

**FINAL**



# **ALABAMA DROUGHT MANAGEMENT PLAN**

**Alabama Department of Economic and  
Community Affairs  
(ADECA)**

**Alabama Office of Water Resources**

**November 30, 2018**



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## **Acronym List**

<b>AACDC</b>	<b>Alabama Association of Conservation Districts Cost-Share Commission</b>
<b>ACF</b>	<b>Apalachicola – Chattahoochee – Flint River Basin</b>
<b>ACT</b>	<b>Alabama – Coosa – Tallapoosa River Basin</b>
<b>ADAPT</b>	<b>Alabama Drought Assessment &amp; Planning Team</b>
<b>ADECA</b>	<b>Alabama Department of Economic &amp; Community Affairs</b>
<b>ADCNR</b>	<b>Alabama Department of Conservation &amp; Natural Resources</b>
<b>ADEM</b>	<b>Alabama Department of Environmental Management</b>
<b>AEMA</b>	<b>Alabama Emergency Management Agency</b>
<b>AFC</b>	<b>Alabama Forestry Commission</b>
<b>AGI</b>	<b>Alabama Department of Agriculture &amp; Industries</b>
<b>AOWR</b>	<b>Alabama Office of Water Resources</b>
<b>APC</b>	<b>Alabama Power Company</b>
<b>AWRC</b>	<b>Alabama Water Resources Commission</b>
<b>DCP</b>	<b>Drought Conservation Plan</b>
<b>DO</b>	<b>Dissolved Oxygen</b>
<b>DSF</b>	<b>Day Second Feet volumetric water flow unit (also known as cfs-days)</b>
<b>FERC</b>	<b>Federal Energy Regulatory Commission</b>
<b>GSA</b>	<b>Geological Survey of Alabama</b>
<b>MIG</b>	<b>Monitoring &amp; Impact Group</b>
<b>NASS</b>	<b>USDA National Agricultural Statistics Service</b>
<b>NIDIS</b>	<b>National Integrated Drought Information System</b>
<b>NOAA</b>	<b>National Oceanic &amp; Atmospheric Administration</b>
<b>NWS</b>	<b>National Weather Service</b>
<b>SWCC</b>	<b>Alabama Soil and Water Conservation Committee</b>
<b>TVA</b>	<b>Tennessee Valley Authority</b>
<b>USACE</b>	<b>U.S. Army Corps of Engineers</b>
<b>USDA</b>	<b>U.S. Department of Agriculture</b>
<b>USGS</b>	<b>U.S. Geological Survey</b>

## **Executive Summary**

Droughts are a naturally occurring aspect of climate and weather patterns. Therefore, it is important for agencies, stakeholders, and other water users to better understand where droughts are occurring and how their impacts are affecting Alabama's water resources and the livelihood of our citizens.

Droughts are unlike most other natural weather events such as floods or tornadoes because they do not occur with a sudden onset but rather a gradual deterioration of conditions. In an effort to be more proactive, the Alabama Office of Water Resources is working closely with numerous local, state, and federal agencies as well as other stakeholders to enhance and improve a statewide approach to drought planning and management. The Alabama Drought Management Plan ("the Plan") defines the procedures for the coordination of drought-related data, information, and impacts by providing for the release of Alabama Drought Declarations. These declarations reflect the state of current and projected drought conditions in Alabama. The Plan further describes the process for the coordination of a state-level input into the U.S. Drought Monitor map. The map, a national product developed under the auspices of the National Oceanic and Atmospheric Administration (NOAA) and the National Integrated Drought Information System (NIDIS), is widely used by federal and state agencies as the primary indicator of drought conditions in the U.S. and plays a major economic role in issues such as federal declarations for emergency aid and the determination of crop insurance claims.

## **Section 1. Purpose**

The Plan implements actions mandated by both general provisions of the Alabama Water Resources Act (Code of Alabama, 1975, §9-10B-1, et seq.) and, more specifically, the Alabama Drought Planning and Response Act (Code of Alabama, 1975, §9-10C-1, et seq.) Under these statutes, the Alabama Office of Water Resources (AOWR) is given responsibilities for drought planning and response activities as they relate to overall water resources management for Alabama. The Drought Act provides more explicit guidance to the AOWR for the establishment of a defined drought planning and coordination structure and process. The Plan provides guidance and defines specific processes to address drought and drought-related activities, such as monitoring climatic conditions, defining declaration levels and triggers, developing impact assessments, response recommendations, and mitigation actions. The Drought Act also established a statewide governmental structure and fundamental requirements for statewide drought planning and response. The Plan provides additional details on how the planning process will work to coordinate information, identify ways to prepare for droughts, identify the different areas impacted by drought conditions, identify risks associated with drought conditions, and communicate the extent and magnitude of drought conditions. Further, the Plan helps to identify ways to mitigate the impacts during drought emergencies. These objectives are accomplished through the development of an Alabama Drought Declaration process with specific drought declaration levels that are developed from the review of current conditions and impacts as well as the assessment of forecasted changes. This declaration

is provided to guide state agencies, reservoir operators, water managers, and other stakeholders in making water use and management decisions. In addition, the Plan also provides for the process of developing state-level inputs to the U.S. Drought Monitor map. The map is defined to capture a "snap shot" of drought conditions and impacts occurring on a weekly basis across the U.S. It is specifically and intentionally limited from the more subjective analysis associated with predicting how conditions might change in the future and does not address more specialized information often needed by various water use sectors. These two products, the Alabama Drought Declaration and the Alabama portion of the U.S. Drought Monitor provide an accurate depiction of current statewide conditions and how they may collectively change in the near future.

## **Section 2. Drought Planning Overview**

### ***A. Role of the Alabama Office of Water Resources***

As the agency responsible for the planning, coordination, development and management of Alabama's water resources in accordance with the Alabama Water Resources Act, the AOWR, a division of the Alabama Department of Economic and Community Affairs, coordinates efforts to compile and share information concerning hydrologic data, water resource conditions, impacts, and drought mitigation responses by:

1. Coordinating the monitoring and collection of data from appropriate sources necessary for the determination of drought declaration levels;
2. Issuing Alabama Drought Declarations in accordance with this Plan. The declaration levels and triggers are developed by AOWR in coordination with the Monitoring and Impact Group (MIG), a standing subcommittee of the Alabama Drought Assessment and Planning Team (ADAPT);
3. Developing procedures necessary to collect and distribute information, convene committees, promote water conservation and other means to encourage the wise stewardship of Alabama's water resources;
4. Coordinating and communicating Alabama drought declaration level and drought impact information to federal agencies, the National Integrated Drought Information System (NIDIS), and for input to the <http://www.drought.gov> web site;
5. Working in close coordination with the Alabama State Climatologist on recommendations and inputs to the Alabama portions of the U.S. Drought Monitor Map; and
6. Encouraging the wise and efficient use of water as both a normal water management practice and during periods of diminished water availability.

### ***B. Alabama Water Resources Commission***

The Alabama Water Resources Commission (AWRC) has both an administrative and advisory role in the overall management of Alabama's water resources, including state level responses to drought conditions, in accordance with the Alabama Water Resources Act. As such, the AWRC can:

1. Provide advice and input to the Governor, Legislature, and AOWR in all aspects of drought planning, management, and response at the state level;
2. Approve any regulations proposed by AOWR in support of this Plan; and
3. Approve any enforcement actions proposed by AOWR.

Accordingly, on May 10, 2016, the AWRC adopted regulations in support of the Drought Planning and Response Act under that authority. The regulations were submitted to the Legislative Reference Service under provisions of the Alabama Administrative Act and became effective on July 1, 2016.

The result is a closely coordinated process managed by the AOWR that provides the necessary oversight and involvement of both the ADAPT (see below) and the AWRC. In general, the AWRC is involved in that advisory role to ensure that any necessary changes to state-level drought policies or management practices are identified and considered for implementation.

### ***C. Alabama Drought Assessment and Planning Team***

The Alabama Drought Assessment and Planning Team (ADAPT) serves in an advisory capacity to AOWR and the Governor's Office to coordinate intergovernmental drought assessments, responses, and management actions and in the implementation of all drought-related activities. In carrying out its responsibilities, the ADAPT shall:

1. Provide guidance for various aspects of drought management, including but not limited to:
  - a) Establishing drought management regions within the state to:
    - i. enable drought monitoring and mitigation to be accomplished within defined geographical areas and
    - ii. prevent overly broad response to drought.
  - b) Supporting the MIG's involvement (see below) in the Alabama Drought Declaration process and assisting in the distribution of drought-related information to the public.
2. Review the Alabama Drought Management Plan at least every five years to evaluate the performance and suitability of the drought indicators and the effect of pre-drought and drought responses. Based on these periodic reviews, the ADAPT shall recommend appropriate changes.
3. Develop plans and procedures to support the implementation of a statewide drought planning and response process and the Alabama Drought Management Plan; and
4. Provide guidance and make recommendations on drought-related matters to AOWR and the Governor, as necessary.

ADAPT is comprised of the directors of the following agencies or departments or their designated representatives:

- Alabama Office of Water Resources (AOWR), Chair;
- Alabama Emergency Management Agency (AEMA);
- Alabama Department of Environmental Management (ADEM);

- Alabama Adjutant General;
- Alabama Department of Agricultural and Industries (AGI);
- Alabama Department of Conservation and Natural Resources (ADCNR);
- Alabama Forestry Commission (AFC);
- Geological Survey of Alabama (GSA);
- Alabama State Climatologist;
- Chair of the MIG;
- Choctawhatchee Pea and Yellow Rivers Watershed Management Authority (CPYRWMA);
- At least two members representing the State at large, appointed by the Governor;
- Alabama Soil and Water Conservation Committee;
- USDA Natural Resource Conservation Service; and
- Other representatives, as invited by the ADAPT Chair, to serve in an ex-officio, non-voting capacity.

In addition, the Drought Act also established a standing technical subcommittee of the ADAPT called the Monitoring and Impact Group (MIG). The MIG Chairman shall be appointed by the Division Director of the Alabama Office of Water Resources and serve at his or her pleasure. The role of the MIG is to analyze data that reflects past and current drought conditions and to assist with recommendations concerning drought declaration levels and drought mitigation efforts. The MIG is responsible for providing technical support to ADAPT and AOWR.

The MIG is comprised of federal, state, and local agencies and other water resources professionals. The duties of the MIG include:

1. Compiling surface water, groundwater, climatic, meteorological, and other data necessary to assess drought conditions;
2. Deciding what is the most effective data for identifying droughts in the state and for computing data into a drought monitoring index;
3. Evaluating the effectiveness of the indices and making modifications as needed;
4. Identifying the impacts associated with a drought;
5. Assessing the actual impacts of drought conditions as these conditions are occurring and offering recommendations to alleviate or mitigate the impacts.
6. Recommending drought declaration levels the state should implement and/or make suggestions to evaluate alternative water sources in an area during drought conditions;
7. Making observations and preparing reports on long-term forecasts to enable the ADAPT to prepare for future droughts;
8. Recommending long range strategies for mitigating the impacts of drought conditions; and
9. Assisting the AOWR in the review and any future revisions to this Plan.

The following operating procedures shall apply to the conduct and operation of all ADAPT meetings. The conduct of all meetings and issuance of all notices shall comply with the Alabama Open Meetings Act.



1. Meeting Notices. All meetings of the ADAPT or the MIG shall be noticed in accordance with the Alabama Open Meetings Act with meeting notifications posted on the Alabama Secretary of State website. Agendas will be distributed in accordance with the Open Meetings Act
2. Meeting Frequency. Meetings of ADAPT and the MIG shall be set at the call of the Chair but shall occur no less twice a year; typically, in the spring and fall seasons.
3. Meeting Quorum. All ADAPT meetings shall have a quorum of a majority of the appointed representatives or their designed alternates. For the purposes of any official actions, participation via remote medium such as conference call or remote teleconference shall not constitute attendance in determining a quorum and any such remote attendees may not participate in any votes.
4. Voting Procedures:
  - a. All actions approved by ADAPT require a majority vote and
  - b. Voting shall be in accordance with the Alabama Open Meetings Act.
5. ADECA shall act as the fiscal agent for any funds received by ADAPT.

#### ***D. Drought Management Regions***

To assess and respond to drought conditions in the most effective and efficient manner, nine drought management regions have been established as follows (see Attachment 1):

Drought Management Region 1 includes Colbert, DeKalb, Franklin, Jackson, Lauderdale, Lawrence, Limestone, Madison, Marshall, and Morgan Counties.

Drought Management Region 2 includes Bibb, Fayette, Greene, Hale, Lamar, Marion, Perry, Pickens, Sumter, and Tuscaloosa Counties.

Drought Management Region 3 includes Blount, Cherokee, Cullman, Etowah, Jefferson, Shelby, St. Clair, Walker, and Winston Counties.

