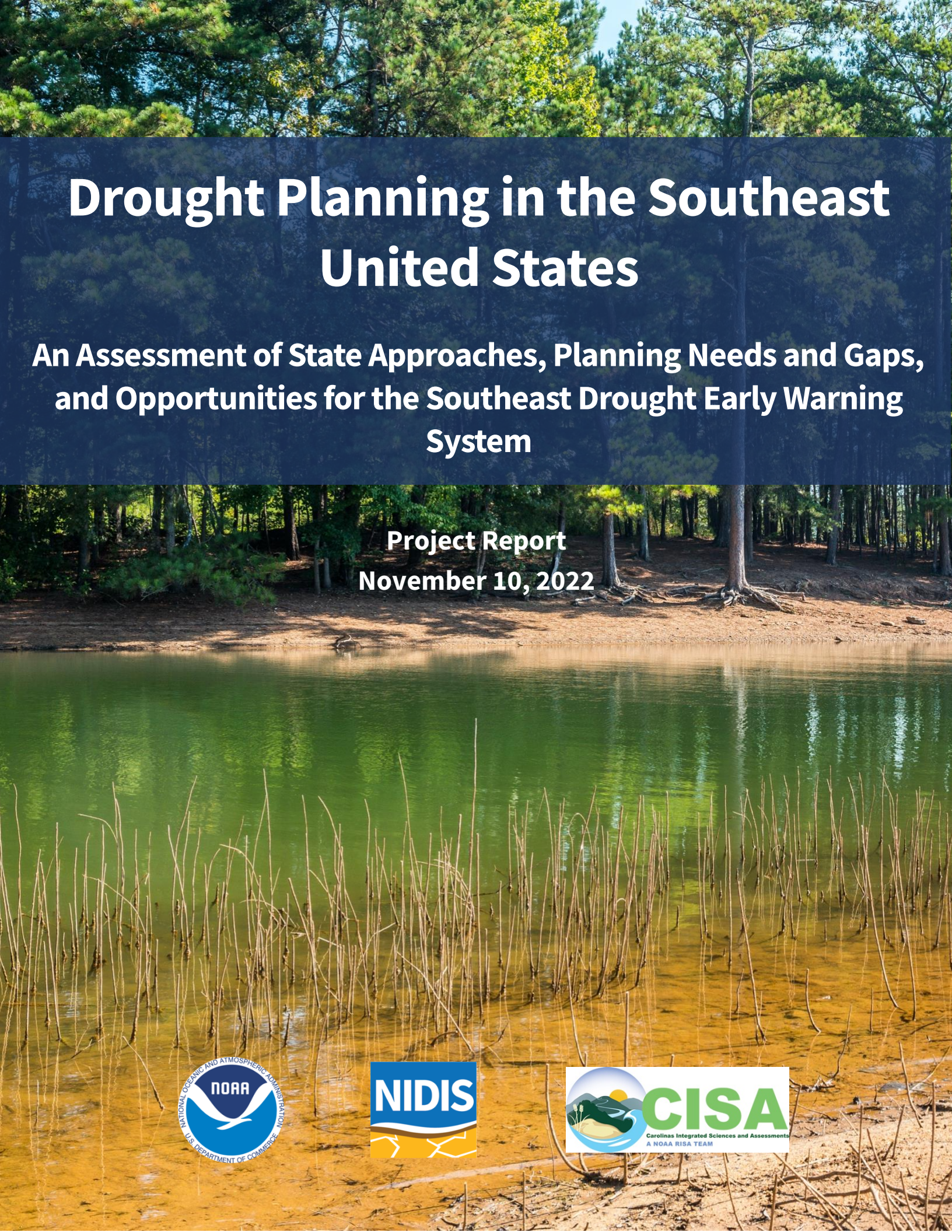

Drought Planning in the Southeast United States

An Assessment of State Approaches, Planning Needs and Gaps, and Opportunities for the Southeast Drought Early Warning System

Project Report

November 10, 2022

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

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Kirsten Lackstrom
Department of Geography, University of South Carolina
Carolinas Integrated Sciences and Assessments (CISA)

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On the cover: *Drought conditions at Lake Lanier in Georgia.*
Credit: Sandra Burn.

