi-step (e.g., 5-, 10-, 20-, and 50-year) water supply growth plan for public water systems. ○ Protect existing water needs and promote the sustainable use of water in Alabama’s growing agribusinesses and industries. 	<p align="center">Governor Agencies Stakeholders</p>	<p align="center">Medium</p>	<p align="center">High</p>	<p align="center">Long</p>	<p align="center">MAP Component - Plan</p>
<p>Once water resource assessments are complete, ADECA should ensure that water capacity and availability information is communicated to the State’s industrial recruiters highlighting any areas where water resource problems may impact or deter the recruitment of industries.</p>	<p align="center">Governor Legislature Agencies</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Mid</p>	<p align="center">MAP Component - Plan</p>
<p>The Governor’s economic development strategic planning process should include consideration of water resources implications in any efforts to focus Alabama’s business and industry recruiting efforts. This would be separate and distinct from the current site-specific coordination process currently in place for individual clients and projects.</p>	<p align="center">Agencies Stakeholders</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Short</p>	<p align="center">MAP Component - Plan</p>
<p>The Governor should task the Inland Waterways and Intermodal Infrastructure Advisory Board to provide recommendations for water resource-related infrastructure projects that would provide direct benefits to economic recruiting efforts.</p>	<p align="center">Governor Agencies Stakeholders</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Short</p>	<p align="center">MAP Component - Plan</p>
<p>ADECA and ADEM should review federal and State water supply development funding programs (including state funded seed monies).</p>	<p align="center">Agencies</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Short</p>	<p align="center">MAP Component - Plan</p>
<p>ADECA should create an information clearinghouse on their web site to summarize sources of potential funding for new water source development.</p>	<p align="center">Agencies Stakeholders</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Short</p>	<p align="center">MAP Component - Plan</p>

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p><u>Start Priority</u> Low Moderate High</p>	<p><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p><u>Comments</u></p>
<p>Public and Stakeholder Education and Outreach</p>					
<p>Solicit the participation of stakeholders and the public. This would include maintaining contact information for all interested individuals and organizations.</p>	<p>Agencies Stakeholders</p>	<p>Low</p>	<p>High</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>Develop a media campaign with media outlets and other advertising venues to target individuals who may not already have a foundational knowledge of water resources.</p>	<p>Agencies Stakeholders</p>	<p>Medium</p>	<p>Moderate</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>Publicize and promote Alabama's water resources and the need to protect them for future generations.</p>	<p>Agencies Stakeholders</p>	<p>Low</p>	<p>Moderate</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>Identify specific representatives from various stakeholder groups to facilitate more effective and efficient communication between policy makers and stakeholder groups. These distinct groups could include citizen-based environmental groups, universities, trade organizations, industrial sectors, public water systems, and various local/state/federal agencies.</p>	<p>Agencies Stakeholders</p>	<p>Low</p>	<p>Moderate</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>Interbasin Transfers</p>					
<p>The IBT related issues charged to the Certificates of Use, Permitting and Interbasin Transfer Focus Panel should include:</p> <ul style="list-style-type: none"> • Determination of an appropriate basin scale for evaluating and accounting for interbasin transfers of water resources. • Identification and summarization of current interbasin transfers (locations and amounts) once the applicable basin unit is defined. • Consideration of the need to require periodic reporting for existing IBTs. • Consideration for establishing an interbasin transfers regulatory mechanism that provides for existing transfers and establishes criteria for new or expanded transfers (including an analysis of alternatives) to ensure they are reasonable and beneficial to the state. 	<p>Governor Agencies Stakeholders</p>	<p>Low</p>	<p>Low</p>	<p>Mid</p>	<p>MAP Component - Plan</p>

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p align="center"><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p align="center"><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p align="center"><u>Start Priority</u> Low Moderate High</p>	<p align="center"><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p align="center"><u>Comments</u></p>
<p>Riparian and Other Legal Issues</p>					
<p>AWAWG recommends the creation of a Riparian and Other Legal Concerns Focus Panel. Topics for the panel's review would include determining the adequacy of existing surface water and groundwater laws and regulations and recommend, if necessary, enhancements to the Alabama Water Resources Act within a reasonable timeframe. Other topics for the group's review should include:</p> <ul style="list-style-type: none"> ○ The efficacy, applicability and future utilization of the critical use study and capacity stress area designation provisions of the Alabama Water Resources Act, §9-10B-21 and §9-10B-22 <i>Code of Alabama, 1975</i>, in Alabama's current riparian system of laws and suggestions, if any, on how to enhance these provisions. ○ Should the RRMWC be used as a model for possible change in Alabama water law? ○ The applicability of laws and policies of surrounding states for potential consideration in Alabama. ○ The need for enhancements to enforcement mechanisms for the Alabama Water Use Reporting Program. ○ Mechanisms for local and regional inputs into state agency planning and a review of other existing statutory authorities pertaining to water planning activities (i.e. Watershed Management Authorities, Resource Conservation & Development Districts, Regional Planning Agencies, Conservancy Districts, Irrigation Districts, etc.). ○ The Panel should recommend, upon completion of this legal review, programs and processes for stakeholder review, education, and input into any proposed recommendations for statutory or regulatory changes. 	<p align="center">Governor Agencies Stakeholders</p>	<p align="center">Low</p>	<p align="center">High</p>	<p align="center">Mid</p>	<p align="center">MAP Component - Plan</p>
<p>Any proposed statutory or regulatory changes should take into consideration the results of the comprehensive assessment of surface and groundwaters of the state.</p>	<p align="center">Governor Legislature</p>	<p align="center">Low</p>	<p align="center">Moderate</p>	<p align="center">Mid</p>	<p align="center">MAP Component - Plan</p>
<p>Consider the need to develop legislation establishing a Safe Dams Program in Alabama with appropriate funding.</p>	<p align="center">Governor Agencies</p>	<p align="center">Low</p>	<p align="center">Low</p>	<p align="center">Long</p>	<p align="center">MAP Component - Plan</p>
<p>Task the OWR with requesting advice from the Alabama Water Resources Commission, the Alabama Water Resources Council and other appropriate state agencies on how to address federal encroachment into water policy and its impacts on statewide water resources management in Alabama.</p>	<p align="center">Agencies</p>	<p align="center">Low</p>	<p align="center">Moderate</p>	<p align="center">Mid</p>	<p align="center">MAP Component - Plan</p>

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p><u>Start Priority</u> Low Moderate High</p>	<p><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p><u>Comments</u></p>
<p>Drought Planning</p>					
<p>In accordance with the MAP process, any comprehensive water resources management plan should fully integrate the <i>Alabama Drought Management Plan</i> and incorporate state-level drought response processes into any proposed actions and activities.</p>	<p>Governor Agencies</p>	<p>Low</p>	<p>High</p>	<p>Mid</p>	<p>MAP Component - Plan</p>
<p>The Legislature should enact and the Governor should sign Senate Bill 20/House Bill 49, the Alabama Drought Planning and Response Act, which has been pre-filed for the 2014 General Session.</p>	<p>Governor Legislature</p>	<p>N/A</p>	<p>High</p>	<p>Short</p>	<p>MAP Component - Plan</p>
<p>The Governor and Legislature should provide adequate funding and staffing to State agencies conducting drought management and response activities. The AWRC also has identified the specific need for staffing and funding at OWR and the Office of the Alabama State Climatologist to support drought response, planning, monitoring and assessment activities.</p>	<p>Governor Legislature</p>	<p>Low</p>	<p>Moderate</p>	<p>Short</p>	<p>MAP Component - Plan</p>
<p>Water efficiency mechanisms such as water conservation and reuse should be in the State's Drought Management Plan.</p>					<p>See Issue Area Water Conservation/ Reuse</p>
<p>Enhanced Certificates Of Use/Permitting</p>					
<p>AWAWG recommends the creation of a Certificates of Use, Permitting and Interbasin Transfer Focus Panel. In addition to issues previously discussed in the Interbasin Transfer section, the panel should incorporate the results from the statewide water resources assessments to address the following questions:</p> <ul style="list-style-type: none"> • What information is required to determine whether a more formal regulatory system is needed to manage water use? • What is the appropriate level of water management registration/permitting needed for the present? Is something different needed in the future? • Should this level be adaptive and vary with water capacity conditions? • How could a regulatory process work in combining the consideration of water use, interbasin transfers, and instream flow? 	<p>Governor Agencies Stakeholders</p>	<p>Low</p>	<p>Low</p>	<p>Mid</p>	<p>MAP Component - Plan</p>

<p align="center"><u>Issue Area Policy Options and Recommendations</u></p>	<p><u>Involvement</u> Governor Legislature Agencies Stakeholders</p>	<p><u>Est. Cost</u> Low ≤1M Medium \$1-3M High >\$3M</p>	<p><u>Start Priority</u> Low Moderate High</p>	<p><u>Est. Comp Schedule</u> Short ≤1 Yr Mid 1-5Yr Long >5 Yr</p>	<p><u>Comments</u></p>
<p>Interstate Coordination Issues</p>					
<p>Agencies should support staff efforts to maintain relationships with peers in neighboring states to improve coordination of activities relating to shared interstate watersheds, and maintain continuity and staff-level lines of communication if contentious issues arise between the states.</p>	<p>Agencies</p>	<p>Low</p>	<p>High</p>	<p>Annual</p>	<p>MAP Component - Plan</p>
<p>The Governor should continue to support agency activities that involve shared water resources including, but not limited to:</p> <ul style="list-style-type: none"> • The Tennessee Valley Water Supply Partnership; • Southeast Instream Flow Network; • Discussions with Tennessee and Mississippi regarding use of the Tennessee-Tombigbee Waterway for water supply; • The National Integrated Drought Information System (NIDIS) initiative to develop a drought early warning system for the ACF River Basin; • The Gulf of Mexico Alliance; and • The Gulf Coast Ecosystem Restoration Task Force. 	<p>Governor Agencies Stakeholders</p>	<p>Low</p>	<p>High</p>	<p>Annual</p>	<p>MAP Component – Plan and Monitor</p>
<p>In accordance with the Alabama Water Resources Act, OWR should maintain a clearinghouse concerning interstate water issues. Alabama’s water resource agencies should continue to inform OWR of potential issues involving interstate watersheds.</p>	<p>Agencies Stakeholders</p>	<p>Low</p>	<p>Moderate</p>	<p>Short</p>	<p>MAP Component - Plan</p>

PART II: WATER ISSUE AREAS

The water management issues identified by AWAAG in the August 2012 report *Water Management Issues in Alabama* and emerging issues identified during the AWAAG deliberations are discussed in the following water issue areas which include the following sections: overview, considerations, stakeholder comments, 1990 report implementing recommendations, and policy options. The overview discussion sections vary from papers with detailed explanations for those issues that the AWAAG perceives are less well known among stakeholders (i.e. instream flow and surface and groundwater assessments), to issues that are an active part of Alabama's water management practices (drought management), and to issues that may become more important in the future (interbasin transfers). The considerations section highlights facts, data, and commonly known information with respect to a particular water issue. The stakeholder comments section presents an abstraction of stakeholder remarks to the WMIA report as interpreted by AWAAG. The *Water for a Quality of Life* report was an important document for water management in Alabama and much of the analysis, conclusions, and recommendations presented therein are very relevant to this report. The next section lists and comments on the success of implementing many of the 1990 report's recommendations over the past 20 years since passage of the Alabama Water Resources Act in 1993. The last section is a listing of policy options and recommendations, distilled from these reports, AWAAG documents and discussions, and other sources of water resources information and studies. Reference materials considered in the water issue discussions are listed at the end of each paper. A common set of reports and materials were considered in all the water issues discussed and included:

- Alabama Water Resources Act (*Code of Alabama*, 1975, §9-10B-1, et seq.)
- *Water Management Issues in Alabama* report
- *Water for a Quality of Life* report
- An analysis of the *Water for a Quality of Life* report (Appendix C)
- A comparison of the *Water for a Quality of Life* report to the *Water Management Issues in Alabama* report (Appendix D)
- A water resources data summary prepared by the Water Resources Database Subcommittee of AWAAG (Appendix E)
- Abstracts of stakeholder comments submitted to the AWAAG in response to the *Water Management Issues in Alabama* report (Appendix F)

SURFACE AND GROUNDWATER ASSESSMENTS

Overview:

Water originates as precipitation and runs off the land into lakes and streams or infiltrates into aquifers that store and transmit water through the subsurface. Freshwater aquifers vary in depth from the land surface, where groundwater is discharged from seeps and springs, to more than 3,000 feet below the land surface. Water well production rates vary widely from a few gallons per minute (gpm) in fractured rock aquifers to more than 5,000 gpm in karst aquifers. Approximately 40 percent of public water supplies in Alabama originate from about 20 major aquifers (Fig. 8).

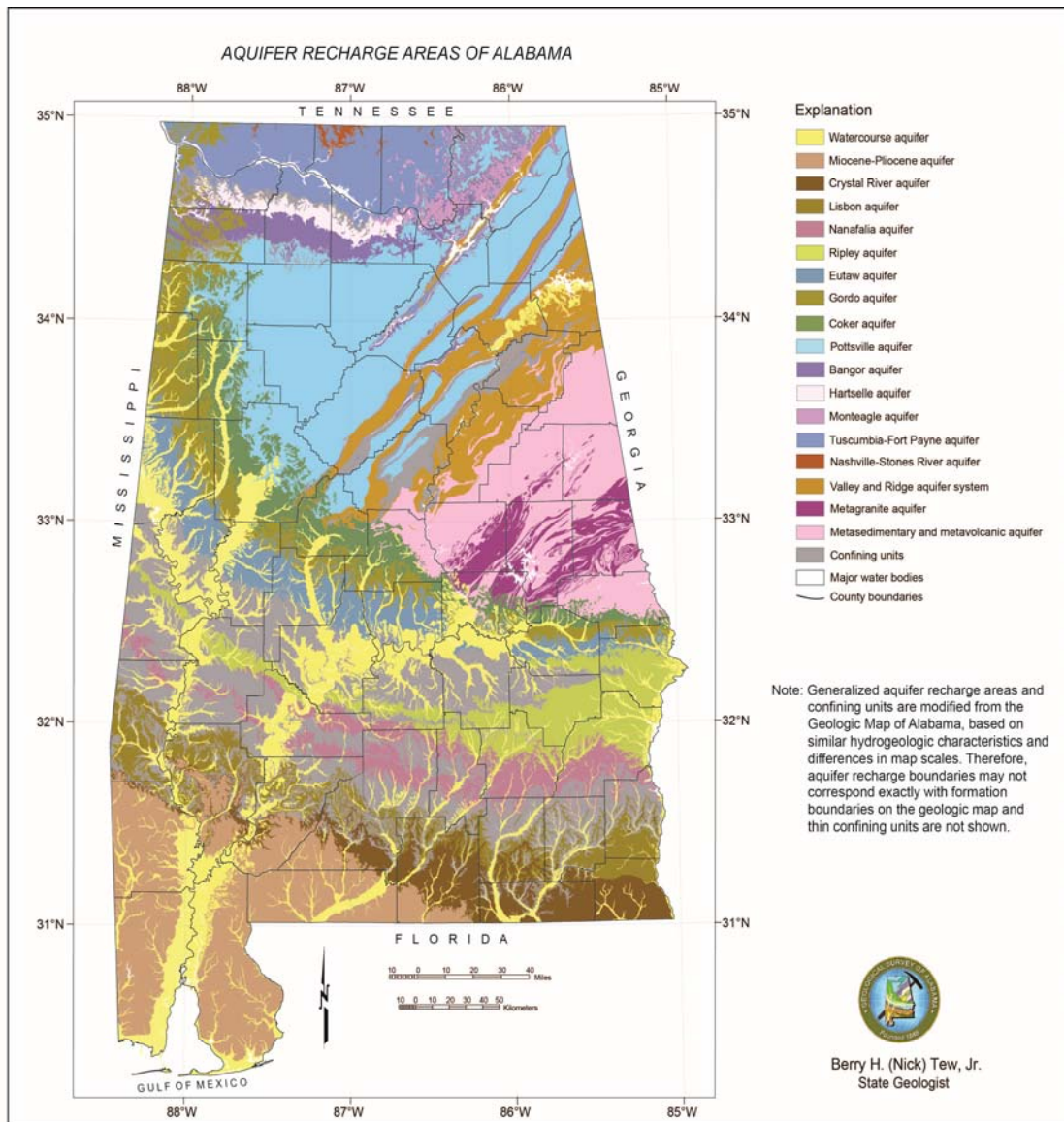


Figure 8. Aquifer recharge areas in Alabama.

Although average annual precipitation in Alabama is about 55 inches, annual groundwater recharge varies from only 2 to about 12 inches. Groundwater recharge areas occur on most of Alabama's land surface where the geology consists of rocks or sediments with porosity and permeability that permits infiltration of precipitation into the subsurface

Groundwater occurs in the subsurface in three primary settings. Shallow groundwater is unconfined and is intimately connected to the land surface and surface-water bodies through various flow paths. Unconfined groundwater is influenced by surface topography, flows relatively short distances, and discharges into nearby surface-water bodies (Fig. 9). Semi-confined groundwater is overlain by discontinuous relatively impermeable confining layers, has longer flow paths, and discharges into surface-water bodies at relatively low elevations. Confined groundwater occurs in aquifers overlain by continuous, impermeable confining units and has no connection with the land surface. Confined groundwater is virtually unaffected by extreme drought and provides water to major users including public water systems and industry (Fig. 9).

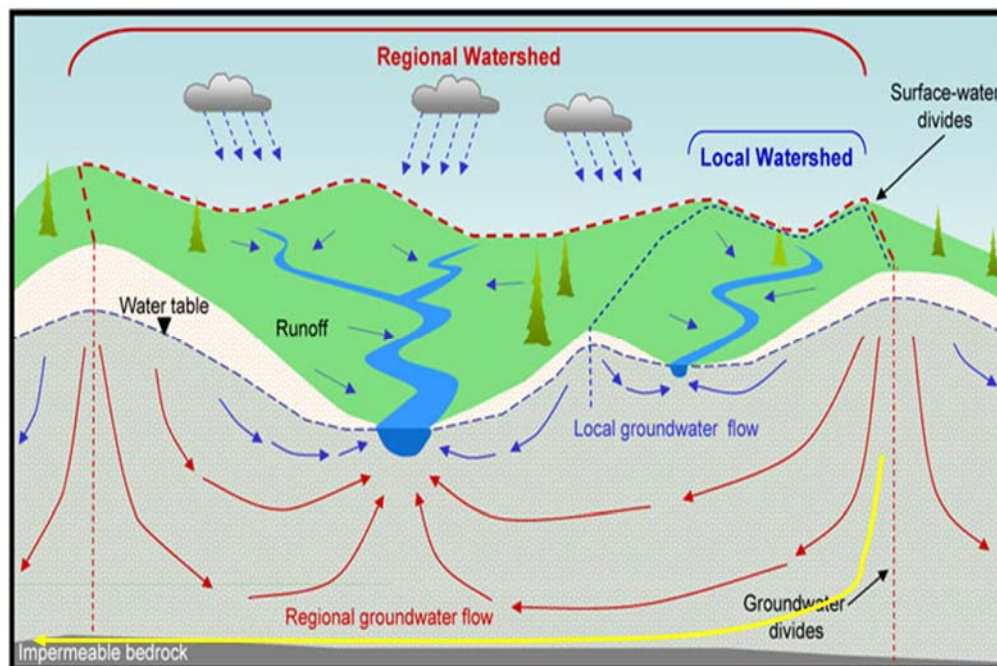


Figure 9. Groundwater flow paths and connections with the land surface

Surface water in Alabama serves many functions including groundwater recharge; public, agricultural, and industrial water supplies; waste assimilation; navigation; recreation; and support of aquatic habitat. Because Alabama shares most of its major rivers and streams with neighboring states, interstate watershed management must be closely coordinated. Surface water quality is impacted by point and nonpoint sources of pollution. Point sources include industrial and municipal wastewater dischargers while nonpoint sources include unregulated urban and rural/agricultural stormwater runoff. Surface water protection is accomplished through water-use policies and water quality and quantity regulations. Water quantity regulation is a state responsibility while water

quality protection is a shared state/federal responsibility through enforcement of the Clean Water Act and other laws and regulations.

Groundwater and surface-water availability and sustainability is determined by numerous interdependent factors and natural processes that guide the occurrence and movement of water (Fig. 10). Interactions between shallow groundwater and surface water are illustrated in Figure 11. Interactions proceed in two ways: groundwater flows through streambeds into streams (termed gaining streams) (Fig. 11A) and stream water infiltrates through sediments into the groundwater system (termed losing streams) (Fig. 11B). These processes are controlled by the elevation of the water table (hydraulic head). During drought conditions most streams continue to flow due to the groundwater contributions.

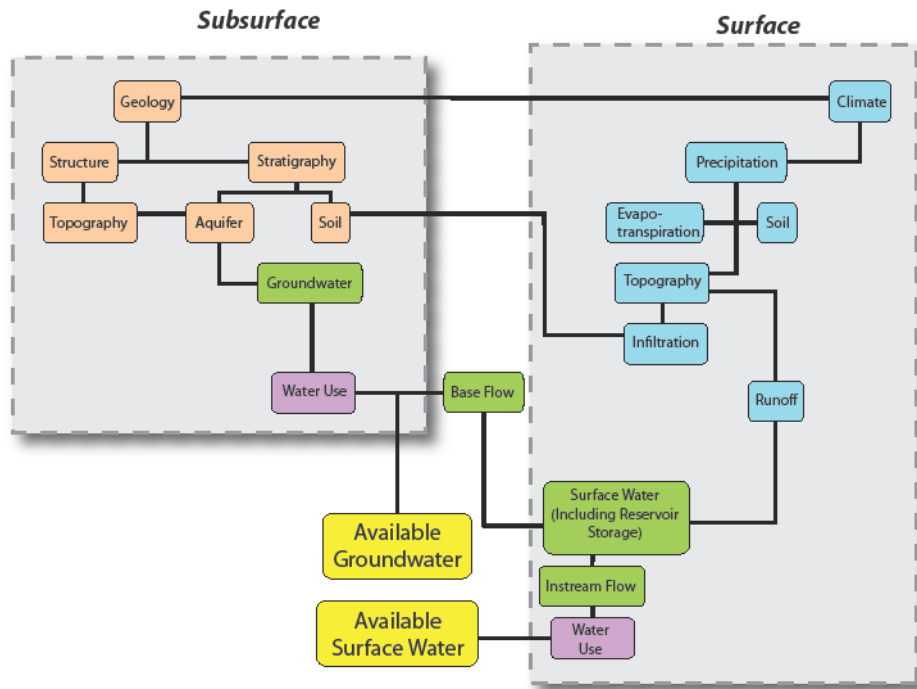
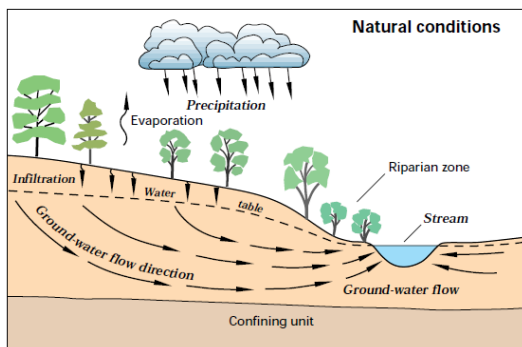


Figure 10. Processes that affect groundwater/surface water interaction and availability.

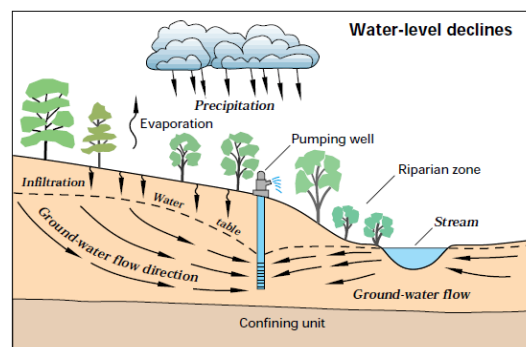
Groundwater/surface-water interaction is common in recharge areas where groundwater provides base flow, which is the primary source of flow for most streams during summers and in drought periods. Base flow supports biological communities and habitat during these periods. Conversely, streams contribute recharge to aquifers during high flow conditions when stream levels are at a higher elevation than the adjacent water table.

Figure 11A



Water is recharged to the groundwater system by infiltration of water from precipitation and then flows to the stream through the groundwater system.

Figure 11B



Water pumped from the groundwater system causes the water table to lower and alters the direction of groundwater movement. Some water that flowed to the stream no longer does so and some water may be drawn in from the stream into the groundwater system, thereby reducing the amount of stream flow.

Figure 11. Interactions of land surface, surface water, groundwater, and groundwater production impacts (modified from USGS, 1998).

Some aquifers yield saline water from depths that vary from near land surface in Tuscaloosa, Hale, Greene, Lowndes, and Clarke Counties to thousands of feet in other parts of the state. Although not currently a widespread problem, saltwater intrusion can occur if excessive amounts of fresh groundwater are removed along coastal areas. Due to concerns about saltwater intrusion and protection of coastal aquifers, regulation of Alabama's coastal groundwater production is an important component of Alabama's water resources management activities. The Alabama Coastal Area Management Act (*Ala. Code* §§9-7-10 through 9-7-20) and the Alabama Department of Environmental Management (ADEM) Coastal Program Rules (ADEM Admin. Code Div. 335-8) provide a regulatory framework for protection of natural resources within the Alabama coastal zone, which is defined as those areas of Mobile and Baldwin Counties from the gulf coast inland to a land-surface elevation of 10 feet.

ADEM Admin. Code R. 335-8-2-.09 provides a permitting mechanism for installation of new water wells or alteration of existing water wells that produce groundwater at rates of 50 gallons per minute or greater. This provision is applicable to any well in the coastal area and any well outside the coastal area with a 50-year capture zone that extends into the coastal area. The purpose of this rule is to protect the quality of groundwater resources, including adverse impacts from saltwater intrusion.

For many decades, except during extreme drought conditions, Alabama has had adequate water resources from rivers, streams, and underground aquifers. The Alabama Office of Water Resources (OWR) has been assessing the availability and use of water in the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) River Basins as part of its statutory charge and on-going efforts to review water policy and management enhancements. This work also included a focused effort on statewide surface water availability of major river systems and smaller unregulated (free flowing) streams.

The vast majority of large water users are located on regulated waterways (Fig. 12). These large public water supply, industrial, and electric utility users need reliable and dependable water sources to ensure the operability of their systems. For water planning purposes, it is reasonable to assume that any large future water users would seek similar levels of certainty and reliability and would therefore locate on regulated river reaches capable of supporting their water requirements.

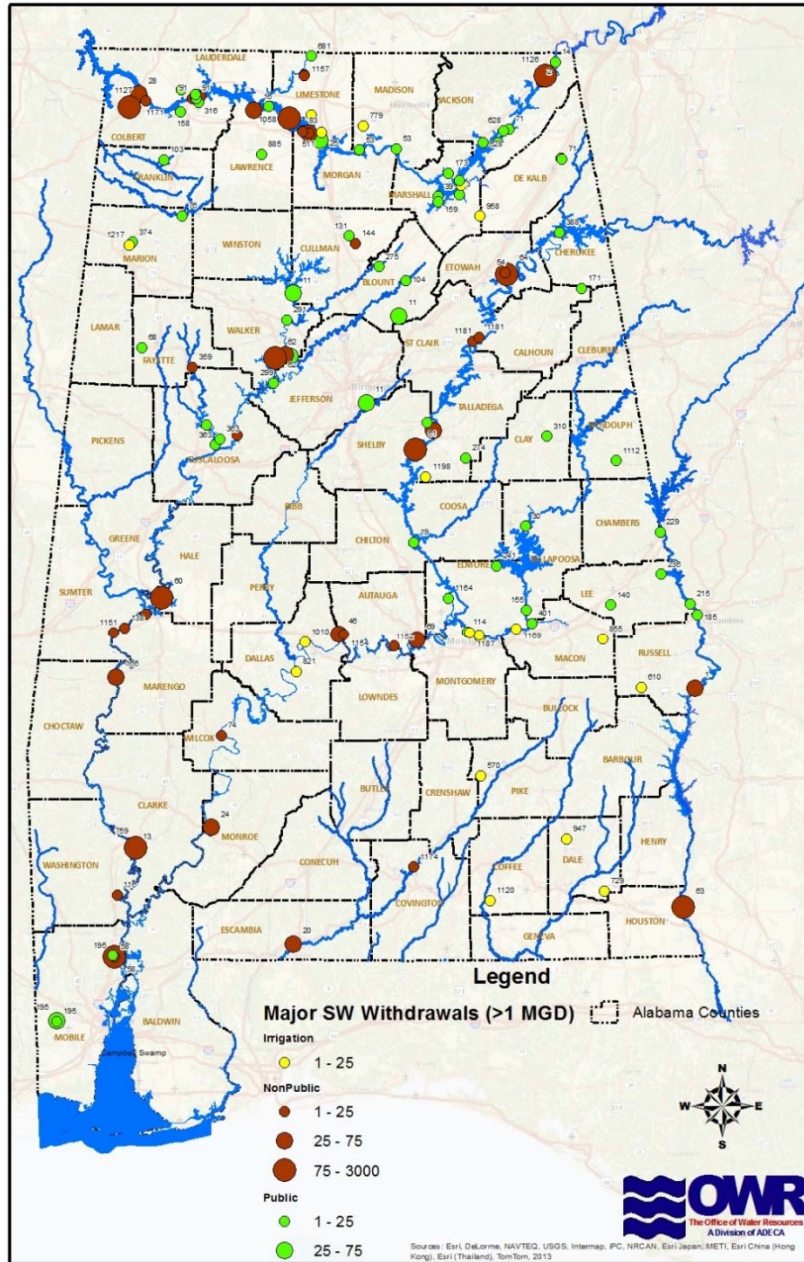


Figure 12. Major surface water users (>1 MGD) in Alabama.
(Source: OWR, 2013)

A Water Use Index has been developed by OWR as a screening tool to broadly evaluate surface-water availability versus water demand. The Water Use Index is a ratio

of water demand against water availability for a region. The index was evaluated by comparing availability and use of water in 2005, a period that provided a benchmark of a "normal" water year, against 2007, a period that reflected water conditions during one of the most severe droughts recorded in the state's history. These two years provided an opportunity to evaluate water supply sources and reservoir systems during a time when they were significantly stressed, and provided a preliminary indication of watersheds needing additional study. Preliminary results of this analysis, presented at the 2012 Alabama Water Resources Conference, indicated that further study should be focused on the Warrior and Cahaba Rivers (Fig. 13). The water use demands in those areas should be evaluated in light of their future growth needs, including the ability to continue providing water to Alabama's most populous region, the Birmingham metropolitan area.

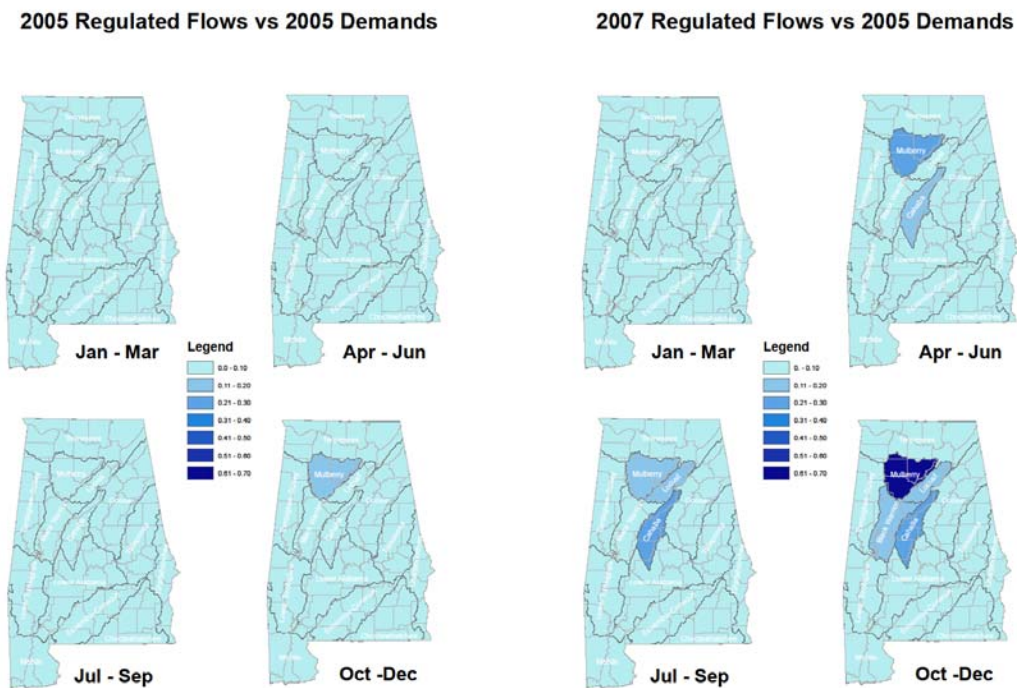


Figure 13. Maps comparing the Water Use Index values on a seasonal basis between 2005 and 2007. (Source: Alabama Office of Water Resources)

A cooperative effort between OWR and GSA will link statewide assessments of surface and groundwater resources collectively in an integrated way. The surface water resources will be assessed by OWR while the groundwater resources will be evaluated by GSA. A pilot study was initiated in 2013 to establish the integrated process, methodologies, and timeline for the statewide assessment of water availability. The Upper Choctawhatchee River watershed (HUC 03140201) was chosen for the pilot study because large surface water reservoirs are absent, regulation is minimal, and the basin has a good baseline of groundwater and aquifer information. As part of its work, OWR will

analyze surface flow regimes and water demands, and develop tools to provide information on current water availability. The tools will also have options for generating stream flow statistics with regard to evaluating instream flow standards and how they would impact overall water availability. The next step in the assessment project will be to finalize these tools and methodologies from the pilot study and then extend the analysis statewide.

Another goal of the assessment will be to establish a surface water budget, represented conceptually in Figure 14, for every basin in the state. A water budget is a conceptual approach to quantify the amount of water available and used for a given time period at a given location. This budget would graphically depict the availability of water (as defined in terms of the Average Annual Daily Flow (AADF)) and how much water remains to meet instream flow needs as well as other downstream and future needs.