Drought Management Region 4 includes Calhoun, Chambers, Chilton, Clay, Cleburne, Coosa, Randolph, Talladega, and Tallapoosa Counties.

Drought Management Region 5 includes Choctaw, Clarke, Dallas, Marengo, Monroe, Washington, and Wilcox Counties.

Drought Management Region 6 includes Autauga, Bullock, Elmore, Lee, Lowndes, Macon, Montgomery, and Russell Counties.

Drought Management Region 7 includes Butler, Conecuh, Covington, Crenshaw, and Escambia Counties.

Drought Management Region 8 includes Barbour, Coffee, Dale, Geneva, Henry, Houston, and Pike Counties.

Drought Management Region 9 includes Baldwin and Mobile Counties.

The establishment of drought management regions does not limit drought management efforts or drought declaration levels in an area smaller than a drought management region, such as a county or watershed. If drought conditions warrant, the AOWR, in consultation with the ADAPT and MIG, may determine that the designated drought management regions are inadequate to capture a particular drought impact and

consequently a drought declaration at a smaller level may be issued. An example of an Alabama Drought Declaration is provided as Attachment 2. An example of a depiction of the Alabama designation of the U.S. Drought Monitor map is included as Attachment 3.

## Section 3. Reservoir System Management

### *A. Alabama-Coosa-Tallapoosa (ACT) River Basin System Management*

The management of the ACT River Basin falls under the authority of the U.S. Army Corps of Engineers (USACE) Mobile District. The Mobile District is under the supervision of the South Atlantic Division headquartered in Atlanta, Georgia. As seen in the map included as Attachment 4, the ACT River Basin contains a series of reservoirs and locks controlled by the USACE as well as reservoirs controlled by the Alabama Power Company (APC).

The operation of the system is outlined in the ACT Master Water Control Manual issued by the USACE in May of 2015. The pertinent portions of the document are detailed in Section 7-12 of the document and include the following language:

*“The ACT Basin Drought Plan defines monthly minimum flow requirements for the Coosa, Tallapoosa, and Alabama Rivers as a function of a Drought Intensity Level (DIL) and time of year. Such flow requirements are daily averages. The key features of the drought plan are described in detail in Exhibit C - Drought Contingency Plan. The ACT Basin Drought Plan is activated when one or more of the following drought triggers occur: (1) basin inflow trigger; (2) composite conservation storage trigger in APC reservoirs; and (3) state line flow trigger. Drought management actions would become increasingly more austere when two triggers occur (Drought Level 2) or all three occur (Drought Level 3). The combined occurrences of the drought triggers determine the DIL. Table 7-4 (Fig.1) lists the three drought operation intensity levels applicable to APC projects. Table 7-5 (provided as Attachment 5) schematically depicts the ACT Basin Drought Plan matrix.”*

**Table 7-4. ACT Basin Drought Intensity Levels**

Drought Intensity Level (DIL)	Drought Level	No. of Triggers Occurring
DIL 1	Moderate Drought	1
DIL 2	Severe Drought	2
DIL 3	Exceptional Drought	3

*Figure 1 - Excerpt from ACT Water Master Manual*

As a result of this process, drought response operations are closely coordinated between the USACE and APC. Additional information on the APC reservoir systems are provided below.

### ***B. Alabama Power Company Reservoir Management***

The Alabama Power Company owns and operates 14 hydroelectric generating facilities on the Coosa, Tallapoosa, and Black Warrior rivers. (See the APC Reservoir System map included as Attachment 6.) These 14 developments have 41 electric generating units that are covered by 6 different Federal Energy Regulatory Commission (FERC) licenses and are capable of producing approximately 1700 MW of hydroelectric capacity for the Alabama Power Bulk Electric Power System.

The reservoirs created by these hydroelectric projects cover approximately 170,000 acres of land with about 3,500 miles of shoreline and 430 river miles on the three river systems. Since beginning work on Lay Dam in 1912, APC has played an important role in water management across the state, striving to meet the needs of recreational users and property owners who enjoy the benefits these lakes provide; the many aquatic species and ecosystems that depend on their habitat; and the state, by providing low-cost renewable energy and supporting the local economies these lakes sustain. Largely because of its existing hydro generation, the State of Alabama is ranked sixth in the nation for renewable energy capacity, according to the U.S. Energy Information Administration.

### ***C. Apalachicola-Chattahoochee-Flint (ACF) River Basin System Management***

The management of the ACF River Basin also falls under the authority of the USACE Mobile District and the South Atlantic Division. As seen in the map included as Attachment 7, the ACF River Basin contains a series of reservoirs and locks controlled by the USACE as well as reservoirs controlled by several other organizations.

The operation of the system is outlined in the ACF Master Water Control Manual issued by the USACE in March of 2017. The pertinent portions of the document are detailed in Section 7-12 of that document and include the following language:

*Drought operations are triggered on the first day of the month following the day that ACF composite conservation storage enters Zone 3, from Zone 2 (Figure 7-9) (Included as Attachment 8.). At that time, all the composite conservation storage Zone 1 - 3 provisions (seasonal storage limitations, maximum fall rate schedule, and minimum flow thresholds) are suspended and management decisions are based on the provisions of the drought plan. Under the drought plan, the minimum discharge is determined in relation to composite conservation storage only. The drought plan for the ACF Basin specifies a minimum release from Jim Woodruff Lock and Dam and temporarily suspends the other minimum release and maximum fall rate provisions until composite conservation storage in the basin is replenished to a level that can support the minimum releases and maximum fall rates. The drought plan also includes a temporary waiver from the water control plan to allow temporary storage above the winter pool guide curve at the Walter F. George and West Point Projects if the opportunity presents itself. There is also an*

*opportunity to begin spring refill operations at an earlier date to provide additional conservation storage for future needs.*

*The drought plan prescribes two minimum releases based on composite conservation storage in Zones 3 and 4 and an additional zone referred to as the Drought Zone. The Drought Zone delineates a volume of water roughly equivalent to the inactive storage in Lake Sidney Lanier, West Point Lake, and Walter F. George Lake plus Zone 4 storage in Lake Sidney Lanier. The Drought Zone line has been adjusted to include a smaller volume of water at the beginning and end of the calendar year. When the composite storage is within Zone 4 and above the Drought Zone, the minimum release from Jim Woodruff Lock and Dam is 5,000 cfs, and all basin inflow above 5,000 cfs that is capable of being stored may be stored. Once the composite conservation storage falls into the Drought Zone, the minimum release from Jim Woodruff Lock and Dam is 4,500 cfs and all basin inflow above 4,500 cfs that is capable of being stored may be stored. When transitioning from a minimum release of 5,000 to 4,500 cfs, fall rates will be limited to a 0.25-ft/day drop. The 4,500 cfs minimum release is maintained until composite conservation storage returns to a level above the top of the Drought Zone, at which time the 5,000-cfs minimum release is reinstated.*

*The drought plan provisions remain in place until conditions improve such that the composite conservation storage reaches Zone 1. At that time, the temporary drought plan provisions are suspended, and all the other provisions are reinstated. During the drought contingency operations, a monthly monitoring plan will be implemented that tracks composite conservation storage to determine the water management operations (the first day of each month will represent a decision point) that will be implemented and to determine which operational triggers, if any, should be applied. There is a special provision for the month of March under drought operation. If recovery conditions are achieved in February (after the 1st), drought plan provisions will not be suspended until 1 April, unless the level of composite conservation storage reaches the top of zone 1 (i.e. all Federal reservoirs are full) prior to 1 March. The month of March usually provides the highest inflows into the reservoirs, but also has some of the highest flow requirements for release from Jim Woodruff Lock and Dam. This extension of drought operations allows for the full recovery of the Federal storage projects in preparation for the spawning and spring refill period that occur from April through June.*

#### ***D. TVA System Management and Drought Response Activities***

The Tennessee Valley Authority (TVA) manages the Tennessee River system as an integrated system for flood-risk reduction, navigation, power generation, water supply, water quality, and recreation. A TVA system map is included as Appendix 9. Operation of the system is seasonally dictated by both minimum-flow requirements and targeted reservoir elevations. Minimum flows provide and sustain water supply, water quality, aquatic life, recreation, and navigation benefits. Reservoir elevations and releases are managed to provide flood-risk reduction, hydropower, water supply, recreation, and wildlife benefits. Preserving the spring inflow for use later in the summer and fall provides water to meet system demands when natural stream flows are low.

The operation of the system is outlined in the Reservoir Operations Study issued by TVA in May of 2004. Details can be found on [www.tva.gov](http://www.tva.gov), but the relevant operations are highlighted below.

*“TVA will use weekly average system flow requirements to limit the drawdown of 10 tributary reservoirs (Blue Ridge, Chatuge, Cherokee, Douglas, Fontana, Nottely, Hiwassee, Norris, South Holston, and Watauga) June 1 through Labor Day to increase recreation opportunities. For four mainstem reservoirs (Chickamauga, Guntersville, Wheeler, and Pickwick), summer operating zones will be maintained through Labor Day. For Watts Bar Reservoir, the summer operating zone will be maintained through November 1. Great Falls Reservoir will be filled on a schedule to achieve summer pool elevation by Memorial Day. Weekly average system minimum flow requirements from June 1 through Labor Day, measured at Chickamauga Dam, will be determined by the volume of water in storage at the 10 tributary reservoirs compared to the total storage available. A system minimum operating guide (SMOG), which is a seasonal system storage guide curve, will be used to define the combined storage volume for those 10 tributary reservoirs (Fig.2). If the volume of water in storage is above the SMOG, the weekly average system minimum flow requirement will be increased each week from 14,000 cfs the first week of June to 25,000 cfs the last week of July. Beginning August 1 and continuing through Labor Day, the weekly average flow requirement will be 29,000 cfs. If the volume of water in storage is below the SMOG curve, only 13,000 cfs weekly average minimum flows will be released from Chickamauga Dam between June 1 and July 31, and only 25,000 cfs weekly average minimum flows will be released from August 1 through Labor Day.*

### Tributary System Storage Guides

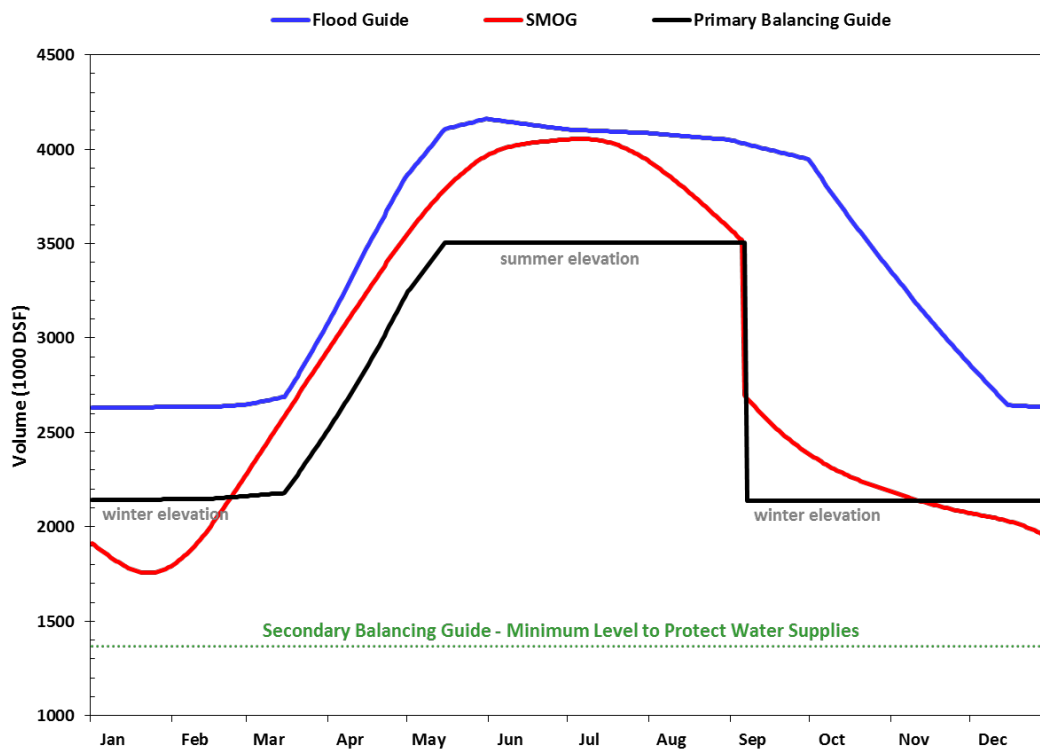


Figure 2 - TVA Tributary System Storage Guide (Source: TVA)

*TVA has established reservoir balancing guides for each tributary storage reservoir to ensure that water releases for downstream system needs will be withdrawn more equitably from tributary reservoirs (Fig. 3). The balancing guide is a seasonal reservoir pool elevation that defines the relative drawdown at each tributary reservoir when water must be released to meet downstream flow requirements. Under this operating principle, water would be drawn from each tributary reservoir so that the elevation of each reservoir is similar relative to its position between the flood guide and the balancing guide.”*