Table of Contents

Funding Support 1
Introduction 5
Project Goals and Objectives 5
Target Geography and Planning Processes 5
Report Overview and Organization 6
Approach and Methods 8
Documents 8
Semi-structured Interviews 9
Summary of Findings 11
Preparedness: "Today's Drought" 11
Mitigation: "Tomorrow's Drought" 12
Key Takeaways 16
Context Matters: Considering State Similarities and Differences 16
Don't Forget the Other Levels and Sectors 17
The Value of Structure 17
The Value of Flexibility 18
Conclusions: Opportunities for States and the SE DEWS 19
US Drought Monitor 19
Drought Indicators for the Southeast 19
Engagement and Planning When There Is No Drought 19
Looking Forward 20
References 21
Abbreviations 23
List of Appendices 24
Appendix A. Drought Monitoring and Response Authorities A-1
Appendix B. Statewide Drought Monitoring and Declaration Processes B-1
Appendix C. Indicators Used in State Monitoring Processes C-1
Appendix D. Drought Emergencies D-1
Appendix E. Drought-Related Policies and Plans in Florida's Water Management Districts E-1
Appendix F. United States Drought Monitor F-1
Appendix G. Interview Approach and Questions G-1

List of Figures

Figure 1. States in the southeastern United States 7

Figure 2. Drought policies, plans, and programs: organizing framework 7

Figure E-1. Florida Water Management Districts E-1

List of Tables

Table 1. Number of interviews by state (n=34) 10

Table 2. Number of interviews by decision-making level/type and role (n=33) 10

Table 3. State Requirements for Local Drought, Water Shortage, or Water Conservation Planning 14

Table 4. Examples of State- and Basin-Based Water Planning Initiatives with a Drought Mitigation Component 15

Table A-1. Drought Specific Legislation, Regulations, and Plans (Summary) A-1

Table A-2. Alabama: Drought Authorities A-4

Table A-3. Georgia: Drought Authorities A-5

Table A-4. North Carolina: Drought Authorities A-6

Table A-5. South Carolina: Drought Authorities A-7

Table A-6. Tennessee: Drought Authorities A-8

Table A-7. Virginia: Drought Authorities A-8

Table A-8. Arkansas: Drought Authorities A-9

Table A-9. Kentucky: Drought Authorities A-10

Table A-10. Louisiana: Drought Authorities A-10

Table B-1. Lead State Agencies and Information Sources (Summary) B-1

Table B-2. Monitoring Committees and Process (Summary) B-3

Table B-3. Making Declarations (Summary) B-5

Table B-4. Alabama: Components of the Drought Monitoring and Declaration Process B-8

Table B-5. Georgia: Components of the Drought Monitoring and Declaration Process B-10

Table B-6. Kentucky: Components of the Drought Monitoring and Declaration Process B-12

Table B-7. North Carolina: Components of the Drought Monitoring and Declaration Process B-14

Table B-8. South Carolina: Components of the Drought Monitoring and Declaration Process B-15

Table B-9. Virginia: Components of the Drought Monitoring and Declaration Process B-17

Table C-1. Indicators Used in State Monitoring Processes C-2
Table D-1. Triggers and Processes for Declaring a Drought Emergency (Summary) D-1
Table D-2. Alabama: Drought Emergency Triggers and Process D-4
Table D-3. Georgia: Drought Emergency Triggers and Process D-5
Table D-4. North Carolina: Drought Emergency Triggers and Process D-6
Table D-5. South Carolina: Drought Emergency Triggers and Process D-7
Table D-6. Tennessee: Drought Emergency Triggers and Process D-8
Table D-7. Virginia: Drought Emergency Triggers and Process D-9
Table D-8. Arkansas: Drought Emergency Triggers and Process D-10
Table D-9. Kentucky: Drought Emergency Triggers and Process D-11
Table D-10. Louisiana: Drought Triggers and Process D-11
Table D-11. Mississippi: Drought Emergency Triggers and Process D-12
Table E-1. Florida Water Management Districts, Websites, and Water Shortage Plans E-4
Table E-2. Northwest Florida WMD: Water Shortage Monitoring and Declarations E-6
Table E-3. South Florida WMD: Water Shortage Monitoring and Declarations E-7
Table E-4. Southwest Florida WMD: Water Shortage Monitoring and Declarations E-8
Table E-5. St. Johns River WMD: Water Shortage Monitoring and Declarations E-9
Table E-6. Suwanee River WMD: Water Shortage Monitoring and Declarations E-10
Table E-7. Florida: Water Shortage Emergency Policies and Procedures E-11
Table F-1. State contributions to and use of the US Drought Monitor (Summary) F-3
Table F-2. Alabama: USDM Contributions and Use F-5
Table F-3. Florida: USDM Contributions and Use F-5
Table F-4. Georgia: USDM Contributions and Use F-6
Table F-5. North Carolina: USDM Contributions and Use F-6
Table F-6. South Carolina: USDM Contributions and Use F-7
Table F-7. Tennessee: USDM Contributions and Use F-7
Table F-8. Virginia: USDM Contributions and Use F-8
Table F-9. Arkansas: USDM Contributions and Use F-8
Table F-10. Kentucky: USDM Contributions and Use F-9
Table F-11. Louisiana: USDM Contributions and Use F-9
Table F-12. Mississippi: USDM Contributions and Use F-10