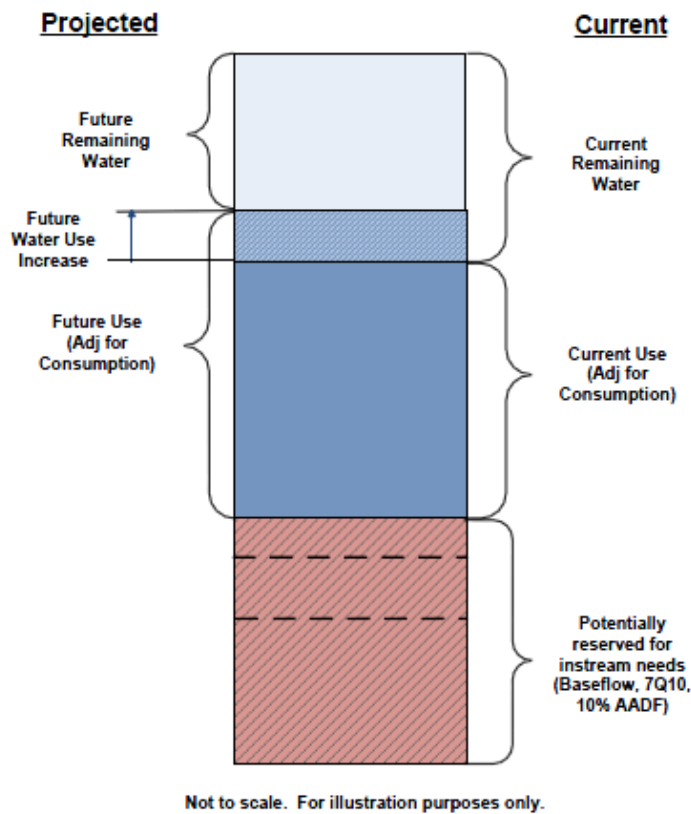


Figure 14. Conceptual illustration of a surface water budget.

Another tool developed to support this effort is reflected in a screenshot shown in figure 15. An example of the preliminary findings is shown for a location on the Choctawhatchee River at Newton (USGS Gage No. 02361000) (Fig. 15). This example illustrates the magnitude of water use relative to various flow statistics. To complete a water budget for this location and time period, a value for instream flow would need to be established.

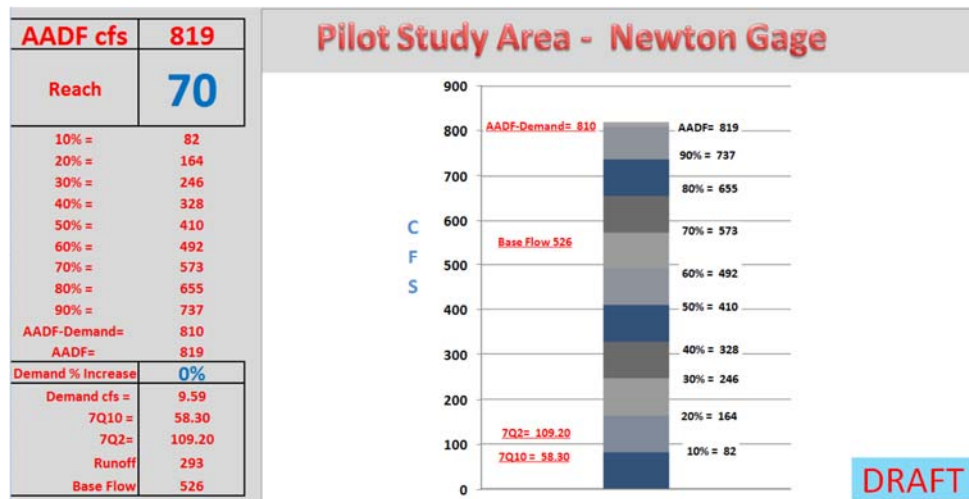


Figure 15. Depiction of flow metrics for the Choctawhatchee River at Newton, Ala. (Source: Alabama Office of Water Resources)

The surface and groundwater assessments will result in determinations of base flow for all assessed watersheds. The base flows will then be used as a component in the analysis of instream flow options. This tool has been developed for the pilot study area and will support some of the data needs for the groundwater assessment in the study area. A complete timetable including the schedule, deliverables and funding needs for this effort will be available in late 2013 or early 2014.

Considerations:

- Statewide assessments of the surface water and groundwater resources are currently underway. The results from this effort will guide the development of the initial Alabama water management plan and implementation of the Alabama Water MAP process.
- Coastal groundwater development in Alabama is regulated under ADEM’s coastal program to ensure protection of human health and groundwater resources in the coastal area.
- Groundwater recharge rates are reduced where significant impermeable surfaces cover recharge areas, increasing runoff and reducing infiltration.
- Groundwater produced at excessive rates or by wells in too close proximity will cause severe water level declines.
- Water use data and analyses are essential components of surface and groundwater protection and water resource policy development.
- The analysis of regulated reservoir systems will entail close coordination and sharing of potentially sensitive information between state agencies and the major reservoir operators, including the Tennessee Valley Authority, the Corps of Engineers and Alabama Power Company.

- State coordination and cooperation with the USGS to maintain an adequate real-time stream flow monitoring program is essential. Long-term reductions in federal funding have resulted in the loss of critical gauging stations and increased the burden on local and state funding to maintain gauging stations. Active gauging stations (especially those with 30 or more years of record) should be maintained and additional stations should be installed in strategic watersheds.

Stakeholder Comments:

Stakeholder comments to the Surface Water and Ground Water Availability portion of the Water Management Issues in Alabama report centered on the following themes:

- A statewide water resources assessment/data collection program should be implemented before any major water policy changes are proposed. It is important that the current water resources data collection efforts of the State be expanded so as to gain a better understanding of water-related issues, and to provide sufficient information for implementing policies and plans.
- Support for the need of additional agency funding for assessments and data collection.
- Alabama should ensure that existing users, such as agriculture and industries, do not lose access to water when water resources are not stressed because of measures implemented to protect water resources when they are stressed (instream flow policies). The State needs time-relevant water management tools that can determine in advance when watersheds are becoming stressed so that preemptive management actions can be invoked to reduce withdrawals. These tools can also be used to develop actuarial information on water insurance programs that can be used to protect users from financial harm should withdrawals be limited.
- Support for the idea of seeking funding assistance from other sources such as public entities or federal agencies.
- Assessments should allow for input and feedback from stakeholders and local entities.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding water assessments:

- Charge the Alabama Office of Water Resources with the responsibility to coordinate comprehensive water resources studies aimed at developing a water resources strategy for the future of Alabama. This effort should be adequately funded and coordinated with federal and state agencies involved with water resources issues and development.

(Status: This recommendation has been partially implemented and is an on-going activity by OWR.)

- Initiate a comprehensive public review of the operations of existing reservoirs in Alabama to determine if original project purposes are still valid.

(Status: The thrust of this recommendation has been partially implemented through the Federal Energy Regulatory Commission (FERC) relicensing process, the technical analysis associated with the ACT and ACF litigation, and OWR's on-going analysis of regulated systems in Alabama.)

- Determine, using information from the instream flow analysis, if additional surface water storage or changes in reservoir operations are needed.

(Status: This recommendation is being implemented through OWR's technical analysis and expertise associated with the evaluation of reservoir operations in the ACT and ACF River Basins and that effort is being expanded with the on-going statewide surface water assessments.)

- Establish a list of potential reservoir sites which could help meet current and future public needs and interests.

(Status: OWR has developed preliminary estimates of surface water impoundments in Alabama using GIS and aerial imagery analysis techniques to better assess the number of existing impoundments and to monitor changes in that inventory.)

- Establish a list of streams and rivers on which no additional dams or impoundments should be constructed.

(Status: One area of the state has been designated as a national preserve (Little River Canyon National Preserve) in which future development is prohibited.)

Policy Options:

- Continue funding for on-going assessments and monitoring efforts.
- Provide funding and support to enhance on-going scientific assessments and data collection efforts. This should also include:
 - State funding to match federal dollars for the USGS monitoring network. The federal water agencies should be strongly encouraged by the Governor to adequately support this program with federal funding to leverage available state resources.
 - Expansion and support of the statewide, real time groundwater level monitoring network currently being implemented by the GSA.
 - Ensure that the groundwater monitoring network includes groundwater quality where needed.
 - Assessments and data collection efforts should provide opportunities for stakeholder involvement.

- Establish laws, policies, and regulations for surface and groundwater that are consistent with the Alabama Water MAP process including:
 - Identification of priority surface and groundwater uses;
 - Preservation and protection of aquifer recharge areas;
 - Determination of proper well spacing;
 - Determination of maximum well production rates; and
 - Determination of maximum water withdrawal for each aquifer.

Additional materials considered

U.S. Geological Survey, 1998, Strategic directions for the U.S. Geological Survey groundwater resources program: Washington D. C., A report to Congress, *Website*: <http://water.usgs.gov/ogw/gwrp/stratdir/>

WATER RESOURCES MANAGEMENT

Overview:

The Alabama Water Resources Act (“Act”) has created the statutory framework for the development of a water resources management plan for Alabama. The Act *"establish[es] the Office of Water Resources and the Alabama Water Resources Commission and ... vest[s] said office and commission with the power and responsibility to develop plans and strategies for the management of the waters of the state"* (Code of Alabama §9-10B-2(5)).

Long-term management of surface and groundwater requires recognition that water is a finite resource; that there is a connection between water quantity and water quality; and there is a need to protect both its future development and its ecological health. Management of water resources should be holistic across an entire watershed or drainage basin due to the interrelationship of the natural and human processes and activities that can impact each other, in some cases from a great distance. This includes both land and water resources, since land use can have significant impacts on water resources and related ecosystems.

Additionally, there is a dynamic aspect to the availability of water over time - from day to day, seasons to season, year to year, and even between decades. The amount of water available to support the various needs of natural systems and man is constantly changing. Therefore, the process of managing Alabama's water resources will require the development of an initial statewide water management plan followed by a continuous process of monitoring, assessments, and planning coupled with the consideration of the need to implement changes to the water management system(s) in place (Fig. 16).

The public trust doctrine and *parens patriae* doctrine can provide a state with an effective means of protecting the resources held in trust for the people of that state. While the public trust doctrine, with regard to water, appears to be embedded in Alabama law (Code of Alabama, §9-10B-2), a clear statement of the State's role in managing and protecting waters of the State, if utilized, would enhance the State's ability to protect its surface and groundwater resources.

In Senate Joint Resolution 16, signed May 8, 2012, by Governor Bentley, both Houses of the Legislature concur "That waters of the State, as defined in the Alabama Water Resources Act, are a natural resource of the State and subject to the State's sovereign power to plan and manage the withdrawal and use of those waters, under law, in order to protect public health, safety, and welfare by promoting economic growth, mitigating the harmful effects of drought, resolving conflicts among competing water users, achieving balance between consumptive and non-consumptive uses of water, encouraging conservation, preventing significant degradation of natural environments, and enhancing the productivity of water-related activities."

Although this legislative action does not resolve many of the legal issues surrounding water resources, the resolution does make it clear that the State has a stewardship role with regard to protecting and managing surface and groundwater resources, communicating this role to all affected parties, protecting and restoring public

waters in the event of natural disasters, and planning and managing water resources for future generations.

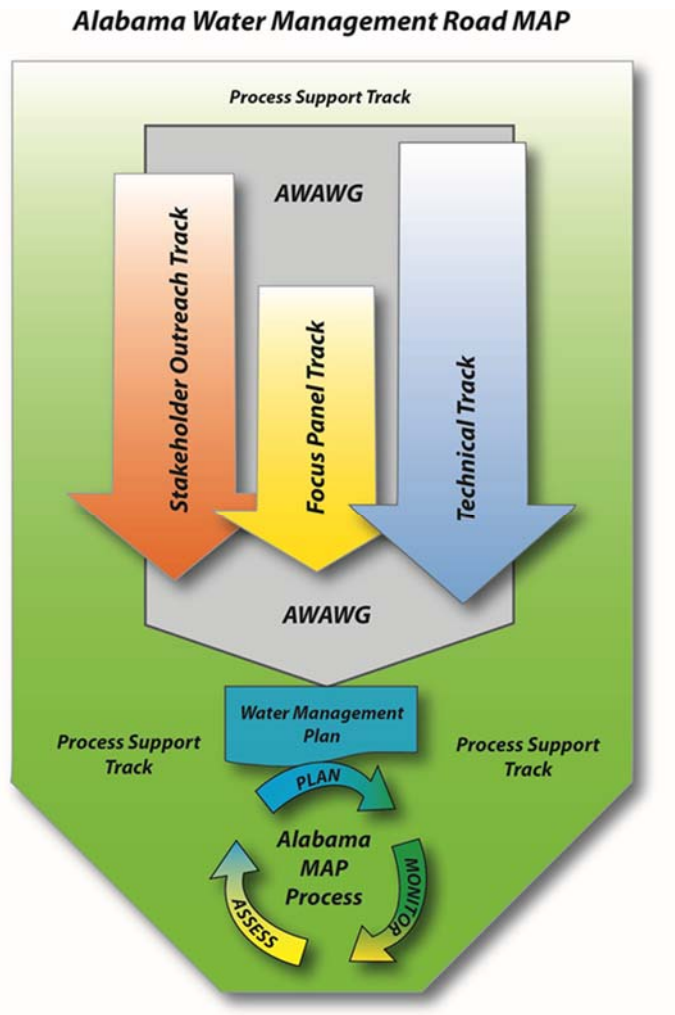


Figure 16. Alabama water management planning and implementation process overview.

Under the Act, any person or entity that withdraws, diverts, or consumes 100,000 gallons per day or more must apply for a Certificate of Use and, upon submittal of a complete application, must be issued a Certificate of Use by the Office of Water Resources (OWR). Except in Capacity Stress Areas of the State, the Certificate of Use system can be viewed as a water withdrawal registration system, not a permitting system, in which the State is merely keeping track of water being withdrawn, diverted or consumed. In those locations of the State which may be designated by the Alabama Water Resources Commission (AWRC) as Capacity Stress Areas, the amount of water which a person withdraws, diverts, or consumes can be limited by OWR in order to address the water deficits in the area. To date, the AWRC has not designated any area of the State as capacity stressed or promulgated regulations appropriate for such situations.

Also absent in the current Act is any direct method of providing local or regional input into the State's water resource planning process. Since most industrial development,

agriculture, and recreation is of a local or regional nature and dependent upon local data for any water resources planning effort, consideration must be given to providing a mechanism for local or regional input into the State's planning process. There are a number of statutory entities, with proper legislative modifications, that could provide this local input. Possibilities for this role include watershed management authorities, irrigation districts, soil and water conservation districts, and regional planning commissions. An evaluation of which entity or entities is most appropriate for this responsibility is needed along with public involvement in the process.

Critical to any improvement in water resources management in Alabama is sufficient funding and staffing of the State agencies responsible for water quantity and water quality management. In the past, many of the recommendations regarding water resource management provided by study groups have not been implemented because of the lack of funding and staffing. Without this component, efforts to advance water resource management are limited.

Finally, it is vital that the process for assessing and developing improvements to how Alabama manages its water resources is clear and open with ample opportunities for public involvement. Specific information and options related to this topic are discussed in the Public and Stakeholder Education and Outreach Issue Area.

The conceptual framework below outlines the key components and concepts that should be included in a comprehensive statewide water resources management plan. Further detail of this outline is provided in Appendix H. The framework consists of eight sections including:

Section I	Vision and guidelines
Section II	Water resources overview
Section III	Water resources data
Section IV	Policy areas
Section V	Stakeholder education and outreach
Section VI	Proposed legislative initiatives
Section VII	Funding needs and strategies
Section VIII	Alabama Water MAP Process

Considerations:

- The public has varying interpretations of the State's role in managing and protecting water resources.
- Alabama lacks a statewide water resource planning process that provides for local and regional input.
- Local land use decisions, which are generally made by counties or municipalities, impact the State's water resources.

- Statutory responsibility for various aspects of water resource management is spread across numerous State and federal agencies, reinforcing the need for close coordination and communication in programs and practices.
- State water resources management must address the need to plan and prepare for the impacts on the State's water resources from land use practices and patterns, population growth, climate change, economic development, hydrologic extremes (both floods and droughts) and any future hydrologic modifications.
- The lack of adequate water resource management actions at the state level will create a vacuum that poses a threat for a greater (and potentially conflicting) federal role in water resource issues.
- Certain fundamental issues should be considered early in the planning process. These should include the establishment of the geographic extent of water resource planning areas (i.e. watersheds, counties, or regions); the delineation of roles between state and local/regional entities; and any modifications to the existing state water resource management agency structures or roles.

Stakeholder Comments:

Stakeholder comments to the Water Management portion of the WMIA report centered on the following themes:

- The need to base management proposals on sound science
- The need to incorporate balanced adaptive management
- The use of watersheds as the primary planning and management unit
- Concerns over federal encroachment
- The need to recognize existing water uses and existing water infrastructure investments in any planning process
- The need to recognize the links between:
 - Water resource management and land use planning
 - Water quantity and water quality
 - Water availability and economic development
- The priority of uses for water
 - Public health and safety are highest priority
 - Recognition of the significant role that stream flows have on ecological integrity, fishery production, and recreational opportunities
- The need for additional funding to support State water resources assessments and planning
- The need to better define and utilize State and local government management roles

- The need to involve local and regional stakeholders in the process
- Concerns of those favoring the existing common law legal system and those proposing revisions to the existing common law legal system based on the Regulated Riparian Model Code

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding water resources management issues:

- Create an Alabama Water Resources Agency with responsibilities in four broad categories: planning, coordinating, financing, and monitoring.
(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act.)
- Create an Alabama Water Resources Commission.
(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act.)
- Charge the Alabama Water Resources Agency with the responsibility to coordinate comprehensive water resources studies aimed at developing a water resources strategy for the future of Alabama. This effort should be adequately funded and coordinated with federal and state agencies involved with water resources issues and development.
(Status: This recommendation has been partially implemented but limited by the lack of funding.)
- Provide additional support for the State floodplain management program to assist Alabama communities in understanding the requirements of the National Flood Insurance Program.
(Status: This recommendation has been fully implemented by OWR.)
- Require the Alabama Water Resources Agency, with the assistance of appropriate federal agencies, to research the encroachment of rural floodplains to determine the magnitude of the problem, develop guidelines for location and construction of catfish ponds, and develop appropriate model regulations to minimize floodplain encroachment.
(Status: This recommendation has been fully implemented by OWR.)
- Require the Alabama Water Resources Agency to be the umbrella organization for drought planning and coordination.
(Status: This recommendation has been fully implemented by OWR.)
- The Alabama Water Resources Agency should monitor federal activities which affect Alabama water resources and implement a policy to involve Alabama with federal agencies operating existing, or proposing new, water resources projects that are located in the State or which will impact water coming into the State.

Representative actions should include arranging periodic meetings with federal agencies to secure status reports of current and proposed activities at projects which affect Alabama water resources, serving as the State's representative on task forces or committees of federal agencies, and serving as the State water resources contact for federal agencies.

(Status: This recommendation has been fully implemented by OWR.)

- Charge the Alabama Water Resource Agency with determining and recommending water resource projects in which the State should participate, developing a method for prioritizing water resource projects, and determining the distribution of State and local cost sharing for regional projects.

(Status: This recommendation has been partially implemented but limited by the lack of funding.)

- Provide active participation in the initiation, planning, development, and support of State and Federal water resource projects.

(Status: This recommendation has been partially implemented.)

- Create a statewide "Alabama Water Resource Authority" with funding powers and the legal capacity to participate as the local sponsor for water resource projects.

(Status: This recommendation has been partially implemented by multiple funding and loan programs from the federal government. The Water Systems Assistance Authority was established (Code of Ala Section 22-23A) but has never been utilized.)

- Establish a State Water Development Fund to provide the required local matching share for projects of State significance, leverage dollars to create a revolving loan fund to provide below-market interest rate loans for water resource development projects, and create State incentives to locate, evaluate, and develop alternative water sources or improve the efficiency of use.

(Status: This recommendation has not been implemented.)

- Resolve any remaining conflicts and complete and enact, in the next session, legislation to establish a "Safe Dams Program."

(Status: This recommendation has not been implemented.)

- Require counties to develop county-wide plans to coordinate the engineering of all water systems within the county. Plans should address sources of supply, strategic locations for major storage facilities, locations of trunk distribution lines, critical points of interconnection, and the potential to share equipment and personnel for maintenance.

(Status: This recommendation has not been implemented.)

- Coordinate and disseminate, through the Alabama Water Resources Agency, information about existing State and federal water resource education programs.

(Status: This recommendation has been fully implemented.)

- Develop water resource information and education programs for all citizens of Alabama.

(Status: This recommendation has been fully implemented.)

- Provide an annual appropriation, through the Alabama Water Resources Agency, of at least \$1,000,000 to support applied water resources research.

(Status: This recommendation has not been implemented.)

Policy Options:

- Continue the AWA WG, under the direction of the Governor, as the coordinating body for statewide water management planning activities.
- Direct the AWA WG, working with appropriate State agencies, and with additional funding, after appropriate stakeholder input, to initiate the Alabama water management planning and implementation process using the attached conceptual framework (Appendix H), consistent with the Alabama Water Resources Act, that:
 - Addresses the impacts on the State's water resources from water use, changing land use patterns, population growth trends, climate change, economic development, hydrologic extremes (both floods and droughts), and hydrologic alterations.
 - Delineates the roles between State and local entities by reviewing options for local roles in water resources management activities including but not limited to Regional Planning Councils (RPC), Watershed Management Authorities (WMA), Soil and Water Conservation Districts, and Irrigation Districts.
 - Considers and incorporates, as appropriate, the recommendations for statewide water resources management from the 1990 study of Alabama's water resources entitled, *Water for a Quality of Life*.
 - Investigates and provides recommendations on how to best coordinate State water quantity and water quality matters.
 - Involves the Governor's Office, the Legislature, stakeholders, and the public, along with the AWRC and the AEMC, in the Alabama Water MAP process and the development of a statewide water resources management plan.

WATER RESOURCES DATA

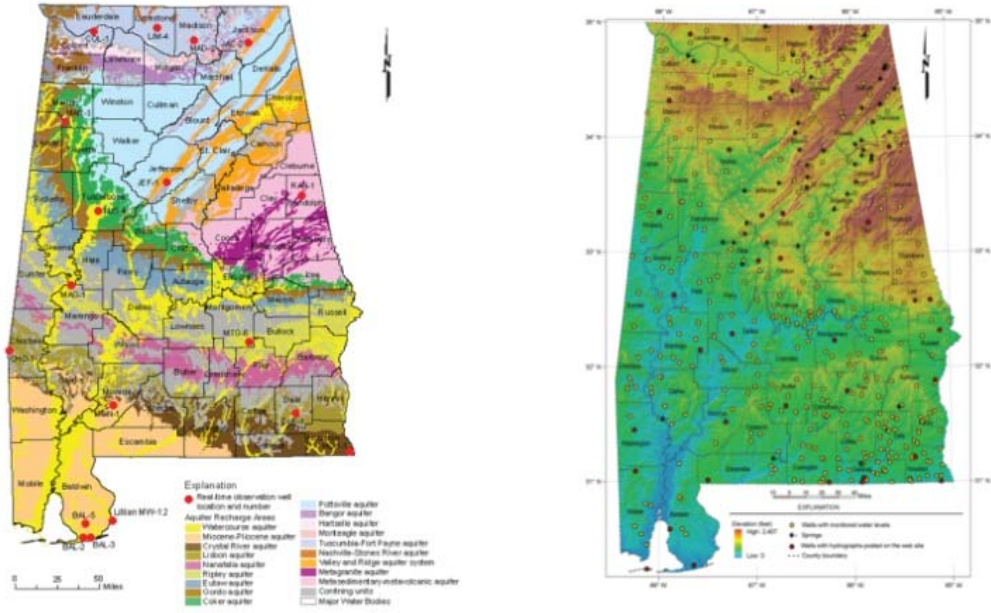
Overview:

Complete and accurate water resources data are a critical component of the Alabama Water MAP process. Any attempt to manage waters of the State without complete and credible scientific information on surface and groundwater availability and quality, surface-groundwater interactions, precipitation patterns, water usage in the State, and instream flow needs of rivers and streams has great potential to slow and impede actions needed to deal effectively with drought, water distribution, and water resource development leading to economic hardship, degraded water resources, and a less certain water future for the State. All AWAWG agencies fully understand the need for better data and information on Alabama's water resources. This information provides a vital foundation to the complex decision and policy issues facing the State as we try to balance the multitude of demands on water resources and the increasing usage associated with population growth, job creation, and economic development.

For many years the Geological Survey of Alabama (GSA) has monitored groundwater levels in more than 400 wells throughout the State. This program is being expanded to include at least 30 wells in strategic aquifer and geographic settings with real-time online capability (Fig. 17). The GSA provides groundwater level data and is currently developing a system for online access to more than 125,000 water well records across the state.

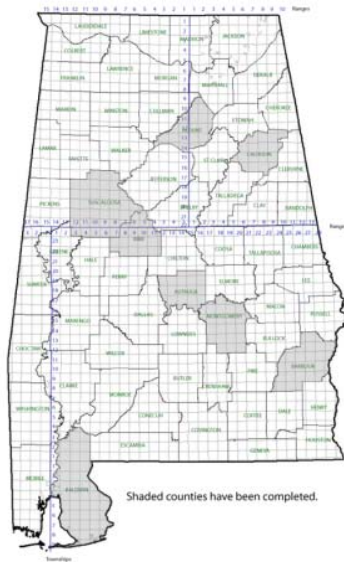
This growing network of monitoring wells now allows the State to evaluate: 1) water production; 2) impacts of climate on groundwater levels; 3) land use effects on groundwater levels; and, 4) salt water intrusion potential in coastal areas. The GSA, as Alabama's natural resource research agency, has authored more than 150 published and open-file reports, providing results of water-related research. The GSA has continued working on assessments of groundwater availability and capacities based on the initial funding provided for this effort in FY2009. The recently funded assessments by GSA and the Office of Water Resources (OWR) will result in the collection of additional water resource data and the compilation and further analysis of existing data.

The United States Geological Survey (USGS) provides current ("real-time") data on the web for over 200 sites in Alabama including stream flow (176 sites), water quality (13), groundwater levels (9 sites), precipitation (29 sites), and lake levels (1 site). Periodic groundwater level data are also available for 23 additional stations. As an example, the USGS provides real-time stream flow data on the web as shown in Figure 18. The USGS in cooperation with OWR also operates the *Climate Response Network* and the *Alabama Active Water Level Network* on the USGS website. The *Climate Response Network* includes seven sites in five local aquifers that are color-coded with the current percentile deviation from normal water-level measurement at the site (source: USGS.gov).



GSA Real-Time Groundwater Level Monitoring Wells

GSA Periodic Groundwater Level Monitoring Wells



GSA Scanned Well Records

Figure 17. Geological Survey of Alabama data on the web.

Current Conditions for Alabama: Streamflow -- 176 site(s) found
PROVISIONAL DATA SUBJECT TO REVISION

Predfined displays: Alabama Streamflow Table | Group table by: no grouping | Select sites by number or name: | go | show sites on a map

[Customize table to display other current-condition parameters](#)

Station Number	Station name	Date/Time	Gage height, feet	Dis-charge, ft ³ /s	Long-term median flow 5/29
● Alabama					
02339495	OSELIGEE CREEK NEAR LANETT AL	05/29 14:45 CDT	3.26	57	15.0
02342500	UCHEE CREEK NEAR FORT MITCHELL, AL.	05/29 15:00 CDT	0.70	81	110
0234296910	CHATTAHOOCHEE RIVER AT COAST GUARD DOCK AT EUFAULA	05/29 14:00 CDT	188.80	--	---
023432415	CHATTAHOOCHEE R. .36 MI DS WFG DAM NR FT GAINES, GA	05/29 15:30 EST	105.62	23,100	4,160
02361000	CHOCTAWHATCHEE RIVER NEAR NEWTON, AL.	05/29 15:00 CDT	3.54	113	402
02361500	CHOCTAWHATCHEE RIVER NEAR BELLWOOD AL	05/29 14:45 CDT	3.70	454	626
02362000	CHOCTAWHATCHEE RIVER NEAR GENEVA, ALABAMA	05/29 14:00 CDT	3.13	--	---
02362240	LITTLE DOUBLE BRIDGES CREEK NR ENTERPRISE, AL.	05/29 15:00 CDT	2.76	8.8	15.0
02363000	PEA RIVER NEAR ARITON AL	05/29 15:00 CDT	2.01	29	162
02364000	PEA RIVER AT ELBA, AL.	05/29 15:00 CDT	7.39	--	---
02364500	PEA RIVER NEAR SAMSON AL	05/29 15:30 CDT	4.26	248	780
02369800	BLACKWATER RIVER NEAR BRADLEY AL	05/29 15:00 CDT	0.81	28	54.0
02371500	CONECUH RIVER AT BRANTLEY AL	05/29 15:00 CDT	0.99	82	215
02372250	PATSALIGA CREEK NEAR BRANTLEY AL	05/29 15:00 CDT	2.90	53	213
02372422	CONECUH RIVER BEL PT A DAM NR RIVER FALLS, AL.	05/29 14:45 CDT	7.24	76	337
02372430	CONECUH RIVER AT RIVER FALLS, ALABAMA	05/29 14:45 CDT	2.00	--	---
02373000	SEPULGA RIVER NEAR MCKENZIE AL	05/29 14:45 CDT	3.31	84	144
02374250	CONECUH RIVER AT STATE HWY 41 NEAR BREWTON, AL.	05/29 15:30 CDT	9.00	807	1,120
02374500	MURDER CREEK NEAR EVERGREEN AL	05/29 14:45 CDT	3.11	94	158
02374700	MURDER CREEK AT STATE HWY 41 AT BREWTON, AL.	05/29 14:30 CDT	9.69	151	230
02374745	BURNT CORN CREEK AT STATE HWY 41 NEAR BREWTON, AL.	05/29 14:30 CDT	2.89	32	57.0
02374950	RIC ESCAMBIA CR AT SARDINE BR NR STANLEY CROSSROAD	05/29 15:30 CDT	1.68	76	96.0

Figure 18. U.S.Geological Survey real-time stream flow data on the web.

The Alabama Department of Environmental Management has maintained a surface water-quality monitoring and assessment program since 1974 and developed a coordinated statewide monitoring strategy in 1997. The monitoring programs that comprise the overall strategy cover both wadeable and non-wadeable rivers and streams, reservoirs, coastal waters and wetlands. Data collection and management efforts follow specific, documented, quality protocols and methods that allow the State to evaluate the generated data for: 1) determination of long-term trends; 2) estimation of overall water quality; 3) identification of high-quality and impaired waters; 4) development of water-quality standards; and 5) evaluation of designated use and water-quality standards attainment. All monitoring data are managed and reported using the ADEM ALAWADR water quality database and submitted through STORET (short for STOrage and RETrieval) (Fig. 19).

STORET
 You are here: EPA Home » Water » Wetlands, Oceans, & Watersheds » Monitoring and Assessing Water Quality » STORET » STORET Data Warehouses » Warehouse Reports » Data Download

STORET Central Warehouse

STORET Data Report

Geographic Location

Select a single type of location search that you wish to perform (state/county, latitude/longitude, or HUC). Then enter the corresponding search criteria.

State/County (Option A)

State Name: ALL | County Name: ALL | [Look Up](#)

Select one or more state(s) (Option B)

ALL, ALABAMA, ALASKA, AMERICAN SAMOA, ARIZONA, ARKANSAS, BAKER ISLAND, CALIFORNIA, COLORADO, CONNECTICUT

Latitude/Longitude (in decimal degrees) (Option C)

North Limit: 90 | West Limit: 180 | East Limit: 0 | South Limit: 0

[Click image for interactive map](#)

Select one or more Drainage Basin/HUC (Option D)

Use the Look Up button to create a list of Cataloging Unit(s)

HUC CODE	HUC NAME

Figure 19. Entry way for STORET central data warehouse.

As Alabama's environmental regulatory agency, the ADEM submits all surface water quality monitoring data to EPA's STORET Data Warehouse. STORET is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others. These organizations submit data to the STORET Warehouse to make their data publically accessible

Since the passage of the Alabama Water Resources Act in 1993, the OWR has been collecting and developing information and data needed to better understand Alabama's water usage trends and future needs. This effort involves various programs, initiatives and coordination with a wide range of federal, state, regional and local organizations as well as a broad cross-section of stakeholders. One of the major activities, administering the Alabama Water Use Reporting Program, is the collection and management of water use data. The program requires the registration of all public water systems and those water consumers using 100,000 gallons per day or more and the collection of annual water use data. The annual water use data is compiled in the program's management application "eWater" (Fig. 20). In addition to the annual collection of water use data, OWR also works on periodic, more comprehensive water quantity assessments of Alabama's water resources. In partnership with the USGS, OWR

has worked to expand the Alabama component of the national water use summary. This summary is a compilation of water use data conducted every five years. The most recent report for Alabama was published in 2009 using 2005 data.

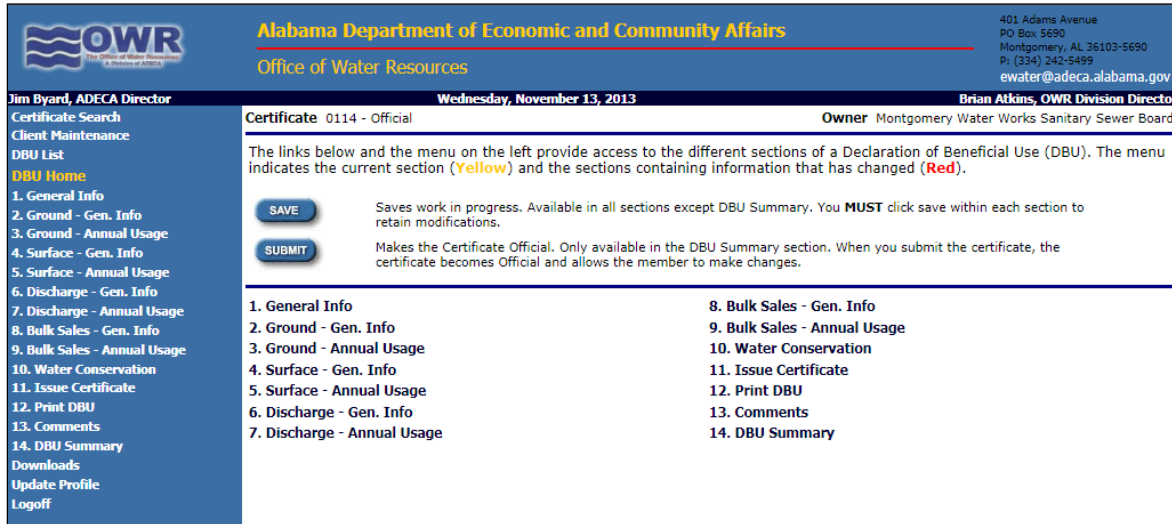


Figure 20. Main menu from eWater application

Water resources data from these many sources are available, in varying degrees, to stakeholders and the general public. These data sources are currently distributed among several agencies and the formats, nomenclatures, and units are inconsistent. Some data are available electronically on the web or by request, while other data are available only in paper format.

Available data are not always associated with their respective collection or analysis methods and quality-related information necessary to determine their proper use and reliability for making decisions. Appropriate data with known quality standards are necessary to support good water resource management decisions. As such, data quality standards should be established (similar to those utilized by ADEM) so that data can be used for analysis and so that any comparisons and trends are based on accurate, consistent, and compatible information. Standards including metadata, to ensure that information related to how, when and where the data was collected and by whom, should be required.