### Example of a Tributary Storage Balancing Guide

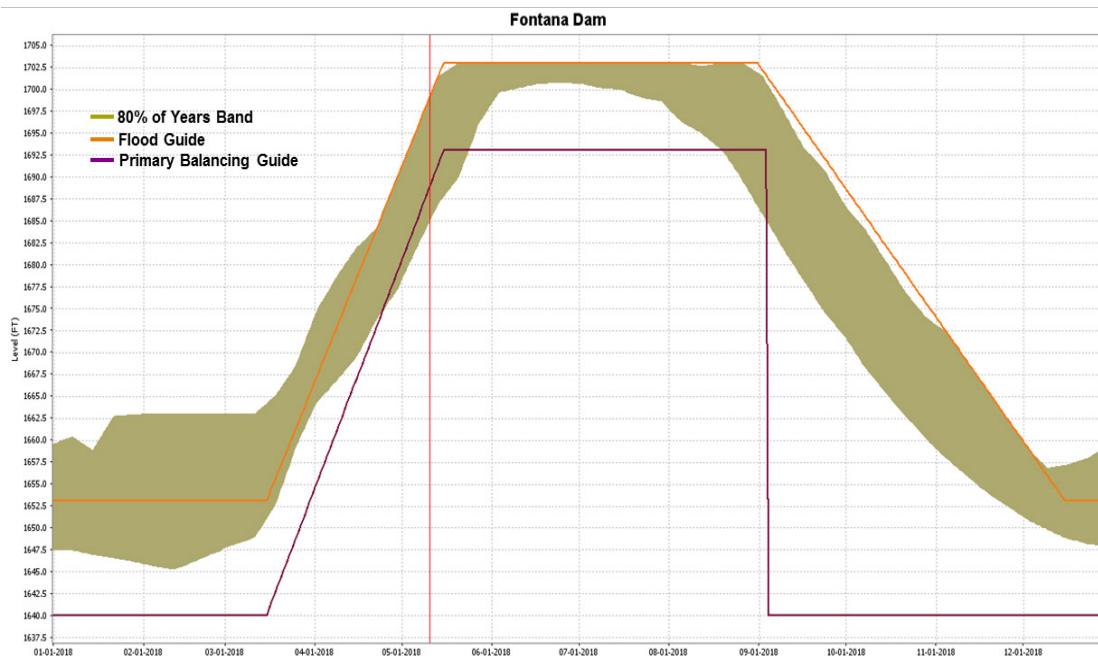


Figure 3 - TVA Example of Tributary Storage Balancing Guide (Source: TVA)

The Tennessee Valley watershed has been periodically subjected to droughts of varying severity and duration. Extreme rainfall and runoff deficits can impact the ability of TVA to balance the multiple benefits of the Tennessee River system. Additionally, as demands on the water system continue to increase, the susceptibility of the Tennessee Valley to suffer problematic impacts from drought will also increase.

TVA's drought response activities are triggered when combined tributary storage falls below the SMOG, and either drought indices, system inflows, reservoir volumes are classified as severe (D2), or the U.S. Drought Monitor shows severe (D2) conditions in the valley.

The drought response involves initiating external communication activities with agencies, stakeholders, and water users in the Tennessee Valley concerning drought-related information and activities. This includes coordination with the Tennessee Valley Water Partnership (TVWP). Formed in 2005, the TVWP consists of representatives from water resource agencies in Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, Virginia, TVA, the U.S. Environmental Protection Agency, and the U.S. Geological Survey. The mission of the TVWP is to support the expeditious exchange of information regarding drought situations including, but not limited to, information about probable drought impacts on natural and economic resources and the severity. The individual representatives of the TVWP will also facilitate coordination among participants for their individual state drought response actions and plans to alert the public.

These activities will continue until there is sufficient rainfall and runoff in the Tennessee Valley to maintain normal reservoir elevations and flows for a minimum period of one month.

### ***E. PowerSouth System Management***

#### **1. Overview of PowerSouth's Facilities:**

PowerSouth Energy Cooperative (PowerSouth) is a generation and transmission cooperative that provides wholesale power to 16 distribution cooperatives and four municipalities. A map of the PowerSouth system is included as Attachment 10. PowerSouth's member-owners serve the electrical needs of 39 counties in Alabama and ten counties in northwest Florida. PowerSouth's generation resources include coal- and gas- fired power plants and two hydroelectric facilities.

PowerSouth owns and operates the Charles R. Lowman Plant (Lowman Plant), McWilliams Plant, and McIntosh Plant. The Lowman Plant is located near Leroy, AL, next to the Tombigbee River in Washington County. The Lowman Plant consists of three coal-fired units (Units 1, 2, and 3). The McWilliams Plant is located about six miles north of Andalusia, Alabama on U.S. Highway 29. The McWilliams Plant is situated on the east bank of the Conecuh River in Covington County. The McWilliams Plant consists of McWilliams Units 1, 2, 3 and 4 and Vann Units 1, 2 and 3. The McIntosh Plant consists of four natural-gas fired, combustion turbine generators and one Compressed Air Energy Storage (CAES) unit. To reduce water usage, all units at the McWilliams Plant (including Vann) are equipped with mechanical draft cooling towers. Lowman Units 2 and 3 are also equipped with mechanical draft cooling towers. Pre-treated water for the McIntosh Plant is purchased from a nearby facility (BASF Corporation) which withdraws water from the Tombigbee River.

The Conecuh Hydroelectric Project (FERC No. 2586) is a licensed hydroelectric facility owned and operated by PowerSouth with a combined capacity of 8.25 megawatts (MW). This project includes the Point A and Gantt reservoirs. Point A Dam is located on the Conecuh River approximately 2.5 miles northwest of the City of Andalusia. The dam is located immediately downstream of the confluence of Patsaliga Creek and the Conecuh River and forms Point A lake, which has a surface area of 700 acres. Point A Lake extends 4.5 miles upstream to the base of Gantt Dam and Gantt Lake. Gantt Dam impounds the Conecuh River to create a reservoir with a surface area of about 2,747 acres. The Gantt and Point A hydroelectric plants, constructed in 1922 and 1926 respectively, were PowerSouth's first generating resources. The project has limited storage capacity in its two reservoirs and has historically functioned as a modified run of river operation where outflows closely mimic inflows. An in-depth description of the projects operating procedures can be found in the FERC License.

#### **2. Description of PowerSouth's Drought Planning and Response Mechanisms:**

PowerSouth has a Drought Contingency Plan in place, via FERC, for the Conecuh River Project (FERC No. 2586-039). This plan outlines PowerSouth's strategy for monitoring and managing dissolved oxygen (DO) levels below Point A Dam during drought events and is designed to reduce the potential impact of conflicting goals (DO maintenance, lake level maintenance, inflows matching outflows) during such extreme drought events.



PowerSouth's Drought Contingency and Order Amending Dissolved Oxygen Monitoring Plans are initiated when the outflow at the Point A dam reaches 150 cubic feet per second. Based upon PowerSouth's operating experience and the evidence to-date, water released through the port holes in the slide gates, which are designed to aerate discharging water, sufficiently maintains satisfactory DO levels during most low flow events. Due to the limited storage capacity of the reservoirs, FERC license constraints, and run of river operation, PowerSouth has very little ability to control the quantity of water released from the project, especially during a drought period.

## Section 4. Drought Contingency Planning

### *A. State Level*

The central focus of Alabama's state-level drought planning and response process is established under the Drought Act, its associated regulations, and this Plan. As such, ADAPT has a primary role to help ensure interagency coordination and develop consensus recommendations on any mitigation steps to present to the Governor. Information related to drought conditions, impacts, and Alabama Declaration levels are available on the AOWR website at [www.water.alabama.gov](http://www.water.alabama.gov).

While the process outlined under the Drought Act is intended to enhance interagency cooperation and coordination, it does not replace the various agency statutory roles related to drought monitoring or response actions.

For example, the following information outlines the procedures and processes related to drought response by other agencies concerning Fire Warning descriptions as outlined on the Alabama Forestry Commission website.

#### 1. Red Flag Warning - (issued by the National Weather Service)

The National Weather Service will issue a "Red Flag Warning" for specific areas when weather conditions indicate a high fire potential. This warning is very short term and is only in place while the weather conditions are occurring. A warning will be issued when the following conditions occur:

##### a. Cool Season Criteria: November 1- April 30

Relative Humidity is < 25% for 4 or more consecutive hours; or Relative Humidity is < 25% with sustained 20 ft. winds of 20 mph or higher (no time restrictions)

##### b. Warm Season Criteria: May 1- October 31

Relative Humidity is  $\leq 30\%$  with 20 ft. winds  $\geq 10$  mph for 4 or more consecutive hours; and Keetch-Byram Drought Index (KBDI)  $\geq 500$ . (If a county is under a Fire Alert, the KBDI criteria is suspended.)

#### 2. Fire Danger Warning - (issued by the Alabama Forestry Commission)

When extremely dry weather conditions and low humidity combine to create an atmosphere favorable for wildfires, the Alabama Forestry Commission urges everyone to delay outdoor burning until conditions improve if at all possible.

### 3. Fire Alert - (issued by the Alabama Forestry Commission)

When weather conditions are such that there are an abnormal number of wildfires, or several unusually large wildfires in an area, or when there is an issue with severe smoke causing air quality degradation, the State Forester may issue a Fire Alert for specified counties. This allows the Alabama Forestry Commission to restrict the issuing of burning permits. On most days, permits are issued to everyone who meets the requirements of the permit law. During a Fire Alert, only Certified Prescribed Burn Managers with adequate manpower and equipment may be issued a permit.

### 4. Drought Emergency - (issued by the Governor)

A Drought Emergency can be declared when a Fire Alert fails to control a wildfire situation. Generally, this occurs when the Keetch-Byram Drought Index (KBDI) is over 600 and there is an average of more than one wildfire per county per day over a wide area. The State Forester works with the Governor's Office to issue a formal regulation, which has the effect of law. A Drought Emergency is commonly called a "No Burn Order" and prohibits any outdoor burning, including any prescribed burns, camp fires, or trash fires.

The regulations allow barbeque fires for cooking if the fire is in a charcoal grill or masonry barbeque pit, including large barbeque pits used by civic organizations to prepare food. Anyone grilling or barbequing during the Drought Emergency should have water hoses on site to prevent any loose sparks from setting a wildfire and a circle at least 10 feet wide around the grill should be cleared of any burnable material. Side fires to generate coals for a barbeque must also be within a grill or masonry pit. Gas grills are allowed.

### 5. Summer Burning Restrictions - (issued by Alabama Department of Environmental Management)

Under ADEM regulations, non-agricultural burns are not allowed during the months of May, June, July, August, September, and October. Counties include Baldwin, Dekalb, Etowah, Jefferson<sup>1</sup>, Lawrence, Madison, Mobile, Montgomery, Morgan, Russell, Shelby, and Talladega. In an effort to uphold these restrictions, the Alabama Forestry Commission (AFC) does not issue burn permits for miscellaneous burns or for land clearing in these counties in these months. Burn permits may only be issued for: (1) wildlife, (2) hardwood control, (3) other understory, (4) piled debris (for silvicultural site prep only), (5) scattered debris, and (6) agriculture. For more information contact ADEM at (334) 271-7700.

In addition, no permits for any prescribed burns will be issued in Jefferson County during the months listed above, by order of the Jefferson County Department of Health.

### 6. USDA Forest Service Public-Use Restrictions - (Issued by the USFS)

During times of high wildfire danger, The USDA Forest Service may restrict or close a portion of a National Forest to the public. This is a safety consideration as well as a fire

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<sup>1</sup> No permits for any prescribed burns will be issued in Jefferson County during the months listed above, by order of the Jefferson County Department of Health.

prevention action. These restrictions are posted on the USDA Forest Service website at [www.fs.usda.gov/alabama](http://www.fs.usda.gov/alabama).

Additional Information can also be found at:

- National Weather Service - Watches, Warnings & Advisories ([www.weather.gov](http://www.weather.gov))
- USDA Forest Service - National Forests in Alabama ([www.fs.usda.gov/alabama](http://www.fs.usda.gov/alabama))
- Alabama Department of Environmental Management (<http://www.adem.alabama.gov>)

### ***B. Local Level***

Each community public water system shall develop a drought conservation plan which addresses graduated drought response procedures with implementation of specific measures based on drought severity. The drought conservation plan (DCP) may be a separate plan or a component of a broader emergency action plan. The procedures or plans shall include appropriate enforcement mechanisms.