Introduction

Project Goals and Objectives

Despite being a humid region, droughts pose a serious threat to the southeastern United States. Recent events, including flash droughts, have caused substantial impacts to agriculture, forestry, water resources, and other sectors and stakeholders. The drought planning literature cites reduced fragmentation and increased coordination as critical needs to improving drought preparedness and response. However, few efforts have investigated precisely what types of drought plans and policies are in place and what mechanisms might facilitate cooperation and collaboration, particularly in the Southeast region.

This project documented, compared, and assessed drought response and preparedness planning in the Southeast United States, with the overall goal of helping to clarify the following items for drought coordinators and other drought decision makers across the region:

- When and how different states monitor, respond to, and plan for drought events
- Effective strategies and "best practices" for drought planning
- Mechanisms and opportunities for collaboration and coordination around drought planning and preparedness, given that droughts are often regional in extent and cross political boundaries

Furthermore, this project is intended to provide a baseline understanding of the drought planning landscape in the southeastern United States and inform planning-related activities of the National Integrated Drought Information (NIDIS) Southeast Drought Early Warning System (SE DEWS) network and partnering organizations.

Target Geography and Planning Processes

Figure 1 shows the states included in this study. Figure 1a shows the states included in the SE DEWS region: Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, and Virginia. Figure 1b shows the full study area, expanded from the SE DEWS footprint to include Arkansas, Kentucky, Louisiana, and Mississippi. This "Southeast United States" footprint was selected to follow National Climate Assessment regions and provide a larger set of states to compare with those in the SE DEWS. This larger region also follows the U. S. Department of Agriculture Southeast Climate Hub boundaries.

Figure 2 provides an organizing framework for thinking about the range of drought policies, plans, and programs that exist across the landscape. This project focused on state-level plans

and activities related to preparedness and mitigation, due to states' primary responsibility for surface and groundwater allocation and regulation of water withdrawals and use. States, as well as local entities, typically lead drought planning and preparedness efforts (Stern et al., 2021). The states also play a major role in hazard mitigation planning and emergency management and response. Accordingly, this project sought to examine not only drought-specific (or "stand-alone" drought plans) but also how and the extent to which drought intersects with water and hazards planning.

Report Overview and Organization

The report is designed to share the project's high-level findings, based on a review of state-level documents and plans and conversations with over forty individuals engaged in drought management or similar activities. The next section provides an overview of the approach and methods, and the subsequent sections summarize key takeaways and potential opportunities for the SE DEWS network. Key takeaways are organized according to policy or plan type (Figure 2). "Preparedness" refers to those operational plans, processes, and capabilities that shape how states respond to and manage a drought event. "Mitigation" refers to proactive plans and activities performed in advance of a drought to reduce vulnerabilities, impacts, and risks.

Appendices provide details about states' operational drought response plans and procedures, namely how they monitor drought conditions, determine drought levels, and respond and take emergency action if necessary, during a drought event (Appendices A-D). These appendices include summary tables with state-by-state comparisons, as well as tables with information about individual states. For states without stand-alone drought plans or procedures (Arkansas, Louisiana, Mississippi), information or activities related to drought response was included if available. Florida's state agencies have less direct involvement in drought-related planning and their activities were less comparable with the other states. Rather, five regional Water Management Districts conduct most water management and planning activities. Their drought response and planning information is available in a separate appendix (Appendix E).