The OWR began a cooperative partnership with the USGS in 2008 to develop preliminary assessments of surface water availability for river basins in Alabama beginning with the Tennessee River. This effort involves a partnership with USGS and OWR and the USGS Cooperative Match Program (providing a 50/50 match of OWR dollars). This is an example of the opportunities available to Alabama in leveraging additional funding to support statewide efforts. Further progress with water resource assessments will depend on the continued availability of state funding. The OWR will continue to work with State agencies and the Water Resources Technical Advisory Committee to explore opportunities, to work cooperatively, and to assist with implementing the recommendations of the Water Resource Assessments, Studies, Data

Collection and Storage subcommittee of the Permanent Joint Legislative Committee on Water Policy and Management.

The Water Resource Assessments, Studies, Data Collection and Storage subcommittee of the PJLCWPM issued a final report in 2008. This subcommittee evaluated many topics related to water resource data, studies, and assessments and several recommendations were adopted by the legislature. These recommendations were grouped into five areas: water assessments, on-going statewide water assessment initiatives, data shortfalls, data storage and sharing technologies, and public access needs.

Considerations:

- Alabama's capacity for acquiring surface water and groundwater data is less than desirable for implementing meaningful water resources management. The State does not operate continual surface water flow monitoring stations, instead relying on or partnering with other agencies such as the USGS, U.S. Army Corps of Engineers, Alabama Power Company, and the Tennessee Valley Authority for this function in all river basins.
- Recent closures of USGS stream-flow monitoring sites in Alabama, and the threat of future gauge closures, illustrates that water resources management in Alabama is vulnerable to political and economic uncertainties up to the national level.
- Collecting water resources data should be a cooperative effort between federal and State water agencies. However, development of assessment methodologies, determination of capacities, and calculation of allocations should be a State function exclusively.
- The quality of water resources data should be assured through documented quality assurance/quality control processes to enable these data to withstand legal challenge and thereby be usable for the purposes of making water resource decisions.

Stakeholder Comments:

- Many stakeholders raised the issue of water resources data as a high priority issue.
- Many stakeholders stated the importance of developing and funding a comprehensive data collection program. After such data are available, State agencies can better consider whether the policy options identified in the WMIA report would be effective in resolving issues identified by the data, and stakeholders would be better able to contribute meaningful comments on proposed policies and plans.
- There must be adequate funding available for comprehensive, unbiased data collection.
- Science should inform the development of water policy. Any plan must be science-based and data-driven. Science and data must not only shape decisions on a State level, but also on a regional and watershed level.

- Multiple stakeholders supported SJR 5 (Act 2009-10) legislation outlining a data collection network to be deployed in Alabama. Funding for this network should be a priority.
- Stakeholders supported the concept of leveraging data collected by other entities through the establishment of data standards and protocols.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding water resources data:

- Enhance statewide networks of water resource monitoring stations to allow monitoring of precipitation, water quantity (including stream flows and groundwater levels), and groundwater and surface water quality.
 - Expand monitoring networks including water-quality stations, stream flow stations, precipitation stations, and groundwater observation wells.
 - Install real-time sensors at key stream flow stations, observation wells, precipitation stations, and water quality stations in order to provide immediate data for decision makers.
 - Expand aquatic biological monitoring and develop biological criteria for surface waters.
- Establish a State water resources information center using an integrated, computerized data network that is coordinated with existing federal and State databases.
 - *An Environmental Protection Plan for the State of Alabama*, a 1989 report by the Alabama Environmental Planning Council, recommended establishment of a centralized water resources database. The Alabama Water Resources Study Commission reiterated this need through the following recommendations.
 - Establish a State “Water Resources Information Center,” including a comprehensive water resources reference collection and computerized databases at scientific water resource agencies, networked to water regulatory and management entities.
 - Establish a data quality assurance program which sets quality control guidelines for data included in the network. Establish and maintain a long-term, baseline data network to monitor trends in the quantity, quality, and distribution of State surface and groundwater. This network must be sufficient to meet planning and monitoring needs into the foreseeable future.

(Status: GSA and USGS continue to expand the State’s groundwater monitoring network and provide access to real-time or near real-time data via the internet. ADEM maintains a network of water quality monitoring stations statewide where specific water quality and biological parameters are measured on a regular frequency. In addition, ADEM conducts river basin-

specific monitoring on a five-year rotating basin cycle. All ADEM water quality and biological data are available to the public via their ALAWADR system. Access to near real-time and archived surface water data is also available through the USGS web page for many locations throughout Alabama. TVA provides near real-time data and archived data for rivers and reservoirs in the Tennessee River Basin, and Alabama Power Company makes reservoir and hydropower release information available via their web page. In addition, the U.S. Army Corps of Engineers provides stage and discharge information via the Mobile District's web page. Near real-time and archived precipitation information is available from the National Weather Service web page for numerous locations in Alabama.)

2011 Water Resource Assessments, Studies, Data Collection and Storage Subcommittee Recommendation:

The Subcommittee supports the need for the establishment of data collection and storage standards among all State and local agencies to ensure that the information being collected and used to assess the water resources of the State is consistent and dependable. Standards should comply with any legal or federal criteria to ensure the maximum possible reliability and usefulness.

Policy Options:

Implementation of the Alabama Water MAP process should be based on, and supported by, a robust and scientifically developed set of water resources data. Resources to support these efforts should be a priority in the budgeting process.

- Continue integrated assessment of the State's surface and groundwater resources that are central to the statewide water management process.
- Provide resources and support for instream flow studies to evaluate existing flow tools and for determining an acceptable framework for implementing future instream flow requirements, if deemed appropriate.
- Fund key monitoring activities to include:
 - Continue working to enhance the State's groundwater monitoring system to ensure coverage in all aquifers and include the collection of groundwater quality data (related to PJLCWPM Subcommittee 2008 report; Recommendation 4).
 - Evaluate Alabama's existing stream gauge network and identify improvements needed to support the Alabama Water MAP process (related to PJLCWPM Subcommittee 2008 report; Recommendation 3).
 - Enhance Alabama's water quality monitoring network.
 - Enhance Alabama's rainfall and soil moisture monitoring networks to support the Alabama Water MAP process. This activity should be coordinated through the State Climatologist and in conjunction with the Community Collaborative

Rain, Hail, and Snow (CoCoRaHS) public network (related to PJLCWPM Subcommittee 2008 report; Recommendations 1 and 2).

- Develop cost estimates for operating and maintaining the State's water data collection and reporting capabilities. Utilize the Water Resources Data Technical Advisory Committee established by the PJLCWPM to communicate these needs and data results, and to make recommendations on needed enhancements in data collection efforts.
 - The Water Resources Data Technical Advisory Committee should consider the need for a formal process to coordinate state monitoring activities.
- Establish a water resources data clearinghouse accessible by the public via a web portal (related to PJLCWPM Subcommittee 2008 report; Recommendation 5).
- Develop consistent and reliable data quality standards and protocols for the acquisition and management of water information. Apply these standards to all data collected and stored that is used to assess, monitor, and allocate water resources (related to PJLCWPM Subcommittee 2008 report; Recommendation 6).

Additional materials Considered:

Alabama Environmental Planning Council, 1989, *An Environmental Protection Plan for the State of Alabama*, 62 p.

Permanent Joint Legislative Committee on Water Policy and Management (WPM Subcommittee): Water Resource Assessments, Studies, Data Collection and Storage Subcommittee Meeting Summary (9/10/2008), 2008.

Report to the Permanent Joint Legislative Committee on Water Policy and Management: 2011 Status Report (3/1/2011).

<http://al.water.usgs.gov/> (5/29/2013).

<http://www.gsa.state.al.us/gsa/water/index.html> (5/29/2013).

<http://www.adeca.alabama.gov/Divisions/owr/Pages/WaterManagement.aspx#Program> (7/9/2013).

INSTREAM FLOW

Overview:

With increasing population growth and associated water needs in Alabama, and the region's susceptibility to extreme drought events, there exists a real possibility in the future of depleting surface and groundwater supplies if they are not managed in a comprehensive and reasonable way. Depletion of water resources has major implications beyond fulfilling the needs for humans. Excessive and inefficient water use and the alteration and modification of instream flow can lead to diminished fish and wildlife populations, degraded wetland/riparian areas, reduced opportunities for recreation, and stifled economic activity.

Water scientists and aquatic biologists generally agree that natural stream flow with all of its variations through seasonal flood events, low flows in summer, and high flows in late winter and spring (inter- and intra-annual natural flow variability) (Fig. 21) is a significant ecological controlling variable in nature helping to recharge groundwater aquifers, create and maintain aquatic habitat, support fish and wildlife populations, and maintain acceptable water-quality conditions (Annear and others, 2004).

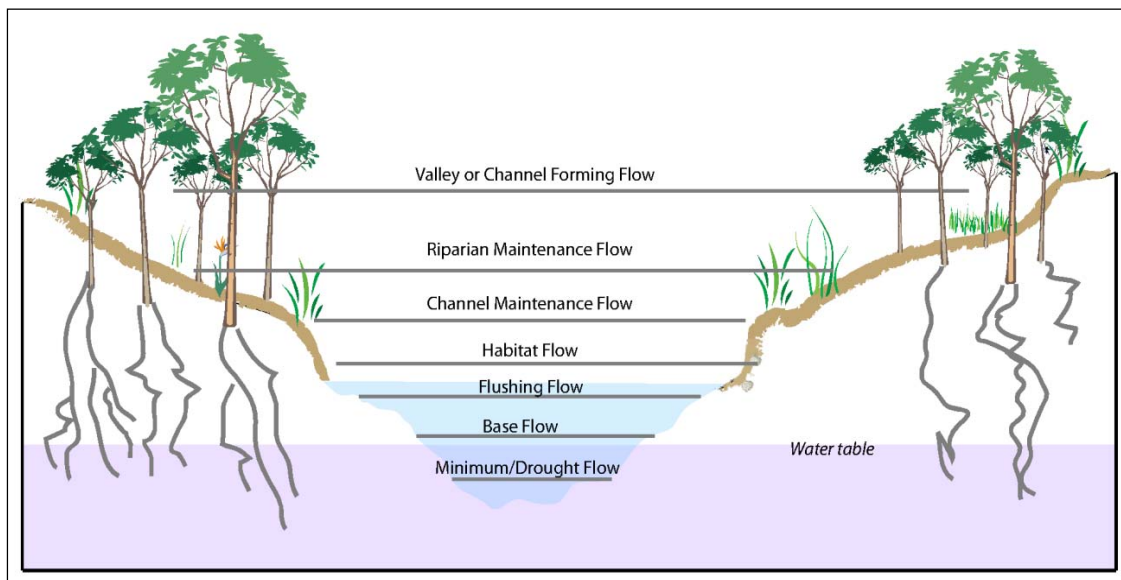


Figure 21. Classification of instream flows relative to ecological functions (modified from Annear, 2004).

This free-flowing characteristic is a fundamental feature of highly functional river and stream systems. Instream flow has been historically thought of as just one of many equally important variables, such as water quality, energy sources, habitat, and biological factors that work collectively to determine local ecological condition (integrity). This concept has, however, shifted to a more modern view with the increasing importance of instream flow regime as the "master variable" controlling, in large part, most of the other variables which shape ecological integrity (Fig. 22) (Resh and others, 1988; Power and others, 1995; Poff and others, 1997).

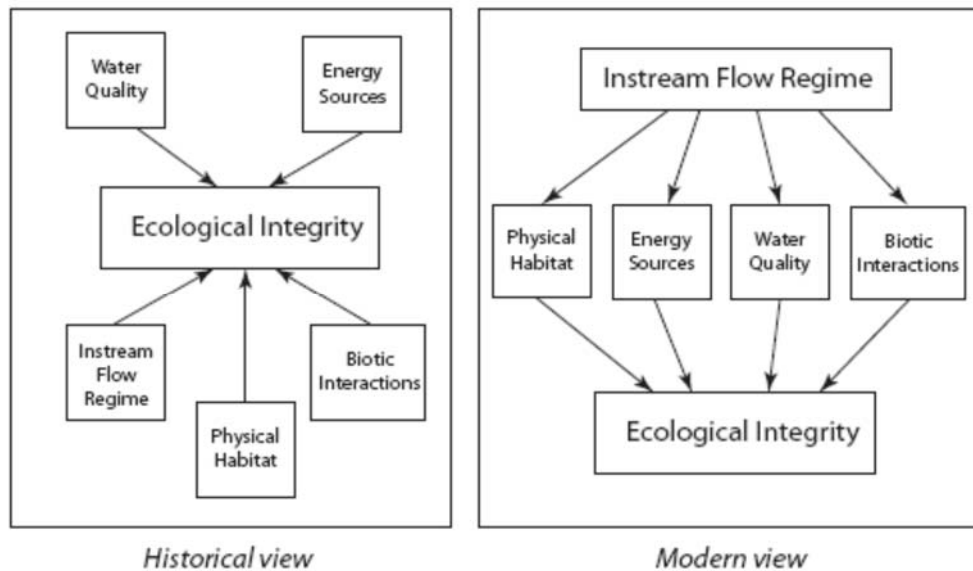


Figure 22. Relationship between instream flow and other factors affecting ecological integrity (modified from Karr and Dudley, 1981; Karr, 1991).

Instream flow can be defined as the amount of water required for instream uses including maintaining water quality standards; protection of freshwater and estuarine fish and wildlife habitat, migration, and propagation; outdoor recreation activities; downstream uses; navigation; power generation; waste assimilation; future needs; and ecosystem maintenance, which includes recruitment of freshwater to estuaries, riparian areas, floodplain wetlands, and maintenance of channel geomorphology (Fig. 23). Each of these uses can be assigned varying economic, social, and ecological benefits that should be balanced when uses compete with one another. The instream flow use referred to as environmental, ecological, or conservation flow is that amount of flow in a stream or river channel that adequately supports the full suite of ecological functions (biodiversity, channel maintenance, floodplain inundation). It is defined with respect to the timing (seasonal), frequency (how often), magnitude (size of flood or drought events), rate of change (how quickly is water delivered during floods), and duration (how long do the floods and droughts last) to ensure ecosystem functionality. Conceptually, conservation flow includes high (flood) flows, flows during dry periods of the year, including droughts, in addition to those average flows.

Instream flows are often thought of as only minimum flows as depicted in Figure 21. Minimum flows may not fully protect instream uses and values. The concept of a minimum flow standard or regime has led to many rivers and streams becoming depleted and damaged with respect to their hydrological and ecosystem function because the flow variability component has been removed. Minimum flows actually become maximum flows in highly used, hydrologically altered systems because managed flows are rarely allowed to exceed this "minimum" limit.

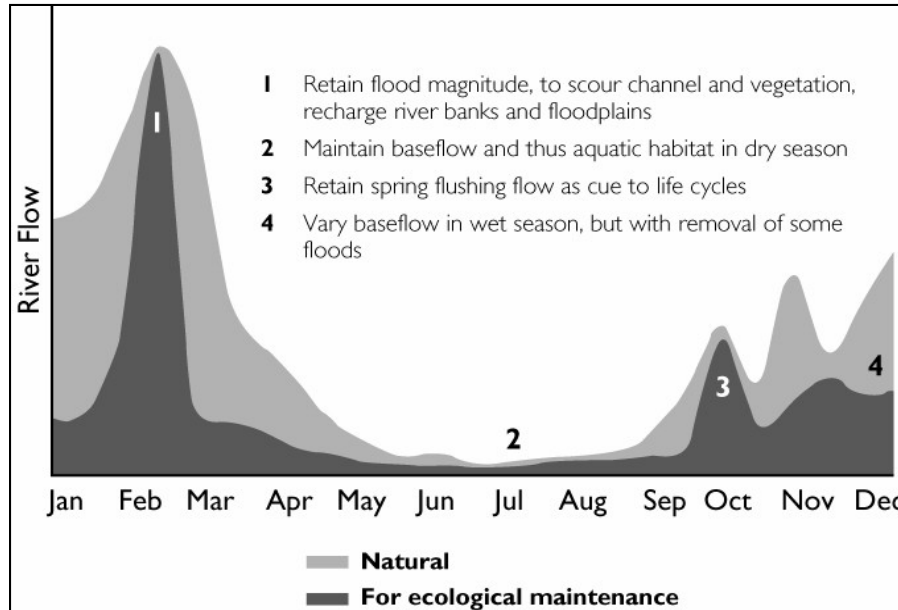


Figure 23. Representation of annual flow regime with instream flow requirement for ecological maintenance indicated by the dark shaded polygon (adapted from Postel and Richter, 2003).

The management questions that arise from this concept of instream flow are (1) how can/will this hydrologic regime be implemented within water resource management policies to allow for protected ecological functions and uses yet allow full development of water resources for human needs and economic activities for off-stream uses, and (2) how much ecological/biological degradation are we willing to socially accept given a certain level of water resource development? The answers to these questions are complex but informed solutions can be provided through implementation of practical research to provide answers to flow-related ecological questions.

Instream flow management approaches vary widely from state to state, and there are few national standardized methods for linking flow quantity and duration to state and local water needs and requirements while considering stream ecology, riparian areas, and floodplain habitats. Federal environmental legislation such as the Clean Water Act, Endangered Species Act, and National Environmental Policy Act can play an indirect role in protecting instream flow through specific regulatory requirements and programs while management activities of the U.S. Army Corps of Engineers and others directly impact water quantity and availability. The regulated riparian regime of permits and licenses (Dellapenna, 1997) has become standard for some eastern states and requires adaptive elements, like instream flow requirements, for effective management of water uses and supply across watersheds and whole basins.

Successful management of an instream flow regime requires that science-based procedures are applied not only in the initial planning stages of water resources management but also in the research and application phases as well. Stakeholder comments to the *Water Management Issues in Alabama* report reinforced this concept with many suggesting that instream flow studies, as well as water resources management

in general, should be based on solid water assessment data and application of the sound science.

An example of a process for evaluating and integrating instream flow into a water management framework was proposed by Poff and others (2010). The ELOHA (Ecological Limits of Hydrologic Alteration) process is a framework for water managers, scientists, and water stakeholders to analyze and synthesize available scientific information into logical, ecologically based, and socially acceptable goals and standards for management of ecological flows. It can be used for determining and implementing ecological flows on a regional scale, such as states, using existing hydrological and biological information. The concepts and ideas of the ELOHA framework have been applied in different ways in several states (Michigan, Massachusetts, Connecticut, Ohio, Rhode Island) and river basins (Susquehanna) leading to a determination of instream flow acceptable to water stakeholders (Kendy and others, 2012).

Some states in the southeast, including Alabama, have taken the approach of using the Public Trust Doctrine through their state water resource agencies to protect instream flow; however, the full extent of inter- and intra-annual flow variability is generally not considered in these negotiated site-specific instream flow requirements.

The Alabama Department of Conservation and Natural Resources (ADCNR) adopted an instream flow policy in 2012 under the Public Trust Doctrine for all flowing waters of the State. This policy was the first State agency step to managing instream flow in a more comprehensive, ecologically protective manner in Alabama and will require further work on specific implementation details. Instream (conservation) flow regimes have been prescribed for some main river channels in Alabama by ADCNR usually through Federal Energy Regulatory Commission (FERC) negotiated site-specific flow requirements for large utility projects.

The trustee powers and duties of ADCNR were established in 1939 (*Code of Alabama*, 1975, §9-2-2). That statute states, “The general functions and duties shall be as follows: To protect, conserve and increase the wildlife of the state and to administer all laws relating to wildlife and the protection, conservation and increase thereof.” Maintaining ecologically significant instream flows is fundamental to fulfilling the trustee resource conservation requirements of the ADCNR. The public trust doctrine provides an indirect means of protecting flow-dependent fish and wildlife resources held in trust for the people of the State. But while the public trust doctrine regarding water appears to be embedded in Alabama law (*Code of Alabama*, 1975, §9-10B-2), clear policies and laws of water ownership/stewardship and the need to maintain balanced, natural flow variability will be required to strengthen and enhance the State’s ability to manage water resources.

The following is a summary of instream flow policies in Alabama and surrounding states:

Alabama - Alabama has no law prescribing instream flow standards. The ADCNR has, however, implemented a specific agency policy for instream flow to serve as guidance in all of its negotiations with industries and other agencies with regard to protecting aquatic

habitat, fish, and wildlife. This policy is based, in part, around the percentage-of-flow approach used in several states.

Florida - Instream flow in Florida is addressed by a statute that obligates each of the state's five water districts to establish minimum flows for all surface watercourses in the area defined as "the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." FLA. STAT. sec. 373.042(1)(a) (2002).

Georgia - In 2001 Georgia shifted generally from a 7Q10 minimum flow standard to an interim modified Tennant approach (percentage of flow) policy that preserves flows by seasonal variation under which permit applicants are allowed to choose one of the following three options: (1) use of a monthly 7Q10, (2) a site-specific flow study from which seasonal instream flows would be derived, or (3) one of the mean annual flow options.

Mississippi - Mississippi has statutory authority to establish and maintain minimum instream flows. Mississippi Code sec. 5-3-3(i) (2003) provides for an established minimum flow of the average stream flow rate over 7 consecutive days that may be expected to be reached as an annual minimum no more frequently than 1 year in 10 years (the "7Q10" stream flow) or any other stream flow rate that the MDEQ may determine and establish using generally accepted scientific methodologies considering biological, hydrological and hydraulic factors.

Tennessee - Sec. 68-221-702 of the Tennessee Code Annotated "Declaration of policy and purpose" states: "Recognizing that the waters of the state are the property of the state and are held in public trust for the benefit of its citizens, it is declared that the people of the state are beneficiaries of this trust and have a right to both an adequate quantity and quality of drinking water." Both the Water Quality Control Act and the Tennessee Wildlife Code require that water withdrawal not result in a condition of pollution or harm to aquatic habitat and that resulting instream flows provide for the protection of fish and aquatic life. Protection and conservation of fish, aquatic life, and aquatic habitat require that, as a result of withdrawal, instream flow not be less than the September median flow or a more conservative multiple of the September median flow and reflect the natural stream hydrograph.

Considerations:

- Maintaining sufficient instream flows is fundamental to sustaining water quality, providing the full spectrum of flows for recreational purposes, protecting ecological functions, and creating sufficient and productive habitat.
- The science of instream flow is maturing within the context of regulated riparian systems but, there is inadequate research for Alabama streams relating instream flow to biological condition, habitat quality, and ecological functions.
- While it may be desirable to conduct site-specific hydrologic modification studies for all waters of the State, resource limitations may require studies on a small percentage of waters and the use of other analysis methodologies. The ELOHA process is an example of a tool that could be used to provide a scientific process to accomplish the goal of assessing instream flow across large regions.

- Under Alabama's current management regime for water withdrawals, the ability to implement and enforce specific withdrawal limits or specify instream flow protections could be complex and cumbersome. Enforcement of such protections would require a multi-agency coordination process with clearly defined agency responsibilities working around common and well-defined water resource management objectives and goals.
- Static minimum instream flows, as implemented in some states, do not reflect the natural inter- and intra-annual flow variability to which most aquatic and riparian ecosystems are adapted. The ecological risk of adopting static minimum flows is that they can and will become maximum flows which will further constrain and degrade aquatic systems. Disruption or modification of the natural flow patterns through a minimum flow standard puts aquatic ecosystems at risk of significant degradation.
- The ADCNR adopted an instream flow policy in 2012 to provide guidance for improving the process of instream flow determination and implementation for their departmental activities.
- The Federal Water Pollution Control Act, also known as the Clean Water Act (CWA), reserves the right for states to manage water resources, including water quantity. While the CWA requires states to address pollution and its sources, it stops short of mandating the management of water use. Instead, this important aspect of water resource management is left to individual states to address through their respective legal processes.

Stakeholder Comments:

- Water centered tourism is a driving force of many local economies and lowered water levels and flow rates will hurt some local economies severely. Angling and other water-based recreational services are generally best delivered under close approximations to natural flow regimes and water quality. Environmental stakeholders suggested that no one should be allowed to remove water to the detriment of aquatic life and habitat. Additionally, they suggested that no one should be exempt from the limits of a statewide water resources management plan. Adequate flows and lake levels are critical to the economy of many local regions. Events in Georgia must be considered in developing Alabama's water plan.
- Business and industry stakeholders were less inclined to support expanded programs to manage instream flow within the context of a formal permitting system.
- Environmental stakeholders were united in promoting adoption of a regionalized river and stream classification system and developing instream flow standards for the classification. They suggested that the best available science should be used to determine instream flows necessary for ecosystem health. Environmental stakeholders also commented that this issue should be at the top of the water agenda and is a cornerstone of any water resources management plan. Instream

flow standards should be site specific and based, in part, on their ability to protect water-quality standards. Finally, they advocated for water policy that addresses ecological flows necessary to maintain the full spectrum of riverine species, processes, and uses.

- Water utilities expressed support for instream flows in conjunction with water-use permitting and to consider instream flow on a case-by-case basis using sound scientific methodology. However, water utilities emphasized that maintaining treatable, healthy waters for human consumption must be considered the first priority of water use and management. They expressed concerns about low summer flows, phosphorous regulations, and costs to meet nutrient criteria. Water utilities also suggested that instream flow be required below dams.
- Several stakeholders suggested that environmental flow standards should be based on the best scientific data available. It was also recommended to select and convene an independent group of scientists to provide recommendations.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report recognized that instream flow was important to the overall process of water management in Alabama and offered two specific recommendations:

- Develop and enact legislation which sets forth the basis for establishing and protecting instream flow and uses of Alabama streams.
(Status: This recommendation has not been implemented.)
- Develop supporting administrative rules and regulations needed to determine the instream flow required to accommodate competing interests, establish maximum withdrawal quantities, and protect instream uses.

(Status: This recommendation has not been implemented.)

Policy Options:

- As discussed under the Alabama Water MAP process, AWAWG recommends the creation of an Instream Flow Focus Panel. The initial charge to the panel should be to:
 - Research scientific approaches, including those used in other states, to assess concepts and criteria for statewide instream flow management;
 - Recommend a study approach for evaluating instream flow. These efforts would consider, at a minimum, assessments and demonstration studies of streams with hydrologic alterations and establishing an instream flow monitoring network for tributary systems; and
 - Recommend implementation strategies.
- Provide support and resources for the appropriate water resource agencies to continue investigation of the instream flow needs of Alabama's aquatic

ecosystems and for evaluating the utility of existing flow tools for management purposes.

Additional materials considered

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WATER CONSERVATION AND REUSE

Overview:

Water conservation is reducing the use of, reusing, and recycling water to prevent waste and use water efficiently. The *Water for a Quality of Life* report recommended the adoption of a statewide policy supporting water conservation and initiation of a local water conservation effort by encouraging water systems to prepare conservation programs, including conservation education, which could be implemented during droughts and in areas where it may be desirable or necessary to reduce water demand. Water conservation plays a significant role in preserving water quality and reducing water loss and water waste. It can be undertaken in residential, commercial, and industrial applications, and can have a beneficial impact on meeting the challenges of water usage in the State by preserving public drinking water supplies, and delaying the need to find additional sources of water.

Water usage can have a major impact on the State's water bodies, recreational activities, and economy but water conservation can help ease the problems caused by excessive water usage. Water conservation not only reduces the amount of water needed for public water systems but also conserves the energy required to treat and distribute water and preserves the habitats of local wildlife and migrating waterfowl by allowing water to remain and flow in natural channels. Changing weather and climate patterns make water conservation especially important in drought situations. Water conservation can include anything from fixing a leak, turning off water when not in use, collecting rainwater for watering a garden, to reusing non-potable water for agricultural and industrial needs and using drip irrigation on farms. Conservation also involves efforts to ensure that public water systems and large commercial and industrial water consumers are using water as efficiently as possible.

Water reuse is just one component to be considered as part of an overall water conservation program. Reuse of wastewater is a valid option to conserve valuable water resources, reduce overall water treatment costs, and reduce the release of pollutants into streams and rivers. With development of water reuse regulations by the Alabama Department of Environmental Management (ADEM), statewide water policies, and a comprehensive water resources management plan that incorporates water conservation and reuse, the State can encourage water conservation and further advance water reuse in residential, agricultural and industrial applications and develop strategies and measures, both voluntary and mandatory, to address droughts and emergency situations.

The opportunities for water reuse include:

- Urban reuse—the irrigation of public parks, schoolyards, highway medians, and residential landscapes, as well as fire protection and toilet flushing in commercial and industrial buildings.
- Agricultural reuse—irrigation of non-food crops such as commercial nurseries and pasture/forest lands. High-quality reclaimed water may be used to irrigate food crops.

- Recreational/aesthetic reuse—ponds and lakes such as those found in residential developments or public parks and irrigation of golf courses or public ballparks.
- Environmental reuse—creating artificial wetlands, enhancing natural wetlands, and sustaining stream flows.
- Industrial reuse—process or make-up water and cooling water and other non-process uses such as dust suppression on industrial access roads.

Considerations:

- A tension exists within public water systems between the need to conserve water and a financial model predominantly based on water sales.
- There is no State system or standard for measuring water efficiency among public water systems.
- ADEM's Drinking Water program encourages water conservation and efficiency as part of its regulatory oversight of the State's public drinking water systems.
- The State's drought planning and response process, managed by the Alabama Office of Water Resources (OWR), provides a mechanism for emphasizing water conservation and efficiency.
- Citizens and stakeholders have varying levels of knowledge about the need for water conservation. The development of an educational outreach program should take this variation into account.
- The successful integration of voluntary water conservation measures is dependent on whether citizens and stakeholders support and implement the policy.
- The public may be less receptive of water reuse if they believe the recycled water is from a common public wastewater source.
- ADEM is currently developing water reuse regulations. In the interim, ADEM has utilized the National Pollutant Discharge Elimination System (NPDES) wastewater permitting program as the mechanism to allow water reuse.

Stakeholder Comments:

- There is general (but not unanimous) support for water conservation and reuse as part of a statewide water management plan.
- Environmental groups suggest that water efficiency measures and conservation should be considered before new sources of water are developed and should be a central focus of water policy.
- Several stakeholders support the development of water reuse regulations and clear guidelines for implementation.
- Water utilities caution that mandatory water conservation measures could result in higher costs for water users and that water reuse can be expensive.

- Agricultural interests suggest that many land and crop conservation measures implemented by farmers have water conservation benefits.
- Water reuse can provide benefits in water-quality limited streams.
- Low impact development, green infrastructure, and stormwater capture for aquifer recharge were suggested as water conservation and reuse practices.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding water conservation.

- Adopt a statewide policy supporting water conservation and initiate local water conservation by encouraging water systems to prepare conservation programs. The program would be implemented during droughts and in areas where it is desirable or necessary to reduce water demand.
 - Enact legislation to require local water conservation when water supply disruption or loss would jeopardize either the health of citizens or economic well-being of an area
 - Empower the Alabama Water Resources Agency to develop model water conservation programs, provide technical assistance to local public entities, and review local water conservation plans to ensure they are capable of attaining State conservation objectives.
 - Use locally prepared programs to accomplish water conservation. Examples of measures to be included in local conservation programs are amending the plumbing code to require the use of "low flow" fixtures, developing landscape water conservation practices, and curtailing certain other outdoor water uses.
 - Support water conservation education programs.

(Status: Several public water supply utilities in Alabama have developed drought mitigation plans which incorporate water conservation as a primary focus of drought mitigation efforts. In addition, many water supply utilities provide water conservation information and tips to their customers via the utility's web page or with the monthly billing statement during periods when water conservation may be necessary. ADEM is currently drafting regulations that will guide the reuse of treated wastewater.)

Policy Options:

- As discussed under the Alabama Water MAP process, AWA WG recommends the creation of a Water Conservation, Efficiency, and Reuse Focus Panel. The initial charge to the panel should be to recommend components of a statewide water management plan to:
 - Evaluate potential water conservation and efficiency incentives that can be implemented by public utilities with consideration for the quality of service and the cost of water delivery.

- Evaluate the state's role in establishing water efficiency standards and methods to measure conservation and efficiency.
- Evaluate the role of water reuse, if any, in water conservation efforts.
- Ensure that adequate local voluntary and mandatory water conservation measures are established by local or State authorities during times of drought and are in accordance with the State's Drought Management Plan.
- Support development of water reuse regulations to conserve water while being protective of human health and water quality and promote water reuse as a practical conservation measure.
- Develop a public education program presenting the need for and benefits of water conservation and reuse.

ECONOMIC DEVELOPMENT

Overview:

Alabama has surface and groundwater resources that can provide the necessary water to support population growth, maintain and improve our quality of life, and sustain our diverse natural resources. This availability of water is also critical for industry, agriculture, transportation, recreation, power generation, and tourism, all of which drive economic health, growth, and job creation in Alabama. However, water resources are not uniformly distributed through all parts of Alabama and the identification of areas of the State where water resources are plentiful and available for these needs would assist the State in its industrial recruitment efforts by ensuring that water would be available for proposed uses.

In addition to the consumptive water needs for business and industry, there is a need to ensure that waterborne transportation remains a viable component in the State's intermodal transportation infrastructure. Although outside the direct focus of the AWWG effort, navigation over Alabama's waterways provides a cost effective alternative to rail and trucking as a method of transporting goods and raw materials and a significant incentive for attracting certain industries. The appropriate support and investment in waterway and port facilities should be encouraged.

Some infrastructure investments (i.e. water and wastewater treatment plants) can provide significant and long-term returns on investment to both local areas and the State's economy in general. Several State and federal funding programs exist to help meet water and wastewater infrastructure needs. Federal programs include the USDA Rural Development Program as well as the U.S. Army Corps of Engineers' Planning Assistance to the States Program. Alabama's Drinking Water State Revolving Fund (DWSRF) and State Revolving Fund for wastewater (SRF) provides low interest loans to communities for construction and maintenance of water supply and wastewater infrastructure and treatment systems. Another program provided under State law but never funded is the Water Supply Assistance Fund (*Code of Alabama*, §22-23A). There is no central clearinghouse available to disseminate information on the sources or application processes for obtaining funding.

Considerations:

- *Accelerate Alabama* is the economic development strategic plan for the state. It provides the Alabama Department of Commerce with a broad-based long-term approach to ensure that state and local efforts to retain and recruit business and industry are consistent and coordinated. Related to water resources, it includes a component which addresses Alabama's views on sustainable development.
- Water resource programs impact economic development in all sectors, including industry, agriculture, transportation, and recreation. In some cases, these uses are conflicting.