Either the DCP or a broader, emergency action plan shall include or address, at a minimum, the following:

- A system overview that contains a physical or electronic map of the community public water system's service area, descriptions and locations of water supply sources and any alternative or emergency water supply sources, population served, number of service connections by type, and identifications of any system interconnections with other community public water systems. If available, the plan should also provide water usage estimates by season or month as well as per capita estimates;
- Identification of drought region(s), as defined in the State Drought Plan, impacted by the community public water system's service area;
- Tiered levels of voluntary or mandatory response actions to be taken to reduce water use based on the severity of water shortage conditions;
- Specific monitoring and measurements of available water supply, water demand, and system conditions that will be used to determine the severity of water shortage conditions and to describe water use reduction measures within the various "tiered" levels;
- A means of implementation and enforcement which shall be evidenced by:
  - A copy of an ordinance or resolution indicating official adoption of the drought conservation plan (or emergency action plan);
  - An interagency or interdepartmental agreement; or
  - Other documentation as approved by AOWR;
- Procedures that will be used to regulate compliance with the provisions of the drought conservation plan;
- Procedures to receive and review applications for variances from specific requirements of the drought conservation plan and the criteria that will be considered in the determination of whether to issue a variance;

- Notification procedures that will be used to inform customers and the public about the implementation of the drought conservation plan and required water conservation response measures;
- Identification of any programs designed to educate customers on voluntary water efficiency measures;
- The designation of a staff position or organizational unit responsible for the implementation of the community public water system drought conservation activities and plans;
- The designation and contact information of staff that will be responsible for notifying AOWR of any voluntary or mandatory restrictions enacted by the system.
- Community public water systems that depend on water stored in a private or public impoundment they operate under a contract for the withdrawal of water shall include provisions for responding to water shortages that are consistent with the provisions of the contract and comply with any drought plan provisions established by the owner of the impoundment;
- Community public water systems that depend on the water that is purchased from another community public water system shall include provisions for responding to water shortages or restrictions from that community public water system;
- The drought conservation plan should provide for water users who have made improvements to maximize water use efficiency in their daily operations and may face disproportionate hardships when making further water use reductions. The drought conservation plan should avoid restricting efficient water users in ways that would undermine incentives for water users to seek continued improvements in water use;
- Community public water systems shall review their drought conservation plan at least every five years or upon change in the key staff position(s) designated to manage drought response actions and provide written verification of that review to AOWR, even if no changes are made to the plan, within 30 days of the review's completion. Any community public water system that modifies or revises their drought conservation plan shall notify the AOWR and provide a copy within 30 days of the adoption of the revised drought conservation plan; and
- Any new community public water system shall prepare and adopt a drought conservation plan within 180 days of commencement of operation.

## **Section 5. Drought Status Reporting**

### ***A. State Level***

The procedures outlined under this Plan are intended to support efforts for a coordinated state level drought planning and response process. While not replacing existing individual agency actions, the ADAPT and MIG structure is designed to help inform and coordinate state level actions and any potential mitigation actions that may be taken or recommended to the Governor.

***B. Local Level***

Any community public water system which implements any voluntary or mandatory water use restrictions or reductions shall report to the AOWR those reductions or restrictions, in paper or electronic format or by such other means approved by the AOWR in a manner specified by AOWR, within seven (7) days of the issuance of such restriction or reduction.

Any report submitted pursuant to the above paragraph shall describe, at a minimum, the restrictions or reductions or other measures implemented, the effective date, the expiration date or length of time they are estimated to remain in place, and the name of the system official that authorized the water use restriction.

Within seven (7) days after modifying or lifting restrictions, reductions or other measures utilized to protect water supplies during a drought, the community public water system shall notify AOWR, in paper or electronic format or by such other means approved by AOWR, of the modification or lifting of restrictions, reductions or other drought response measures and the effective date of such action.

**Section 6. Drought Information Center**

The AOWR shall maintain a clearinghouse of drought and water conservation information and make this information available to the public through AOWR's website (<http://water.alabama.gov>). Information about the status of drought conditions and impacts as well as other drought-related information will be maintained on the website under the Drought Planning and Management section.

The MIG shall routinely monitor and evaluate climatic, biological, water quantity, water quality, and water use data, as necessary, to identify the onset of a drought and the potential geographic extent of the affected area and to assess changes in the drought declaration levels.

The frequency of the drought indices computation shall be based on drought declaration levels. These computations will be compared with the various similar indices computed by other state, federal and private agencies.

***A. Monitoring of Conditions***

A key factor in the ability to assess drought conditions is the development and operation of a comprehensive monitoring network of various hydrologic indicators. Available hydrologic and drought-related data may be provided to the MIG by agencies and organizations such as the USGS, GSA, ADEM, ADCNR, AGI, AFC, NWS, NOAA, USDA, the State Climatologist, reservoir operators, industries, public water systems, and the general public to assist in efforts to analyze drought conditions and impacts. Below is a summary of the sources of various information categories.

Information Type	Source Agency(s)
Streamflows	USGS, AOWR
Reservoir System Status	TVA; USACE; Alabama Power, PowerSouth
Groundwater Levels	GSA; USGS
Weather Observations and Forecasts	National Weather Service
Soil Moisture Levels	State Climatologist; USDA
Forest Fire Risk	Alabama Forestry Commission
Public Water Supply Status	ADEM; AOWR; EMA
Water Quality	ADEM
Agricultural Drought Impacts	USDA; AGI; SWCC; AACDC
Impacts on Habitat and Recreation	ADCNR

Monitoring shall be accelerated whenever drought conditions approach or enter the drought watch stage in one or more drought management areas. This may include acquiring additional rainfall, streamflow, water use, and groundwater level data; and collecting additional information on the impact of the drought on agriculture, industry, domestic water supplies, and other users.

### ***B. Drought Impact Reporting***

In addition to the review of drought-related data and information, it is imperative for the AOWR and the MIG to have the best available information on local impacts of drought conditions. In addition to the required reporting of any water restrictions imposed by local water system managers, reservoir operators and other stakeholders should make every effort to assist in the information gathering process by the submittal of information related to local conditions and drought impacts to the AOWR. The AOWR will include such information in the Drought Information Center to ensure the availability of the data to other state and federal agencies as well as the general public.

## **Section 7. Drought Triggers**

### ***A. Introduction***

Four drought declaration levels have been established, with each identified by a compilation of drought indices that are used to measure and assess the severity of a drought. They range in ascending order from Drought Advisory to Drought Watch to Drought Warning; culminating in a declaration of Drought Emergency. Each is discussed in more detail below.

The status of the drought declaration levels will be based on the best available data and information. If any one of the indicators in any one or more of the nine drought regions

experiences a defined condition for two consecutive months, a preliminary evaluation by the AOWR and the MIG is triggered, if not already accomplished.

The establishment of each drought declaration level should be verified by other means when possible, including, but not limited to, such other indices as antecedent precipitation and temperature, soil moisture, stream flows, groundwater levels, reservoir elevations, water supply status, agricultural and forestry conditions, and historical climatological data.

Drought triggers do not automatically invoke a required response from the various categories of water users. The triggers do indicate the need for additional monitoring and for the AOWR to consider the need to send notices to public water systems, Certificate of Use holders, and the general public regarding the ongoing drought conditions. The AOWR will notify the local governments and water utilities, when needed, as to severity of the drought and make recommendations and provide guidance on the appropriate actions that should be considered.

Drought triggers are specific values of indicators that help to determine when each level of suggested drought response should begin or end. However, drought declaration levels are also a function of drought impacts that may vary in intensity and location during or even following a drought. Therefore, drought declaration levels are supported by, but not limited to, the following combinations of indices. In addition to the specific indices described below, general assessments of groundwater levels, reservoir system statuses and impacts to public water supply systems will be included at each declaration level. Due to the varying nature of the location, duration, and severity of drought impacts, specific quantifiable criteria have not been established for each declaration level. The assessment of the impacts of the drought conditions will be included as part of the overall declaration assessment by the AOWR and the MIG.

### ***B. Drought Advisory***

1. Lawn and Garden Index, ranges from -0.1 to -0.5
2. Crop Moisture Index, ranges from -0.5 to -1.49
3. Palmer Drought Severity Index, ranges from -1 to -1.99
4. USGS, below normal 28-day average streamflow compared to historical streamflow for the day of year, ranges from 10<sup>th</sup> to 24<sup>th</sup> percentile (Below normal)
5. Keetch-Bryam Drought Index, ranges from 450 to 499
6. AOWR Drought Streamflow Portal for regulated and unregulated streamgages
  - a. 60-day streamflow – 25<sup>th</sup> percentile or less
7. Precipitation:
  - a. 180-day rainfall – 30<sup>th</sup> percentile or less
  - b. 60-day rainfall – 30<sup>th</sup> percentile or less

A Drought Advisory is the lowest drought declaration level. It is indicated by abnormally dry conditions among multiple indicators. This level of dryness informs the user that moisture indicators are near the lowest third of historical conditions, i.e. conditions that occur about once every three years. Water managers should increase



monitoring of conditions and the assessment of water sources. A drought advisory may be declared if any of the indices indicate a drought advisory declaration level; however, indication by one index alone does not mandate a declaration. The drought advisory declaration level shall initiate responses by the ADAPT and the AOWR. The AOWR shall routinely monitor the climatic variables, streamflow, reservoir levels and groundwater elevations in coordination with the MIG and shall notify the ADAPT and relevant state, federal, and local agencies that a region of the state is experiencing a drought advisory condition.

### ***C. Drought Watch***

1. Lawn and Garden Index, -0.5 to -1
2. Crop Moisture Index, ranges from -1.5 to -2.99
3. Palmer Drought Severity Index, ranges from -2.0 to -2.99
4. USGS, below normal 28-day average streamflow compared to historical streamflow for the day of year, ranges from 6th to 9th percentile (Moderate hydrologic drought)
5. Keetch-Bryam Drought Index, ranges from 500 to 549
6. AOWR Drought Streamflow Portal for regulated and unregulated streamgages
  - a. 60-day streamflow 10<sup>th</sup> percentile or less
  - b. 90-day streamflow 25<sup>th</sup> percentile or less
7. Precipitation:
  - a. 180-day rainfall – 25<sup>th</sup> percentile or less
  - b. 60-day rainfall – 10<sup>th</sup> percentile or less

A Drought Watch is the next drought declaration level. It is indicated by continued abnormally dry conditions among multiple indicators. This level of dryness informs the user that moisture indicators are near the lowest ten percent of recorded historical conditions. Water managers should increase monitoring of conditions and the assessment of water sources and, if not already underway, implement efforts to conserve water and ensure water use efficiency. A drought watch may be declared if any of the indices indicate a drought watch; however, indication by one index alone does not mandate a declaration. During a drought watch, statements may be released to the news media by the AOWR and other appropriate agencies must accelerate monitoring activities. In addition, upon the establishment of a Drought Watch declaration level, the AOWR will consider the need for at least monthly meetings of the MIG.

### ***D. Drought Warning***

1. Lawn and Garden Index, -1 or less
2. Crop Moisture Index, ranges from -3.0 to -3.99
3. Palmer Drought Severity Index, ranges from -3.0 to -3.99
4. USGS, below normal 28-day average streamflow compared to historical streamflow for the day of year, ranges from 2<sup>nd</sup> to 5<sup>th</sup> percentile
5. Keetch-Bryam Drought Index, ranges from 550 to 650
6. AOWR Drought Streamflow Portal for regulated and unregulated streamgages



- a. 60-day streamflow – 5<sup>th</sup> percentile or less
- b. 90-day streamflow – 15<sup>th</sup> percentile or less
7. Precipitation:
  - a. 180-day rainfall – 20<sup>th</sup> percentile or less
  - b. 60-day rainfall – 5<sup>th</sup> percentile or less

A Drought Warning is the next to highest drought declaration level. It is indicated by sustained dry conditions; including impacts associated with either high drought intensities or long durations (or both). This level of dryness informs the user that moisture indicators are near the lowest five percent of recorded historical conditions. Water managers should consider active measures to ensure the sustainability of water supplies; including mandatory restrictions or cutbacks, water reuse, the availability of alternate sources, or other contingency plans. A drought warning declaration level should be based on the best available data and forecasts from various agencies and the MIG. Indication by one index alone does not mandate a declaration. Appropriate implementation of local water conservation and drought warning ordinances should be encouraged. During a Drought Warning declaration level, statements may be released to the news media by the AOWR and other appropriate agencies to assist with monitoring and response activities. The AOWR and ADEM should consider the need to formally notify water system managers of the status of conditions and forecasts in the impacted areas. Further, the AOWR and the MIG will work with water managers to encourage the submittal of local drought-related impact information. In addition, upon the establishment of a Drought Warning declaration level, the AOWR will consider the need for more frequent meetings of the MIG and/or increased reporting of conditions and impacts.