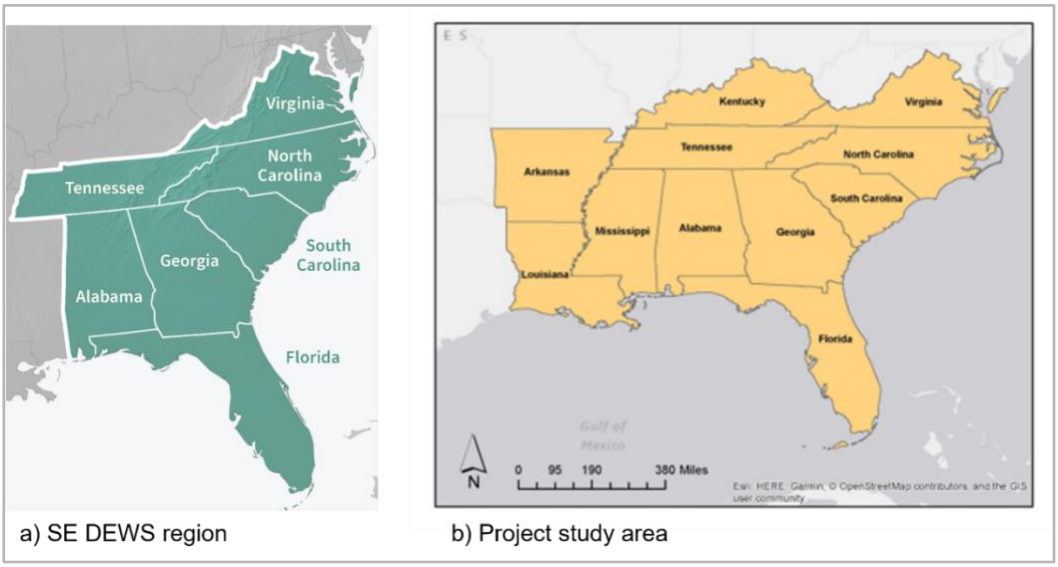

Figure 1. States in the southeastern United States

Fig. 1a shows the states included in the SE DEWS region: Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, and Virginia (source: https://www.drought.gov/). Fig. 1b shows this project's study area, expanded from the SE DEWS footprint to include Arkansas, Kentucky, Louisiana, and Mississippi.

Type	Level	Sector
Post-Impact disaster assistance	**Federal**	Agriculture
Preparedness "today's drought" tactical / operational	**State** university / SCOs	Emergency Management
		Energy
	Sub-state river basin / regions	Environment
		Fire / Forestry
Mitigation "tomorrow's drought" strategic		Health
	Local county / municipality / water system	Industry
		Water

Figure 2. Drought policies, plans, and programs: organizing framework

Approach and Methods

The project involved two main information sources and methods: 1) review of drought documents and written materials and 2) semi-structured interviews with individuals with a role in drought response and planning. The purpose of this two-pronged approach was to document the formal authority and required procedures for drought management and explore how those documents and plans work in practice, what works well, and any gaps or challenges.

Documents

The first step involved searching for and collecting both drought-specific and drought-related documents and plans for each state. These documents include:

- **Drought-specific** state statutes, regulations or administrative codes, and/or plans that establish drought response and planning requirements, codified specific activities and responsibilities, and/or detailed actions to take during a drought event.
- **Water resources** state statutes, regulations or administrative codes, and/or plans that address or relate to drought in some way. Examples include rules for water allocation during water shortages and water conservation policies and plans.
- **Emergency Operations Plans** (EOP) are typically all-hazard plans. They guide agency coordination and detail the roles and responsibilities of local, state, federal, and non-governmental partners for preparedness, response, and recovery. The Federal Emergency Management Agency's most recent emergency planning guidance notes that EOP annexes can be developed to provide specific directions for particular hazards, including drought (Federal Emergency Management Agency, 2021).
- **Hazard Mitigation Plans** are intended to provide state, local, and tribal governments with a long-term framework for identifying, assessing, and reducing risks from multiple types of hazards and are required by the Stafford Act (2000) to receive certain disaster assistance funding. Drought is just one of many hazards and risks included in HMPs (Federal Emergency Management Agency, 2022).

States' drought, water, and emergency management agency websites were used to obtain these documents and reviewed for additional relevant programmatic information and reports. If not available through a "drought program" website, the Nexis Uni research database was used to search for and obtain copies of state statutes, codes, and regulations, using "drought", "water shortage", "water emergency", and "water allocation" as search terms.