- Industry – Industries use water in the manufacturing process, for cooling purposes or for transporting products. Water for industrial use may be purchased from a public water supplier or be self-supplied.
- Agriculture – Agricultural producers are highly dependent upon natural rainfall and only a small percentage of farming operations utilize irrigation systems. Additional funding or the development of economic incentives such as low-interest loans or tax credits may help encourage investments in irrigation infrastructure.
- Recreation – Fishing, paddling, and wildlife watching are recreational activities that account for a significant and growing tourism segment of economic development in Alabama. As part of the overall efforts to support these activities, it is important that Alabama ensure adequate public access to help maximize development and participation.
- Navigation – Statewide economic development and trade enhancement vitally depend on competitive transportation alternatives. Efficient inland navigable waterways require adequate channel widths and depths, stream flows, maintenance provisions, and professional management to sustain a necessary transportation infrastructure.
- Water resource programs need to be better used as tools for economic development and job creation opportunities in Alabama.
- Depending on water resources availability, in certain areas of the State, economic recruitment needs to ensure that a potential client's water-related needs would not jeopardize the availability or water quality capacity of existing users.
- Low-flow conditions due to drought or upstream withdrawals can be costly to water users by threatening water supply needs; the availability of navigation for raw materials and finished products; the assimilative capacity of streams in handling wastewater discharges; and the ability to use waters for cooling in industrial and power generation facilities.
- Economic development is dependent on adequate local and regional water supplies which can be costly and time consuming to develop. Proper planning of new water source development minimizes the need for new interbasin transfers and additional surface and groundwater withdrawals.
- Availability of treated wastewater for reuse could enhance economic development opportunities.

Stakeholder Comments:

Stakeholder comments to the Economic Development portion of the WMIA report centered on the following themes:

- An overarching sentiment was to not adversely impact economic development or recruitment with any reforms and revisions to the State's water management system. The need to explore how best to promote and support full development of

water resources on behalf of economic development and ensure that the health of citizens, the economy, and the environment are protected first in any plan was expressed. Adequate river flows and lake levels are critical to the economy of selected regions in the state. Rivers and lakes are significant tourist destinations in many areas of the state and careful consideration of the economic impacts should be included in any proposed water management plans.

- Water was viewed by several stakeholders as a strategic commodity that needs better management. Several activities were suggested to accomplish this including encouraging regional water planning, encouraging private/public partnerships, identifying potential reservoir sites, encouraging off-stream storage, communicating water information to state's industrial recruiters, reviewing federal and state water supply development programs to enhance long-term infrastructure planning, creating information clearinghouse to summarize funding sources for water supply development.
- Support was expressed by several stakeholders to work more aggressively with the agricultural community for irrigation combined with implementation of effective soil and water conservation and best management practices. The plan should ensure that agricultural users maintain their access to water resources, with some suggesting that agriculture be exempt from any water metering requirements under a permitting/allocation system. A water policy summit with attendees from other states emphasizing the importance of water and agriculture in Alabama's economy should be considered.
- A statewide plan should be cognizant of the fact that water supply is inequitably distributed and a plan should evaluate the feasibility and cost of establishing new impoundments to equalize water availability during periods of water scarcity.
- Environmental and economic impacts to both donor and receiving streams should be evaluated for any interbasin transfer negotiations. Interbasin transfer prohibitions can/will have calamitous effects on water utilities, will slow economic development, and handicap the equitable distribution of economic development in the state.
- Tourism, outdoor recreation, recreational angling were not addressed in the original *Water Management Issues in Alabama* paper. They should be considered for their significant economic benefits to Alabama.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding economic development:

- Develop and implement a state water resource program which establishes a basis for protecting existing, expanding, and future industrial locations.

(Status: This recommendation has been partially implemented with the passage of the Alabama Water Resources Act.)

- Assess the maximum levels of water withdrawal and waste discharge appropriate for a given location or region. This consideration should include effects of potential or existing land application spray of treated effluent.

(Status: This recommendation has been partially implemented with the passage of the Alabama Water Resources Act and actions undertaken by ADEM under the auspices of the Clean Water Act and the development of Total Maximum Daily Loads (TMDLs). Additional efforts to identify the maximum withdrawals will be the focus of the on-going water assessments underway by GSA and OWR.)

- Estimate future production support requirements (10-year minimum) for existing industries giving consideration to projected expansions.

(Status: This recommendation has been partially implemented and will be more fully implemented through efforts by OWR to assess and estimate future industrial water demands.)

- Identify municipal water supply and waste treatment systems by current capacity, average use, and peak use levels as well as source and facility descriptions.

(Status: This recommendation has been implemented with the passage of the Alabama Water Resources Act.)

- Encourage a multi-step (e.g., 5-, 10-, 20-, and 50-year) water supply growth plan for public water systems.

(Status: This recommendation has been partially implemented and is an on-going activity by both OWR and ADEM through voluntary cooperation. Many public water systems already undertake such planning processes but there is no formal statutory authority to require such efforts.)

- Educate individuals in state and regional development agencies who have impact on site location decisions and establish a coordinated, pre-planning process to ensure consideration of current and projected water uses.

(Status: This recommendation has been partially implemented by OWR and ADEM through coordination with the Alabama Department of Commerce.)

Policy Options:

As a result of the WMIA report, stakeholder comments on that report, the *Waters for a Quality of Life* report, and other research the following policy options were developed:

- The Alabama Water MAP process and any State water resources management plan should include policies and guidance for water resources development programs. These should:
 - Be consistent with the *Accelerate Alabama* economic development strategic plan.
 - Encourage regional planning in water source development.

- Evaluate the role that reservoir development could play in economic development.
- Encourage the development of off-stream storage for water supply needs to minimize impacts to major rivers and streams.
- Encourage the exploration of public/private partnerships.
- Include tourism, outdoor recreation, and recreational angling as significant drivers of economic development in the water resources arena.
- Estimate future production support requirements (10-year minimum) for existing industries giving consideration to projected expansions.
- Identify water infrastructure needs to support economic development and encourage a multi-step (e.g., 5-, 10-, 20-, and 50-year) water supply growth plan for public water systems.
- Protect existing water needs and promote the sustainable use of water in Alabama's growing agribusinesses and industries.
- Once water resource assessments are complete, OWR should ensure that water capacity and availability information is communicated to the State's industrial recruiters highlighting any areas where water resource problems may impact or deter the recruitment of industries.
- The Governor's economic development strategic planning process should include consideration of water resources implications. This would be separate and distinct from the current site-specific coordination process currently in place for individual clients and projects.
- The Governor should task the Inland Waterways and Intermodal Infrastructure Advisory Board to provide recommendations for water resource-related infrastructure projects that would provide direct benefits to economic recruiting efforts.
- ADECA and ADEM should review federal and State water supply development funding programs (including state funded seed monies, i.e. the Water Supply Assistance Authority (*Code of Alabama*, 1975, §22-23A) and the Inland Waterways and Intermodal Infrastructure Fund (*Code of Alabama*, 1975, §41-23-123)) and develop recommendations to enhance and encourage long term infrastructure planning and regional cooperation in the development of new water sources.
- ADECA should create an information clearinghouse on their web site to summarize sources of potential funding for new water source development, infrastructure improvements, or system expansions.

Additional materials considered:

Alabama Department of Commerce, 2012, Accelerate Alabama Strategic Economic Development Plan: Montgomery, Alabama, Alabama Department of Commerce, 75 p.

PUBLIC AND STAKEHOLDER EDUCATION AND OUTREACH

Overview:

There are numerous entities that have a vested interest in pursuing the protection and preservation of Alabama's water resources. The development of a comprehensive policy for the management of Alabama's water resources will require input from a wide-range of entities that offer expertise in multiple areas. These entities, or stakeholders, include local/state/federal agencies, industries, trade organizations, universities, watershed management authorities, public utilities and citizen-based environmental groups. Each of these entities would be considered stakeholders due to their work in areas related to water resource protection and preservation. Yet, the effective implementation of a comprehensive policy will also rely on the support of the citizens of Alabama and ensuring those citizens understand the substance and importance of the comprehensive policy.

One of the keys to the long-term, effective management and sustainability of water resources is ensuring local citizens are invested in protecting and preserving water resources at the local level. There are wide variations in how knowledgeable citizens are about water quality/quantity issues and how citizens utilize water resources. Many citizens understand water resources as they relate to fishing, swimming, skiing, and other water sports but may not understand water resource issues related to water conservation, water reuse, wastewater treatment, industrial water usage, drinking water supplies, and the needs of aquatic organisms. Therefore, any public education and outreach campaign should consider a wide-range of issues during message development.

The foundations upon which the stakeholders conduct their day-to-day activities vary as widely as the stakeholders themselves. Some have legal authority to support their work while others have the power of large memberships that have the ability to influence elected officials and decision makers. In addition, some stakeholders focus more on water quantity issues while others focus on water quality issues. They likely have differing viewpoints on important water quality and water quantity issues and may advocate different approaches for achieving the protection of Alabama's water resources. Some stakeholders have already developed “blueprints” and “agendas” describing their recommended approaches to protect and preserve water resources. Nonetheless, stakeholders play an active and important role in water resource management in Alabama.

An effective education and outreach campaign will need multiple components and should target multiple citizen groups. Message delivery must also be considered in order to reach large numbers of citizens in all socioeconomic groups. The traditional delivery methods of television, radio, and print media are available, but internet and social media mechanisms should be considered as well.

Considerations:

- Alabama's water resources impact so many different facets of peoples' lives that the development of an effective water management policy will benefit from the up-front participation of all stakeholders.

- Citizens must understand why there is a need for a comprehensive water policy and how they will benefit from such policy.
- The development of outreach campaigns should account for the wide disparity in citizens' knowledge of water resources.
- Citizens' support of a comprehensive water policy is integral to the successful implementation of such policy.
- The large number of stakeholders results in a wide-range of viewpoints regarding the protection/preservation of water resources in Alabama.
- Some stakeholders may be reluctant to participate in active discussions on water policy issues in the presence of other stakeholders because of differing viewpoints.
- General public support for the implementation of a water management policy will be greatly enhanced if all stakeholders voice general support for the water management policy.

Stakeholder Comments:

- There is consensus support for broad-based stakeholder education and outreach as a component of water resources management planning.
- Several groups suggested that all stakeholders need to be engaged in the water resources management planning process.
- Education should include topics such as water conservation and reuse, the current status / availability of the State's water resources, best management practices, and scientific research.
- Education should be coordinated and all meetings should be open to the public to ensure the widest possible participation.
- Education should occur at both the regional and local levels and should target both the public at large and elected officials.
- Several agencies and organizations offered to help with this process through general environmental education programs, stakeholder engagement, and public outreach.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding water resources-related education for citizens.

- Support water resources education as a part of formal education through existing institutions by expanding courses, curricula, and training requirements and through continuing education by inclusion of water resources topics in seminars and conferences and creative use of mass media outlets.

- Encourage the Department of Education to develop water resource courses and integrate them in environmental education curricula for grades K through 12.
- Require water resource training credits for teacher certification.
- Coordinate and disseminate, through the Alabama Water Resources Agency, information about existing state and federal water resource education programs.
- Develop water resource information and education programs for all citizens of Alabama.

(Status: Several statewide environmental education programs have been implemented in Alabama since 1990.)

Policy Options:

The Alabama Water MAP process includes significant stakeholder involvement. The stakeholder outreach track reflects a strategy to inform the public as to the progress of water management planning and a way to solicit their input. Components of stakeholder outreach should include:

- Soliciting the participation of stakeholders and the public. This would include maintaining contact information for all interested individuals and organizations.
- Developing a media campaign with media outlets and other advertising venues to target individuals who may not already have a foundational knowledge of water resources.
- Publicizing and promoting Alabama's vast water resources and the need to protect them for future generations.
- Identifying specific representatives from various stakeholder groups to facilitate more effective and efficient communication between policy makers and stakeholder groups. These distinct groups could include citizen-based environmental groups, universities, trade organizations, industrial sectors, public water systems, and various local/state/federal agencies.

INTERBASIN TRANSFERS

Overview:

A fundamental principle of watershed management is that water is used and reused as it moves downstream through a watershed for a multitude of both ecological and human related purposes. An interbasin transfer (IBT) involves the removal of water from that cycle and can be defined as the withdrawal, diversion, or pumping of water from one watershed (basin) to another. These transfers are normally the result of a manmade conveyance scheme and not some natural process.

Although the term is primarily used in reference to the transfer of surface waters involving raw or potable water, it can also be applied in regard to the transfer of wastewater return discharges. Additionally, the concept can be applied to the transfers of groundwater from one watershed to another.

A fundamental component in defining the scope of an interbasin transfer is defining the geographic extent (or size) of the referenced watersheds. There is a standard numerical and naming convention for classifying watersheds called hydrologic unit codes (HUCs) that have been established by the states and federal government. The maps on this page (Fig. 24) depict the delineations of these basins in Alabama at the four-digit, six-digit and eight-digit HUC levels.

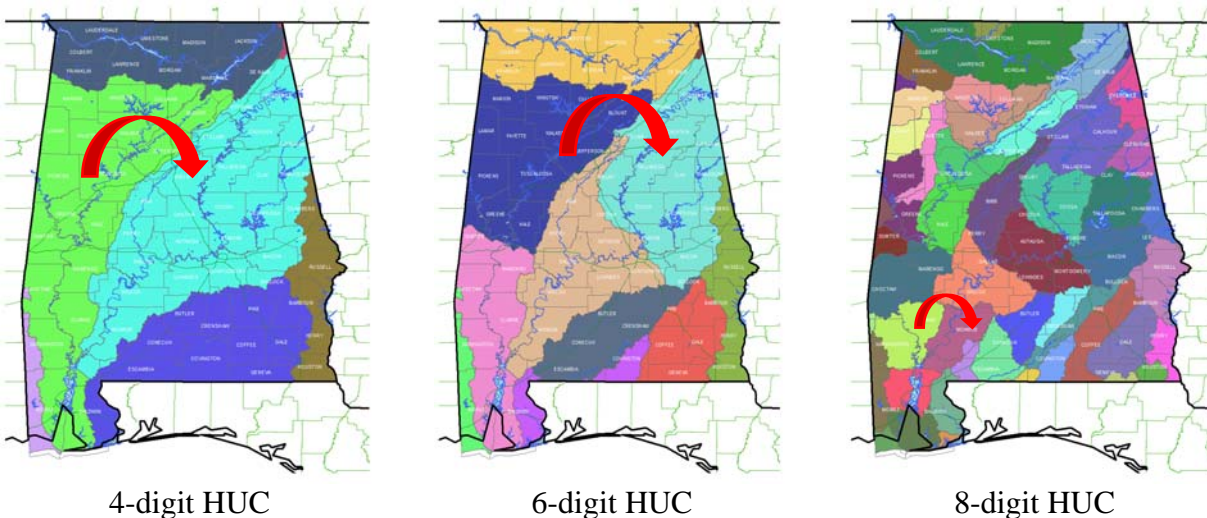


Figure 24. Three examples of varying HUC watershed sizes (red arrow indicates a transfer).

The smallest resolution currently available for Alabama is the 12-digit HUC watershed delineation. In each instance the movement of water from one HUC to another could be considered an IBT. Thus, establishing the size of the basins is one of the two major aspects of any IBT management concept; the other involves setting the threshold or *de minimis* amount of water transfer, either rate or total volume, below which IBTs would not be monitored or managed.

Considerations:

A number of IBTs currently exist in Alabama and have operated for many years. Specific numbers are not known since there is no monitoring or reporting requirement. The exact number would also depend on the size of the basin defined.

- There is limited case law directly addressing the subject of interbasin transfers in Alabama.
- IBTs can be problematic in that they can contribute to unsustainable growth (e.g. Atlanta) as greater quantities of water from outside watersheds are required for expanded consumption and future demands.
- IBTs can create permanent and significant detrimental impacts to water quantity, water quality, and fish and wildlife resources.
- Alabama has enacted eight local legislative Acts banning IBTs in eight north Alabama counties including Colbert (Act 2006-373), Jackson (Act 2006-115), Lauderdale (Act 2007-252), Lawrence (Act 2006-606), Limestone (Act 2006-361), Madison (Act 2006-341), Marshall (Act 2005-176), and Morgan (Act 2006-603) Counties. These bills all have common language that will be superseded by statewide IBT legislation once enacted.
- Many states, including most in the southeast, have recognized the need to manage and control interbasin transfers. These include Arkansas (ACA §15-22-304), Florida (Consumptive Use Permits, FL Stat. §373.219; IBT of Groundwater, FL Stat. §373.2295), Georgia (OCGA §12-5-31), North Carolina (General Statute G.S. §143-215.221), South Carolina (Title 49, Chapter 21), and Tennessee (Tenn. Code Ann. §69-7-201 et seq.).

Stakeholder Comments:

- There was a broad spectrum of comments ranging from concern over allowing new or expanded IBTs to consideration for incorporating IBTs as a key aspect of public water supply source availability.
- Several stakeholders stressed the need for more studies and analysis before any actions to limit or regulate IBTs.
- Environmental groups stressed the need to implement conservation before any new IBTs would be allowed.
- An evaluation of existing IBTs (location, source and receiving basins, volumes transferred) should be conducted.
- Several comments were received supporting the concept that IBTs should be integral to any state water management plan.
- IBTs should be managed and controlled according to watershed dynamics and downstream needs.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding interbasin transfers.

- Promulgate rules and regulations to require permits for interbasin transfers of water and to require reporting of water transfer values.
 - Discourage, on a short-term basis, interbasin transfers of water until a procedure has been established to evaluate the matter on a statewide basis.
 - Enact legislation, on an intermediate-term basis, to require water users to obtain interbasin transfer permits from the appropriate state water management agency. The agency should determine whether the benefits of approving the transfer outweigh the costs of not approving it.
- Require permits to control interbasin transfers of ground and surface water that exceed a specified quantity. The permit should specify the maximum quantity of water that can be transferred during a given time period.

(Status: Interbasin transfers of water continue to exist in Alabama and are an important mechanism that many water supply systems use to ensure adequate water is available for customers during periods of drought or as a backup to the primary water source.)

Policy Options:

As discussed under the Alabama Water MAP process, AWAWG recommends the creation of a Certificates of Use, Permitting and Interbasin Transfer Focus Panel. The IBT related issues charged to the panel should include:

- Determination of an appropriate basin scale for evaluating and accounting for interbasin transfers of water resources.
- Identification and summarization of current interbasin transfers (locations and amounts) once the applicable basin unit is defined.
- Consideration of the need to require periodic reporting for existing IBTs.
- Consideration for establishing an interbasin transfers regulatory mechanism that provides for existing transfers and establishes criteria for new or expanded transfers (including an analysis of alternatives) to ensure they are reasonable and beneficial to the state.

RIPARIAN AND OTHER LEGAL ISSUES

Overview:

Alabama, like most other states east of the Mississippi River, is classified as a riparian state when it comes to surface water law - as opposed to a prior appropriation state. This means that Alabama generally follows traditional common-law riparian doctrine to determine legal rights to surface waters. Technically, "riparian" refers to rivers and streams and the right to use such water by persons or entities owning land adjacent to these watercourses. Riparian common law had its origins in 18th century England and was introduced to this country in its prior status as an English colony. Very early Alabama legal authority did not clearly establish Alabama as either a "natural flow" riparian state or a "reasonable use" riparian state. Later Alabama cases in the mid 1800s adopted the "natural flow doctrine," which held that a riparian landowner had the right to use and consume water for natural, domestic purposes despite the harm that might occur to a lower riparian.

By 1889, Alabama had begun its journey away from the "natural flow doctrine" toward the "reasonable use doctrine" – a doctrine that allows a riparian owner to use water from a water body on his land but could not engage in uses that unreasonably injured other riparian owners. The right of non-riparian owners to use water from a watercourse is not clearly defined by statute or case law. Consequently, absent prescription, the right to use water from various waterways is acquired definitively by purchasing or leasing riparian land. In order to obtain a prescriptive right, the use of the water must have been exclusive, notorious and acquiesced to by the riparian landowner for a period of time determined by statute or case law.

With regard to groundwater, Alabama follows the "American reasonable use" rule, which holds that only the overlying land owner has the right to use the subsurface groundwater. However, Alabama courts have generally approached groundwater law with a mixture of absolute ownership theory, reasonable use and nuisance law. While courts generally hold that a landowner has the absolute right to use groundwater on the landowner's property, courts also mandate that a landowners' use of the subsurface groundwater be reasonable and not of a malicious nature. (See generally, 6, Waters and Water Rights, 325-348, Robert Beck, ed. 2005 Replacement Volume, "Alabama" by William L. Andreen, for a discussion of Alabama surface water and groundwater law.)

In 1993, the Alabama legislature enacted the Alabama Water Resources Act (Act) which established a water withdrawal registration system and allowed for, under certain specified circumstances, the establishment of limits to the amount of water that an individual could withdraw from surface or underground sources. The Act specifically preserved the common law governing surface and groundwater at the time of passage.

With projected population growth, expanding water needs for industry and businesses, and greater dependence on irrigation by agribusiness, the effectiveness of the common law to address water resource conflicts and issues has been brought into question.

Considerations:

- The critical use study and capacity stress area designation provisions of the Alabama Water Resources Act, §9-10B-21 and §9-10B-22 *Code of Alabama*, 1975, should be more fully evaluated as a possible alternative to a formal water withdrawal permitting system.
- Given the passage of time, changes in circumstances, new case law, and Attorney General's Opinions since the Alabama Water Resources Act was enacted in 1993, are there changes in the Act needed to accommodate current conditions?
- If changes in the Act are needed, what are they and what model, if any, should be followed in making any necessary changes?
- Water quantity and water quality are closely connected. How should this connection be better emphasized at the State level?
- What type of local governance should be used to provide input into water quantity planning?
- The federal government appears to be moving into the water quantity area – an area traditionally addressed by states. How should Alabama respond?
- Most, if not all states other than Alabama, have a Safe Dams program which evaluates the risk and safety of dams within the state. What actions are needed, if any, to address this risk?

Stakeholder Comments:

The Water Management Issues in Alabama (WMIA) Report received numerous stakeholder comments regarding riparian law in Alabama as well as other legal issues. Many of these comments can be grouped into the following themes:

- Unclear understanding of the extent of the State's control of water resources.
- Stakeholders and the public should be educated on the current status of water law in Alabama including surface water law, groundwater law, and how Alabama law compares with other states in the Southeast. This could be accomplished using water diplomacy and consensus building techniques (i.e. facilitated stakeholder meetings).
- No new regulations, policies or laws should be adopted until there are sufficient data and assessments supporting them or there is a demonstrated need for them - "we cannot manage what we do not measure."
- The state should consider adoption or use as guidance the American Bar Association (ABA) / American Society of Civil Engineers (ASCE) Regulated Riparian Model Water Code (RRMWC).
- There should be close coordination of water quantity and quality matters and issues.

- There should be a strong enforcement program for water quantity regulations and laws.
- There is a need for regional or localized inputs into water quantity planning and issues.
- There is encroachment by the federal government into state water quantity issues.
- The state should consider enacting Safe Dams legislation.
- Water “networks” issues. Water conflicts occur when natural, societal and political forces interact. Together, these interactions generate what is termed water networks. As population growth and economic development impose pressures on finite water resources, management of these networks becomes crucial. Water network issues include permitting, instream flow, interbasin transfers and non-riparian issues (water for irrigation, water supply, etc.).

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report did not include any discussion of riparian common law and did not make any recommendations for changes to that common law. The report did recommend the creation of a State Water Resource Agency. As a result, in 1993, the Alabama Water Resources Act was passed creating the Office of Water Resources and contained language in that statute specifically preserving riparian common law. The report did, however, have the following implementing recommendations related to legal issues raised in stakeholder comments to the paper Water Management Issues in Alabama.

- Resolve any remaining conflicts and enact legislation to establish a “Safe Dams Program.”

(Status: Safe Dams legislation was introduced in the 2003 General Session but failed to gain passage. In addition, OWR is conducting an inventory of dams in Alabama using GIS and aerial imagery analysis techniques.)

- Coordinate and disseminate, through the Water Resources Agency, information about existing state and federal water resource education programs.

(Status: This has been partially implemented through OWR, ADEM, and GSA public education programs and web sites.)

- Develop water resources information and education programs for all citizens of Alabama.

(Status: This has been partially implemented through the Alabama-Coosa-Tallapoosa (ACT) River Basin and Apalachicola-Chattahoochee-Flint (ACF) River Basin Comprehensive Study and Compacts process as well as through OWR, ADEM, and GSA public education programs and web sites.)

Policy Options:

As discussed under the Alabama Water MAP process, AWAAG recommends the creation of a Riparian and Other Legal Concerns Focus Panel.

- The Governor should appoint members to the Riparian and Other Legal Concerns Focus Panel. The charge would include determining the adequacy of existing surface water and groundwater laws and regulations and recommend, if necessary, enhancements to the Alabama Water Resources Act within a reasonable timeframe. Other topics for the group's review should include:
 - The efficacy, applicability and future utilization of the critical use study and capacity stress area designation provisions of the Alabama Water Resources Act, §9-10B-21 and §9-10B-22 *Code of Alabama*, 1975, in Alabama's current riparian system of laws and suggestions, if any, on how to enhance these provisions.
 - Should the RRMWC be used as a model for possible change in Alabama water law?
 - The applicability of laws and policies of surrounding states for potential consideration in Alabama.
 - The need for enhancements to enforcement mechanisms for the Alabama Water Use Reporting Program.
 - Mechanisms for local and regional inputs into state agency planning and a review of other existing statutory authorities pertaining to water planning activities (i.e. Watershed Management Authorities, Resource Conservation & Development Districts, Regional Planning Agencies, Conservancy Districts, Irrigation Districts, etc.).
 - The Panel should recommend, upon completion of this legal review, programs and processes for stakeholder review, education, and input into any proposed recommendations for statutory or regulatory changes.
- Any proposed statutory or regulatory changes should take into consideration the results of the comprehensive assessment of surface and groundwaters of the state.
- Consider the need to develop legislation establishing a Safe Dams Program in Alabama with appropriate funding.
- Task the OWR with requesting advice from the Alabama Water Resources Commission, the Alabama Water Resources Council and other appropriate state agencies on how to address federal encroachment into water policy and its impacts on statewide water resources management in Alabama.

Additional materials considered:

Alabama Water Resources Act (*Code of Alabama*, 1975, §9-10B-1, et.seq.)

Andreen, W. L., 2011, Volume 4 of Waters and Water Rights (Alabama), in Amy L. Kelley, ed., 3rd ed., *Waters and Water Rights: Mathew Bender and Co. Inc.*, a member of Lexis-Nexis Group (All rights reserved), p. 3-30.

U.S. Army Corps of Engineers, ACT and ACF Draft Environmental Impact Statement Volumes, September 1998

Dellapenna, J.W., ed., 1997, *The Regulated Riparian Model Water Code: Water Laws Committee of the Water Resources Planning and Management Division of the American Society of Civil Engineers*, New York, New York, ASCE 978-0-7844-0226-9 / 0-7844-0226-4, 1997, 382 p.

DROUGHT PLANNING

Overview:

Since the early 1980s, Alabama has experienced at least six major droughts in all or a portion of the state. These droughts have been costly and adversely impacted (both directly and indirectly) its citizens, industries, agriculture, and recreation in a variety of ways.

The State's drought response mechanisms are distributed over several agencies and programs including public health, water supply, agriculture, water quality, habitat protection, and forestry. The State's primary drought coordination mechanism is housed in the Alabama Office of Water Resources (OWR). This drought coordination effort was initially created in 2002 and led to the publication of the first statewide drought plan in 2004.

The drought planning process was enhanced by the issuance of Executive Order 19 on June 24, 2011 (amended on August 19, 2013) and by the release of an update to the Alabama Drought Management Plan on May 22, 2013. Under this plan, OWR supervises a process to collect information on drought conditions and impacts as well as receive inputs and recommendations from State and federal agencies and stakeholders. One of the products from this process is the periodic release of a statewide drought declaration which provides county-level specific drought assessments. This process is used by the Governor to determine appropriate State response actions. The primary focus of these declarations is to provide information and recommendations to local officials and water users for their use in implementing specific local response actions. In addition, the plan outlines the process for the State's input into the U.S. Drought Monitor and the structure and operating procedures for the drought planning and response process. The plan update was developed in consultation with a wide range of organizations, stakeholders and others. One key organization was the Alabama Water Resources Commission (AWRC) which created its own Drought Subcommittee. The AWRC Drought Subcommittee issued a report in December of 2012 listing nine specific recommendations, one of which dealt directly with the need to update the Alabama Drought Management Plan. The report also recognized other issues including the need for drought legislation, adequate funding and staffing, the importance of data collection and management, and effective outreach processes for stakeholders and the general public.

In 2012, OWR played a key role in the development of a bill to codify Executive Order 19 and improve drought management in Alabama. The bill was titled the Alabama Drought Planning and Response Act. The proposed bill enhanced Alabama's current drought management programs by:

- Codifying the current organizational structure including the Alabama Drought Assessment and Planning Team (ADAPT) to advise the Governor on state activities related to droughts, and the Monitoring and Impact Group (MIG) to develop technical assessments of drought conditions and impacts.
- Codifying the charge given to OWR to develop and maintain a state drought plan and issue state drought declarations.

- Clarifying the role of the Alabama State Climatologist.
- Reaffirming the Governor's role in responding to drought related events.
- Ensuring that adequate information concerning the supply and demand of water is available to these groups as they assess conditions.

The bill failed to pass in the 2013 General Session of the Alabama Legislature but has been pre-filed for the 2014 General Session. It continues to be supported by the Governor, AAWWG, and the Permanent Joint Legislative Committee on Water Policy and Management (PJLCWPM).

Although closely coordinated under this process, there are other separate drought related activities that take place in the state. The Alabama Forestry Commission works directly with the Governor to address the protection of Alabama forests from wildfire during drought conditions through the issuance of open burning bans. The Alabama Department of Environmental Management (ADEM) is involved in issuing burn bans in areas where air quality would be adversely impacted, is involved with drinking water systems to ensure adequate water supplies are available and with regulated wastewater dischargers to ensure water quality is not adversely impacted during drought conditions. The Alabama Emergency Management Agency (AEMA) leads any State level response where public health is endangered through the limitation or loss of public water supplies. Also, in addition to State level activity, there are coordination processes used by the U.S. Army Corps of Engineers and Tennessee Valley Authority in assessing drought impacts on their reservoir system operations. Alabama Power Co., operating under its Federal Energy Regulatory Commission licenses on the Coosa, Tallapoosa and Warrior Rivers, also has drought operations coordination processes. Additionally, the United States Department of Agriculture's Drought Declaration process is used to provide financial and other federal assistance to agricultural producers impacted by drought. All of the above organizations are part of the drought planning organization as outlined in the plan.

Considerations:

- There is a need to incorporate a drought planning mechanism in a State water resources management plan.
- The national drought map, known as the U.S. Drought Monitor, is being increasingly used to both reflect the extent of drought conditions in a local county or region and as a determining factor for many federal drought assistance and relief programs. It is vital that national authors of the map have accurate and timely information from individual states to ensure that conditions and impacts are correctly depicted.
- Alabama should have a permanent and sustained coordination process for the collection of data, information and assessments of both conditions and impacts in order to provide consistent input on behalf of the State into the federal drought monitoring process.
- Water conservation measures and priorities during periods of drought should be explicitly addressed in a comprehensive State water resources management plan.

- There is a need for the commitment in funding and staffing by the Governor and Legislature to support both the collection and maintenance of data and information related to assessments of drought conditions and impacts.

Stakeholder Comments:

Stakeholder comments to the Drought Planning portion of the WMIA report centered on the following themes:

- The need for drought planning to be incorporated as a part of a comprehensive statewide water management plan,
- The need for clear delineation of drought related problems or issues,
- Recognition of the importance of adequate drought monitoring,
- Recognition of the importance of the U.S. Drought Monitor (especially involving the Alabama input),
- The need for public education and outreach in drought-related matters,
- The need for flexibility in understanding and responding to drought, and
- The need to encourage water sustainability through:
 - Efficiency
 - Conservation
 - Reuse/recycling
 - New source development

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding drought planning:

- Require the Alabama Water Resources Agency to be the umbrella organization for drought planning and coordination.

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act.)

- Enact legislation to require drought contingency planning for local water systems to be incorporated into existing emergency management plans.

(Status: This recommendation has not been implemented. Drought planning legislation introduced in the 2013 General Session contained some provisions related to this issue but failed to pass. It is anticipated that the legislation will be introduced in the 2014 General Session and is contained in the Policy Option below related to legislation.)

- Enact legislation to require drought contingency planning for local systems requesting water withdrawal authority.

(Status: This recommendation has been partially implemented and is an on-going activity by both OWR and ADEM through voluntary cooperation. Many public water systems already undertake such drought contingency planning processes but there is no formal statutory authority to require such efforts.)

- Enact legislation to require a permit to withdraw a specified amount of water from either surface or groundwater supplies.

(Status: This recommendation has been partially implemented through the passage of the Alabama Water Resources Act under the Capacity Stress Area provision, but this provision has never been utilized.)

Policy Options:

As a result of the WMIA report, stakeholder comments on that report, the 1990 study, *Waters for a Quality of Life*, and other research, the following policy options were developed:

- In accordance with the Alabama Water MAP process, any comprehensive water resources management plan should fully integrate the *Alabama Drought Management Plan* and incorporate state-level drought response processes into any proposed actions and activities.
- The Legislature should enact and the Governor should sign Senate Bill 20/House Bill 49, the Alabama Drought Planning and Response Act, which has been pre-filed for the 2014 General Session.
- The Governor and Legislature should provide adequate funding and staffing to State agencies conducting drought management and response activities. The AWRC also has identified the specific need for staffing and funding at OWR and the Office of the Alabama State Climatologist to support drought response, planning, monitoring and assessment activities.
- Water efficiency mechanisms such as water conservation and reuse should be in the State's Drought Management Plan. Water conservation is examined as a separate issue in this report.

Additional materials considered:

Report of the Water Resource Assessments, Studies, Data Collection and Storage Subcommittee of the Permanent Joint Legislative Committee on Water Policy and Management, 2008.

Alabama Drought Planning and Response Act, pre-filed as Senate Bill 20 by Senator Beasley.

2012 Report on Alabama Drought Planning and Management, AWRC.

ENHANCED CERTIFICATES OF USE/PERMITTING

Overview:

The State has public trust obligations to protect its water resources and to provide for their prudent use and development. Currently, water withdrawals are managed through the Alabama Water Use Reporting Program. The Alabama Water Resources Act (specifically *Code of Alabama*, 1975 §§9-10B-19 and 20) and associated regulations (Alabama Administrative Rules 305-7-9 thru 12) establish the requirements for this program, including the criteria for Declaration of Beneficial Use applications and the issuance of Certificates of Use (COU) by the Alabama Office of Water Resources (OWR). Entities with a capacity to withdraw more than 100,000 gallons per day and all public water systems are required to obtain a COU. The COU places few requirements on the water user other than for the applicant to certify that the proposed water use will not interfere with an existing legal use of the water and is reasonable and beneficial. The process for issuance of a COU does not consider the cumulative impact of multiple withdrawals on surface or groundwater resources. The current system provides for annual reporting of withdrawal quantities; however, the COU neither modifies nor confers any additional legal rights to the applicant concerning the proposed use of water.

More comprehensive management of water withdrawals, including interbasin water transfers and other non-riparian uses, and enforcing instream flow standards through some type of permitting or enhanced COU program will require modifications to the current system through legislation. The benefits of permitting water withdrawals, interbasin transfers, or establishing an enhanced COU program would include resolving legal issues associated with non-riparian uses, providing a mechanism to protect instream flow needs, improving the ability to monitor and enforce withdrawal provisions, protecting current users while providing a mechanism for accommodating future demands, strengthening the current administrative review and appeal process, developing a mechanism to facilitate drought or emergency response actions, and implementing water resource management recommendations associated with watershed level studies and assessments. A permitting program would allow both current and prospective water users to have a clear level of expectations and certainty with regards to the availability of water resources necessary for long-term planning and investments.