### ***E. Drought Emergency***

1. Crop Moisture Index, -4.0 or less
2. Palmer Drought Severity Index, -4.0 or less
3. Keetch-Bryam Drought Index, greater than 650
4. USGS, below normal 28-day average streamflow compared to historical streamflow for the day of year, at or near record lows
5. AOWR Drought Streamflow Portal for regulated and unregulated streamgages
  - a. 60-day streamflow 5<sup>th</sup> percentile or less
  - b. 90-day streamflow 5<sup>th</sup> percentile or less
6. Precipitation:
  - a. 180-day rainfall – 10<sup>th</sup> percentile or less
  - b. 60-day rainfall – 2<sup>nd</sup> percentile or less

A Drought Emergency is the most severe drought declaration level. The level is also normally associated with both hydrologic and economic impacts in water use sectors such as agriculture, recreation, navigation, etc. This level of dryness informs the user that moisture indicators are near the lowest two percent of recorded historical conditions and approaching or achieving record dry levels. The AOWR and the MIG shall continue to evaluate information from various sources through more intensive monitoring and the

potential use of more frequent meetings. Upon issuance of a Drought Emergency declaration level, the AOWR (in coordination with ADAPT) will work with the Governor's Office to ensure adequate dissemination of information and recommended actions related to drought conditions. This may include, but is not limited to, public statements that a drought emergency exists, disaster declarations, and the appropriate implementation of water conservation and drought emergency ordinances. Further, the AOWR and the MIG will actively work with water managers to ensure the submittal of local drought-related impact information.

## **Section 8. Alabama Drought Declarations**

Based on the assessment of conditions and input from the MIG, AOWR will issue or revise Drought Declarations that describe drought levels in accordance with the Plan in all areas of the State. These declarations shall consider both the intensity of drought conditions and the projected forecasts for the foreseeable future (generally up to 10 days) to help alert and educate water users, managers and stakeholders on the conditions in their geographic area.

AOWR shall issue Drought Declarations through publication on the AOWR website and consider the need to publicize or distribute through other mechanisms to specific water systems, reservoir operators, and other users as needed and predicated by the level of drought conditions in a given area.

An example of an Alabama Drought Declaration from August 15, 2007 is included as Attachment 2.

## **Section 9. U.S. Drought Monitor Map Input**

In addition to the release of Alabama Drought Declarations by AOWR, the Alabama State Climatologist, the AOWR, and members of the MIG shall work together to develop inputs regarding drought conditions in Alabama for the U.S. Drought Monitor Map. This map represents a collective assessment of both the intensity of drought conditions as well as the impacts of those conditions on the state and its citizens.

The map is prepared weekly and is a joint effort of in-state experts, the Federal Government and the National Drought Mitigation Center at the University of Nebraska-Lincoln under the National Integrated Drought Information System (NIDIS) program. It is designed to describe the status of drought conditions in accordance with five drought intensity levels. It is significant to note that the Drought Monitor map does not include any forecast component. It is limited to a "snapshot" of conditions as of a certain date and intentionally is not designed as a tool to predict or indicate if conditions will improve or deteriorate.

An example of the Alabama portion of the U.S. Drought Monitor from August 7, 2007 is included as Attachment 3.

## Section 10. Drought Impacts

Droughts are responsible for a wide range of potential impacts throughout the state. They can be categorized into potential social, environmental, and economic implications that are directly or indirectly related to the drought. The risk of these potential impacts depends on the type of water demands, how these demands are met, and the availability of water supplies necessary to meet these demands. These potential impacts should be integrated into the planning, mitigation, and response activities of local, state and federal agencies.

In order to identify and catalogue potential drought impacts, the following five categories of drought impact sectors have been created.

- Domestic Impacts - This category is impacted by water quantity and quality problems associated with public water supply. Prevention of water supply shortfalls and degradation of water quality is the major concern within this impact area.
- Agricultural Impacts - This category of impacts is concerned primarily with soil moisture and precipitation forecast data, and the ability to irrigate farmland. The timely and accurate assessment of agricultural conditions is vital for the appropriate mitigation and response mechanisms to be activated.
- Environmental Impacts - This category includes the efforts of various agencies and organizations striving to identify environmentally sensitive areas, develop strategies to assess and mitigate drought-related disasters, and recommend response action plans.
- Industrial Impacts - The impacts associated with this group range from crop failures (processing, inspecting, and shelling industry), livestock losses (processing plants), navigational issues, and revenues lost within all industries that use large amounts of water for production, such as pulp and paper manufacturing and power production.
- Recreational Impacts - These impacts affect homeowners, boat owners, and other users of reservoirs and water sources throughout the state that generate or depend on revenue through various recreational activities.

## Section 11. Drought Response

With regard to other state or federal drought response activities, nothing in this Plan shall be construed to interfere with or modify separate drought response activities by other agencies. The goal is to ensure that, when and where those activities are occurring, there is complete coordination of those actions within ADAPT and its member agencies and organizations.

As discussed in the previous section, a key aspect of drought goes beyond the identification of drought conditions and triggers and involves the categorization of impacts by the five identified sectors: Domestic Impacts, Agricultural Impacts, Environmental Impacts, Industrial Impacts and Recreational Impacts. State, regional, and local governments, agencies, and organizations are encouraged to develop and support strategies that can both encourage water conservation and help mitigate drought impacts. Specific concepts or areas for consideration within each of the five impact areas are provided below.

### *A. Domestic Drought Response*

Domestic and residential water suppliers are encouraged to be proactive in providing information to reduce general water demand (i.e. landscaping options, appliance options) and thus reduce overall risks during a drought.

All community public water systems are required to develop local drought conservation plans and/or ordinances to encourage reductions in water use during drought conditions or implement more severe restrictions if necessary (see Section 4). Sample drought conservation plans and ordinances are available upon request from the AOWR; however, the ordinances should be adjusted to address the drought vulnerabilities of the individual water systems and any pre-determined drought responses. These ordinances would provide for drought responses for the following uses, depending on the extent of the drought.

1. Outdoor Uses:
  - Established landscapes
  - Newly installed landscapes (in place less than 30 days)
  - Irrigating public maintained recreational parks and fields
  - Filling existing swimming pools
  - Washing vehicles
2. Indoor Uses
  - Encouraging installation of low flow fixtures such as toilets, faucets, and showerheads
  - Encouraging shutting off unnecessary flows from faucets and washing full loads of dishes and laundry

***B. Agriculture Drought Mitigation and Response***

Irrigation water users are encouraged to use best management practices and to use efficient irrigation systems during pre-drought conditions in addition to water conservation practices during droughts. Agencies and organizations providing resources and education to agriculture water users are encouraged to coordinate responses to drought conditions and to help maintain an available supply for future use by:

1. Working through professional organizations and societies to develop and coordinate more efficient water management practices and drought procedures;
2. Promoting the development and distribution of information on water efficient irrigation techniques;
3. Providing information and encouraging agricultural producers to take advantage of available financial incentives for retrofitting and updating older or less efficient systems and distributing lists of such incentives;
4. Improving communications and cooperation among agricultural stakeholders and relevant state and federal agencies regarding available assistance during drought conditions;
5. Encouraging the installation of water efficient irrigation technology for newly installed systems;
6. Educating landscapers, nursery operators, and irrigators on proper application of pesticides and fertilizers and conservation of water to reduce effects on water quality;
7. Recommending irrigation system efficiency audits every five to seven years; and
8. Promoting the use of flow meters for irrigation practices to monitor flow and quantity of water used.

Regarding mitigating the effects of drought on agriculture, best practices can be used in advance of or after drought to reduce the agricultural impacts and the potential for widespread fire associated with drought. These practices are encouraged throughout the agricultural community and include but are not limited to the following practices:

Practice	Mitigating Effect
Prescribed burning	Widespread wildfire
Fire breaks	Widespread wildfire
Temporary or Permanent Vegetation on cropland damaged by fire or drought	Improve water quality
Alternative Livestock Watering	Improve livestock production
Erosion and Sediment Control Practices	Improve water quality
Soil Health Improvement	Reduces dependence on water/improves production
Temporary Grazing Improvement	Improve livestock production

Through existing programs, the AACDC, SWCC and NRCS can provide technical and financial assistance to landowners to incorporate these practices to mitigate drought and wildfire effects.

### ***C. Environmental Drought Response***

The appropriate local, state, and federal agencies will help maintain adequate water quality and protect ecosystems by:

1. Encouraging appropriate releases from reservoirs and innovative reservoir management to meet critical needs (such as alternative release or hydropower generation patterns) in coordination with FERC requirements or Congressional authorizations;
2. Working with water users to reduce water withdrawals through water conservation ordinances and best management practices;
3. Encouraging utilities and local governments to increase surveillance for sewer spills and leaks that may have more severe impacts as drought conditions worsen; and
4. Implementing voluntary pollutant load reduction opportunities where possible (i.e., below levels in wastewater discharge permits) when flows are less than the flow upon which discharge permit limits were established.

### ***D. Industrial Drought Response***

Industrial and other commercial water users are encouraged to coordinate water usage and constraints during drought conditions by:

1. Establishing more direct drought communication between the industrial sector and state and local governments and the appropriate water systems;
2. Conducting voluntary water audits for businesses that use water for a production or service, especially in an area that has a history of drought-related water shortages;

3. Encouraging the development and implementation of water conservation and drought contingency plans to limit any unnecessary consumption and interbasin transfers, if applicable, during droughts;
4. Identifying vulnerable water dependent industries and, as necessary and as funding is available, work to determine their impacts and provide assistance with procedures to curtail water use during droughts and/or identify alternative water sources for emergency use; and
5. Implementing industrial water reduction opportunities previously identified (i.e., use less water in producing products and services during drought, and thereby reducing quantity of wastewater in streams).

### ***E. Recreation Drought Response***

Homeowners, boat owners, and other users of reservoirs and water courses throughout the state that generate or depend on revenue through various recreational activities are encouraged to coordinate drought responses with the appropriate local, state, and federal agencies in an effort to:

1. Investigate indicators and develop tools to analyze drought impacts for waterways used for recreation and sport fishing;
2. Develop and promote implementation of sustainable lawn care programs based on Best Management Practices; and
3. Educate individual homeowners on proper application of pesticides and fertilizers and conservation of water to reduce effects on water quality.

## **Section 12. Water Conservation and Efficiency**

Alabama supports and encourages the wise and efficient use of water by all water users. To assist in these efforts, AOWR provides information on the Drought Information Center website on various water conservation topics. There are links to resources that help water users understand the importance of water conservation and access to tools and guidelines regarding water conservation and efficiency. In addition, AOWR is a member of EPA's WaterSense Program that provides information and assistance to public water systems, commercial businesses, state agencies, and individuals to educate water users and managers on water conservation and efficiency topics, tools, and best management practices. The WaterSense Program also provides a national labeling certification for various fixtures and water-intensive systems to identify the most water efficient technologies on the market for commercial and residential applications of indoor, outdoor, and irrigation water usage.

### ***A. Domestic Water Conservation and Efficiency***

Domestic or residential water use varies by region, climate and weather conditions, socioeconomic factors, and other customer characteristics. Factors such as the efficiency of plumbing fixtures, the cost of water, lifestyle of user, climate, and the general awareness of the need to conserve water all have a huge effect on residential water use.



Seasonal outdoor uses such as irrigation of lawns, filling of swimming pools, and washing of vehicles also influences residential water use. Per capita rates of water use for the residential sector have been declining in many households. These reduced rates are primarily from increased efficiency in plumbing fixtures and appliances. As new homes are built, the more efficient fixtures allow for reduced water usage. Retrofitting new water efficient fixtures and appliances such as showerheads, faucets, toilets, washing machines, dishwashers, etc. are the main ways to improve water conservation and efficiency inside the home. For outside the home, removal of any plants that require excessive amounts of water and planting more native or adaptive plants that require less water as well as ensuring proper grading and drainage will increase the efficiency of the landscaping. In addition, homeowners should ensure that residential irrigation systems are operated and maintained properly to help ensure the most efficient use of water for lawns and landscape plants.

With regard to water utilities (public water systems), water conservation and efficiency benefits can be achieved in several ways. Tools such as water loss programs, system level water audits, and tiered conservation rates can help to ensure water is used efficiently while ensuring that financial stability is not jeopardized. AOWR is working with groups such as the Alabama-Mississippi Section of the American Water Resources Association and the Alabama Rural Water Association in partnership with the Alabama Department of Environmental Management to help provide information, training, and resources to water system managers and operators. These efforts to promote water conservation planning and water efficiency practices will continue to support the wise and sustainable use of our water resources.

### ***B. Agriculture Water Conservation and Efficiency***

Agriculture is a major part of Alabama's economy and water use plays a significant role in the industry. Based on findings from AOWR's water use reports, agricultural water use has accounted for just under 20% of all non-thermoelectric water use in the state. Economic incentives related to higher productivity and yields as well as reduced energy costs are driving producers to look at water usage and increase water efficiency.

Current efforts are emphasizing education and training to ensure producers are aware of the latest tools and best management practices to maximize water efficiency for their particular applications. AOWR's Drought Information Center on its website will continue to be updated for this sector as additional resources are identified.