The second step involved organizing, reviewing, and categorizing the document content. Coding categories were adapted from Fontaine et al. (2014) and represented key elements of a

proactive drought plan and management approach. Documents were reviewed to assess the presence or absence of these elements:

- description of drought role and responsibilities
- description of a monitoring process
- indicators and triggers to be used in monitoring and making drought level designations
- schedule of response actions
- mechanisms for enforcement, conflict mediation, or variance requests
- communication procedures
- agency coordination
- impact and/or risk assessment
- post-drought assessment, including review and revision of a drought plan or process
- mitigation activities to reduce future drought impacts

Semi-Structured Interviews

Semi-structured interviews were conducted from October 2021 to February 2022, with two additional interviews conducted in July 2022. Interviewees consisted of state drought coordinators and others who have drought monitoring or drought-related (i.e., water planning) responsibilities. Forty-one individuals participated in thirty-three interviews; this does not include one of the Florida interviews (Table 1), a group webinar conducted with approximately thirty representatives from Florida Department of Environmental Protection and the Water Management Districts to learn more about how they manage and plan for drought. Table 1 and Table 2 show the interview breakdowns by state, decision-making level, and drought role.

Prior to the interview, a state-specific summary of drought plans and processes was developed based on a review of that state's drought documents (plans, regulations, and statutes) and provided to interviewees for their review. As each state approaches drought monitoring and management somewhat differently, the summaries and specific questions varied among states. The interviews were semi-structured; questions were drawn from a master list of questions (see Appendix G) and tailored when necessary to better fit individual interviewees' roles, responsibilities, and context. Approximately half of the interviews were recorded, with the interviewees' permission. The University of South Carolina Institutional Review Board reviewed the interview protocol and determined the study was exempt from Human Research Subject Regulations.

Following the same document coding framework described above, interview transcripts and notes were reviewed for the interviewees' perspectives regarding what elements worked well in their state, program, or organization and/or where they encountered challenges. Tangible examples related to resources (e.g., staff, funding) and information (e.g., data, monitoring tools), while other examples pertained to less tangible elements such as agency coordination and finding and maintaining interest in drought planning in the absence of a drought event.

Table 1. Number of interviews by state (n=34)

SE DEWS States		Other Southeastern States	
State	**Number of Interviews**	**State**	**Number of Interviews**
Alabama	3	Arkansas	3
Florida	3	Kentucky	1
Georgia	2	Louisiana	5
North Carolina	2	Mississippi	3
South Carolina	3		
Tennessee	3		
Virginia	2		
Multiple States		4 Interviews	

Table 2. Number of interviews by decision-making level/type and role (n=33)
Note: This table does not include group webinar with Florida Department of Environmental Protection and Water Management Districts)

Decision-making Level / Type	Number of Interviews	Primary Role	Number of Interviews
State Agency	17	Drought Coordinator	6
University	9	Monitoring (State Climatologist Office)	7
River Basin / Regional	3	Monitoring (Other Agency)	3
Federal Agency	4	Water Management and/or Planning	17

Summary of Findings

This section provides a summary of findings from the combined document and interview analyses. Appendices A-D provide details (i.e., the "nuts and bolts") of states' operational drought monitoring and response processes.

- Appendix A: Drought Monitoring and Response Authorities
- Appendix B: Statewide Drought Monitoring and Declaration Processes
- Appendix C: Indicators Used in State Monitoring Processes
- Appendix D: Drought Emergencies

Preparedness: "Today's Drought"

Among the eleven states included in this study, some states have well-established drought programs, while others conduct very minimal drought planning. In the latter group (Arkansas, Mississippi, Louisiana), drought is somewhat addressed through its inclusion in emergency operations and hazard mitigation plans. Arkansas and Louisiana have water use and allocation codes that establish response to water shortage emergencies (see Appendix D). However, these states currently lack prepared plans and procedures that would guide more proactive action before an emergency occurred.