The intent of comprehensive water resources management is to protect the water resources under the State's public trust obligations and to provide for prudent use and development while keeping the regulatory burden to a minimum. It would allow both current and prospective water users to have a clear level of expectations and certainty with regards to the availability of the resource necessary for long-term planning and investments.

Considerations:

- Due to population growth, industrial growth, interstate water disputes and other factors, greater demands are placed on finite water resources that, in the future, may result in water shortages.

- The Permanent Joint Legislative Committee on Water Policy and Management, as well as other water stakeholder groups, are considering and discussing whether water usage should be regulated in Alabama.
- If more formal management of water usage is to be undertaken, then legislation or additional regulatory authority would be required. A mechanism to fund such activity would also be required.
- The management of water usage in Alabama is currently determined by riparian common law where non-riparian users have limited rights to consume water.
- Riparian common law provides for little direct consideration or management of instream flow beyond the "reasonable use" requirement for water use.
- Current water users in Alabama are subject to uncertainty during times of water shortage because there is no method (other than riparian common law) to manage water usage.
- There is limited oversight and no formal, comprehensive statewide plan for water allocations, future water use, and water resources management in Alabama.
- Any mechanism to regulate withdrawals and protect stream flows will require the establishment of instream flow standards.
- Any enhanced system for managing water should be part of the Alabama Water MAP process and a comprehensive statewide plan based on water quality, water quantity, instream flow, and water use data.

The Clean Water Act reserves to the states the right to manage water quantity. However, it does not mandate the process the states must follow or even that they have one. States have the latitude to develop individual approaches based on their respective policies and priorities.

Stakeholder Comments:

Stakeholder comments to the Enhanced Certificates of Use / Permitting portion of the WMIA report centered on the following themes:

- A range of opinions on the current COU system were expressed.
 - Some groups feel it is premature to change the system at the current time.
 - Others proposed a move to a formal permitting system.
 - A number believe the current COU system is ineffective.
- Adjusting COU program withdrawal threshold needs to be considered.
- Dependable and equitable enforcement mechanisms are needed.
- Any water allocation system should recognize the connection between water quality and water quantity.
- Any allocation system should be able to adapt to acute water resources situations.

- All existing COU holders should be grandfathered into any future system and process.
- There should be a dispute resolution process.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendation regarding permitting:

- Assess the maximum levels of water withdrawal and waste discharge appropriate for a given location or region. This consideration should include effects of potential or existing land application spray of treated effluent.

(Status: This recommendation has been partially implemented through the passage of the Alabama Water Resources Act and ADEM statutes/permitting programs.)

- Develop and enact legislation which sets forth the basis for establishing and protecting instream flow and uses of Alabama streams.

(Status: This recommendation has not been implemented.)

- Develop supporting administrative rules and regulations needed to determine the instream flow required to accommodate competing interests, establish maximum withdrawal quantities, and protect instream uses.

(Status: This recommendation has not been implemented.)

- Enact legislation to require a permit to withdraw a specified amount of water from either surface or groundwater supplies.

(Status: This recommendation has been partially implemented under the authority available with the designation of Capacity Stress Areas.)

- Enact legislation requiring larger volume water users to obtain a Certificate of Use and report annual water use. Water use reports required under the certificate of use should include representative type of information found in the *Water for a Quality of Life* report [Appendix Table 3].

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act.)

- Enact legislation to enable the declaration of critical use and capacity use areas.

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act with regard to legislative authority to require water withdrawal permits within Capacity Stress Areas. To date, no Capacity Stress areas have been designated and therefore no regulations governing water withdrawal have been promulgated.)

- Require water withdrawal permits within capacity use areas for water users that withdraw, divert, or consume more than a specified quantity of water. Criteria such as, but not necessarily limited to, that found in the *Water for a Quality of*

Life report [Appendix Table 4] can be used to evaluate the applications for permits.

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act with regard to legislative authority to require water withdrawal permits within Capacity Stress Areas. To date, no Capacity Stress Areas have been designated and therefore no regulations governing water withdrawal have been promulgated.)

- Discourage, on a short-term basis, interbasin transfers of water until a procedure has been established to evaluate the matter on a statewide basis.

(Status: This recommendation has not been implemented due to lack of legislative or regulatory authority.)

- Enact legislation, on an intermediate-term basis, to require water users to obtain interbasin transfer permits from the appropriate state water management agency. The agency should determine whether the benefits of approving a transfer outweigh the costs of not approving it.

(Status: This recommendation has not been implemented due to lack of legislative or regulatory authority.)

Policy Options:

As discussed under the Alabama Water MAP process, AWAWG recommends the creation of a Certificates of Use, Permitting and Interbasin Transfer Focus Panel. In addition to issues previously discussed in the Interbasin Transfer section, the panel should incorporate the results from statewide water resources assessments to address the following questions:

- What information is required to determine whether a more formal regulatory system is needed to manage water use?
- What is the appropriate level of water management registration/permitting needed for the present? Is something different needed in the future?
- Should this level be adaptive and vary with water capacity conditions?
- How could a regulatory process work in combining the consideration of water use, interbasin transfers, and instream flow?

Additional materials considered:

Report of the Water Resource Assessments, Studies, Data Collection and Storage Subcommittee of the Permanent Joint Legislative Committee on Water Policy and Management, 2008.

2012 Report on Alabama Drought Planning and Management, AWRC.

INTERSTATE COORDINATION

Overview:

Various aspects of water resources management touches numerous State and local agencies including but not limited to: The Alabama Office of Water Resources (OWR), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), Geological Survey of Alabama (GSA), Alabama Department of Agriculture and Industries (AGI), Alabama Department of Public Health, Alabama Forestry Commission, Alabama Emergency Management Agency, Regional Planning Councils/ Commissions, Soil and Water Conservation Districts, etc. In addition, various federal agencies have some jurisdiction or interest in the waters of Alabama including the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Tennessee Valley Authority, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, and the U.S. Geological Survey.

The OWR is charged by statute with the role of coordinating federal, State, and local planning efforts involving the quantity of the waters of the State. Consequently, OWR actively participates in interstate water quantity issues such as the water dispute between Alabama, Florida, and Georgia involving the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) River Basins (Water Wars) (Fig. 25). Technical support is provided to the Governor and the Alabama legal team in any potential litigation between the states, and OWR participates in negotiations to determine how interstate water resources will be shared. Currently that effort also includes the review and assessment of the proposed updates to individual project operations and master water control manuals for both the ACT and ACF basins. Under its statutory authority to protect water quality of the waters of the State, ADEM also provides water quality review and assessment of individual project operations and master control manuals for both the ACT and ACF basins. In addition to the ACT and ACF River Basins, other shared basins with adjacent states include the Tennessee, Tombigbee, Choctawhatchee, Yellow, Blackwater, Escambia, Perdido, and Escatawpa River Basins.

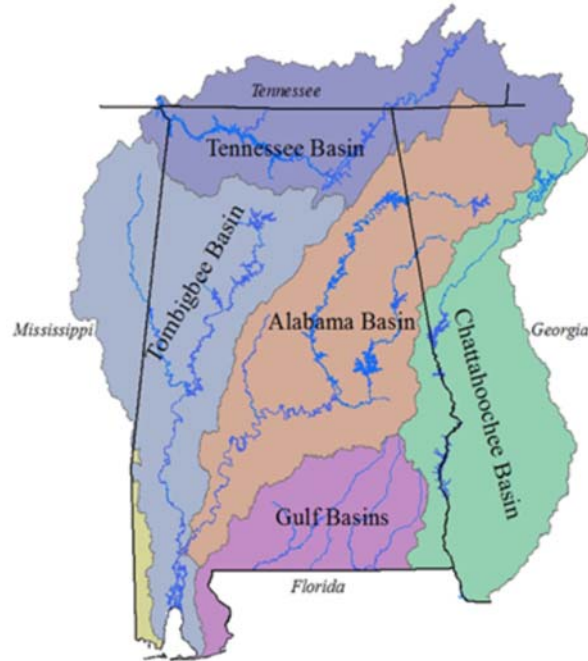


Figure 25. Interstate watersheds in Alabama (Gulf Basins include the Choctawhatchee, Yellow, Blackwater, Escambia, and Perdido River Watersheds).

Considerations:

- Ensuring that Alabama receives its equitable share of both surface water and groundwater resources shared with neighboring states is very important to Alabama’s population, economy, and environment for the present and in the future.
- The Corps of Engineers released a Draft Environmental Impact Statement containing the results of the USACE analysis of the environmental effects of the Proposed Action Alternative for the revised ACT River Basin Master Water Control Manual on March 1, 2013. This proposed update to the ACT Water Control Manual will guide the USACE's operation of federal reservoir projects in Georgia and Alabama and will impact waters flowing into the state for many years to come. On May 31, 2013, the State of Alabama and other affected stakeholders, responded with extensive comments and objections regarding the proposed alternative. The OWR will continue to monitor the status of this effort. Further, a similar effort is anticipated to begin in the ACF basin in the 2015 timeframe.
- Disagreements and conflicts over the shared use of interstate waters tend to develop over long periods of time and require continuous State agency monitoring and involvement.
- In addition to the ACT and ACF water control manual update processes, there are several, potentially contentious, issues involving other shared interstate water resources that include:

- The increasing, and potentially conflicting, use of the Tennessee-Tombigbee Waterway for water supply;
- The Georgia-Tennessee border issue in which Georgia proposes a change in their state line to include part of the Tennessee River;
- Increasing pressure on the Tennessee River for water supply and other uses that impact upstream storage reservoirs in Georgia, North Carolina, Tennessee, and Virginia;
- Concerns in Florida over water uses upstream of the Florida panhandle area affecting both surface water and groundwater resources.

Stakeholder Comments:

Stakeholder comments to the Interstate Coordination portion of the WMIA report centered on the following themes:

- A majority of stakeholders commenting on this topic support coordination of water resources activities with other states. One commenter recommended that the state should continue to support the Southeastern States Regional Water Resource Alliance Initiative (an initiative begun by the Corps of Engineers in the 2008-2009 timeframe that has not had further support or action).
- A majority of stakeholders agree on the need for the state to monitor interstate rivers and watersheds and ensure Alabama's interests are protected.
- Some stakeholders commented on the importance of maintaining relationships and partnerships with our neighboring states as a way to better coordinate activities and interests in shared watersheds.
- One stakeholder supported the recommendation for an interstate issues clearinghouse.
- The Environmental Protection Agency volunteered their services to facilitate coordination of interstate issues and encourages all states to keep in mind the CWA provision to protect all downstream uses.
- Many stakeholders continue to express concerns over water grabs by neighboring states and want the State to work diligently, more cooperatively, and in a coordinated way with neighboring states toward acceptable, negotiated solutions to interstate water issues.
- Some stakeholders believed that developing a fair and comprehensive statewide water resources management plan is the best tool for Alabama to manage and negotiate its interstate water issues.

1990 Report Implementing Recommendations:

The *Water for a Quality of Life* report contained the following implementing recommendations regarding interstate coordination issues:

The following was an Implementing Recommendation under the Federal-State Water Management Partnership Issue in the report:

- The Alabama Water Resources Agency should monitor federal activities which affect Alabama water resources and implement a policy to involve Alabama with federal agencies operating existing, or proposing new water resources projects that are located in the State or which will impact water coming into the State. Representative actions should include arranging periodic meetings with federal agencies to secure status reports of current and proposed activities at projects which affect Alabama water resources, serving as the State's representative on task forces or committees of federal agencies, and serving as the State water resources contact for federal agencies

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act.)

The following was an Implementing Recommendation under the Interstate Compacts Issue in the report:

- Research, develop, and implement procedures, through legislation or other methods, that allow agreements on interstate water resource quantity and quality issues to ensure Alabama's current and future water needs are adequately assured and protected.

(Status: This recommendation has been fully implemented through the passage of the Alabama Water Resources Act. Alabama has extensive experience with the development of interstate compacts based on the efforts associated with the ACT and ACF Compacts enacted in 1998.)

Policy Options:

- Agencies should support staff efforts to maintain relationships with peers in neighboring states to improve coordination of activities relating to shared interstate watersheds, and maintain continuity and staff-level lines of communication if contentious issues arise between the states.
- The Governor should continue to support agency activities that involve shared water resources including, but not limited to:
 - The Tennessee Valley Water Supply Partnership
 - Southern Instream Flow Network
 - Discussions with Tennessee and Mississippi regarding use of the Tennessee-Tombigbee Waterway for water supply
 - The National Integrated Drought Information System (NIDIS) initiative to develop a drought early warning system for the ACF River Basin
 - The Gulf of Mexico Alliance
 - The Gulf Coast Ecosystem Restoration Task Force

- In accordance with the Alabama Water Resources Act, OWR should maintain a clearinghouse concerning interstate water issues. Alabama's water resource agencies should continue to inform OWR of potential water quantity issues involving interstate watersheds.

Additional materials considered:

Report of the Water Resource Assessments, Studies, Data Collection and Storage Subcommittee of the Permanent Joint Legislative Committee on Water Policy and Management, 2008.

Appendix A

Letter from Governor Robert Bentley, April 18, 2012

OFFICE OF THE GOVERNOR

ROBERT BENTLEY
GOVERNOR



STATE CAPITOL
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STATE OF ALABAMA

April 18, 2012

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Dear Ladies and Gentlemen:

Thank you for the information you have provided regarding the water resources of our State. As you have noted, and as a number of commissions,

April 18, 2012
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study groups, committees, and knowledgeable individuals—both within and outside of state government—have noted, water is one of the State's vital resources, and it must be managed and protected for all who have an interest in it. To further our State's water management efforts, I am requesting that you do the following:

1) Continue the Alabama Water Agencies Working Group. Reconvene the working group, and undertake the actions provided further herein. Bennett Bearden shall serve as chairman of this group and shall report its progress and developments to me or my office in writing on a monthly basis. Thank you in advance for providing Bennett with your cooperation and support.


2) Create a comprehensive database of Alabama's water resources. Gather all existing data and let me know about any additional data that needs to be collected to provide a full understanding of the State's water resources, the current uses of these resources, and the need for these resources (including, but not limited to, industrial, economic, public health and safety, and environmental needs.)

3) Meet with stakeholders. Organize and conduct meetings with my staff, key legislators, and outside stakeholders from groups that represent—at a minimum—economic, industrial, utility, public drinking water supply, public safety, recreational, environmental, ecological, and agricultural interests.

4) Recommend a statewide water management plan by December 1, 2013. Recommend a statewide water management action plan and timeline that takes into account and equitably manages the various demands on the State's water. Create a plan that is science-based, data-driven, and that is in the best interest of the State of Alabama, but that also takes into account and protects proper existing uses of water. Include in your recommendation any proposed legislation necessary to implement such a plan.

Thank you for the work you have already done on this significant state resource, and thank you in advance for the work that you will do in carrying out the goals and objectives set forth herein. Please keep me posted on your progress and do not hesitate to call upon my office and my staff for support and assistance. I believe that this work will benefit all Alabamians now and for generations to come.

Sincerely,


Robert Bentley
Governor

RB/RCS/vm

Appendix B

Origin of the Alabama water resources paradigm:
How did we get here?

ORIGIN OF THE ALABAMA WATER RESOURCES PARADIGM: HOW DID WE GET HERE?

Historically, the Alabama water resources paradigm was shaped by two drivers: drought and the tri-state water wars. In the mid-to-late 1980s, severe droughts affected the ACT and ACF basins resulting in water shortages and lower flows and reservoir levels in some areas. The U.S. Army Corps of Engineers' proposal to reallocate storage from federal reservoirs in Georgia and that state's plans to construct a regional water-supply reservoir in the Tallapoosa River Basin heightened awareness of water quantity issues. These events also emphatically highlighted the lack of a system to assess and track water use in Alabama. Consequently, in February 1989, Governor Guy Hunt issued Executive Order 27 that established the Water Resources Study Commission to study water issues in Alabama.

In June 1990, the State of Alabama filed a lawsuit in federal court in the Northern District of Alabama (in Birmingham) challenging the USACE's operations in the ACT and ACF basins. Florida and Georgia moved to intervene in the lawsuit and in July, the litigation was stayed from July 1990 to January 1992 to allow discussions and negotiations between the three states and the USACE. This lawsuit and the ensuing court battles were dubbed the "tri-state water wars." In the ACF litigation the states, counties, cities, a water district, and a power company brought separate actions against the USACE, challenging its reallocation of reservoir's water storage capacity under the National Environmental Policy Act (NEPA) and the Water Supply Act, among other Congressional enactments. In October 1990, the Alabama Water Resources Study Commission issued its report concluding that Alabama did not have the governmental structure in place to address water resources issues facing the State. The report included several recommendations that would eventually become the framework for formation of the OWR. In 1991, Governor Hunt issued Executive Order 44 establishing the OWR as a division of ADECA.

In January of 1992, a Memorandum of Agreement was signed by Alabama, Florida, Georgia, and the USACE calling for an ACT/ACF Comprehensive Study which took place from 1992-1997 with OWR as the lead state agency. In the meantime as a result of the 1990 Water Resources Study Commission report, beginning in 1991 the Alabama Legislature proposed implementation of the State's first water use reporting program, the Alabama Water Resources Act (Act Number 93-44, now *Code of Alabama*, 1975 Section 9-10B-1, *et seq.*, "Act") which became effective on February 23, 1993, and established the OWR. Consequently, the traditional common law riparian system in Alabama is overlain by a statutory template of government-issued use certificates administered by OWR. The OWR is responsible for the planning, coordination, development and management of Alabama's surface water and groundwater resources. The functions of OWR include but are not limited to:

- Administering the Water Use Reporting Program which requires all public water systems and nonpublic and irrigation users with the capacity to withdraw 100,000 gallons per day or more to report annual water use.
- Representing the State of Alabama in the interstate water issues, including involvement in the ACT and ACF River Basins litigation.

- Floodplain management.
- Drought planning.

The Act also created the Alabama Water Resources Commission, a 19-member body responsible for oversight of the OWR (*Ala. Code* sec. 9-10B-12, (2001 Repl.)). Alabama is now generally considered one of 18 states which have been identified as “regulated riparian states” (Grant & Weber, 2010, p. 308, note 1); however, this is somewhat of a legal fiction because OWR does not issue *permits* but rather certificates of use. Noteworthy is that the Act provides that “[n]othing contained in this chapter shall change or modify existing common or statutory law with respect to the rights of existing or future riparian owners concerning the use of waters of the state” (*Ala. Code* sec. 9-10B-27 (2001 Repl.)). This was, obviously, a significant policy consideration for the State.

In 1997, the ACT/ACF Comprehensive Study was completed. In addition common language for the ACT and ACF Interstate Compacts was developed by Alabama, Florida and Georgia and introduced into the individual state legislatures. The ACT and ACF River Basin Compacts were adopted by the respective states’ legislatures, approved by Congress, and signed into law by President Clinton in November 1997. From 1998-2003, the states negotiated water allocation formulas for the ACT and ACF River Basins. Protracted negotiations resulted in extended deadlines on several occasions by agreement of the three states. In 2000-01, the region, including large parts of Alabama, was once again plagued by a major drought in the ACT and ACF basins.

In August 2003, the ACF Compact expired after negotiations collapsed and were not extended. Alabama and Florida challenged a “secret” settlement agreement between the USACE, Georgia, and the Southeastern Federal Power Customers (SEFPC) that reallocated a significant amount of Lake Lanier’s reservoir storage for water use supply, in a previously filed lawsuit in district court in Washington, D.C. Later, in July 2004, the ACT Compact expired after negotiations collapsed and litigation resumed.

Beginning in 2005, Alabama Governor Bob Riley worked continuously on the interstate water wars and placed a priority on litigation and negotiations. OWR began working on its statewide water-use assessment for 2005. In 2006, Alabama began to once again experience drought conditions in large areas of the State. In the interstate litigation, Judge Bowdre of the U.S. District Court, Northern District of Alabama, ordered mediation in the ACT case led by Judge Charles Renfrew beginning in late 2006. In the D.C. District case, the Court upheld the “secret” settlement agreement between Georgia, the USACE, and the SEFPC, prompting Alabama and Florida to appeal the decision to the D.C. Circuit Court of Appeals. In 2007, drought conditions in Alabama worsened in the spring and summer and lasted well into the spring of 2008. On November 28, 2007, the Alabama Water Resources Commission adopted a Resolution supporting Alabama’s response to drought conditions, endorsing the State’s actions in the tri-state water wars and encouraging Governor Riley to enhance “laws, policies and procedures relating to the use and management of Alabama’s water resources.”

In 2007, the court consolidated seven cases in the ACF basin litigation and transferred the litigation to the Middle District Court in Jacksonville, Florida, under Judge Paul Magnuson. Judge Magnuson divided the case into two phases. The actions

were consolidated by Judicial Panel on Multidistrict Litigation, and the parties cross-moved for summary judgment. The court-ordered mediation in the ACF basin case ended in mid-2007 without agreement. In November 2007, President George W. Bush appointed Interior Secretary Dirk Kempthorne to lead negotiations in the tri-state water wars.

Although drought conditions continued into 2008, they were not as severe as they had been. In February, the Court of Appeals for the D.C. Circuit overturned the D.C. District Court's ruling which effectively vacated the so-called "secret" settlement agreement. Unfortunately, the negotiations led by Interior Secretary Kempthorne proved fruitless and collapsed in April 2008. The three states then began briefing for the consolidated ACF Phase 1 litigation. In response to drought conditions and the lack of a statewide water management plan, the Alabama Legislature passed Senate Joint Resolution 28 (SJR28, Act 2008-164) creating the Permanent Joint Legislative Committee on Water Policy and Management (PJLCWPM) which began meeting in June. In December, the Water Resources Assessments, Studies, Data Collection and Storage Subcommittee of the PJLCWPM issued its report on water resources data needs in the State. In February of 2009, Governor Riley signed Act 2009-10 into law codifying all nine recommendations contained in the Water Resource Assessments, Studies, Data Collection and Storage Subcommittee's final report.

In July 2009, Judge Magnuson ordered a three-year stay in the consolidated ACF basin Phase 1 litigation to allow the parties to reach an agreement and submit it to Congress for approval. Judge Magnuson granted motions in part, concluded that the USACE had exceeded its authority in its "de facto" reallocation of storage to accommodate current water supply withdrawals, and directed the USACE to limit releases. This order in favor of Alabama and Florida prompted an appeal by Georgia to the Eleventh Circuit Court of Appeals and cross-appeals were taken.

Later that year, OWR and the U.S. Geological Survey published a report entitled *Estimated Use of Water in Alabama in 2005*. This is the most comprehensive summary of water use in the State ever published and included summaries at both the county and eight-digit watershed level.

In the summer of 2010, Alabama again began experiencing drought conditions that continued into 2012 for 50% of the State. Several negotiations were held between Alabama, Florida and Georgia in the ACF and ACT cases during 2010. Briefings for the ACF Phase 2 litigation began. Oral arguments were held before Judge Magnuson in June resulting in a holding (without relief) that the USACE failed to comply with NEPA and rejecting Florida and Georgia's Endangered Species Act (ESA) claims.

In June 2011, the Eleventh Circuit Court of Appeals overturned Judge Magnuson's ACF basin Phase 1 ruling. The Court of Appeals held that: (1) it had pendent appellate jurisdiction over the other three cases; (2) the district court lacked jurisdiction to review claims challenging water withdrawals from reservoirs; (3) the USACE was authorized to allocate storage in reservoir for water supply; and (4) the USACE's denial of Georgia's water supply request was based on clear error of law. This ruling prompted Alabama and Florida to petition the court for an en banc hearing in August. In late September 2011, the Eleventh Circuit Court of Appeals denied that petition. Also in June,

Alabama Governor Robert Bentley issued Executive Order 19 (amended in August 2013) which established the Alabama Drought Assessment and Planning Team (ADAPT) to advise OWR in the development and implementation of all drought-related activities. In October 2011, Judge Bowdre considered motions to dismiss certain limited issues in the ACT basin litigation.

In February 2012, Alabama and Florida filed a petition for certiorari in the Supreme Court of the United States (SCOTUS) seeking review of the Eleventh Circuit Court of Appeal's ACF basin Phase 1 decision. On June 25, 2012, the SCOTUS announced that it would not intervene in the water dispute between Alabama, Florida, and Georgia. The decision was not welcome news for the State of Alabama, which has challenged how much water Georgia and the City of Atlanta are allowed to remove from Lake Lanier for water supply. By refusing to hear the appeals from Alabama and Florida, the nation's highest court let stand a ruling by the Eleventh Circuit Court of Appeals allowing Georgia to use water from Lake Lanier to supplement the growing thirst in metropolitan Atlanta. Alabama and Florida have argued that taking water out of Lake Lanier reduces the flow of water downstream on the Chattahoochee River, which hurts recreation, wildlife, businesses, economic development, ecosystems and the seafood industries in Alabama and Florida. On June 29, 2012, Judge Bowdre dismissed nine of ten counts in the ACT basin case, originally filed to prevent Georgia from siphoning too much water upstream from rivers that flow into Alabama, holding that the USACE's actions involving their operations at Lake Allatoona were not final agency actions. Shortly thereafter, all parties advised the Court that they had agreed to dismissal of the final count with prejudice and, on September 23, 2012, Judge Bowdre issued a final order of dismissal of the case.

After the dismissal, on March 1, 2013, the USACE released a draft Environmental Impact Statement (EIS) containing the results of their analysis of the environmental effects of the proposed action alternative (PAA) for the ACT River Basin Master Water Control Manual. On May 31, 2013, Alabama responded to the USACE's PAA with extensive comments and objections. A similar process is slated to begin for the ACF basin in the 2015 timeframe.

On October 1, 2013, Florida filed suit against Georgia in the Supreme Court of the United States over water consumption. The lawsuit is targeted at damage to the oyster industry in Apalachicola Bay, which has seen a near collapse in the last two years because of reduced flow. Alabama was not named in the lawsuit.

The epic three-state battle over the ACF and ACT basins is decades old now and droughts will continue to impact the State. Against this backdrop of recurrent drought, population growth, economic development activities and the potential for future interstate water conflicts, Governor Robert Bentley formally organized the AWAAG on April 18, 2012.

Appendix C

Evaluation of 1990 Alabama Water Resources Study Commission Report
entitled *Water for a Quality of Life*

Introduction

The following is an Office of Water Resources assessment based on an analysis and evaluation of the responses to a survey submitted to the original agency participants in the report entitled, "Water for a Quality of Life". The survey asked the original agency participants to characterize the current status of the recommendations found in the report. Prior to discussing these responses, it is first necessary to provide a background and overview of the report's origins and objectives.

Background and Overview

In February 1989, Governor Guy Hunt issued Executive Order 27 which established the Alabama Water Resources Study Commission (AWRSC) to address water issues and problems the state was facing at the time. Executive Order 27 charged the Commission with the following duties:

- Study water use problems in Alabama
- Determine water use trends in relation to supply and utilization
- Plan for long-term water availability with equitable access
- Compare Alabama's water planning process, coordination mechanisms, and legislation with that of other states
- Determine the role of the State of Alabama relative to the federal and local governments and the private sector
- Develop policies for the future use and development of Alabama water resources

The Commission consisted of 7 members with each member representing each of the Congressional districts in the state. A Technical Advisory Committee was created which consisted of representatives from 15 state and 10 federal agencies with responsibilities related to water resources in Alabama. In addition 13 study committees were created which consisted of over 270 representatives from state, federal, and local governments, stakeholder groups, and private businesses. The committees addressed a wide range of water uses related to the areas of agriculture, environment, finance, groundwater, industry, legal, natural hazards, navigation, power generation, recreation and tourism, surface water, and water supply. The Study Commission published a report summarizing its findings and conclusions in October 1990 entitled "Water for a Quality of Life."

In the report, the Study Commission dealt with several water resource issues which included:

- Abandoned Wells
- Citizen Awareness
- Declining Ground Water
- Droughts
- Environmental Concerns
- Financing
- Floods
- Salt Water Intrusion
- Septic Tanks
- Surface Water Depletion and Transfers
- Water Quality

- Water Quantity Protection for Future Growth
- Water Resources Management

In addition, the Study Commission also considered the following issues and developed policy statements and recommendations for them:

- Ground-Surface Water Relationships
- Local Responsibilities
- Navigable Waterways and Primary Infrastructure
- Facilitating Industrial Location

To address the problems issues and problems studied, the Study Commission proposed a water management strategy based on four cornerstones: managing, protecting, using, and understanding Alabama's water resources. Water resources policy statements were developed and categorized with each policy statement followed by an issue description and recommendations for implementing the policy statements. A total of 29 proposed policy statements and 105 recommendations were presented in the report.

Under the first cornerstone, management, the Study Commission recommended the establishment of an Alabama Water Resources Agency that would be a new executive branch agency that would be directly responsible to the Governor or as an alternative, the establishment of a water resources division (now the Office of Water Resources) within the Alabama Department of Economic and Community Affairs. This Alabama Water Resources Agency would have responsibilities that covered planning, coordinating, financing, and monitoring. The establishment of the Alabama Office of Water Resources, as created by the Alabama Water Resources Act in 1993, is the embodiment of that recommendation.

In addition to creating the Alabama Water Resources Agency, the Study Commission also recommended the creation of an Alabama Water Resources Commission that would act in an advisory capacity to the Governor and what has become the Office of Water Resources. The members would be appointed for staggered terms and would serve on a part-time basis, developing and advising on water resources policy, approving strategies, adopting rules and regulations, and hearing appeals. The establishment of the Alabama Water Resources Commission, as created by the Alabama Water Resources Act in 1993, is the embodiment of that recommendation.

The water agency's planning function would include three elements: data collection, databases, and studies. The coordination function would consist of interacting with state, federal, local, interstate and intrastate agencies and entities and taking action to protect Alabama's interests regarding the sharing of interstate waters. The financing function focused on revenues for water projects, a water development fund, coordinating projects, and matching federal funds for assistance when possible. The fourth function, monitoring, dealt with water quantity, interbasin transfers, and safe dams. The discussion of the management cornerstone was broken out by topics and sub-topics in the report as follows:

MANAGING WATER RESOURCES

- Alabama Water Resources Agency and Commission
 - Background
 - Primary Organizational Structure
 - Alternative Organizational Structure

- The Commission
- Implementing Recommendations

- Planning
 - Monitoring Networks
 - Databases and Information
 - Plans and Studies
 - Reservoirs
 - Instream flow
 - Enhanced Coordination of Hydrologic Emergencies
 - Floodplain Management
 - Drought Management

- Coordinating
 - Federal-State Water Management Partnership
 - Interstate Compacts
 - Aquatic Plant Management

- Financing
 - Coordinating, Selecting, and Sponsoring Water Resource Development Projects
 - State Water Development Fund

- Monitoring
 - Water Quantity Program
 - Certificates of Use
 - Water Supply and Demand Analysis
 - Critical Use Areas
 - Capacity Use Areas
 - Permitting of Water Quantity
 - Water Withdrawal Permits
 - Interbasin Transfers of Water
 - Alabama Safe Dams Program

The second cornerstone of the Study Commission's recommendations, protecting the water resources of the state, focused primarily on clarifying and expanding existing program to address point and non-point source pollution problems. Recommendations related to this cornerstone dealt with wells, septic tanks, sedimentation, irrigation backflow, wetlands, and strengthening certain existing pollution protection programs at the time. The topics and sub-topics from the report for this area included:

PROTECTING WATER RESOURCES

- Wells
 - General Policy Statement
 - Source Protection
 - Testing
 - Construction and Siting
 - Well Drillers
 - Abandoned Wells

- Septic Tanks
- Sedimentation
- Irrigation Backflow Prevention
- Wetlands Strategy
- Pollution Protection Program

The third cornerstone, water use, focused on water used for public supply, industrial manufacturing and cooling, crop irrigation, movement of goods, and power generation. Under this cornerstone discussion, the Study Commission placed priority on the conservation, county water systems, and scenic and recreational streams.

Understanding water resources, the fourth cornerstone of the Study Commission's recommendations, included two key recommendations towards developing an understanding of the state's water resources. One recommendation supported water resources education as part of a formal and informal training process involving expanded courses, revised curricula, and adding additional training requirements. A second recommendation focused on increasing research funding and monitoring research programs related to Alabama's water resources.

Evaluation of the 1990 Study Commission Report

In 2012, the Alabama Water Agencies Working Group (AWAWG) asked the ADECA Office of Water Resources (OWR) to review the 1990 Study Commission report and evaluate the status of the recommendations in the report. OWR consulted with the Water Resources Management Subcommittee of the Alabama Water Resources Commission and also sent a survey on October 10, 2012, to the department heads of each of the 15 state agencies that participated on the Study Commission's Technical Advisory Committee. The survey consisted of a listing of the 105 recommendations and the status of each recommendation was to be categorized as either:

- Fully Implemented
- Partially Implemented
- No Longer Applicable
- Open

Seven agencies (47%) responded to the survey and they are as follows:

- Alabama Department of Economic and Community Affairs - OWR
- Alabama Attorney General
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Environmental Management
- Alabama Department of Health
- Alabama Forestry Commission
- Geological Survey of Alabama

Eight agencies (53%) did not respond to the survey and they are as follows:

- Alabama Department of Agriculture and Industries
- Alabama Department of Commerce (formerly ADO)
- Alabama Department of Labor (formerly Dept of Industrial Relations)
- Alabama Public Service Commission
- Alabama Soil and Water Conservation Committee

- Alabama State Docks
- Alabama Surface Mining Commission
- Alabama Water Resources Research Institute

OWR evaluated the responses received and developed the assessment of the current status of the 1990 report recommendation status as summarized below:

Category	Number	Percentage
Fully Implemented	28	27%
Partially Implemented	49	46%
No Longer Applicable	0	0%
Open	28	27%
Totals	105	100.0%

Fourteen of the 28 recommendations that were considered as fully implemented were implemented as a result of passage of the Alabama Water Resources Act in 1993. Those fourteen recommendations that were implemented were:

- Create an Alabama Water Resources Commission.
- Create an Alabama Water Resources Agency with responsibilities in four broad categories: planning, coordinating, financing, and monitoring.
- Require the Alabama Water Resources Agency to be the umbrella organization for drought planning and coordination.
- Enact legislation to require a permit to withdraw a specified amount of water from either surface or groundwater supplies.
- Enact legislation requiring larger volume water users to obtain a certificate of use and report annual water use. Water use reports are required under a certificate of use.
- Enact legislation to enable the declaration of critical use and capacity use areas.
- Require water withdrawal permits within capacity use areas for water users that withdraw, divert, or consume more than a specified quantity of water. Criteria such as, but not necessarily limited to, those found in Appendix Table 4 (of the Study Commission report) can be used to evaluate the applications for permits.
- The Alabama Water Resources Agency should monitor federal activities which affect Alabama water resources and implement a policy to involve Alabama with federal agencies operating existing, or proposing new, water resources projects that are located in the State or which will impact water coming into the State. Representative actions should include arranging periodic meetings with federal agencies to secure status reports of current and proposed activities at projects which affect Alabama water resources, serving as the State's representative on task forces or committees of federal agencies, and serving as the state water resources contact for federal agencies.
- Research, develop, and implement procedures, through legislation or other methods, that allow agreements on interstate water resource quantity and quality issues to

ensure Alabama's current and future water needs are adequately assured and protected.