### ***C. Industrial Water Conservation and Efficiency***

Industrial water conservation and efficiency practices have been implemented in most, if not all, major industries and are driven by a number of factors including economic cost and environmental stewardship. Current efforts in this water use sector are focused on education and assistance to encourage the wise and efficient use of water.



## **Section 13. Notification**

Upon the issuance of a new or increased drought declaration level, the AOWR, in coordination with the ADAPT, is responsible for disseminating appropriate information to state and federal agencies, organizations, and stakeholders. It is important to provide appropriate and relevant information to the public including drought education and water conservation measures. The AOWR will work to ensure adequate efforts to widely distribute information concerning drought declaration levels. This should include, at a minimum:

1. Coordination with public water systems in the affected drought management region and other appropriate agencies and individuals beginning at the issuance of a drought watch declaration level and as the drought declaration level is elevated to a higher level;
2. Publication of notices on the AOWR website and/or press and social media releases beginning at the inception of a drought watch declaration level and as the declaration levels change; and
3. Other appropriate actions to publicize drought declaration levels.

## **Section 14. Point of Contact**

For any information or questions related to Alabama's drought planning and response programs or the contents of the Plan, please contact:

Alabama Department of Economic and Community Affairs  
Office of Water Resources  
401 Adams Avenue  
Suite 434  
Montgomery, Alabama 36104

P.O. Box 5690  
Montgomery, Alabama 36103-5690

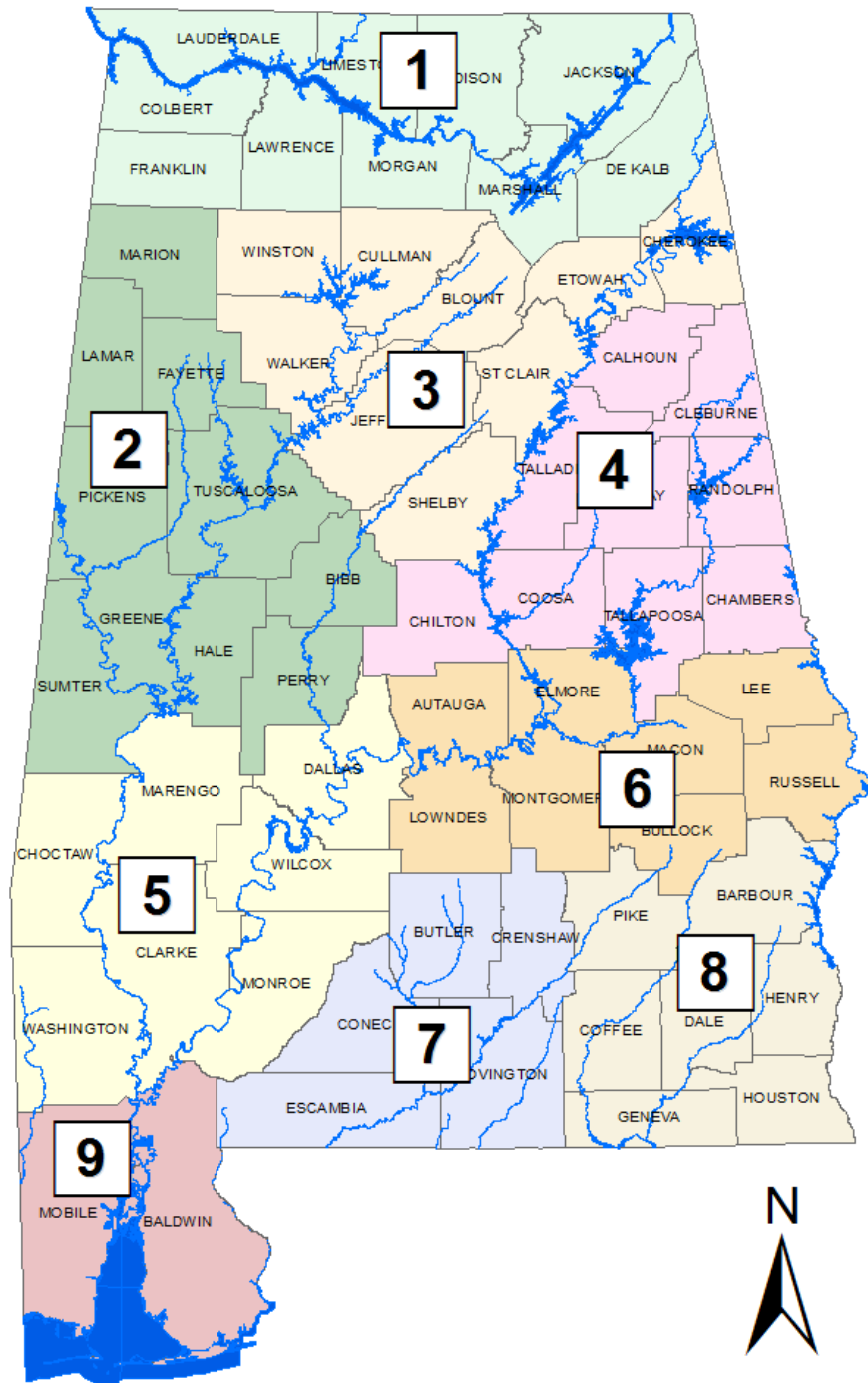
Website: <http://water.alabama.gov>

Email: [water@adeca.alabama.gov](mailto:water@adeca.alabama.gov)

Phone: (334) 242-5499 or toll free at 1-877-252-9283 (ALA WATER)

Fax: (334) 242-0776

## Attachment 1 Drought Management Regions Map



## Attachment 2 Example of Alabama Drought Declaration



Release Date: August 15, 2007



## For Public Dissemination

# Alabama Drought Declarations

In accordance with the Alabama Drought Management Plan, the ADECA Office of Water Resources (OWR), based on a review of current and anticipated hydrologic conditions, has declared the following portions of the State of Alabama to be under the specified drought declaration levels.

**Declaration Level****Emergency**

**Regions 1, 2, 3, 4, 6 and 8 under the Alabama Drought Management Plan which includes the counties of:**

Autauga, Barbour, Bibb, Blount, Bullock, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Coffee, Colbert, Coosa, Cullman, Dale, DeKalb, Elmore, Etowah, Fayette, Franklin, Geneva, Greene, Hale, Henry, Houston, Jackson, Jefferson, Lamar, Lauderdale, Lawrence, Lee, Limestone, Lowndes, Macon, Madison, Marion, Marshall, Montgomery, Morgan, Perry, Pickens, Pike, Randolph, Russell, Shelby, St. Clair, Sumter, Talladega, Tallapoosa, Tuscaloosa, Walker, Winston

**Warning**

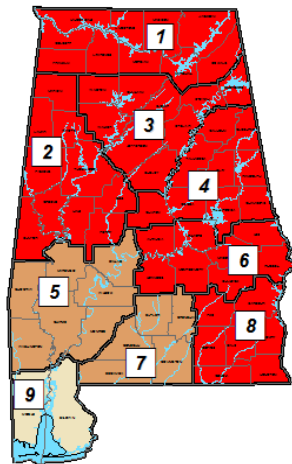
**Regions 5, and 7 under the Alabama Drought Management Plan which includes the counties of:**

Butler, Choctaw, Clarke, Conecuh, Covington, Crenshaw, Dallas, Escambia, Marengo, Monroe, Washington, Wilcox