Of the eight remaining states, two states stand out: Florida and Tennessee. First, in Florida, operational drought planning and response occurs primarily at the Water Management District (WMD) level, not at the state level (see Appendix E). The Florida Water Resources Act of 1972 (Chapter 373, Florida Statutes) established the responsibilities of the five WMDs for water supply, water quality, flood protection and floodplain management, and natural system protection. The Department of Environmental Protection (DEP) provides oversight and can address these functions through the Water Resource Implementation Rule and other statutory authority (for example, 373.036(1)(d) and 373.101(1), among others). Each WMD develops and routinely updates water shortage, conservation, supply, and strategic plans which must be consistent with the Water Resource Implementation Rule established by DEP.

Second, Tennessee's Drought Management Plan outlines the state approach to monitoring, water management, and agency coordination during drought and requires local water systems to have response plans. However, it is not an operational plan as it does not specify monitoring indicators nor the threshold values that would trigger drought declaration levels and response actions.

The remaining six states (Alabama, Georgia, Kentucky, North Carolina, South Carolina, Virginia) all have a state-level institutional structure (i.e., codified procedures and responsibilities and/or

operational plan) in place to guide drought monitoring and response. For the most part, these states' formal drought plans or documents provide for agency roles and responsibilities and processes to follow for monitoring, declaring drought levels, implementing response actions, communications, and agency coordination. However, despite general similarities, some noticeable differences exist.

- One key difference pertains to who has responsibility for determining drought levels and making declarations, for example, a technical committee, a committee consisting of local-level decision makers and stakeholders, or a higher-level agency official (see Appendix A).
- In terms of monitoring and determining affected areas, states use different sets of indicators, geographic boundaries, and severity level terminology (see Appendices B and C).
- State agencies' responsibilities also vary in their nature and scope. Some are primarily tasked with monitoring, information sharing, interagency coordination, and providing technical assistance to community water systems, while others have authority and responsibility to enforce water use restrictions and make determinations about equitable water use and priorities (see Appendix B).

Regarding emergency operations, all eleven states have EOPs and statutes authorizing their Governors' and emergency management agencies' emergency powers and responsibilities (see Appendix D). Only North Carolina and South Carolina have a Drought Plan included as an Annex or Appendix within the more comprehensive state emergency operations or management plan. Both provide considerable detail about the actions that should be taken during a drought and/or water shortage emergency; otherwise, EOPs only mention drought as one of many hazards covered by the plan. Alabama's and Virginia's drought plans include triggers and numeric values that correspond to an emergency level and outline the actions and procedures to take to transition to a Governor's emergency declaration.

Mitigation: "Tomorrow's Drought"

As noted above, "mitigation" refers to proactive activities performed in advance to reduce drought vulnerabilities, impacts, and risks (Fontaine et al., 2014; Wilhite, 2011). Examples of drought mitigation activities include, but are not limited to:

- efforts to enhance drought and/or water shortage preparedness, such as through planning processes or building capacity to implement plans

- water planning processes, efforts to secure water supply (e.g., infrastructure, water system efficiency improvements, water audits), and demand-side efforts (e.g., water conservation, water use efficiency)
- monitoring, data, and information improvements

Of the "stand-alone" drought plans reviewed for this project, Alabama's and Kentucky's plans were notable for identifying and including mitigation-oriented strategies, priorities, and activities. Otherwise, "drought-specific" documents primarily focused on processes to respond to drought, during a drought.

Regarding hazard mitigation plans (HMPs), state approaches to and inclusion of drought varied somewhat. Many states conducted comprehensive drought risk assessments, similar to other hazards, describing drought exposure, vulnerabilities, past impacts, and future probabilities. A few plans only mentioned drought (i.e., did not conduct a full assessment) or combined drought with other hazards such as fire or heat. The document review revealed few examples of drought-specific mitigation actions, and those were often connected to water planning-related activities and improving monitoring and communications capabilities. Interviews suggested limited coordination and integration between the hazard mitigation planning process and existing drought plans, programs, and processes. Kentucky was one exception; the state drought coordinator conducted a detailed assessment of agriculture and water supply impacts and mitigation actions, with plans to include a health component in the next HMP iteration and better integrate the assessment into statewide drought planning efforts.

States engage in drought mitigation activities primarily through their water resource planning and management authority and responsibilities, namely through requiring 1) some type of drought-related local action and/or planning and/or 2) statewide water planning processes, assessments, or initiatives.