- Appoint a committee of technical specialists to develop a definition for Alabama water resources, acknowledging the interactive ground and surface water relationship prior to, or in conjunction with, legislative action.
- Legislatively define water resources and direct that all water resource laws and subsequent management and development actions consider the overall effects on the ground and surface water system.
- Coordinate and disseminate, through the Alabama Water Resources Agency, information about existing state and federal water resource education programs.
- Develop water resource information and education programs for all citizens of Alabama.
- Monitor federal water resources research through the Alabama Water Resources Agency.

The remaining recommendations that were considered as being fully implemented were:

- Require any water system applying for a state administered grant or loan to include a financial analysis of the rate structure estimating its ability to generate adequate revenues for operations, debt retirement, and system expansions.
- Identify municipal water supply and waste treatment systems by current capacity, average use, and peak use levels as well as source and facility descriptions.
- Develop memorandums of understanding among state agencies, identifying roles and responsibilities for hydrologic emergencies.
- Encourage, through the Alabama Emergency Management Agency and the Association of County Commissions of Alabama, all Alabama counties to have full-time, trained emergency management coordinators with financial support provided by the Federal Emergency Management Agency.
- Provide additional support for the state floodplain management program to assist Alabama communities in understanding the requirements of the National Flood Insurance Program.
- Require the Alabama Water Resources Agency, with the assistance of appropriate federal agencies, to research the encroachment of rural floodplains to determine the magnitude of the problem, develop guidelines for location and construction of catfish ponds, and develop appropriate model regulations to minimize floodplain encroachment.
- Provide matching funds to ensure that the Alabama Water Pollution Control Authority and ADEM capture all federal grant seed monies to provide a perpetual source of low-interest loan funds for municipal waste water improvements.
- Support other types of ground water protection programs.
- Provide, through the State Health Department, individual county health departments with equipment to test water for outside contaminants.
- Require the State Health Department to continue to offer bacteriological testing, initiate non-duplicative, two-parameter chemical testing at each laboratory, and charge a nominal fee to offset the expenses of the testing program.
- Implement, through state and county health departments, an informational program to inform users of private water sources of the need to periodically sample their water.

- Instruct the Health Department to develop and adopt rules and implement enforcement actions necessary to eliminate the public threats caused by improper on-site sewage systems.
- Develop a definition of lakes applicable to Alabama.
- Encourage public water systems to develop emergency operations plans.

Seven of the 49 partially implemented recommendations that were considered as partially implemented were implemented as a result of passage of the Alabama Water Resources Act in 1993. Those seven recommendations that were partially implemented were:

- Develop and implement a state water resource program which establishes a basis for protecting existing, expanding, and future industrial locations.
- Assess the maximum levels of water withdrawal and waste discharge appropriate for a given location or region. This consideration should include effects of potential or existing land application spray of treated effluent.
- Charge the Alabama Water Resources Agency with the responsibility to coordinate comprehensive water resources studies aimed at developing a water resources strategy for the future of Alabama. This effort should be adequately funded and coordinated with federal and state agencies involved with water resources issues and development.
- Charge the Alabama Water Resource Agency with determining and recommending water resource projects in which the State should participate, developing a method for prioritizing water resource projects, and determining the distribution of State and local cost sharing for regional projects.
- Enact legislation implementing a comprehensive well permitting program, including locating and inspecting all new wells.
- Support water conservation education programs.
- Empower the Alabama Water Resources Agency to develop model water conservation programs, provide technical assistance to local public entities, and review local water conservation plans to ensure they are capable of attaining state conservation objectives.

Fifteen recommendations have not been fully implemented due to lack of funding. Those recommendations were:

- Include navigation in basic decision and policy making with respect to all water resource allocation issues.
- Expand monitoring networks including hydrologic water quality stations, streamflow stations, precipitation stations, and observation wells.
- Install real-time sensors at key streamflow stations, observation wells, precipitation stations, and water quality stations in order to provide immediate data for decision makers.
- Charge the Alabama Water Resources Agency with the responsibility to coordinate comprehensive water resources studies aimed at developing a water resources strategy for the future of Alabama. This effort should be adequately funded and coordinated with federal and state agencies involved with water resources issues and development.

- Provide adequate funding, manpower, and training to state agencies anticipated to be required to respond to hydrologic emergencies.
- Charge the Alabama Water Resource Agency with determining and recommending water resource projects in which the State should participate, developing a method for prioritizing water resource projects, and determining the distribution of State and local cost sharing for regional projects.
- Provide adequate funds for water resources data collection and information dissemination, scientific analyses, baseline and trend information for long-term planning and specific short-term data, and other water resource agency activities as required.
- Provide State funding to establish and enforce best management practices for all rural land-disturbing activities.
- Strengthen animal waste nutrient guidelines and provide more funding to the Alabama Cost Share Program to expand technical assistance for best management practices to reduce non-point agricultural pollution.
- Support water conservation education programs.
- Empower the Alabama Water Resources Agency to develop model water conservation programs, provide technical assistance to local public entities, and review local water conservation plans to ensure they are capable of attaining state conservation objectives.
- Prepare a comprehensive river corridor assessment based on land uses and the multiple interests that exist in the river corridors.
- Develop a scenic and recreational stream program based on the corridor assessments and establish the authority to enact local ordinances to control development in the corridors.
- Utilize public agencies, universities, and other organizations within the State of Alabama that have responsibilities for water resources/environmental research.
- Provide an annual appropriation, through the Alabama Water Resources Agency, of at least \$1,000,000 to support applied water resources research.

Thirteen recommendations have not been fully implemented due to lack of legislative or regulatory authority. Those recommendations were:

- Require all local water systems to use enterprise accounting and require that revenues be used only for expenses related directly to the management, maintenance, and operation of the local system.
- Advise and provide incentives to all local water systems to implement impact or replacement fee systems.
- Encourage all water systems to establish flat, or increasing block, rate structures.
- Encourage a multi-step (e.g., 5-, 10-, 20-, and 50-year) water supply growth plan for public water systems.
- Enact legislation to require drought contingency planning for local systems requesting water withdrawal authority.
- Enact legislation to establish broad-based water user fees. An illustration of how this would work is shown in Table 1 (of the Study Commission report). There are, however, other sources that could be used to generate funds.

- Enact legislation, on an intermediate-term basis, to require water users to obtain interbasin transfer permits from the appropriate state water management agency. The agency should determine whether the benefits of approving a transfer outweigh the costs of not approving it.
- Require permits to control interbasin transfers of ground and surface water that exceed a specified quantity. The permit should specify the maximum quantity of water that can be transferred during a given time period.
- Resolve any remaining conflicts and complete and enact, in the next session, legislation to establish a “Safe Dams Program.”
- Require public water systems and large capacity self providers to secure bonding to ensure the proper abandonment of wells.
- Enact legislation to require local water conservation when water supply disruption or loss would jeopardize either the health of citizens or economic well being of an area.
- Use locally prepared programs to accomplish water conservation. Examples of measures to be included in local conservation programs are amending the plumbing code to require the use of "low flow" fixtures, developing landscape water conservation practices, and curtailing certain other outdoor water uses.
- Require counties to develop countywide plans to coordinate the engineering of all water systems within the county. Plans should address sources of supply, strategic locations for major storage facilities, locations of trunk distribution lines, critical points of interconnection, and the potential to share equipment and personnel for maintenance.

Summary

A complete listing of the 105 recommendations, their recommendation status, and comments by the agencies that responded to the survey are included in the Appendices. Many of the recommendations found in the report "Water for a Quality of Life" are also found in the AWAAG report, "Water Management Issues in Alabama." The one notable exception is that the 1990 report listed water infrastructure funding as a problem area and the issue is not highlighted in the 2012 Water Agency report.

For informational purposes, the results are provided in two formats. The first, in Appendix 1, provides a summary of the recommendations in the order listed in the report. The second summary, in Appendix 2, provides a summary of recommendations sorted by their specific status category.

The results of this survey are provided to the AWAAG in support of their efforts to develop recommendations for water resources planning and management by December 2013. A copy of the survey results was also provided to the Alabama Water Resources Commission at their meeting on December 4, 2012.

Appendix D

A comparison of the 1990 report *Water for a Quality of Life* to the
2012 *Water Management Issues in Alabama* report

Comparison of 1990 Alabama Water Resources Report to
2012 Water Management Issues Report in Alabama

1990 Report	2012 Report
Groundwater – Surface Water Relationships	
<ul style="list-style-type: none"> • Appoint a committee of technical specialists to develop a definition for Alabama water resources, acknowledging the interactive ground and surface water relationship prior to, or in conjunction with, legislative action. • Legislatively define water resources and direct that all water resource laws and subsequent management and development actions consider the overall effects on the ground and surface water system. 	<ul style="list-style-type: none"> • Current gaging stations (especially those with 30 or more years of record) should be maintained and additional stations should be installed in strategic watersheds. The USGS (or DOI) should be strongly encouraged by the Governor to adequately support this program with federal funding to leverage available state resources. • Provide funding and support for scientific assessments and initiatives by Alabama’s water agencies. This includes expansion of ADEM, ADCNR, and GSA assessments of water quality and biological resources, GSA and OWR groundwater and surface-water assessments, and OWR water use assessments. • Establish groundwater regulations that are consistent with water policies and the statewide water resources management plan and includes: <ul style="list-style-type: none"> ○ Identification of priority groundwater uses; ○ Preservation and protection of aquifer recharge areas; ○ Determination of proper well spacing; ○ Maximum well production rates; and ○ Maximum aquifer water withdrawals. • Develop a comprehensive scientific knowledge of Alabama groundwater to accomplish groundwater protection, prudent groundwater development, and future groundwater policy development. • Provide funding and support for groundwater and streamflow monitoring in Alabama. This includes expansion and support of the statewide, real-time groundwater level monitoring network currently being implemented by the GSA as well as state funding to match federal dollars for the USGS streamflow monitoring network. • Ensure that the groundwater monitoring network is also monitoring groundwater quality where needed. • Provide support for adequate protection of groundwater quality through ADEM’s groundwater and drinking water protection programs.

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

Local Responsibilities Related to Water Supply	
<ul style="list-style-type: none"> • Require all local water systems to use enterprise accounting and require that revenues be used only for expenses related directly to the management, maintenance, and operation of the local system. • Require any water system applying for a state administered grant or loan to include a financial analysis of the rate structure estimating its ability to generate adequate revenues for operations, debt retirement, and system expansions. • Advise and provide incentives to all local water systems to implement impact or replacement fee systems. • Encourage all water systems to establish flat, or increasing block, rate structures. 	<ul style="list-style-type: none"> • A statewide water management plan should contain components that: <ul style="list-style-type: none"> ○ Promote water conservation and efficiency for public utilities; ○ Set methods to measure conservation and efficiency; ○ Educate stakeholders and the public regarding the benefits of water conservation and overcomes negative perceptions of water reuse; ○ Require advanced treatment standards of wastewater for water reuse; ○ Direct the adoption of water reuse regulations; and ○ Set localized voluntary and mandatory water conservation measures during times of drought through the state’s Drought Management Plan.
Navigable Waterways are Primary Transportation Infrastructure	
<ul style="list-style-type: none"> • Include navigation in basic decision and policy making with respect to all water resource allocation issues. 	<ul style="list-style-type: none"> •
Facilitating Industrial Locations	
<ul style="list-style-type: none"> • Develop and implement a state water resource program which establishes a basis for protecting existing, expanding, and future industrial locations. • Assess the maximum levels of water withdrawal and waste discharge appropriate for a given location or region. This consideration should include effects of potential or existing land application spray of treated effluent. • Estimate future production support requirements (10-year minimum) for existing industries giving consideration to projected expansions. • Identify municipal water supply and waste treatment systems by current capacity, average use, and peak use levels as well as source and facility descriptions. • Encourage a multi-step (e.g., 5-, 10-, 20-, and 50-year) water supply growth plan for public water systems. • Educate individuals in state and regional development agencies who have impact on site location decisions and establish a coordinated, pre-planning process to insure consideration of current and projected water uses. 	<ul style="list-style-type: none"> •

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

Alabama Water Resources Agency and Commission	
<ul style="list-style-type: none"> • Create an Alabama Water Resources Agency with responsibilities in four broad categories: planning, coordinating, financing, and monitoring. The duties of the Commission include: <ul style="list-style-type: none"> – Planning <ul style="list-style-type: none"> ○ Implementing strategies to obtain favorable outcomes from Federal water-related programs. ○ Insuring protection of State water resources on non-environmental issues. ○ Preparing comprehensive river basin and aquifer studies and plans. ○ Undertaking studies and actions to establish water needs for Alabama's economic growth and long range planning for water management. . ○ Preparing drought contingency plans and coordinating water resources development and management projects. ○ Implementing comprehensive water projects and programs. – Coordinating <ul style="list-style-type: none"> ○ Interceding for protection of interstate water. ○ Providing liaison with water industry agencies and interest groups. ○ Providing assistance to communities and industries in water supply use and development. ○ Coordinating recommendations and diverse task forces, agencies and interest groups. – Financing <ul style="list-style-type: none"> ○ Assisting in development of financial policy and providing financial assistance for water resources development. ○ Identifying projects, financial resources and implement actions needed to enhance water resources management. – Monitoring <ul style="list-style-type: none"> ○ Developing and implementing a water withdrawal control program. ○ Requiring reporting and permitting of interbasin transfer of water. ○ Administering an Alabama Safe Dam program. • Create an Alabama Water Resources Commission. The duties of the Commission include: <ul style="list-style-type: none"> – Develop and advise the Governor and Agency on water resource policy. – Review geographic area and functional water plans. – Approve strategies. – Adopt rules and regulations to implement the plans and strategies. • Hear appeals related to administrative actions related to rules and regulations. 	<ul style="list-style-type: none"> • Develop a joint legislative resolution to clearly establish the state’s ownership of Alabama’s water resources. See footnote 1/ (below) for suggested language. • Direct the Water Agencies Working Group to recommend components of a statewide water management plan, consistent with the Alabama Water Resources Act, that: <ul style="list-style-type: none"> ○ Provides for local planning; ○ Addresses the impacts on the state's water resources from water use, land use patterns, population growth, climate change, economic development, and hydrologic extremes (both floods and droughts); ○ Establishes the geographic extent of the water resource planning areas (i.e. watersheds, counties, regions, etc.); ○ Delineates the roles between state and local entities by reviewing options for local roles in water resources management activities including but not limited to Regional Planning Councils (RPCs), Watershed Management Authorities (WMA), Soil and Water Conservation Districts, Irrigation Districts, etc.; ○ Considers and incorporates, as appropriate, the recommendations for statewide water resources management from the October 1990 study of Alabama’s water resources entitled, Water for a Quality of Life; and ○ Considers enhancements and/or additions to the Alabama Water Use Reporting Program. • Involve the Alabama Water Resources Commission in the development of a statewide water resources management plan.

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

Monitoring Networks	
<ul style="list-style-type: none"> • Expand monitoring networks including hydrologic water quality stations, streamflow stations, precipitation stations, and observation wells. • Install real-time sensors at key streamflow stations, observation wells, precipitation stations, and water quality stations in order to provide immediate data for decision makers. • Expand aquatic biological monitoring and develop biological criteria for surface waters. 	<ul style="list-style-type: none"> • Provide funding and support for groundwater and streamflow monitoring in Alabama. This includes expansion and support of the statewide, real-time groundwater level monitoring network currently being implemented by the GSA as well as state funding to match federal dollars for the USGS streamflow monitoring network. • Current gaging stations (especially those with 30 or more years of record) should be maintained and additional stations should be installed in strategic watersheds. The USGS (or DOI) should be strongly encouraged by the Governor to adequately support this program with federal funding to leverage available state resources. • Ensure that the groundwater monitoring network is also monitoring groundwater quality where needed.
Databases and Information	
<ul style="list-style-type: none"> • Establish a state "Water Resources Information Center," including a comprehensive water resources reference collection and computerized databases at scientific water resource agencies, networked to water regulatory and management entities. • Establish a data quality assurance program which sets quality control guidelines for data included in the network. • Establish and maintain a long-term, baseline data network to monitor trends in the quantity, quality, and distribution of state surface and ground water. This network must be sufficient to meet planning and monitoring needs into the foreseeable future. 	<ul style="list-style-type: none"> • A viable state water management process should be based on, and supported by, a robust and scientifically developed set of water resources data. Resources to support these efforts should be a priority in the budgeting process. <ul style="list-style-type: none"> ○ Recent work to expand the state's groundwater monitoring system should continue and be expanded to provide the needed coverage in all aquifers and should include the collection of groundwater quality data. ○ The state's surface water assessment and monitoring capabilities should be expanded, particularly with regard to drought and flows resulting from compact negotiations with other states. ○ Ensure that key stream flow gages remain active and are strategically located with respect to water quantity and water quality assessment needs. ○ Conjunctive assessment of the state's surface and groundwater resources should be initiated and become central to the statewide water management process. • Evaluate the status of Alabama's existing stream gage network needs by appropriate agencies and stakeholder groups and identify improvements and changes that are needed for supporting a statewide water management initiative. • Provide resources and support for instream flow studies to evaluate existing flow tools and for determining an acceptable framework for implementing future instream flow requirements. • Expand Alabama's rainfall monitoring network to accommodate the data needs of future water management. This activity should be coordinated through the State Climatologist and enhanced further by working with the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) public network.

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

	<ul style="list-style-type: none"> • Develop cost estimates for operating and maintaining the state’s water data collection and reporting capability. Utilize the Water Resources Data Technical Advisory Committee established by the Permanent Joint Legislative Subcommittee on Water Policy and Management to communicate these needs and data results, and to make recommendations on needed enhancements in data collection efforts. • Establish a water resources data clearinghouse accessible by the public via a web portal. • Develop consistent and reliable data quality standards and protocols for the acquisition and management of water information. Apply these standards to all data collected and stored that is used to assess, monitor, and allocate water resources.
Plans and Studies	
<ul style="list-style-type: none"> • Charge the Alabama Water Resources Agency with the responsibility to coordinate comprehensive water resources studies aimed at developing a water resources strategy for the future of Alabama. This effort should be adequately funded and coordinated with federal and state agencies involved with water resources issues and development. 	<ul style="list-style-type: none"> • Provide funding and support for scientific assessments and initiatives by Alabama’s water agencies. This includes expansion of ADEM, ADCNR, and GSA assessments of water quality and biological resources, GSA and OWR groundwater and surface-water assessments, and OWR water use assessments. • A statewide water management plan should contain components that: <ul style="list-style-type: none"> ○ Promote water conservation and efficiency for public utilities; ○ Set methods to measure conservation and efficiency; ○ Educate stakeholders and the public regarding the benefits of water conservation and overcomes negative perceptions of water reuse; ○ Require advanced treatment standards of wastewater for water reuse; ○ Direct the adoption of water reuse regulations; and ○ Set localized voluntary and mandatory water conservation measures during times of drought through the state’s Drought Management Plan.

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Reservoirs	
<ul style="list-style-type: none"> • Initiate a comprehensive public review of the operations of existing reservoirs in Alabama to determine if original project purposes are still valid. • Determine, using information from the instream flow analysis, if additional surface water storage or changes in reservoir operations are needed. • Establish a list of potential reservoir sites which could help meet current and future public needs and interests. • Establish a list of streams and rivers on which no additional dams or impoundments should be constructed. 	
Instream Flow	
<ul style="list-style-type: none"> • Develop and enact legislation which sets forth the basis for establishing and protecting instream flows and uses of Alabama streams. • Develop supporting administrative rules and regulations needed to determine the instream flows required to accommodate competing interests, establish maximum withdrawal quantities, and protect instream uses. 	<ul style="list-style-type: none"> • Provide support and resources for investigations into the instream flow needs of Alabama’s aquatic ecosystems and for evaluating the utility of existing flow tools for management and regulatory purposes. • Begin a process to define an acceptable framework for implementing instream flows into a statewide water management plan. • Adopt instream flows as a required component of any water allocation process that is likely to be implemented in the future. • Adopt a unified instream flow policy or legislation at the state level to provide a mechanism for better agency coordination and management of water resources. A statewide policy concerning instream flows should serve as one cornerstone to a comprehensive, realistic, and economically balanced water management plan.
Enhanced Coordination of Hydrologic Emergencies	
<ul style="list-style-type: none"> • Develop memorandums of understanding among state agencies, identifying roles and responsibilities for hydrologic emergencies. • Provide adequate funding, manpower, and training to state agencies anticipated to be required to respond to hydrologic emergencies. • Encourage, through the Alabama Emergency Management Agency and the Association of County Commissions of Alabama, all Alabama counties to have full-time, trained emergency management coordinators with financial support provided by the Federal Emergency Management Agency. 	

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

Floodplain Management	
<ul style="list-style-type: none"> • Provide additional support for the state floodplain management program to assist Alabama communities in understanding the requirements of the National Flood Insurance Program. • Require the Alabama Water Resources Agency, with the assistance of appropriate federal agencies, to research the encroachment of rural floodplains to determine the magnitude of the problem, develop guidelines for location and construction of catfish ponds, and develop appropriate model regulations to minimize floodplain encroachment. 	
Drought Management	
<ul style="list-style-type: none"> • Require the Alabama Water Resources Agency to be the umbrella organization for drought planning and coordination. • Enact legislation to require drought contingency planning for local water systems to be incorporated into existing emergency management plans. • Enact legislation to require drought contingency planning for local systems requesting water withdrawal authority. • Enact legislation to require a permit to withdraw a specified amount of water from either surface or groundwater supplies. 	<ul style="list-style-type: none"> • Develop legislation to establish a statutory mechanism for drought monitoring, management, planning and response processes. These permanent mechanisms need to: <ul style="list-style-type: none"> ○ Provide for mandatory reductions in withdrawals upon order of the Governor; ○ Foster improved and sustained coordination among both state and federal agencies; ○ Ensure various programs are using consistent drought data and information; ○ Ensure drought data is uniformly collected; ○ Ensure impact information is centrally housed and available; and ○ Ensure that the Drought Management Plan is consistent with any statewide comprehensive water resources management plan. • Require periodic review of the Alabama Drought Management Plan. • Develop formal standard operating procedures describing the development of the Alabama portion of the U.S. Drought Monitor. • Include a description of state-level efforts to promote water efficiency mechanisms such as water conservation and reuse in the state's Drought Management Plan. • Coordinate potential legislation with the Permanent Joint Legislative Committee on Water Policy and Management's subcommittee on drought planning. • Establish groundwater regulations that are consistent with water policies and the statewide water resources management plan and includes: <ul style="list-style-type: none"> ○ Identification of priority groundwater uses; ○ Preservation and protection of aquifer recharge areas; ○ Determination of proper well spacing; ○ Maximum well production rates; and ○ Maximum aquifer water withdrawals.

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Federal-State Water Management Partnership	
<ul style="list-style-type: none"> • The Alabama Water Resources Agency should monitor federal activities which affect Alabama water resources and implement a policy to involve Alabama with federal agencies operating existing, or proposing new, water resources projects that are located in the State or which will impact water coming into the State. Representative actions should include arranging periodic meetings with federal agencies to secure status reports of current and proposed activities at projects which affect Alabama water resources, serving as the State's representative on task forces or committees of federal agencies, and serving as the state water resources contact for federal agencies. 	<ul style="list-style-type: none"> • Identify specific representatives to facilitate more effective and efficient communication between policy makers and the stakeholder groups. These distinct groups could include citizen-based environmental groups, universities, trade organizations, industrial sectors, and various local/state/federal agencies.
Interstate Compacts	
<ul style="list-style-type: none"> • Research, develop, and implement procedures, through legislation or other methods, that allow agreements on interstate water resource quantity and quality issues to ensure Alabama's current and future water needs are adequately assured and protected. 	<ul style="list-style-type: none"> • Agencies should support staff efforts to maintain relationships with peers in neighboring states to improve coordination of activities relating to shared interstate watersheds, and maintain continuity and staff-level lines of communication if contentious issues arise between the states. • The Governor should continue to support agency activities that involve shared water resources including: <ul style="list-style-type: none"> ○ The Tennessee Valley Water Supply Partnership; ○ Southeast Instream Flow Network; ○ Discussions with Tennessee and Mississippi regarding use of the Tennessee-Tombigbee Waterway for water supply; ○ The National Integrated Drought Information System (NIDIS) initiative to develop a drought early warning system for the ACF River Basin; ○ The Gulf of Mexico Alliance; and ○ The Gulf Coast Ecosystem Restoration Task Force. • In accordance with the Alabama Water Resources Act, establish a clearinghouse to update the Governor's office on a regular basis concerning interstate water issues. Alabama's water resource agencies should continue to inform OWR of potential issues involving interstate watersheds.
Aquatic Plant Management	
<ul style="list-style-type: none"> • Direct, on a short-term basis and within existing statutory authority, State agencies to endorse, initiate, and cooperate with federal agencies and private firms that have interests in the management of aquatic weeds. • Enact, on an intermediate-term basis, legislation to implement an aquatic plant management plan to minimize adverse effects on Alabama freshwater bodies. 	<ul style="list-style-type: none"> •

Comparison of 1990 Alabama Water Resources Report to 2012 Water Management Issues Report in Alabama

Financing	
<ul style="list-style-type: none"> • Enact legislation to establish broad-based water user fees. An illustration of how this would work is shown in Table 1. There are, however, other sources that could be used to generate funds. • Amend existing legislation to increase registration and inspection fees on pesticides and fertilizers. 	<ul style="list-style-type: none"> •
Coordinating, Selecting, and Sponsoring Water Resource Development Projects	
<ul style="list-style-type: none"> • Charge the Alabama water Resource Agency with determining and recommending water resource projects in which the State should participate, developing a method for prioritizing water resource projects, and determining the distribution of State and local cost sharing for regional projects. • Provide active participation in the initiation, planning, development, and support of state and federal water resource projects. • Create a statewide "Alabama Water Resource Authority" with funding powers and the legal capacity to participate as the local sponsor for water resource projects. 	<ul style="list-style-type: none"> • Provide funding and support for scientific assessments and initiatives by Alabama's water agencies. This includes expansion of ADEM, ADCNR, and GSA assessments of water quality and biological resources, GSA and OWR groundwater and surface-water assessments, and OWR water use assessments. • ADECA and ADEM should review federal and state water supply development funding programs (including state funded seed monies, i.e. the Water Supply Assistance Authority (Code of Alabama, 1975, §22-23A) and the Inland Waterways and Intermodal Infrastructure Fund (Code of Alabama, 1975, §41-23-123)) and develop recommendations to enhance and encourage long term infrastructure planning and regional cooperation in the development of new water sources.
State Water Development Fund	
<ul style="list-style-type: none"> • Establish a State Water Development Fund to provide the required local matching share for projects of State significance, leverage dollars to create a revolving loan fund to provide below-market interest rate loans for water resource development projects, and create State incentives to locate, evaluate, and develop alternative water sources or improve the efficiency of use. • Provide matching funds to ensure that the Alabama Water Pollution Control Authority and ADEM capture all federal grant seed monies to provide a perpetual source of low-interest loan funds for municipal waste water improvements. • Provide adequate funds for water resources data collection and information dissemination, scientific analyses, baseline and trend information for long-term planning and specific short-term data, and other water resource agency activities as required. 	<ul style="list-style-type: none"> • Any state water resources management plan should include policies and guidance for water resources development and reservoir planning programs. These policies should: <ul style="list-style-type: none"> ○ Encourage regional planning in water source development; ○ Encourage the exploration of public/private partnerships; ○ Identify potential reservoir sites, in conjunction with local authorities and planning agencies; and ○ Encourage the development of off-stream storage for water supply needs to minimize impacts to major rivers and streams. • The Governor's Economic and Development strategic planning process should include consideration of water resources implications in any efforts to focus Alabama's business and industry recruiting efforts. This would be separate and distinct from the current site-specific coordination process currently in place for individual clients and projects. • The Governor should task the Inland Waterways and Intermodal Infrastructure Advisory Board to provide recommendations for water resource-related infrastructure projects that would provide direct benefits to economic recruiting efforts.

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	<ul style="list-style-type: none"> • Once water resource assessments are complete, OWR should ensure that water capacity and availability information is communicated to the state’s industrial recruiters highlighting any areas where water resource problems may impact or deter the recruitment of industries. • ADECA and ADEM should review federal and state water supply development funding programs (including state funded seed monies, i.e. the Water Supply Assistance Authority (Code of Alabama, 1975, §22-23A) and the Inland Waterways and Intermodal Infrastructure Fund (Code of Alabama, 1975, §41-23-123)) and develop recommendations to enhance and encourage long term infrastructure planning and regional cooperation in the development of new water sources. • ADECA should create an information clearinghouse on their web site to summarize sources of potential funding for new water source development, infrastructure improvements, or system expansions. • Provide funding and support for scientific assessments and initiatives by Alabama’s water agencies. This includes expansion of ADEM, ADCNR, and GSA assessments of water quality and biological resources, GSA and OWR groundwater and surface-water assessments, and OWR water use assessments.
Water Withdrawal Permits	
<ul style="list-style-type: none"> • Enact legislation requiring larger volume water users to obtain a certificate of use and report annual water use. Water use reports required under the certificate of use should include representative type of information found in Appendix Table 3. • Enact legislation to enable the declaration of critical use and capacity use areas • Require water withdrawal permits within capacity use areas for water users that withdraw, divert, or consume more than a specified quantity of water. Criteria such as, but not necessarily limited to, that found in Appendix Table 4 can be used to evaluate the applications for permits. 	<ul style="list-style-type: none"> • Review the benefits, costs, and issues associated with establishing a more formal system for managing water withdrawals in the state. • Determine the legal basis under which Alabama will manage its water resources. • Any enhanced system for managing water should be part of a comprehensive statewide plan based on water quality, water quantity, instream flow, and water use data.
Interbasin Transfers of Water	
<ul style="list-style-type: none"> • Discourage, on a short-term basis, interbasin transfers of water until a procedure has been established to evaluate the matter on a statewide basis. • Enact legislation, on an intermediate-term basis, to require water users to obtain interbasin transfer permits from the appropriate state water management agency. The agency should determine whether the benefits of approving a transfer outweigh the costs of not approving it. 	<ul style="list-style-type: none"> • Define IBTs based on an established watershed size. • OWR and ADEM should work jointly to identify and summarize current interbasin transfers (locations and amounts) once the applicable watershed size is defined. • Allow existing IBTs to continue but require periodic reporting. • Establish specific criteria for new or expanded IBTs to ensure that they are reasonable and beneficial to the state.

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<ul style="list-style-type: none"> • Require permits to control interbasin transfers of ground and surface water that exceed a specified quantity. The permit should specify the maximum quantity of water that can be transferred during a given time period. 	<ul style="list-style-type: none"> • Establish a regulatory program for all IBTs which includes objective evaluations of all other practical alternatives to the interbasin transfer.
<p>Alabama Safe Dams Program</p> <ul style="list-style-type: none"> • Resolve any remaining conflicts and complete and enact, in the next session, legislation to establish a "Safe Dams Program". 	<ul style="list-style-type: none"> •
<p>Source Protection</p> <ul style="list-style-type: none"> • Enact legislation implementing a comprehensive well permitting program, including locating and inspecting all new wells. • Assess permitting fees to pay for the administrative and inspection costs related to the permitting program, a portion of the fee to be escrowed in a "plugging fund." • Require public water systems and large capacity self providers to secure bonding to ensure the proper abandonment of wells. • Support other types of ground water protection programs. 	<ul style="list-style-type: none"> • Establish groundwater regulations that are consistent with water policies and the statewide water resources management plan and includes: <ul style="list-style-type: none"> ○ Identification of priority groundwater uses; ○ Preservation and protection of aquifer recharge areas; ○ Determination of proper well spacing; ○ Maximum well production rates; and ○ Maximum aquifer water withdrawals. • Develop a comprehensive scientific knowledge of Alabama groundwater to accomplish groundwater protection, prudent groundwater development, and future groundwater policy development. • Provide support for adequate protection of groundwater quality through ADEM's groundwater and drinking water protection programs.
<p>Wells</p>	
<ul style="list-style-type: none"> • Testing <ul style="list-style-type: none"> ○ Provide, through the State Health Department, individual county health departments with equipment to test water for outside contaminants. ○ Require the State Health Department to continue to offer bacteriological testing, initiate non-duplicative, two-parameter chemical testing at each laboratory, and charge a nominal fee to offset the expenses of the testing program. ○ Implement, through state and county health departments, an informational program to inform users of private water sources of the need to periodically sample their water. • Construction and Siting <ul style="list-style-type: none"> ○ Develop standards for all types of wells and use well permitting to monitor and inspect all wells not already regulated. 	<ul style="list-style-type: none"> • Establish groundwater regulations that are consistent with water policies and the statewide water resources management plan and includes: <ul style="list-style-type: none"> ○ Identification of priority groundwater uses; ○ Preservation and protection of aquifer recharge areas; ○ Determination of proper well spacing; ○ Maximum well production rates; and ○ Maximum aquifer water withdrawals.