**Watch**

**Region 9 under the Alabama Drought Management Plan which includes the counties of:**

Baldwin and Mobile

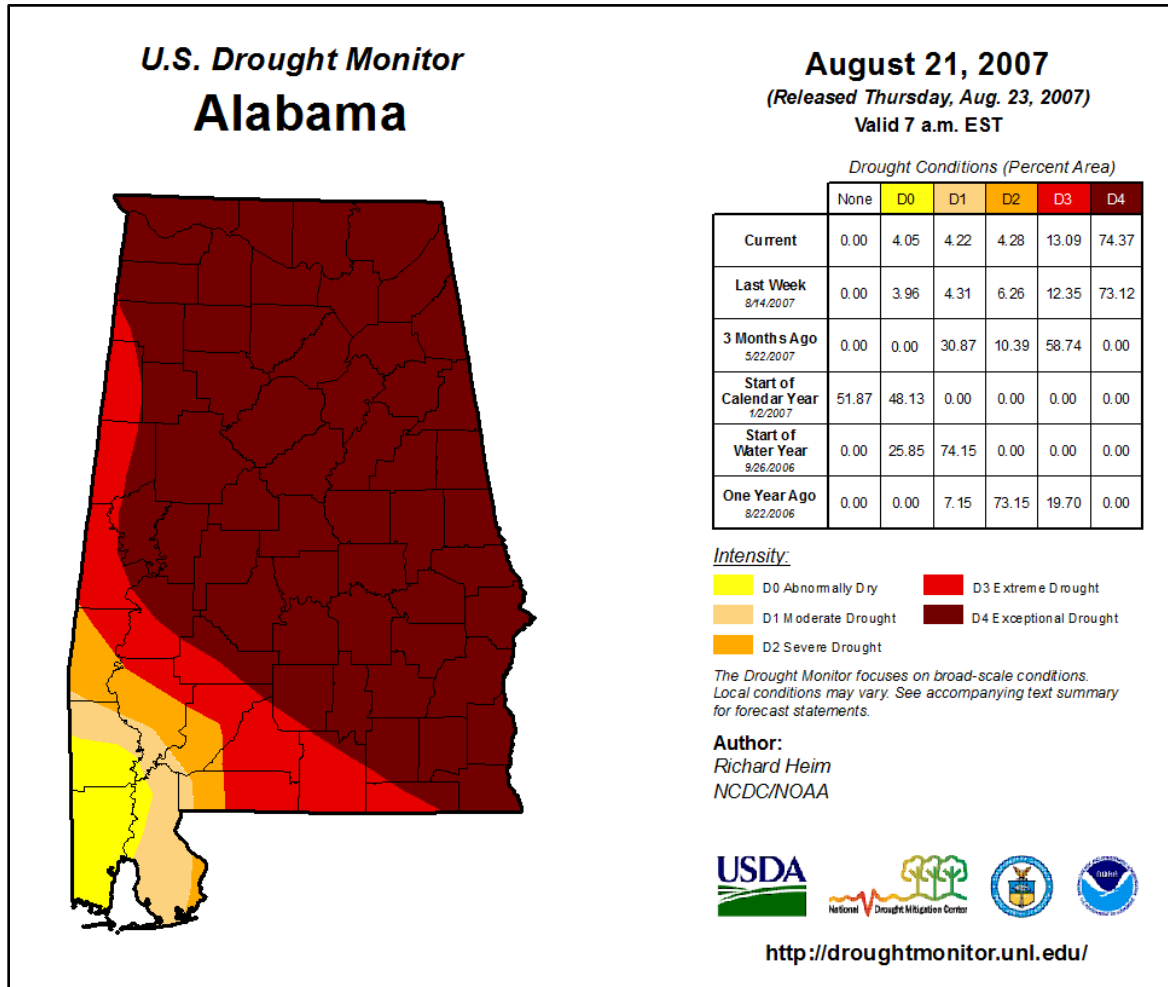


Drought Declaration Levels
Advisory
Watch
Warning
Emergency

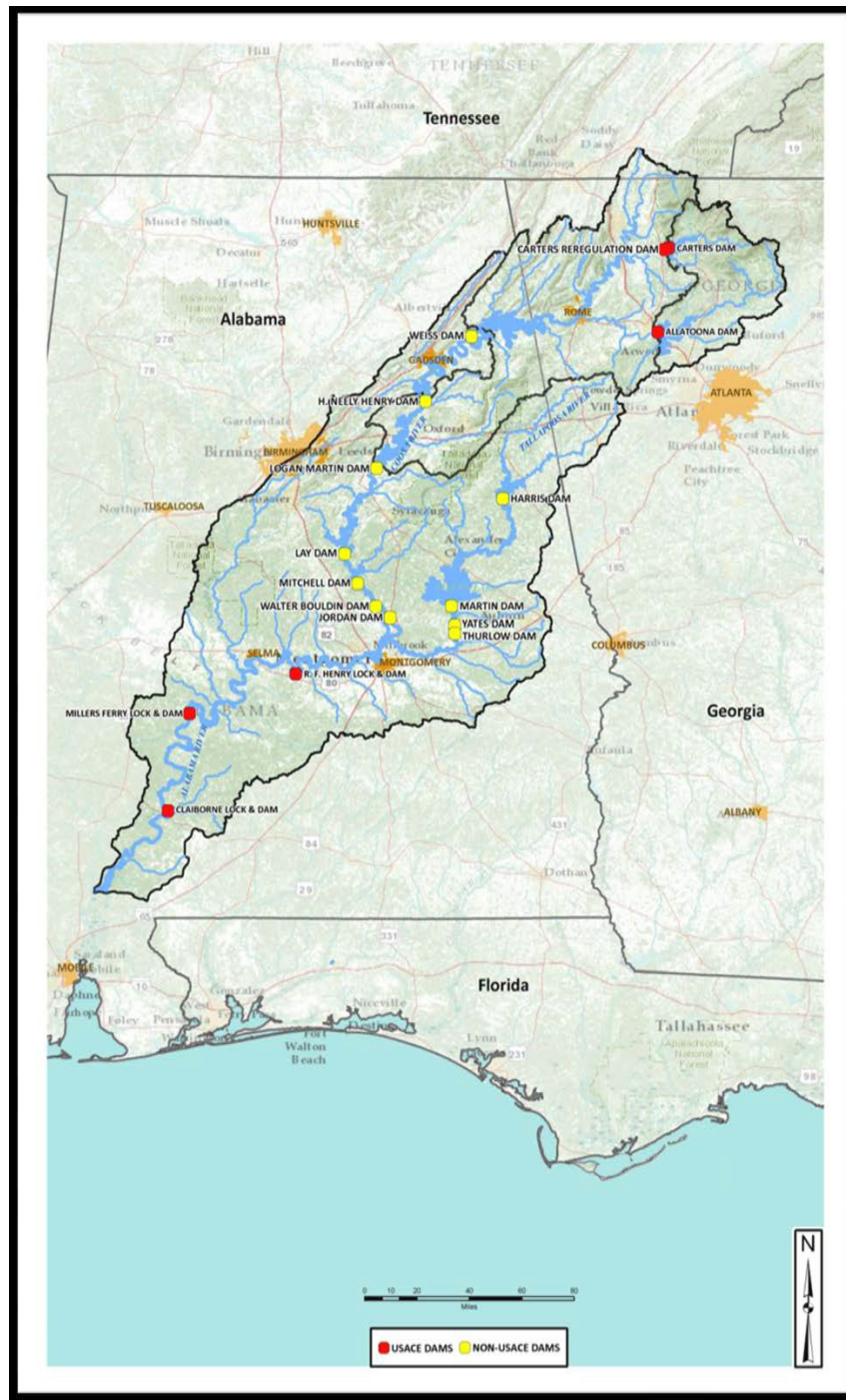
As a result of this declaration, public water systems and other non-public and private water users should monitor conditions and prepare procedures in the event that conditions continue to worsen. The OWR will be monitoring conditions and will provide updated notifications as the summer progresses.

For further information, please visit our web site at [www.adeca.alabama.gov/water](http://www.adeca.alabama.gov/water) and follow the links to the Office of Water Resources. You may also reach our office by phone at (334) 242-5499, fax at (334) 242-0776, or e-mail at [drought@adeca.alabama.gov](mailto:drought@adeca.alabama.gov).

## Attachment 3 Example of Alabama Map from the U.S. Drought Monitor



## Attachment 4 Alabama-Coosa-Tallapoosa (ACT) System Map



Source: USACE ACT Master Manual, May 2015

## Attachment 5 Table 7-5. ACT Basin Drought Management Matrix

*Alabama—Coosa-Tallapoosa River Basin Water Control Manual*

**Table 7-5. ACT Basin Drought Management Matrix**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Drought Level Response <sup>a</sup>	Normal Operations											
	DIL 1: Low Basin Inflows or Low Composite or Low State Line Flow											
	DIL 2: DIL 1 criteria + (Low Basin Inflows or Low Composite or Low State Line Flow)											
	DIL 3: Low Basin Inflows + Low Composite + Low State Line Flow											
Coosa River Flow <sup>b</sup>	Normal Operation: 2,000 cfs		4,000 (8,000)		4,000 – 2,000		Normal Operation: 2,000 cfs					
	Jordan 2,000 +/-cfs		4,000 +/- cfs		6/15 Linear Ramp down		Jordan 2,000 +/-cfs		Jordan 2,000 +/-cfs			
	Jordan 1,600 to 2,000 +/-cfs		2,500 +/- cfs		6/15 Linear Ramp down		Jordan 2,000 +/-cfs		Jordan 1,600 to 2,000 +/-cfs			
	Jordan 1,600 +/-cfs		Jordan 1,600 to 2,000 +/-cfs		Normal Operations: 1200 cfs		Jordan 2,000 +/-cfs		Jordan 1,600 to 2,000 +/-cfs			
Tallapoosa River Flow <sup>c</sup>	Greater of: 1/2 Yates Inflow or 2 x Heflin Gage(Thurflow releases > 350 cfs)				1/2 Yates Inflow		1/2 Yates Inflow					
	Thurflow 350 cfs				1/2 Yates Inflow		Thurflow 350 cfs					
	Maintain 400 cfs at Montgomery WTP (Thurflow release 350 cfs)						Thurflow 350 cfs		Maintain 400 cfs at Montgomery WTP (Thurflow release 350 cfs)			
	4,200 cfs (10% Cut) - Montgomery				Normal Operation: Navigation or 4,640 cfs flow		4,640 cfs - Montgomery		Reduce: Full – 4,200 cfs			
Alabama River Flow <sup>d</sup>	3,700 cfs (20% Cut) - Montgomery				4,200 cfs (10% Cut) - Montgomery		Reduce: 4,200 cfs-> 3,700 cfs Montgomery (1 week ramp)					
	2,000 cfs Montgomery				3,700 cfs Montgomery		4,200 cfs (10% Cut) - Montgomery		Reduce: 4,200 cfs -> 2,000 cfs Montgomery (1 month ramp)			
	Normal Operations: Elevations follow Guide Curves as prescribed in License (Measured in Feet)											
	Corps Variances: As Needed; FERC Variance for Lake Martin											
Guide Curve Elevation	Corps Variances: As Needed; FERC Variance for Lake Martin											
	Corps Variances: As Needed; FERC Variance for Lake Martin											
	Corps Variances: As Needed; FERC Variance for Lake Martin											
	Corps Variances: As Needed; FERC Variance for Lake Martin											

a. Note these are base flows that will be exceeded when possible.

b. Jordan flows are based on a continuous +/- 5% of target flow.

c. Thurflow flows are based on continuous +/- 5% of target flow: flows are reset on noon each Tuesday based on the prior day's daily average at Heflin or Yates.

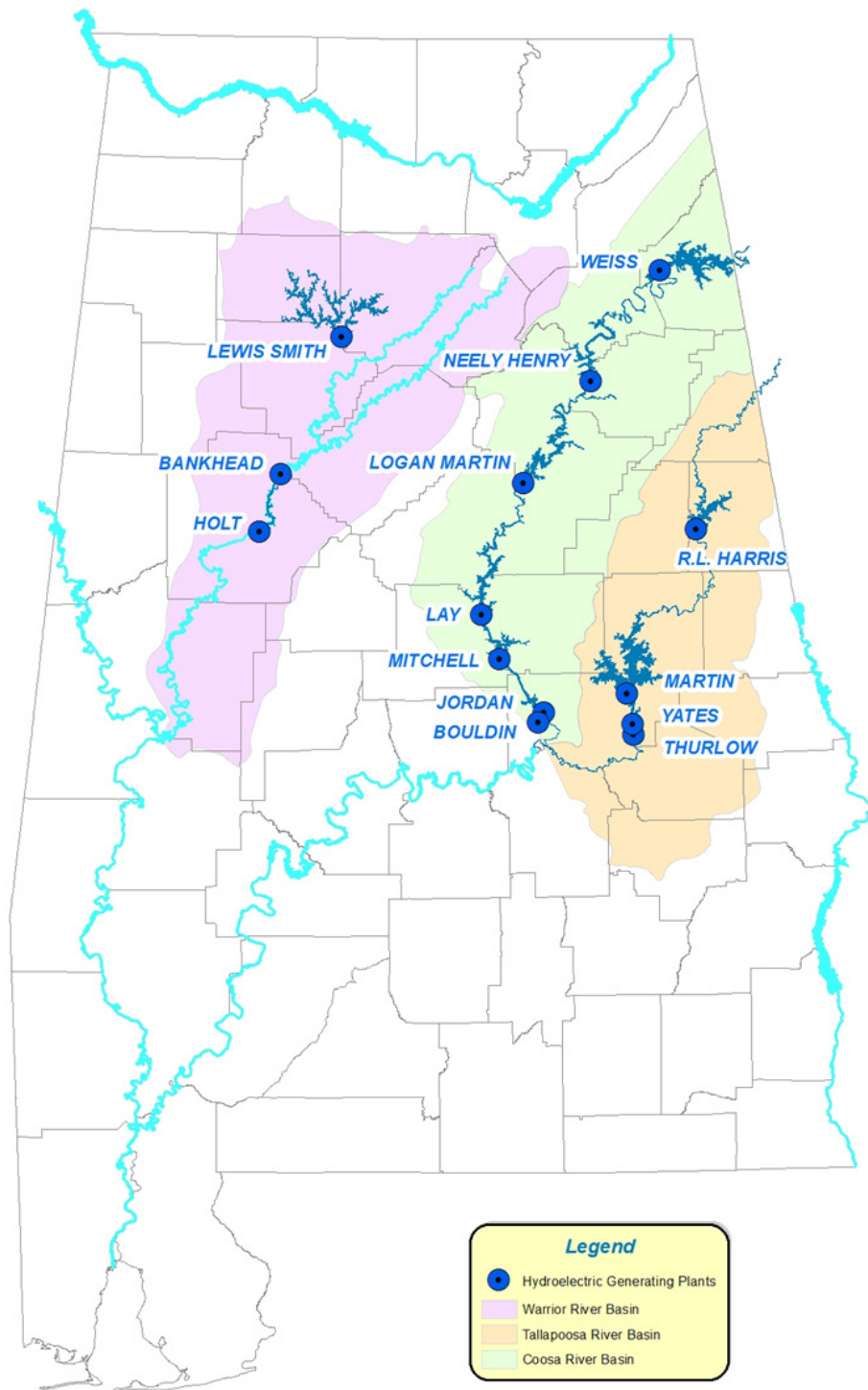
d. Alabama River flows are 7-Day Average Flow.