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<ul style="list-style-type: none"> ○ Establish and enforce, through the Department of Health, minimum private well (drinking water) construction standards. Other departments, such as ADEM, should regulate wells within their normal areas of jurisdiction. ● Well Drillers <ul style="list-style-type: none"> ○ Increase well driller licensing standards to be in general conformity with adjacent states and certify each driller for the type of well(s) that each is permitted to install. ● Abandoned Wells <ul style="list-style-type: none"> ○ Aggressively enforce, through multiple state agencies, the existing standards on well abandonment procedures. ○ Provisions should allow prosecution to ensure the proper abandonment of all types of well. ○ Inventory, through a multi-agency effort and over an extended period of time, the different types of wells that have been abandoned. ○ Require all new well permits to include information on whether the new well will result in the abandonment of an existing well. The permit should require an accurate reporting of the location of the abandoned well, and an inspection should be made to determine that the well is properly capped. ○ Use the well "plugging fund," generated by well permit fees, to pay for proper well abandonment when the legal responsibility cannot be determined. 	
Septic Tanks	
<ul style="list-style-type: none"> ● Amend the Alabama Code regarding the Alabama Department of Health and on-site sewage systems. ● Instruct the Health Department to develop and adopt rules and implement enforcement actions necessary to eliminate the public threats caused by improper on-site sewage systems. 	<ul style="list-style-type: none"> ●
Sedimentation	
<ul style="list-style-type: none"> ● Enact a "Sediment Pollution and Erosion Control Act." ● Require phased-in implementation of local sediment control ordinances, <i>giving</i> priority to communities with high rates of growth and areas with highly erodible soils. ● Provide State funding to establish and enforce best management practices for all rural land disturbing activities. ● Charge ADEM with implementing and enforcing these regulations. 	<ul style="list-style-type: none"> ●
Irrigation Backflow Prevention	
<ul style="list-style-type: none"> ● Enact legislation that would require backflow prevention devices to be installed on irrigation systems. 	<ul style="list-style-type: none"> ●

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Wetlands Strategy	
<ul style="list-style-type: none"> • Implement wetland protection strategies identified in the State Comprehensive Outdoor Recreation Plan, Volume 2. • Establish a formal state wetlands acquisition program. • Issue an Executive Order requiring state agencies to protect wetlands through alternatives and mitigation. • Evaluate and implement wetlands mitigation banking. • Use implementing tools, such as Executive Order 12372, Section 401 CWA certification, and legislated regulatory actions to foster wetland retention and preservation. 	<ul style="list-style-type: none"> •
Clean Lakes Program	
<ul style="list-style-type: none"> • Developing a definition of lakes applicable to Alabama. • Studying sequentially Alabama's lakes to determine the key water resource parameters and establish standards to improve the water quality of the lake. • Adopting and enforcing the established lake standards within a specified period following completion of each study. 	<ul style="list-style-type: none"> •
Using Water Resources	
<ul style="list-style-type: none"> • Conservation <ul style="list-style-type: none"> ○ Enact legislation to require local water conservation when water supply disruption or loss would jeopardize either the health of citizens or economic well being of an area. ○ Empower the Alabama Water Resources Agency to develop model water conservation programs, provide technical assistance to local public entities, and review local water conservation plans to ensure they are capable of attaining state conservation objectives. ○ Use locally prepared programs to accomplish water conservation. Examples of measures to be included in local conservation programs are amending the plumbing code to require the use of "low flow" fixtures, developing landscape water conservation practices, and curtailing certain other outdoor water uses. ○ Support water conservation education programs. 	<ul style="list-style-type: none"> • A statewide water management plan should contain components that: <ul style="list-style-type: none"> ○ Promote water conservation and efficiency for public utilities; ○ Set methods to measure conservation and efficiency; ○ Educate stakeholders and the public regarding the benefits of water conservation and overcomes negative perceptions of water reuse; ○ Require advanced treatment standards of wastewater for water reuse; ○ Direct the adoption of water reuse regulations; and ○ Set localized voluntary and mandatory water conservation measures during times of drought through the state's Drought Management Plan.

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<ul style="list-style-type: none"> • County Water Systems <ul style="list-style-type: none"> ○ Require counties to develop countywide plans to coordinate the engineering of all water systems within the county. Plans should address sources of supply, strategic locations for major storage facilities, locations of trunk distribution lines, critical points of interconnection, and the potential to share equipment and personnel for maintenance. ○ Encourage public water systems to develop emergency operations plans. ○ Provide State incentives, such as project rating and financial assistance, for water systems and projects that comply with the above. • Scenic and Recreational Streams <ul style="list-style-type: none"> ○ Prepare a comprehensive river corridor assessment based on land uses and the multiple interests that exist in the river corridors. ○ Develop a scenic and recreational stream program based on the corridor assessments and establish the authority to enact local ordinances to control development in the corridors. 	
Understanding Water Resources	
<ul style="list-style-type: none"> • Education <ul style="list-style-type: none"> ○ Encourage the Department of Education to develop water resource courses and integrate them in environmental education curricula for grades K through 12. ○ Require water resource training credits for teacher certification. ○ Coordinate and disseminate, through the Alabama Water Resources Agency, information about existing state and federal water resource education programs. ○ Develop water resource information and education programs for all citizens of Alabama. 	<ul style="list-style-type: none"> • Solicit the participation of key stakeholders and the public and target those individuals that already have an interest in protecting water resources. • Develop a media campaign with media outlets and other advertising venues to target individuals who may not already have a foundational knowledge of water resources. • Publicize and promote Alabama’s vast water resources and the need to protect them for future generations to enjoy. • Publicize and promote the varied recreational opportunities, abundant clean drinking water, economic development opportunities, and unique habitats supported by Alabama’s water resources. • Solicit the public’s input into key decision-making processes.
Research	
<ul style="list-style-type: none"> • Utilize public agencies, universities, and other organizations within the State of Alabama that have responsibilities for water resources/environmental research. • Provide an annual appropriation, through the Alabama Water Resources Agency, of at least \$1,000,000 to support applied water resources research. • Monitor federal water resources research through the Alabama Water Resources Agency. 	<ul style="list-style-type: none"> • Afford key stakeholders an opportunity to participate in the process of developing a comprehensive policy for the management of Alabama’s water resources. • Identify specific representatives to facilitate more effective and efficient communication between policy makers and the stakeholder groups. These distinct groups could include citizen-based environmental groups, universities, trade organizations, industrial sectors, and various local/state/federal agencies.

Appendix E

Database Subcommittee Interim Report

INTRODUCTION

The Alabama Water Agencies Working Group was formed by Governor Robert Bentley in 2011 to identify important water management issues facing Alabama and to provide policy options that would begin to address each of the issues. The original working group consisted of representatives from four state agencies involved in water resource management: the Geological Survey of Alabama, the Alabama Office of Water Resources, the Alabama Department of Environmental Management, and the Alabama Department of Conservation and Natural Resources. In April 2012 Governor Bentley charged the working group to:

- Continue meetings and report progress and developments to the Governor's Office;
- Create a comprehensive database of Alabama's water resources by gathering all existing data and reviewing surface water, groundwater and instream flows/ecosystems assessments to provide a full understanding of the State's water resources, the use of those resources and need for those resources (including, but not limited to, industrial, economic, public health and safety and environmental needs);
- Conduct stakeholder meetings with the Governor's staff, key legislators and outside stakeholders from groups that represent—at a minimum—economic, industrial, utility, public drinking water supply, public safety, recreational, environmental, ecological and agricultural interests; and
- Recommend a statewide water management plan and timeline that takes into account and equitably manages the demands on the State's water resources. Include in the plan any proposed legislation necessary to implement such a plan.

The Alabama Department of Agriculture and Industries was added to the working group and in August 2012 the AWAAG issued a report titled "Water Management Issues in Alabama," which provided a concise discussion of twelve separate water management issues facing the State of Alabama and provided policy options for each issue. The report was subsequently released to the public for review and comment.

In conjunction with his charge to the AWAAG, Governor Bentley appointed Dr. Bennett Bearden as chairman of the group and several subcommittees were established to accomplish each of the Governor's directives. The Data Subcommittee, consisting of representatives from each of the AWAAG agencies was tasked to "create a comprehensive database of Alabama's water resources by gathering all existing data and reviewing surface water, groundwater and instream flows/ecosystems assessments to provide a full understanding of the State's water resources, the use of those resources and need for those resources (including, but not limited to, industrial, economic, public health and safety and environmental needs)."

This report presents the interim findings and recommendations of the Data Subcommittee of the AWAAG relative to the creation of a water resources database for the State of Alabama. Specifically, an inventory of water resources data is presented along with a discussion of data accessibility and remaining data needs. The subcommittee met on several occasions, held conference calls, and exchanged numerous emails in the course of completing this task.

WATER RESOURCES DATA IN ALABAMA

Various types of water resources data are currently collected by numerous agencies and organizations in Alabama. Sorting through this information to select the most pertinent data to describe the status and trends in water availability and quality and to provide a basis for making management decisions is challenging. As such, it is important that specific questions regarding Alabama’s water resources and its water balance be clearly stated so that the most appropriate data can be applied to provide answers to those questions. The State’s surface and groundwater balance consists of water sources and demands which can be estimated using some basic data components. These basic data components can be formulated to provide an estimate of water availability and water use on a watershed basis. The data components include information on water use for hydropower and steam power electricity generation, drinking water and industrial supply and irrigation withdrawals from surface and ground water, navigation water needs, water needs for aquatic resources and recreation, interbasin water transfers, water returns through wastewater treatment facilities, irrigation runoff, and cooling water returns, water losses through evapotranspiration, and the principle water source – precipitation.

Table 1 presents a list of questions to guide the development of a water resources database that can serve as a management tool for Alabama.

Table 1 – Water Resources Questions

Question	Type of Data Needed
What is the seasonal, geographic and long-term variability of precipitation in Alabama?	Long-term precipitation measurements at strategic locations across the state
What is the seasonal, geographic and long-term variability of surface runoff in Alabama?	Long-term stream gauging measurements at strategic locations across the state
What is the seasonal, geographic and long-term variability of surface water storage volume in surface impoundments in Alabama?	Long-term water level measurements in existing impoundments, accurate bathymetry measurements of impoundments
What is the seasonal, geographic and long-term variability of ground water levels in major aquifers in Alabama?	Long-term ground water level measurements at strategic locations across the state
What is the seasonal, geographic and long-term variability of surface and ground water quality?	Long-term water quality measurements at strategic locations across the state, current and projected land cover
What is the seasonal long-term trend in surface water flow entering Alabama from adjacent states and leaving Alabama into adjacent states?	Long-term stream gauging measurements at or near the state line on strategic rivers entering and leaving the state

<p>What are the seasonal long-term trends in water quality in surface water entering Alabama from adjacent states and leaving Alabama into adjacent states?</p>	<p>Long-term water quality monitoring at or near the state line on strategic rivers entering and leaving the state</p>
<p>What are the current and projected domestic regional water supply needs for Alabama?</p>	<p>Accurate surface and ground water withdrawal rates for domestic water supply, population growth estimates by region, population currently served by domestic water supply by region, domestic water usage trends by region</p>
<p>Are there regions of Alabama where current surface and ground water supplies are inadequate to meet existing needs?</p>	<p>Long-term stream gauging measurements, long-term ground water level measurements, surface and ground water usage rates, existing available reservoir storage volume</p>
<p>What are the current and projected industrial water supply needs (including navigation, cooling, hydroelectric generation and process water) for Alabama?</p>	<p>Accurate surface and ground water withdrawal rates for industrial uses, long-term stream gauging and reservoir elevation measurements, licensed hydroelectric power generation capacity, existing and proposed seasonal hydroelectric power generation water usage, navigation channel depths or water surface elevations, typical water usage rates by industry sector, current and projected navigation usage (number of lockages and water release volumes to support navigation)</p>
<p>What are the current and projected agricultural water supply needs from surface water and ground water sources by region?</p>	<p>Measurements of current water withdrawal rates / volumes from surface and ground water sources for agricultural uses by region, including irrigation, accurate withdrawal locations, agricultural water use trends by region</p>
<p>What are the seasonal water needs of aquatic biological communities in Alabama's surface waters?</p>	<p>GIS coverage of critical habitat for sensitive aquatic species, long-term stream gauging and water surface elevation measurements at strategic locations across the state, accurate bathymetry data for streams, rivers, reservoirs, and coastal waters, long-term assessment of aquatic community composition and health, long-term physical and chemical water quality measurements, determination of regional flow-ecology relationships for tributaries and main river channels.</p>

What are the current and projected water return rates from municipal and industrial water users (i.e., wastewater and cooling water returns)?	Accurate water return locations, water return rate measurements (i.e., discharge volumes or rates)
What are the current and projected water transfer rates between major river basins in Alabama?	GIS coverage of water distribution systems showing interconnections across basin boundaries, water purchase or sale volumes across basin boundaries, wastewater discharge volume and location across basin boundaries, wastewater reuse volume and locations across basin boundaries, water usage trends by region

The questions in the table above will guide the search for pertinent and available water resources data for Alabama and, where necessary, adjacent states. These questions will also help to identify missing data or data that may not be readily available. It is important to note that state or federal agencies may already be collecting information pertinent to the questions concerning Alabama’s water resources as a part of their statutory duties. However, the following inventory (table 2) will define which agencies are collecting which specific data and where data gaps may exist in the current effort. The data types shown in the table are those which will be most useful in answering the questions listed in Table 1.

Table 2 – Types of Data and Primary Collection Agencies

Type of Data	Primary Collection Agency or Organization	Data Availability
Stream gauging measurements – including flow and/or stage	<ol style="list-style-type: none"> 1. U.S. Geological Survey – Alabama Water Science Center 2. Tennessee Valley Authority 3. U.S. Army Corps of Engineers 4. Geological Survey of Alabama 5. Alabama Department of Environmental Management 6. National Oceanic and Atmospheric Administration 	<ol style="list-style-type: none"> 1. Real-time and historic stream flow and water level data online: http://al.water.usgs.gov/ 2. Real-time and historic stream flow and water level data online: http://www.tva.com/lakes/stream.s.htm 3. Real-time and historic water level and reservoir release data online: http://www.sam.usace.army.mil/Missions/CivilWorks/WaterManagement.aspx 4. Historic stream flow data – spot measurements during special studies. Data available in paper reports and in electronic spreadsheets in some cases.

		<p>5. Historic stream flow data – spot measurements during ambient monitoring. Data available online through the STORET Data Warehouse: http://ofmpub.epa.gov/storpubl/dw_pages.resultcriteria</p> <p>6. Real-time and historic tide stage data available online: http://tidesandcurrents.noaa.gov/ports/index.shtml?port=mb</p>
<p>Precipitation / Climate Data/ Drought Intensity and Duration</p>	<ol style="list-style-type: none"> 1. Alabama Office of the State Climatologist 2. National Weather Service 3. U.S. Geological Survey 4. Community Collaborative Rain, Hail & Snow Network 5. Tennessee Valley Authority 6. National Weather Service Southeast River Forecast Center 7. National Oceanic and Atmospheric Administration - National Climatic Data Center 8. National Estuarine Research Reserve System – Central Data Management Office (Weeks Bay) 9. Alabama Power Company 10. U.S. Drought Monitor 11. Mobile Bay National Estuary Program 	<ol style="list-style-type: none"> 1. Alabama Climate Station network, climatology reports and forecasts, and historic precipitation and climate data are available online at: http://nsstc.uah.edu/aosc/ 2. Real-time and historic precipitation and climate data are available on-line at: http://water.weather.gov/precip/ 3. Real-time and historic precipitation and climate data available for a limited number of stations online at: http://waterdata.usgs.gov/al/nwis/current/?type=precip 4. Volunteer climate data collection with near real-time and historic precipitation and climate data available online at: http://www.cocorahs.org/ViewData/ 5. Near real-time and historic precipitation data available online at: http://www.tva.com/river/lakeinfo/precip.htm 6. Real-time precipitation data available online at: http://www.srh.noaa.gov/serfc/

		<ol style="list-style-type: none"> 7. Historic precipitation and climate data available online at: http://www.ncdc.noaa.gov/ 8. Near real-time and historic precipitation and climate data at the Weeks Bay NERR available online at: http://cdmo.baruch.sc.edu/get/landing.cfm 9. Near real-time and historic precipitation and climate data available upon request 10. Current drought levels available online at: http://droughtmonitor.unl.edu/ 11. Near real-time meteorological data available for a limited number of locations online at: http://www.mymobilebay.com/
<p>Reservoir water surface elevation</p>	<ol style="list-style-type: none"> 1. Alabama Power Company 2. Tennessee Valley Authority 3. Georgia Power Company 4. PowerSouth Energy Cooperative 5. U.S. Geological Survey 6. U.S. Army Corps of Engineers 	<ol style="list-style-type: none"> 1. Near real-time water surface elevation available online at: https://lakes.alabamapower.com/ Historic lake levels available upon request. 2. Historic and near real-time water surface elevation available online at: http://www.tva.com/river/lakeinfo/index.htm 3. Near real-time water levels available online at: http://lakes.southernco.com/ Historic lake levels available upon request. 4. Reservoir elevations available upon request. 5. Historic and real-time lake level data for one reservoir available online at: http://waterdata.usgs.gov/al/nwis/current/?type=res 6. Historic and near real-time river and reservoir elevations

		<p>available for the ACT basin, Tenn-Tom Waterway, ACF basin online at: http://www.sam.usace.army.mil/Missions/CivilWorks/WaterManagement.aspx</p>
<p>Ground Water Levels and Water Quality</p>	<ol style="list-style-type: none"> 1. U.S. Geological Survey 2. Geological Survey of Alabama 3. Public Water Supply Utilities 4. RCRA / CERCLA Remediation Facilities and Wastewater Disposal through Land Application and Underground Injection Control Facilities 	<ol style="list-style-type: none"> 1. Historic and real-time water level data for a limited number of locations is available online at: http://waterdata.usgs.gov/al/nwis/current/?type=gw 2. Historic and near real-time water level data for a limited number of locations is available online at: http://www.gsa.state.al.us/gsa/well_monitor.html. GSA maintains an extensive data file of historic groundwater levels and has published reports pertaining to groundwater levels in the state 3. Historic water level, pumping rates, and water quality data available upon request and through the ADEM eFile online document system at: http://edocs.adem.alabama.gov/eFile/ 4. Project-specific water level and limited water quality data available upon request and through the ADEM eFile online document system at: http://edocs.adem.alabama.gov/eFile/
<p>Hydropower generation water releases</p>	<ol style="list-style-type: none"> 1. Alabama Power Company 2. U.S. Army Corps of Engineers 3. Tennessee Valley Authority 4. Power South Energy Cooperative 5. Georgia Power Company 	<ol style="list-style-type: none"> 1. Turbine generation schedules available online at: https://lakes.alabamapower.com/ Historic turbine release schedules and rates available upon request. 2. Historic and near real-time turbine generation schedules and

		<p>release rates available for the ACT basin, Tenn-Tom Waterway, ACF basin online at: http://www.sam.usace.army.mil/Missions/CivilWorks/WaterManagement.aspx</p> <p>3. Historic and near real-time turbine generation schedules and release rates available online at: http://www.tva.com/river/lakeinfo/index.htm</p> <p>4. Turbine generation schedules and release rates are available upon request.</p> <p>5. Turbine generation schedules and release rates are available upon request.</p>
<p>Surface Water Withdrawal Volumes / Rates</p>	<ol style="list-style-type: none"> 1. Alabama Department of Economic and Community Affairs – Office of Water Resources 2. Public Water Supply Utilities / Alabama Department of Environmental Management 3. Alabama Power Company 4. Georgia Power Company 5. PowerSouth Electric Cooperative 6. Tennessee Valley Authority 	<ol style="list-style-type: none"> 1. Surface water withdrawal volumes for registered entities withdrawing more than 100,000 gallons per day available upon request. 2. Surface water withdrawal rates by individual public water supply utilities are available upon request and may also be found in the ADEM eFile online document system at: http://edocs.adem.alabama.gov/eFile/ 3. Surface water withdrawal rates for steam power generation are available upon request and may also be found in the ADEM eFile online document system at: http://edocs.adem.alabama.gov/eFile/ 4. Surface water withdrawal rates for steam power generation are available upon request. 5. Surface water withdrawal rates for steam power generation are available upon request.

		6. Surface water withdrawal rates for steam power generation are available upon request
Ground Water Withdrawal Volumes / Rates	<ol style="list-style-type: none"> Alabama Department of Economic and Community Affairs – Office of Water Resources Public Water Supply Utilities / Alabama Department of Environmental Management 	<ol style="list-style-type: none"> Groundwater? withdrawal volumes for registered entities withdrawing more than 100,000 gallons per day available upon request. Groundwater? withdrawal rates by individual public water supply utilities are available upon request and may also be found in the ADEM eFile online document system at: http://edocs.adem.alabama.gov/eFile/
Wastewater and cooling water discharge volumes / rates and quality	<ol style="list-style-type: none"> Alabama Department of Environmental Management 	<ol style="list-style-type: none"> Historic data available online for facilities with an individual National Pollutant Discharge Elimination System (NPDES) permit at: http://www.epa-echo.gov/echo/compliance_report_water.html
Irrigation volumes / rates	<ol style="list-style-type: none"> 	<ol style="list-style-type: none"> This information is not currently tracked.
Interbasin transfer volumes / rates	<ol style="list-style-type: none"> Public Water Supply Utilities 	<ol style="list-style-type: none"> This information is not currently tracked.
Navigation	<ol style="list-style-type: none"> U.S. Army Corps of Engineers Tennessee Valley Authority 	<ol style="list-style-type: none"> Data on number of lockages is available upon request. Data on number of lockages is available upon request.

<p>Surface and Ground Water Quality</p>	<ol style="list-style-type: none"> 1. Alabama Department of Environmental Management 2. Geological Survey of Alabama 3. Alabama Surface Mining Commission 4. U.S. Geological Survey 5. Alabama Water Watch 6. Mobile Bay National Estuary Program 7. Dauphin Island Sea Lab 8. Alabama Department of Public Health – Seafood Branch 9. National Estuarine Research Reserve System – Central Data Management Office (Weeks Bay) 	<ol style="list-style-type: none"> 1. ADEM’s water quality monitoring data is uploaded to a national database and is available online at: http://www.waterqualitydata.us/ Data collected by industries and municipalities as a condition of their NPDES permit is stored electronically and is available in the Department’s eFile database at: http://edocs.adem.alabama.gov/eFile/ 2. Water quality data for specific projects is available upon request. 3. Surface and ground water quality data collected at surface coal mining facilities is available upon request. 4. Water quality data collected by the USGS is uploaded to a national database and is available online at: http://waterdata.usgs.gov/nwis Real-time water quality data at a limited number of locations is available online at: http://waterdata.usgs.gov/al/nwis/current/?type=quality 5. Citizen volunteer monitoring data is available online at: https://fp.auburn.edu/icaae/index.aspx 6. Near real-time water quality data is available for a limited number of locations within the Mobile Bay area online at: http://www.mymobilebay.com/ 7. Publication abstracts are available online at: http://dim.disl.org/management_main.cfm 8. The ADPH – Seafood Branch conducts sampling near shellfish
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		<p>harvesting areas in the Mobile Bay area. The comprehensive sanitary survey reports are available online at: http://www.adph.org/foodsafety/Default.asp?id=1141</p> <p>9. Near real-time and historic water quality data at the Weeks Bay NERR available online at: http://cdmo.baruch.sc.edu/get/landing.cfm</p>
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<p>Aquatic biological resource data</p>	<ol style="list-style-type: none"> 1. Alabama Department of Environmental Management 2. Geological Survey of Alabama 3. U.S. Geological Survey 4. Tennessee Valley Authority 5. Alabama Power Company 6. PowerSouth Energy Cooperative 7. U.S. Fish and Wildlife Service 8. Alabama Department of Conservation and Natural Resources 9. Dauphin Island Sea Lab 10. Alabama Natural Heritage Program 	<ol style="list-style-type: none"> 1. Aquatic macroinvertebrate and fish community assessment results are available upon request. Limited information is available online at: http://www.adem.state.al.us/programs/water/wqsurvey.cnt 2. Aquatic macroinvertebrate and fish community assessment results are available upon request. Limited information is available online at: http://www.gsa.state.al.us/gsa/ec/publications.html 3. Limited biological assessment results are available online at: http://al.water.usgs.gov/publications/pubsqw.html 4. Biological assessment results are available upon request. Additional biological assessment data collected at cooling water intake structures is available in ADEM's eFile database at: http://edocs.adem.alabama.gov/eFile/ 5. Biological assessment information associated with project relicensing by the Federal Energy Regulatory Commission is available in various documents, including the license application package. All license application documentation is available online at: http://www.ferc.gov/for-citizens/projectsearch/SearchProjects.aspx Additional biological assessment data collected at cooling water intake structures is available in ADEM's eFile database at: http://edocs.adem.alabama.gov/eFile/
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		<p>6. Biological assessment information associated with project relicensing by the Federal Energy Regulatory Commission is available in various documents, including the license application package. All license application documentation is available online at: http://www.ferc.gov/for-citizens/projectsearch/SearchProjects.aspx</p> <p>Additional biological assessment data collected at cooling water intake structures is available in ADEM's eFile database at: http://edocs.adem.alabama.gov/eFile/</p> <p>7. Biological and Critical Habitat assessment results for specific projects are available upon request. Information related to listed species and species of conservation concern is available at: http://fws.gov</p> <p>8. Fish and wildlife community assessment results for specific projects are available upon request. The ADCNR Natural Heritage database can supply distribution information upon request for most of Alabama's aquatic species.</p> <p>9. Publication abstracts are available online at: http://dim.disl.org/management_main.cfm</p> <p>10. Information on rare species is available online at: http://www.alnhp.org/submit_query.php</p>
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WATER RESOURCES DATA LIMITATIONS

For the extensive data types and sources listed in Table 2, several factors affect the usefulness of the information. First and foremost among these factors is the electronic availability of the information. Information which is not readily available in a format that makes the data amenable to analysis is of very limited value for the purpose of supporting management decisions. In addition, data which is proprietary or confidential and cannot be released is not useful to state agencies for making water resources management decisions. Ideally, data should be available electronically through a web address (e.g., file transfer protocol or ftp site) which can be accessed and the information displayed in a suitable format. Potential solutions to this limitation and the others discussed below relative to pertinent water resources information for Alabama will be discussed more fully in the Recommendations section of this report.

The second factor limiting the usefulness of water resources data is the format in which it is currently stored. Much of the historic water resource data in Alabama resides in paper publications kept in agency files or in libraries. While this information can be scanned and made available as a portal document format (PDF) file, the information cannot be easily analyzed or combined with other information, except in special circumstances. Data which is the most useful has been electronically stored in a database which facilitates the export and manipulation of data for analysis. For example, the U.S. Geological Survey stores all surface and groundwater data, including certain metadata, in its National Water Information System (NWIS) database. The database easily facilitates data access, export, and manipulation through queries and geographic information systems (GIS) tools. ADEM's surface water quality database is another example of an electronic data storage and retrieval system which facilitates data access through a national water quality data portal (STORET).

A third factor which can limit the usefulness of water resources data is the period of record and data collection frequency. Much of the state's water resources data was collected for specific purposes and is limited in temporal and spatial extent. The availability and condition of Alabama's water resources are not static, and long-term monitoring at strategic locations is needed to adequately assess trends in both quality and quantity. However, different types of water resources data may require collection at different temporal and spatial scales. For example, stream flow or reservoir elevation data may be collected on a real-time or near real-time basis at multiple locations and reported almost instantaneously so that rapid changes in flow or water surface elevation can be detected. However, collection of biological assessment data is generally not possible or necessary on a real-time basis. This is generally a true statement when conducting long-term monitoring but some events need immediate response, such as fish kills or aggravating stream conditions with increasing drought. With some biological assessment tools, such as the fish assemblage IBI, we can put an answer on the Governor's desk with the push of a button on site soon after the data has been collected.

Data gaps or missing data is the fourth factor which can limit the usefulness of water resources data. These gaps can take the form of limited spatial coverage, limited parameter coverage, or limited temporal coverage. Sound management decisions are made more difficult in the absence of adequate data. For example, understanding the extent and impact of a drought or a flood (and formulating appropriate responses) is much faster when there

is an adequate coverage of stream gauges, rain gauges, ground water level gauges, and reservoir level gauges reporting on a real-time or near real-time basis to water resource managers. A similar example, but on a different time-scale, involves the extent and impact of improved wastewater treatment or different farming practices.

Finally, the quality of water resource data must be considered as a limitation to its potential use in management decisions. While there may be available data describing some aspect of water resources, its quality may not be well documented or known. Data collection programs must have a documented data quality assurance process to ensure that information generated is of known quality. For example, information retrieved from a national or state database should include data qualifiers to alert the user to important data characteristics. These qualifiers may indicate details about the data such as whether the reported value is an estimate, whether the sample was analyzed out of its recommended holding time, failure to pass certain laboratory quality control procedures, or whether the actual value is less than or greater than the reported value.

RECOMMENDATIONS FOR ENHANCING WATER RESOURCES DATA COLLECTION AND AVAILABILITY IN ALABAMA

There is a long history of water resource data collection in Alabama by various state, federal, and local agencies and organizations. Today, this effort continues despite declining resources for data collection activities. Technology has provided cost savings and allowed the collection of key water resources data to continue. Technology has also made it possible to have access to information much more rapidly so that management decisions can be made on the basis of scientific data more quickly. However, the limitations to the use of data discussed in the previous section must be addressed in order to have ready access to the most pertinent water resource data for use during policy development and as a water resource management tool. Therefore, the following recommendations will address each of the limitations mentioned earlier.

- **Data availability**

Chemical, physical (including flow and water level), biological, climate-related data and water use and return data which may currently reside in agency or company databases but is not available for use by water resource managers should be made available through a web portal or GIS-based tool. One example is the national Water Quality Portal (www.waterqualitydata.us) that combines data from the USGS NWIS database with data from the U.S. Environmental Protection (USEPA) STORET water quality database. This database provides access to both the USGS stream gauging and water quality network data and the water quality data collected by other state and federal agencies. The initial effort should focus on linking water withdrawal data currently residing in OWR's water withdrawal database with wastewater discharge data currently available through the USEPA Enforcement, Compliance History Online (ECHO) database so this information can be used with stream flow and groundwater level data currently being collected by the USGS and the ground water level data being collected by GSA. Additionally, the reservoir levels and turbine release data available from the U.S. Army Corps of Engineers, Alabama Power Company, TVA, Georgia Power Company, and PowerSouth Energy

Cooperative should be linked to these state and federal databases to provide a more complete picture of water use and availability on a near real-time basis. Ideally, data from these various data sources could be viewed using a GIS tool such as Virtual Alabama or some other web-based platform.

- Data Storage Format

The use of water resources data is limited in the cases where water resources data is not stored in an electronic database or other electronic format. Database development can be a very costly undertaking but one that is essential if the data is to be useful for broad application through an electronic portal such as the one described above. The initial effort should focus on providing a means for electronic storage of water quality and biological assessment data being collected by GSA. The water quality database developed by ADEM for storing water quality and biological assessment data could be adapted for GSA at a significant cost savings. The GSA data could then be uploaded to the national water quality database and would be available through the Water Quality Portal along with USGS and ADEM data.

- Data Collection Frequency and Data Gaps

Data collection frequency and data gaps are the last two limitations to water resource data use. Data collection frequency is generally established based on the desired use of the data. For example, where conditions may change rapidly or vary widely during a short period of time, such as in the case of stream flow or water level, a data collection frequency which adequately captures this variability is needed. Conversely, where conditions do not change rapidly less frequent data collection is generally adequate. Data gaps create areas of significant uncertainty relative to water resource questions. Addressing this limitation involves identifying the data gaps for each of the various types of water resources data and implementing a process to fill the gaps. The initial effort to address both the data collection frequency and data gaps limitations should focus on the establishment of a formal Alabama Water Monitoring Council made up of representatives from state/federal water resource agencies, universities, citizen monitoring groups, business, agriculture, industry, and municipal water supply and wastewater utilities. This group would facilitate greater coordination among agencies and provide for opportunities to coordinate and combine monitoring efforts and stretch available monitoring resources. In addition, the group could make specific recommendations regarding monitoring needs in Alabama and provide a forum for ideas which could further the State's understanding of its water resources. A number of states and interstate groups have established monitoring councils to coordinate water resource data collection, information dissemination, and discussion. Additional information on monitoring councils can be found on the National Water Quality Monitoring Council web page at: <http://acwi.gov/monitoring/> .

- Data Quality

For water resources data to be useful and reliable as a tool for water resource managers, the data must be of known and assured quality. Water resource data

included in a water resource database must therefore include appropriate quality assurance documentation. This documentation includes standard procedures for making measurements, data quality review procedures, and the use of data qualifiers. The documentation should be made available along with the water resource data so that users can understand the methods used to gather, analyze, and report the data.

The recommendations offered above will require additional funding but the exact funding amounts will depend on the efforts chosen to address water resources data limitations. The next step in this planning process will be to choose specific actions that will lead to monitoring and reporting of Alabama's water resources data. The Alabama Water Agencies Working Group Database Subcommittee will continue to formulate specific recommendations leading to more comprehensive water resources database for Alabama.

Appendix F

Alabama Water Agencies Working Group Summary Of Stakeholder Comment Themes

1 - Water Resources Management

Executive Summary:

- Direct the Alabama Water Agencies Working Group to develop a process for creating a statewide water management plan and identify the necessary components consistent with the Alabama Water Resources Act.
- Involve the Alabama Water Resources Commission in the development of a statewide water resources management plan.

Issue Paper:

- Direct the Alabama Water Agencies Working Group to recommend components of a statewide water management plan, consistent with the Alabama Water Resources Act, that:
 - Provides for local planning;
 - Addresses the impacts on the State's water resources from water use, land use patterns, population growth, climate change, economic development, and hydrologic extremes (both floods and droughts);
 - Establishes the geographic extent of the water resource planning areas (i.e. watersheds, counties, regions, etc.);
 - Delineates the roles between state and local entities by reviewing options for local roles in water resources management activities including but not limited to Regional Planning Councils (RPC), Watershed Management Authorities (WMA), Soil and Water Conservation Districts, Irrigation Districts, etc.;
 - Considers and incorporates, as appropriate, the recommendations for statewide water resources management from the October 1990 study of Alabama's water resources entitled, *Water for a Quality of Life*; and
 - Considers enhancements and/or additions to the Alabama Water Use Reporting Program.
- Involve the Alabama Water Resources Commission in the development of a statewide water resources management plan.

Themes/Issues for Water Resources Management

- Base management proposals on sound science
- Incorporate balanced adaptive management
- Use watersheds as the planning & management unit
- Evaluate concerns over Federal encroachment
- Recognize existing uses and existing investments in water resources planning
- Recognize the links between:

- Water management & land use planning
- ○ Water quantity & water quality
- Priority of uses for water
 - Public health & safety are highest priority
 - EPA and others propose to place equal priority for ecological needs
- Recognition of need for more funding
- State and sub-state management roles need to be better defined and utilized
- Involve local & regional stakeholders in the process
- Concerns both favoring the existing legal system and proposing revision using Regulated Riparian Model Code as example

2 - Enhanced COU/Permitting

Executive Summary:

- Review the benefits, costs, and issues associated with establishing a more formal system for managing water withdrawals in the state.
- Determine the legal basis under which Alabama will manage its water resources.
- Any enhanced system for managing water should be part of a comprehensive statewide plan based on water quality, water quantity, instream flow, and water use data.

Issue Paper:

- Same as above

Themes/Issues for Enhanced COU/Permitting

- Range of opinions on current COU system
 - Some groups feel it is premature to change system at the current time
 - Others proposed move to a formal permitting system
 - A number believe current COU system is ineffective
- Need to consider adjusting program withdrawal threshold
- Need for dependable and equitable enforcement mechanisms
- Any water allocation system should recognize the connection between water quality and quantity
- Any allocation system should be able to adapt to acute water resources situations
- All existing users should be grandfathered
- There should be a dispute resolution process

3 - Economic Development Themes

Policy Options:

- Any state water resources management plan should include policies and guidance for water resources development and reservoir planning programs. These policies should:
 - Be consistent with the Accelerate Alabama economic development strategic plan.
 - Encourage regional planning in water source development.
 - Encourage the exploration of public/private partnerships.
 - Identify potential reservoir sites, in conjunction with local authorities and planning agencies.
 - Encourage the development of off-stream storage for water supply needs to minimize impacts to major rivers and streams.
- The Governor's Economic and Development strategic planning process should include consideration of water resources implications in any efforts to focus Alabama's business and industry recruiting efforts. This would be separate and distinct from the current site-specific coordination process currently in place for individual clients and projects.
- The Governor should task the Inland Waterways and Intermodal Infrastructure Advisory Board to provide recommendations for water resource-related infrastructure projects that would provide direct benefits to economic recruiting efforts.
- Once water resource assessments are complete, OWR should ensure that water capacity and availability information is communicated to the State's industrial recruiters highlighting any areas where water resource problems may impact or deter the recruitment of industries.
- ADECA and ADEM should review federal and state water supply development funding programs (including state funded seed monies, i.e. the Water Supply Assistance Authority (Code of Alabama, 1975, §22-23A) and the Inland Waterways and Intermodal Infrastructure Fund (Code of Alabama, 1975, §41-23-123) and develop recommendations to enhance and encourage long-term infrastructure planning and regional cooperation in the development of new water sources.
- Protect existing water needs and promote the sustainable use of water in Alabama's growing agribusinesses and industries.
- ADECA should create an information clearinghouse on their web site to summarize sources of potential funding for new water source development, infrastructure improvements, or system expansions.

Stakeholder Comments:

- An overarching sentiment was to not impact the economy through any reforms and revisions to the state's water management system. Explore how best to promote and support full development of water resources on behalf of economic development and ensure that the health of citizens, the economy, and the environment are protected first in any plan. Adequate river flows and lake levels are critical to the economy of selected regions in the state. Coosa and Tallapoosa River lakes are significant tourist attractions for the region and consideration of the economic impacts of water resource development is strongly encouraged.
- Water was viewed by several stakeholders as a strategic commodity that needs better management than we now give it. Several activities were suggested to accomplish this including: encourage regional water planning, encourage private/public partnerships, identify potential reservoir sites, encourage off-stream storage; communicate water information to state's industrial recruiters, review federal and state water supply development programs to enhance long-term infrastructure planning, create information clearinghouse to summarize funding sources for water supply development.
- Support was expressed by several stakeholders to work more aggressively with the agricultural community for irrigation combined with implementation of effective soil and water conservation and best management practices. The plan should ensure that the agricultural community does not lose access to the State's water resources when trying to protect the resource, perhaps even exempting agriculture from any water metering requirements under a permitting/allocation system. Consider a water policy summit with attendees from other states emphasizing the importance of water and agriculture in Alabama's economy.
- A statewide plan should be cognizant of the fact that water supply is inequitably distributed and a plan should evaluate the feasibility and cost of establishing new impoundments to levelize water availability during periods of water scarcity.
- Environmental and economic impacts to both donor and receiving streams should be evaluated for any interbasin transfer negotiations. Interbasin transfer prohibitions can/will have calamitous effects on water utilities, will slow economic development, and handicap the equitable distribution of economic development in the state.
- Tourism, outdoor recreation, recreational angling were not addressed in the Water Management Issues paper and should be considered significant economic issues for Alabama. The use priorities of Alabama's largest

reservoirs should be reevaluated in light of increasing recreational (economic) activity for the state.

4 - Quantify the Availability of Water Resources

Executive Summary:

- Provide enhanced funding and expand the State's capability for acquiring and evaluating surface water and groundwater resources data and information.
- Establish groundwater regulations relative to water production rates, protection of aquifer recharge zones, and identification of priority groundwater uses and integrate them into a statewide water management plan.
- Support, enhance, and implement protective measures of groundwater quality through existing water-quality programs.

Issue Paper:

- Current gauging stations (especially those with 30 or more years of record) should be maintained and additional stations should be installed in strategic watersheds. The USGS (or DOI) should be strongly encouraged by the Governor to adequately support this program with federal funding to leverage available state resources.
- Provide funding and support for scientific assessments and initiatives by Alabama's water agencies. This includes expansion of ADEM, ADCNR, and GSA assessments of water quality and biological resources, GSA and OWR groundwater and surface-water assessments, and OWR water use assessments.
- Establish groundwater regulations that are consistent with water policies and the statewide water resources management plan and includes:
 - Identification of priority groundwater uses;
 - Preservation and protection of aquifer recharge areas;
 - Determination of proper well spacing;
 - Maximum well production rates; and
 - Maximum aquifer water withdrawals.
- Develop a comprehensive scientific knowledge of Alabama groundwater to accomplish groundwater protection, prudent groundwater development, and future groundwater policy development.
- Provide funding and support for groundwater and streamflow monitoring in Alabama. This includes expansion and support of the state-wide, real-time groundwater level monitoring network currently being implemented by the GSA as well as state funding to match federal dollars for the USGS streamflow monitoring network.
- Ensure that the groundwater monitoring network is also monitoring groundwater quality where needed.

- Provide support for adequate protection of groundwater quality through ADEM's groundwater and drinking water protection programs.

Themes/Issues for Water Assessments

- A statewide water resources assessment/data collection program should be implemented before any major water policy changes are proposed.
- Needs for additional agency funding for assessments should be supported.
- It is important that the current data collection effort be expanded so as to gain a better understanding of water-related issues and to provide sufficient information in order to implement the proposed policies and plans.
- Alabama should ensure that existing users such as farmers and industries do not lose access to water when water resources are not stressed trying to protect water resources when they are stressed (Instream flow policies). The State needs water management tools that can determine when watersheds are stressed so that active management can take place to reduce withdrawals. These tools can also be used to develop actuarial information on water insurance programs that can be used to protect users from financial harm should withdrawals be limited.
- Support for the idea of seeking funding assistance from other sources such as public entities or federal agencies.
- Assessments should involve stakeholders and sub-state entities.

5 - Drought Planning

Executive Summary:

- Establish a statutory basis and mechanism for drought planning, monitoring, and management.
- Require periodic review of the state's drought management plan and promote water conservation and water reuse in the plan.
- Develop standard operating procedures for input into the Alabama portion of the U.S. Drought Monitor program.

Issue Paper:

- Develop legislation to establish a statutory mechanism for drought monitoring, management, planning and response processes. These permanent mechanisms need to:
 - Provide for mandatory reductions in withdrawals upon order of the Governor;
 - Foster improved and sustained coordination among both state and federal agencies;
 - Ensure various programs are using consistent drought data and information;

- Ensure drought data is uniformly collected;
- Ensure impact information is centrally housed and available; and
- Ensure that the Drought Management Plan is consistent with any statewide comprehensive water resources management plan.
- Require periodic review of the Alabama Drought Management Plan.
- Develop formal standard operating procedures describing the development of the Alabama portion of the U.S. Drought Monitor.
- Include a description of state-level efforts to promote water efficiency mechanisms such as water conservation and reuse in the State's Drought Management Plan.
- Coordinate potential legislation with the Permanent Joint Legislative Committee on Water Policy and Management's subcommittee on drought planning.

Themes/Issues for Drought Planning

- Need for comprehensive approach as part of a statewide plan
- Need clear delineation of problems or issues
- Need to recognize the importance of adequate monitoring
- Need to recognize the importance of US Drought Monitor (Alabama input)
- Need for public education and outreach
- Need for flexibility in understanding and responding to drought
- Need to encourage water sustainability through:
 - Efficiency
 - Conservation
 - Reuse/recycling
 - New source development
- While not specifically addressed in comments, proposed drought legislation meets some of these issues and needs and is not contrary to any comments

6 - Water Conservation & Reuse

Executive Summary:

- Develop a public education program concerning the need for and benefits of water conservation and reuse.
- Support development of water reuse regulations to conserve water while being protective of human health and water quality and promote water reuse as a practical conservation measure.
- Encourage water conservation and efficiency for public drinking water utilities through the statewide water management plan.

Issue Paper:

- A statewide water management plan should contain components that:
 - o Promote water conservation and efficiency for public utilities;
 - o Set methods to measure conservation and efficiency;
 - o Educate stakeholders and the public regarding the benefits of water conservation and overcomes negative perceptions of water reuse;
 - o Require advanced treatment standards of wastewater for water reuse;
 - o Direct the adoption of water reuse regulations; and
 - o Set localized voluntary and mandatory water conservation measures during times of drought through the State's Drought Management Plan.

Themes/Issues for Water Conservation and Reuse

- There is general (but not unanimous) support for water conservation and reuse as part of a statewide water management plan.
- Environmental groups suggest that water efficiency measures and conservation should be considered before new sources of water are developed and should be the central focus of water policy.
- Several stakeholders support the development of water reuse regulations and clear guidelines for implementation.
- Water utilities caution that mandatory water conservation measures could result in higher costs for water users and that water reuse can be expensive.
- Agricultural interests suggest that many conservation measures implemented by farmers are water conservation practices.
- Water reuse can provide water quality benefits in water quality limited streams.
- Low impact development, green infrastructure, and stormwater capture for aquifer recharge were suggested as water conservation and reuse practices.
- USEPA and several other agencies / organizations offered technical assistance and guidance.

7 - Interbasin Transfers (IBTs)

Executive Summary:

- Determine an appropriate basin unit for evaluating and accounting for interbasin transfers of water resources.
- Identify and summarize existing interbasin transfers.
- Establish a regulatory mechanism for interbasin transfers that provides for existing transfers and establishes criteria for new or expanded transfers to ensure they are reasonable and beneficial to the state.

Issue Paper:

- Define IBTs based on an established watershed size.
- OWR and ADEM should work jointly to identify and summarize current interbasin transfers (locations and amounts) once the applicable watershed size is defined.
- Allow existing IBTs to continue but require periodic reporting.
- Establish specific criteria for new or expanded IBTs to ensure that they are reasonable and beneficial to the State.
- Establish a regulatory program for all IBTs which includes objective evaluations of all other practical alternatives to the interbasin transfer.

Themes/Issues for Interbasin Transfers (IBTs)

- There was a wide range of comments ranging from concern over allowing new or expanded IBTs to consideration for incorporating IBTs as a key aspect of public water supply source availability.
- Several stakeholders stressed the need for more studies and analysis before any actions to limit or regulate IBTs.
- Environmental groups stressed the need to implement conservation before any new IBTs would be allowed.
- Several comments supporting the concept that IBTs should be integral to any state water management plan.

8 - Instream Flow Stakeholder Themes

Policy Options:

- Provide support and resources for investigations into the instream flow needs of Alabama's aquatic ecosystems and for evaluating the utility of existing flow tools for management and regulatory purposes.
- Begin a process to define an acceptable framework for implementing instream flows into a statewide water management plan.
- Adopt instream flows as a required component of any water allocation process that is likely to be implemented in the future.
- Adopt a unified instream flow policy or legislation at the state level to provide a mechanism for better agency coordination and management of water resources. A statewide policy concerning instream flows should serve as one cornerstone to a comprehensive, realistic, and economically balanced water management plan.

Stakeholder Comments:

- Water centered tourism is a driving force of many local economies and lowered water levels and flow rates will hurt local economies severely. Angling and other water-based recreational services are generally best delivered under close approximations to natural flow regimes and water quality. No one should be allowed to remove water to the detriment of aquatic life and habitat. No one should be exempt from the limits on a statewide water management plan. Adequate flows and lake levels are critical to the economy of local regions. Events in Georgia must be considered in developing Alabama's water plan.
- Some business stakeholders do not support programs to better manage instream flows within the context of permitting. Clarification is needed on the new ADCNR instream flow policy.
- Environmental stakeholders were united in promoting adoption of a water classification system and developing instream flow standards for the classification. Should use the best available science to determine environmental flows necessary for ecosystem health. This issue should be at the top of the water agenda and is a cornerstone of any water management plan. Site-specific instream flow standards are recommended and based, in part, on their ability to protect water quality standards. Water policy must address ecological flows necessary to maintain the full spectrum of riverine species, processes, and services.
- Utilities expressed support for instream flows with water-use permitting needed to address instream flows on a case-by-case basis using a solid scientific methodology. However, maintaining treatable, healthy waters for human consumption must be considered the first priority of water management. Concerns were expressed about low summer flows, phosphorous regulations, and costs to meet nutrient criteria. Water utilities suggested that instream flows be required below dam systems.
- Environmental flow standards should be based on the best scientific data available. Should select and convene an independent group of scientists to develop a scientific-based consensus document to provide environmental flow standards recommendations and guidance.

9 - Comprehensive Water Data Collection

Executive Summary:

- Provide enhanced funding to support state efforts to develop a robust and scientifically based surface-water and groundwater data foundation for conducting assessments and determining water allocations.

- Encourage the Governor and other officials and representatives to work with federal water agencies to fund water flow gauges in Alabama.
- Expand Alabama's rainfall monitoring network working through the State Climatologist and through public climate data cooperatives.
- Develop and apply consistent data quality standards and protocols for acquisition, management, and disposition of water resources data.

Issue Paper:

- A viable state water management process should be based on, and supported by, a robust and scientifically developed set of water resources data. Resources to support these efforts should be a priority in the budgeting process.
 - Recent work to expand the state's groundwater monitoring system should continue and be expanded to provide the needed coverage in all aquifers and should include the collection of groundwater quality data.
 - The state's surface water assessment and monitoring capabilities should be expanded, particularly with regard to drought and flows resulting from compact negotiations with other states.
 - Ensure that key stream flow gauges remain active and are strategically located with respect to water quantity and water quality assessment needs.
 - Conjunctive assessment of the state's surface and groundwater resources should be initiated and become central to the statewide water management process.
- Evaluate the status of Alabama's existing stream gauge network needs by appropriate agencies and stakeholder groups and identify improvements and changes that are needed for supporting a statewide water management initiative.
- Provide resources and support for instream flow studies to evaluate existing flow tools and for determining an acceptable framework for implementing future instream flow requirements.
- Expand Alabama's rainfall monitoring network to accommodate the data needs of future water management. This activity should be coordinated through the State Climatologist and enhanced further by working with the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) public network.
- Develop cost estimates for operating and maintaining the state's water data collection and reporting capability. Utilize the Water Resources Data Technical Advisory Committee established by the Permanent Joint Legislative Subcommittee on Water Policy and Management to communicate these needs and data results and to make recommendations on needed enhancements in data collection efforts.
- Establish a water resources data clearinghouse accessible by the public via a web portal.
- Develop consistent and reliable data quality standards and protocols for the acquisition and management of water information. Apply these standards to all

data collected and stored that is used to assess, monitor, and allocate water resources.

Themes/Issues for Water Resources Data

- Many stakeholders raised water resources data as the number one or a high priority issue.

Many stakeholders raised the importance of developing and funding a comprehensive data collection program. After such data is available, state agencies can better consider whether the policy options identified in the AWAAG report would be effective in resolving problems identified by the data and stakeholders would be better able to contribute meaningful comments on proposed policies and plans.

- There must be adequate funding available for comprehensive, unbiased data collection.
- Science should inform the development of water policy. Any plan must be science-based and data-driven. Science and data must not only shape decisions on a state level, but also on a regional and watershed level.
- Multiple references supporting SJR 5 (Act 2009-10) legislation outlining a data collection network that should be deployed in Alabama. Funding for this network should be a priority.
- The concept of leveraging data collected by other entities through the establishment of data standards and protocols should be supported.

10 - Interstate Coordination

Executive Summary:

- Provide meeting support to strengthen staff-level peer relationships with neighboring states to improve coordination and information sharing.
- Support agencies' activities that involve interstate water resources.
- In accordance with the Alabama Water Resources Act, establish a clearinghouse to keep the Governor's office updated on all interstate water resources related issues.

Issue Paper:

- Ensuring that Alabama protects and receives its equitable share of both surface and groundwater is very important to Alabama's population, economy, and environment for the present and in the future.
- Disagreements and conflicts over the shared use of interstate waters tend to develop over long periods of time and require continuous state agency involvement.

- In addition to the Water Wars, there are several, potentially contentious, issues involving other shared interstate water resources that include:
 - The increasing, and potentially conflicting, use of the Tennessee-Tombigbee Waterway for water supply;
 - The Georgia-Tennessee border issue in which Georgia proposes a change in their state line to include part of the Tennessee River;
 - Increasing pressure on the Tennessee River for water supply and other uses that impact upstream storage reservoirs in Georgia, North Carolina, Tennessee, and Virginia;
 - Concerns in Florida over water uses upstream of the Florida panhandle area affecting both surface-water and groundwater resources.

Themes/Issues for Interstate Coordination

- A consensus of stakeholders commenting on this topic agree on the need for the state to monitor interstate rivers and watersheds and ensure Alabama's interests are protected.
- Some stakeholders commented on the importance of maintaining relationships and partnerships with our neighboring states as a way to better coordinate activities and interests in shared watersheds.
- One stakeholder supported the recommendation for an interstate issues clearinghouse.
- EPA volunteered their services to facilitate coordination of interstate issues.

11/ 12 - Key Stakeholder Education and Outreach / Public Education and Outreach

Executive Summary

- Identify key stakeholder groups to facilitate a more efficient and effective dialog for statewide water management.
- Afford the opportunity for all stakeholders to participate in the process of developing water policies and a statewide water management plan.
- Publicize and promote Alabama's water resources as fundamental to sustaining a desirable quality of life, future economic development, aquatic habitat, and biological diversity.

Issue Paper

- Afford key stakeholders an opportunity to participate in the process of developing a comprehensive policy for the management of Alabama's water resources.
- Identify specific representatives to facilitate more effective and efficient communication between policy makers and the stakeholder groups. These

- distinct groups could include citizen- based environmental groups, universities, trade organizations, industrial sectors, and various local/state/federal agencies.
- Solicit the participation of key stakeholders and the public and target those individuals that already have an interest in protecting water resources.
 - Develop a media campaign with media outlets and other advertising venues to target individuals who may not already have a foundational knowledge of water resources.
 - Publicize and promote Alabama's vast water resources and the need to protect them for future generations to enjoy.
 - Publicize and promote the varied recreational opportunities, abundant clean drinking water, economic development opportunities, and unique habitats supported by Alabama's water resources.
 - Solicit the public's input into key decision-making processes.

Themes/Issues for Key Stakeholder Education and Outreach / Public Education and Outreach

- There is consensus support for broad-based stakeholder education and outreach as a component of water management planning.
- Several groups suggested that all stakeholders need to be engaged in the water management planning process.
- Education should include topics such as water conservation and reuse, the current status / availability of the State's water resources, best management practices, and scientific research.
- Education should be coordinated and all meetings should be open to the public to ensure the widest possible participation.
- Education should occur at both the regional and local levels and should target both the public at large and elected officials.
- Several agencies and organizations offered to help with this process through general environmental education programs, stakeholder engagement, and public outreach.

13 - Riparian or Other Legal Issues

- Educate stakeholders and public on current status of water law in Alabama
 - Surface Water
 - Groundwater
 - How Alabama law compares with other states
- No new regulations, policies or laws until there is sufficient data, an assessment supporting regulations or a demonstrated need for them.
- Adopt or use as guidance the American Society of Civil Engineers Regulated Riparian Model Water Code.

- Closely coordinate water quantity and water quality investigations and management.
- Strong enforcement program for water quantity regulations and laws.
- Need for regional or localized inputs into water quantity planning and issues.
- Encroachment of federal government into state water quantity issues.
- Consider safe dams legislation.

Appendix G

Stakeholder Comment Matrix

Stakeholder	Issues												
	1 Water Resources Management	2 Surface and groundwater assessments	3 Water Data Collection	4 Conservation and Reuse	5 Instream Flows	6 Economic Development	7 Key Stakeholders Education/Outreach	8 Interbasin Transfers	9 Public Education/Outreach	10 Riparian/Legal	11 Drought Planning	12 Enhanced COU/Permitting	13 Interstate Coordination
Relative rank	1	2	3	4	5	6	7	8	9	10	11	12	13
Citizen													
Matthew Miller	*			*	*	*		*					
Darrel and Lydia Haynes	*	*						*		*		*	
82nd Flotilla U.S. Coast Guard, Bill Hayes					*								
Gene Phifer, water quality expert					*								
Senator Phil Williams	*				*	*							*
Dwight Thompson, citizen-retired TVA engineer	*								*				
William Copeland	*				*	*			*				*
Rita Grub				*	*				*				
Hobson Bryan					*	*			*	*			
Water Utility													
Birmingham Water Works Board, Darryl Jones	*	*	*	*	*	*	*	*	*		*	*	*
Gadsden Water Works and Sewer Board, Frank Eskridge	*		*		*			*		*	*	*	*
Mobile Area Water and Sewer System, Leslie Brown	*	*	*						*				
City of Pelham, Eddy Jowers					*			*					
Federal Agency													
NOAA, Jim Stefkovich	*		*				*	*			*		*
Tennessee Valley Authority, Brenda Brickhouse	*												
USDA Farm Services Agency, Daniel Robinson	*									*			
USEPA, Jim Giattina	*	*	*	*	*	*		*				*	*
Mobile Bay National Estuary Program, Roberta Swann	*	*		*			*		*	*			
U.S. Army Corps of Engineers, Col. Steven Roemhildt	*												
U.S. Geological Survey Alabama Water Science Center			*		*								
U.S. Fish and Wildlife Service, Dan Everson		*	*		*								
State Agency													
Dept of Commerce, Greg Canfield						*	*						
Alabama Forestry Commission, Linda Casey	*	*	*			*		*	*		*	*	
State Soil and Water Conservation Committee, Steve Cauthen, J.O. Norris	*					*			*				
Public Health Dept., Don Williamson		*	*										
Attorney General, Jess Nix													*
Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority, Barbara Gibson	*	*	*	*									

Stakeholder	Issues												
	Water Resources Management	Surface and groundwater assessments	Water Data Collection	Conservation and Reuse	Instream Flows	Economic Development	Key Stakeholders Education/Outreach	Interbasin Transfers	Public Education/Outreach	Riparian/Legal	Drought Planning	Enhanced COU/Permitting	Interstate Coordination
Relative rank	1	2	3	4	5	6	7	8	9	10	11	12	13
Academic													
Alabama Cooperative Extension Service, Eve Brantley			*	*		*	*		*	*	*		
Alabama University Irrigation Initiative, Richard McNider		*	*	*	*	*	*	*	*		*		
John Cristy, State Climatologist				*									
Discovering Alabama, Doug Phillips							*		*				
Environmental Policy and Information Center, Jacksonville State University, Pete Conroy	*				*		*	*	*				
University of Alabama School of Law, Bill Andreen, Heather Elliott										*			
NGO/Business-Industry													
Alabama Power Company, Matt Bowden	*	*	*							*			
PowerSouth Energy Cooperative, Keith Stephens		*	*				*						
Alabama Farmers Federation, Jerry Newby		*	*	*		*			*				
Etowah County Tourism Board, Hugh Stump						*							
Blue Horizon Enterprises, Kathleen Kirkpatrick	*	*	*	*			*		*				
Coalbed Methane Association of Alabama, Dennis Lathem		*											
Alabama Pulp and Paper Council, Roy McAuley		*	*										
Business Alliance for Responsible Development, David Roberson	*	*	*	*	*	*	*	*	*	*	*	*	*
Business Council of Alabama, William Canary	*	*	*	*	*	*	*		*	*		*	
Manufacture Alabama, George Clark		*	*										
Coalition of Alabama Waterway Associations	*		*			*		*		*			
Tennessee River Valley Association, Cline Jones						*		*					
NGO/Environmental													
Alabama Rivers Alliance, Mitch Reid	*	*	*	*	*		*	*	*	*	*	*	*
American Rivers, Rebecca Haynes				*	*								
Cahaba River Society, Beth Stewart, Randall Haddock	*	*	*	*	*								
Cahaba Riverkeeper, Myra Crawford					*			*	*			*	
Chattahoochee River Warden, Roger Martin		*	*	*								*	
Choctawhatchee Riverkeeper, Mike Mullen	*			*	*		*						
Wildsouth, Mark Kolinski		*			*		*						
Friends of Locust Fork, Nancy Jackson			*	*			*		*				
Mobile Baykeeper, Casi Callaway	*	*	*	*	*		*	*	*		*		
The Nature Conservancy, Chris Oberholster	*		*	*	*	*						*	
Southern Environmental Law Center, Gil Rogers, Sara Stokes	*	*		*	*	*		*			*		
Black Warrior Riverkeeper, Nelson Brooke, Eva Dillard	*	*		*	*		*		*	*		*	
Conservation Alabama, Adam Snyder	*					*	*		*				
Dog River Clearwater Revival, Kim Sweet				*		*							

Stakeholder	Issues												
	Water Resources Management	Surface and groundwater assessments	Water Data Collection	Conservation and Reuse	Instream Flows	Economic Development	Key Stakeholders Education/Outreach	Interbasin Transfers	Public Education/Outreach	Riparian/Legal	Drought Planning	Enhanced COU/Permitting	Interstate Coordination
Relative rank	1	2	3	4	5	6	7	8	9	10	11	12	13
NGO/Water Association													
American Water Works Association, Jim Watterson-Ala-Miss Section						*		*	*	*	*		
Baldwin County Water Distributors Association, Richard Peterson-Clifford Johnson	*	*		*			*	*					
Alabama Water and Wastewater Institute, Richard Hanan	*	*	*			*		*		*	*		
Alabama Water Environment Association, Lennette Sheffield	*			*				*		*			
NGO/Watershed-Recreation													
Black Warrior CWP, Kellie Johnston							*						
B.A.S.S., Noreen Clough						*							
NGO/Lake HOB0													
Neely Henry Lake Association, Kelly Stephens					*	*							
Lake Mitchell HOB0, Ralph Mason	*	*	*	*			*		*				
Lake Martin HOB0, Dave Heinzen	*						*		*				*
Smith Lake Environmental Preservation Committee, Eddie Hand				*									
Lake Martin Resource Association, Steve Forehand						*							

Stakeholder	Additional themes												
	Reference to other issues	Reference to development of a statewide plan	Reference to water quality concerns	Need for additional funding	Reference to recreational issues	Integrated water quality/water quantity mgmt	Protecting economic viability of investments	Use of the watershed approach	Reference to land management in process	Reference to need for Safe Dams legislation	Concerns about statutory overlap among state agencies	Concern about federal intrusion	Need for better enforcement of water regulations
Relative rank	1	2	3	4	5	6	7	8	9	10	11	12	13
Citizen													
Matthew Miller	*	*	*			*		*					
Darrel and Lydia Haynes	*											*	
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Senator Phil Williams	*	*			*								
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Rita Grub	*	*				*		*					
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Birmingham Water Works Board, Darryl Jones			*			*							
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Mobile Area Water and Sewer System, Leslie Brown	*	*		*			*			*			
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Federal Agency													
NOAA, Jim Stefkovich		*								*			
Tennessee Valley Authority, Brenda Brickhouse		*											
USDA Farm Services Agency, Daniel Robinson		*											
USEPA, Jim Giattina		*	*			*		*					
Mobile Bay National Estuary Program, Roberta Swann		*											
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State Agency													
Dept of Commerce, Greg Canfield		*		*								*	
Alabama Forestry Commission, Linda Casey													
State Soil and Water Conservation Committee, Steve Cauthen, J.O. Norris	*	*								*			
Public Health Dept., Don Williamson		*											
Attorney General, Jess Nix		*										*	
Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority, Barbara Gibson	*	*						*					

Stakeholder	Additional themes												
	1 Reference to other issues	2 Reference to development of a statewide plan	3 Reference to water quality concerns	4 Need for additional funding	5 Reference to recreational issues	6 Integrated water quality/water quantity mgmt	7 Protecting economic viability of investments	8 Use of the watershed approach	9 Reference to land management in process	10 Reference to need for Safe Dams legislation	11 Concerns about statutory overlap among state agencies	12 Concern about federal intrusion	13 Need for better enforcement of water regulations
Relative rank	1	2	3	4	5	6	7	8	9	10	11	12	13
Academic													
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Alabama Farmers Federation, Jerry Newby				*					*				
Etowah County Tourism Board, Hugh Stump					*								
Blue Horizon Enterprises, Kathleen Kirkpatrick	*	*	*	*									
Coalbed Methane Association of Alabama, Dennis Lathem													
Alabama Pulp and Paper Council, Roy McAuley	*												
Business Alliance for Responsible Development, David Roberson	*						*						
Business Council of Alabama, William Canary	*			*									
Manufacture Alabama, George Clark				*									
Coalition of Alabama Waterway Associations	*		*				*						
Tennessee River Valley Association, Cline Jones	*				*								
NGO/Environmental													
Alabama Rivers Alliance, Mitch Reid		*	*	*		*					*		*
American Rivers, Rebecca Haynes		*											
Cahaba River Society, Beth Stewart, Randall Haddock	*		*		*	*	*				*		
Cahaba Riverkeeper, Myra Crawford	*		*			*							
Chattahoochee River Warden, Roger Martin	*								*				
Choctawhatchee Riverkeeper, Mike Mullen		*											
Wildsouth, Mark Kolinski	*												
Friends of Locust Fork, Nancy Jackson	*												
Mobile Baykeeper, Casi Callaway		*		*									
The Nature Conservancy, Chris Oberholster	*	*							*				
Southern Environmental Law Center, Gil Rogers, Sara Stokes	*	*	*	*		*		*					
Black Warrior Riverkeeper, Nelson Brooke, Eva Dillard		*		*	*	*							
Conservation Alabama, Adam Snyder	*	*		*	*			*					
Dog River Cleanwater Revival, Kim Sweet	*		*		*								

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Alabama Water and Wastewater Institute, Richard Hanan	*	*	*										
Alabama Water Environment Association, Lennette Sheffield			*			*					*		
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B.A.S.S., Noreen Clough			*		*								
NGO/Lake HOBO													
Neely Henry Lake Association, Kelly Stephens		*	*		*								
Lake Mitchell HOBO, Ralph Mason	*	*	*										
Lake Martin HOBO, Dave Heinzen	*												*
Smith Lake Environmental Preservation Committee, Eddie Hand	*		*										
Lake Martin Resource Association, Steve Forehand	*				*								

Appendix H

Suggested Alabama Water Resources Management Plan Conceptual Framework

Section I. Vision and Guidelines for Water Resources Management in Alabama (Why water management policies and plans are important to Alabama's water future)

1. Vision for water resource management in Alabama. Concise strategic statement to guide and direct the State's goal for water resources management.
2. Water availability - A water supply adequate for human consumption and for support of long-term economic growth and stability is absolutely essential for any populated region, and Alabama is no exception. Alabama's water resources, although abundant, are unevenly distributed across the State. This fact, coupled with future population growth and the uncertainties of extreme climate events, such as prolonged drought, can leave Alabama with an unsecure water future. Water resource management plans and policies are tools designed to prevent water resource emergencies and sustain the economic, cultural, and environmental health of a region. Water resources should be systematically managed and fairly allocated during water shortage periods. Only through a stakeholder approved and accepted water resources management plan, implemented through a legislatively created water policy can this be done in an economically feasible, environmentally acceptable, and legally binding manner.
3. Economic stability - Population growth without adequate water and infrastructure planning often results in economic uncertainty and stagnation, which limits growth potential and increases the risk of environmental degradation.
4. Resource protection - Maintaining and protecting the integrity and health of natural stream channels, floodplains and riparian zones, and groundwater aquifers (Alabama's water production system) is essential to a sustainable water resource future and are fundamental to any water resources management plan.
5. Understand the impact of federal statutes and coordination with federal authorities and programs
 - a. National Environmental Policy Act (NEPA)
 - b. Clean Water Act (CWA)
 - c. Safe Water Drinking Act (SWDA)
 - d. Wetlands Protection
 - e. Endangered Species Act (ESA)
 - f. Coastal Zone Management Act
 - g. Rivers and Harbors Act

Section II. Water Resources Overview

1. Overview of the State's resources
 - a. Hydrological setting and water resources
 - b. Geology
 - c. Soils

- d. Biology
 - e. Land Use
 - f. Ecoregions
 - g. Physiographic Regions
2. Discussion of surface water resources (watershed by watershed breakouts)
 - a. Water Quantity
 - b. Water Quality
 - c. Biology
 - d. Land Use
 3. Discussion of groundwater resources (aquifer by aquifer breakouts)

Section III. Water Resources Data

1. State agency data sharing, coordination, and interoperability
2. Current water use compilations (for both withdrawal and net consumption)
3. Surface and Groundwater availability - Determining how much water is available from surface- and groundwater sources and the geographic distribution of these sources is required knowledge for effective and efficient water management.
4. Water-Use - Determining how much water is used in various water use sectors is required knowledge for effective and efficient water resources management. Detailed, continuous water-use inventories are needed in the following sectors:
 - i. Domestic water supply
 - ii. Power productions (energy-water nexus)
 - iii. Industrial (including quarries) water supply (including water supply impacts due to operation)
 - iv. Agriculture
 - v. Irrigation
 - vi. Recreation
 - vii. Aquaculture
 - viii. Transportation
5. Instream flows - Determining how much water should remain in surface channels and features to support fish and wildlife populations and sustain the water-production functions of natural hydrologic systems is required knowledge for effective and efficient water resources management. Understanding how surface-water and groundwater systems are linked in this context is essential.

- i. Discussion of flow regime – timing, duration, frequency, rate of change, volume
6. Monitoring Data
 - i. Water quality and quantity monitoring (surface water and groundwater)
 - ii. Rainfall monitoring network
 - iii. Soil moisture monitoring network
 - iv. Identification of critical need areas and possible capacity-stress areas
7. Projections for future population and water use

Section IV. Policy areas (in no priority order):

1. Interbasin transfers
 - a. Basin delineation proposals
 - b. Area of origin
2. Instream flow standards
3. Agriculture irrigation initiative
4. Drought planning
 - a. Including water conservation
5. Water reuse
6. Water resource development
 - a. Groundwater development
 - b. Reservoir development and management
 - i. (Including recommendations for dealing with new reservoirs - i.e. SB485 concerning Duck River Reservoir in Cullman Co.)
 - ii. Potential identification and protection of candidate sites
 - iii. FERC license requirements for existing hydropower reservoirs
 - c. Regional capacity development (efficiencies to encourage water systems to work together to develop and share water resources)
 - i. Well spacing
 - ii. Aquifer storage and recovery
 - iii. Alternate water supplies (intersystem connectivity)
 - d. Funding policies and strategies for infrastructure development
7. Coastal concerns (i.e. freshwater inflows, saltwater intrusion, estuaries)
8. Interstate issues and coordination
 - a. Collaborative assessment of shared interstate watersheds

- b. Monitoring strategies
- c. Interstate water allocation issues
- 9. Education and outreach
- 10. Support for economic development
- 11. Water resources management issues
 - a. Local and regional water management role and water supply planning
 - i. Use a regionalized or watershed-based water resource research collaborative model for a systematic approach to data gathering and local problem identification and actions.
 - ii. Land use planning
 - b. Capacity stress area designations/water quantity permitting

Section V. Stakeholder Education and Participation

- 1. Leverage identification of key stakeholders and continued feedback based on initial inputs
- 2. Opportunities for information to the general public
 - a. Town hall meetings
 - b. Web site information
 - c. Social networking tools (Facebook, Twitter, etc.)
- 3. Process for periodic feedback on plan development

Section VI. List of any proposed legislative initiatives

Section VII. Discussion of funding needs and strategies

Section VIII. Recommendations for next steps