7-19

Source: ACT Master Water Control Manual, May 2015

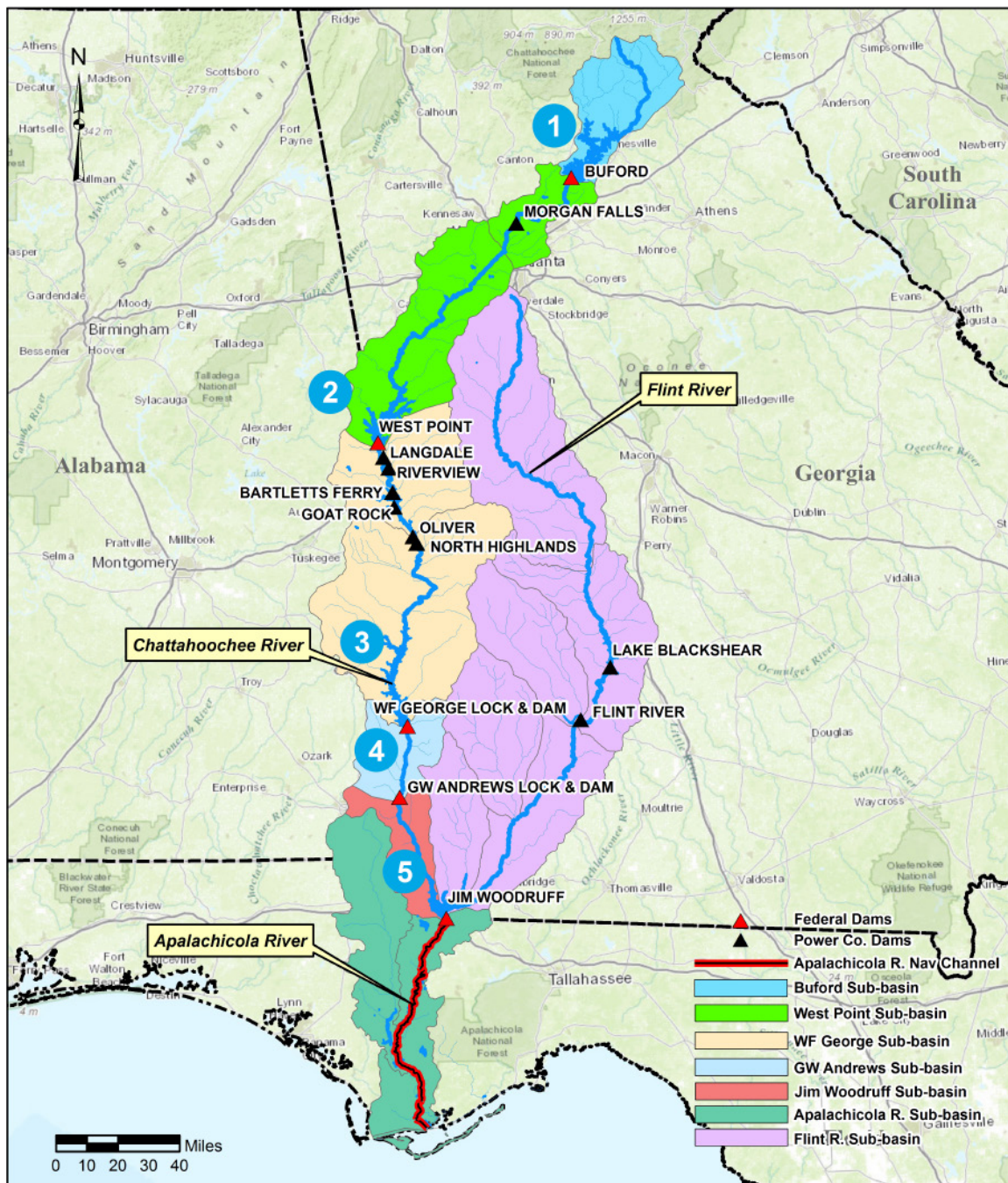


## Attachment 6 Alabama Power Company Reservoir System Map



Source: Alabama Power Company

## Attachment 7 Apalachicola-Chattahoochee-Flint (ACF) System Map



Source: ACF Master Water Control Manual, March 2017



## Attachment 8 Figure 7-9. ACF Drought Operation Triggers

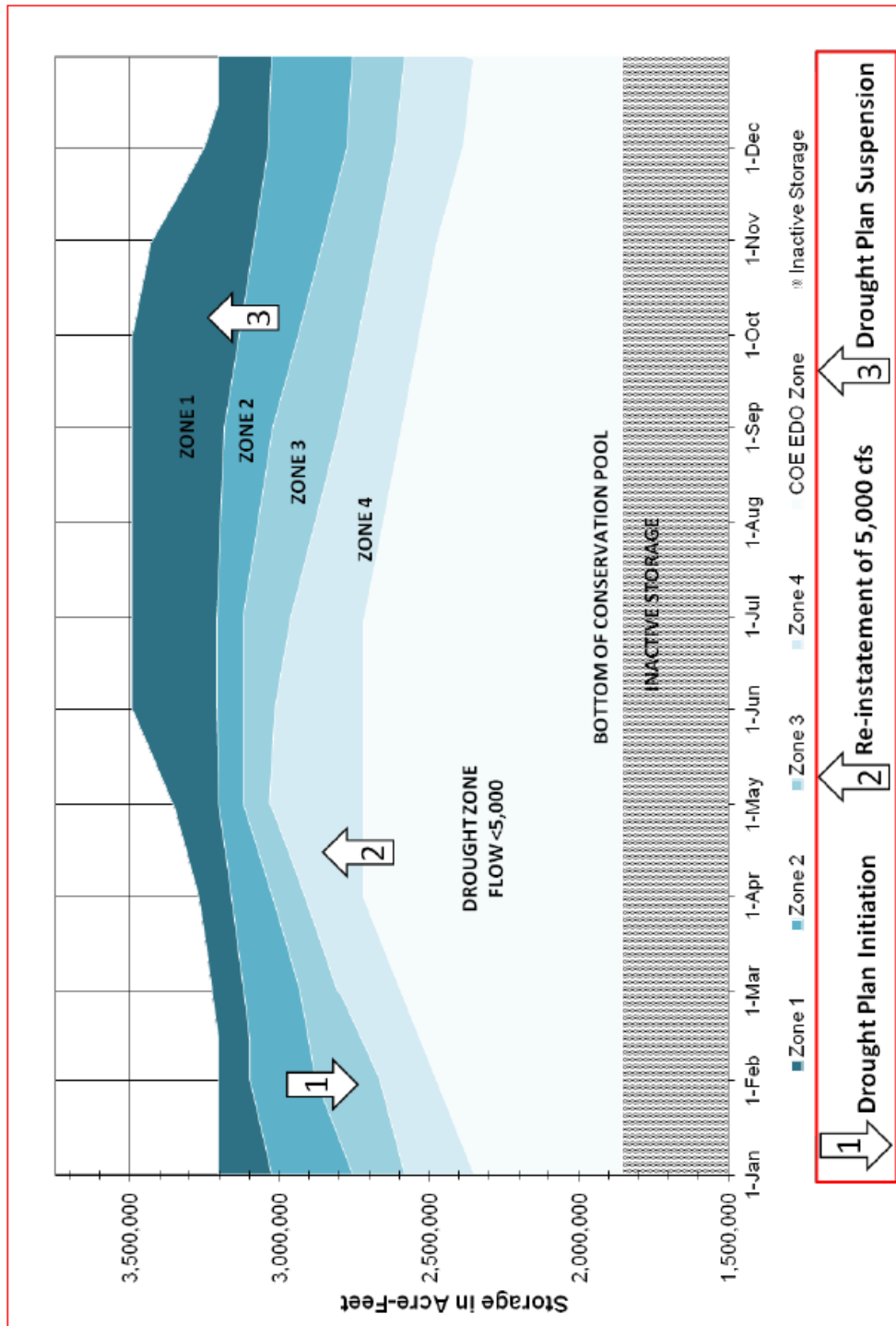
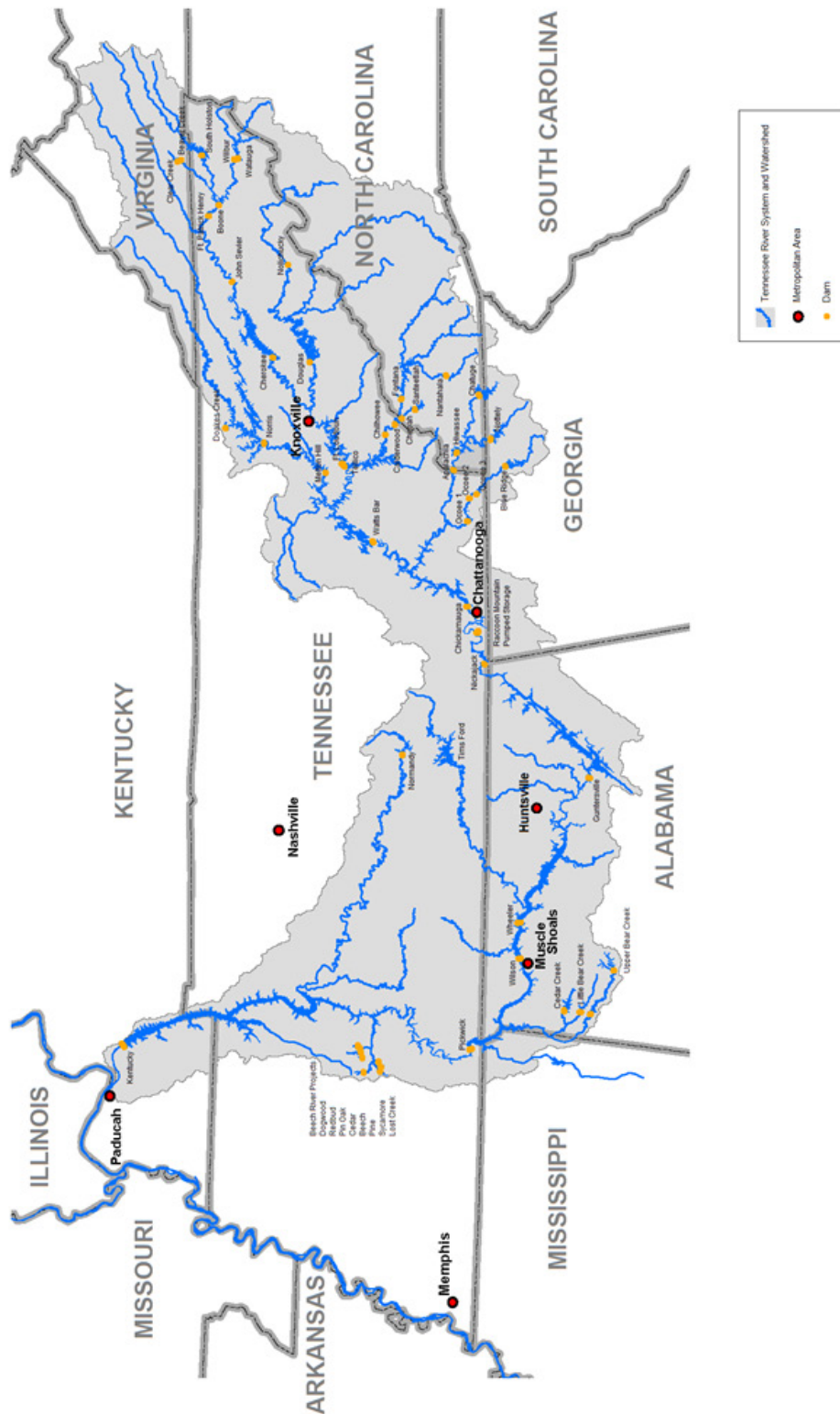


Figure 7-9. Drought Operation Triggers

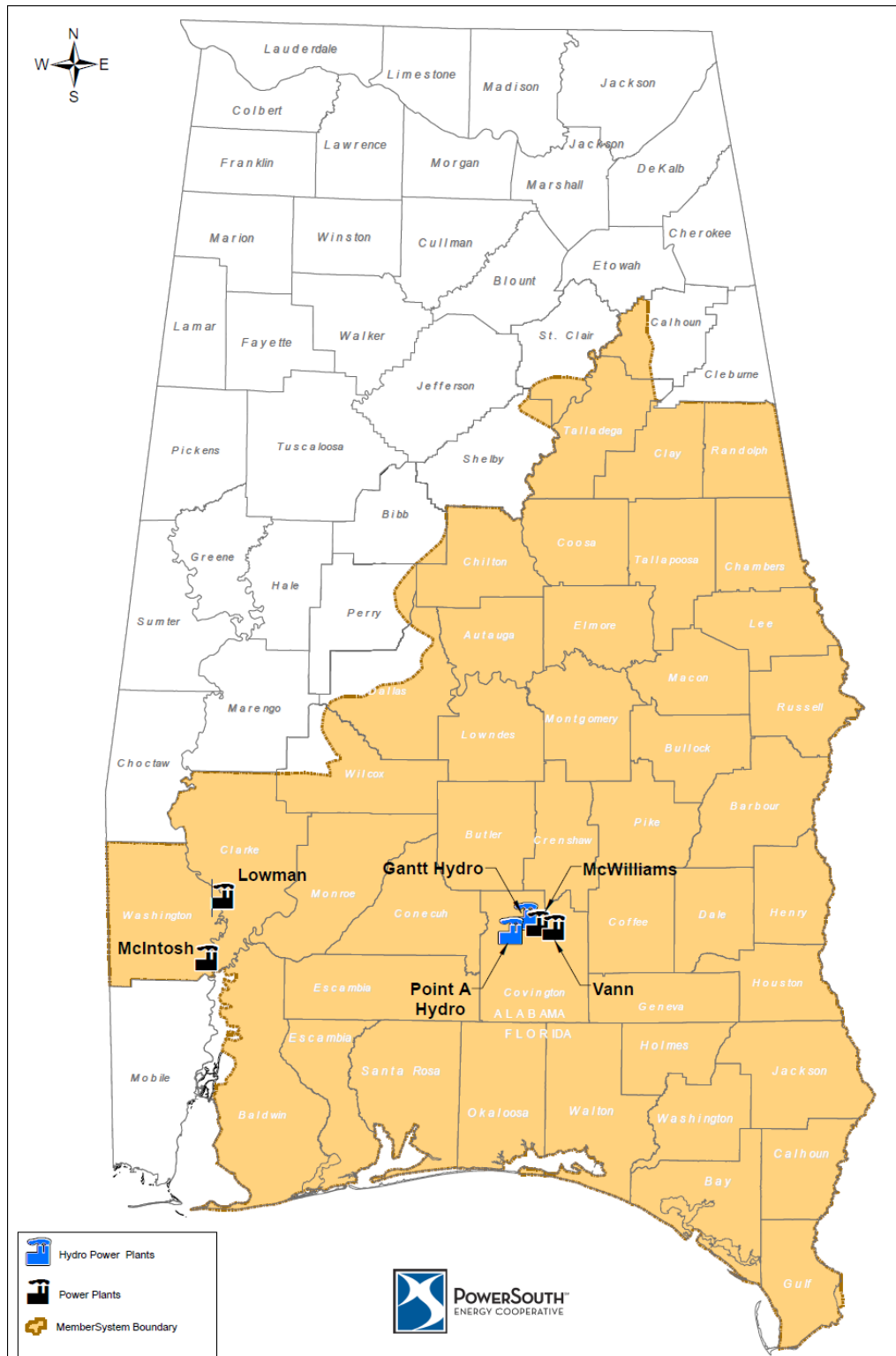
Source: ACF Master Water Control Manual, March 2017

## Attachment 9 TVA System Map



Source: TVA

## Attachment 10      PowerSouth System Map



Source: PowerSouth