In terms of local planning, all SE DEWS states require a local plan to manage drought but focus and terminology can vary from state to state. Public water supply systems are the primary target for rules and regulations; required efforts may be intended to address drought events, prepare for any type of water shortage, and/or foster water conservation. Table 3 shows examples from the SE DEWS states. Some require stand-alone plans, while others include drought in more comprehensive water planning efforts. At a minimum, all states provide plan templates and/or expected components of a drought (water shortage, water conservation) plan.

Table 3. State Requirements for Local Drought, Water Shortage, or Water Conservation Planning

State	Approach
Alabama	Public water systems are required to develop a drought conservation plan. Systems have the option to develop a stand-alone plan or integrate the drought plan into an existing plan or process, such as a local comprehensive plan.
Florida	WMDs are required to develop District-wide water shortage and water conservation plans. In addition, WMDs regulate, and issue permits for, water use which may include requirements for water conservation plans and compliance with WMD Water Shortage Orders.
Georgia	Surface water withdrawal permittees are required to develop drought contingency and water conservation plans.
North Carolina	Public and privately owned water systems having 1,000 or more connections or serving more than 3,000 people are required to prepare a Local Water Supply Plan, to include a Water Shortage Response Plan.
South Carolina	Community water systems are required to have drought response plans and ordinances.
Tennessee	Community water systems are required to have an Emergency Operations Plan and a separate drought management plan that includes trigger points and corresponding actions.
Virginia	All local governments (counties, cities, towns) are required to develop drought response and contingency plans as part of a broader water supply program that also includes a water plan, water use information, and description of resource conditions. For permitted entities, drought plans are incorporated into water withdrawal permits.

Other water planning efforts vary by scale (i.e., statewide, basin, other regional boundaries or jurisdictions), comprehensiveness (e.g., a plan considers water supply, water quality, environmental needs, and other issues), and type/level of authority or enforcement they provide (e.g., guidance documents v. those that require action). Many processes are currently ongoing and may be able to provide lessons learned and new drought mitigation strategies as they evolve. While it was beyond the scope of this project to document all water planning and management efforts occurring throughout the region, Table 4 provides several examples of those with a drought component.

Table 4. Examples of State- and Basin-Based Water Planning Initiatives with a Drought Mitigation Component

State	Example
Alabama	Watershed-based plans are being developed to guide sustainable development of irrigation for agricultural products that are vulnerable to drought events.
Florida	Water Management Districts regularly update strategic plans, as well as plans for water supply, conservation, and efficiency.
Georgia	Many of Georgia's water planning and management requirements focus on water conservation and efficiency, established through the Water Stewardship Act of 2010.
North Carolina	Initially designed to address water quality, basin plans are increasingly integrating water quantity considerations, including drought-related constraints.
South Carolina	The ongoing River Basin Planning process includes assessments of current and future surface and groundwater availability and stakeholder-developed strategies to address anticipated water shortages.
Virginia	The recently completed State Water Resources Plan (2020) evaluates current and future surface and groundwater conditions during short and long-term droughts using water supply demand scenarios to facilitate local drought planning. Climate change scenarios were also evaluated. A new State Water Resources Plan is produced every 5 years, which includes updated water demand projections and comprehensive model analysis.
Catawba-Wateree Water Management Group	Public water systems, in conjunction with Duke Energy, are developing an Integrated Water Resources Plan as a holistic document to guide water quantity and quantity management.

Key Takeaways

This section highlights themes that emerged through the interview process, with a focus on context and what works well in operational plans and processes.

Context Matters: Considering State Similarities and Differences

The region normally receives plentiful precipitation, but droughts can interact with patterns of water supply and use to stress water resources and adversely affect water availability. With states having primary responsibility for regulating water rights and allocation, the ***regional*** perspective reported here reveals a patchwork of statutes, rules, and plans that address water shortage situations. This patchwork contributes to state-level differences in who makes drought decisions, and when and how they make those decisions. Opportunities for collaborative and coordinated response activities between states could be hindered by the lack of a uniform process in the region.

While not totally unexpected, this project highlights how each state has developed its own approach to planning for drought risks and responding to these events when they occur. Drought and drought-related decisions are embedded in an evolving water planning landscape as individual states experience impactful drought events, increasing populations and demands on water resources, and/or overuse of specific supply sources (e.g., groundwater aquifers).[1] For example, severe droughts spurred the most recent iterations of statewide drought response rules and plans in some states: Alabama (2011); Georgia, Kentucky, and North Carolina (2007); and South Carolina and Virginial (2000-2002). Additionally, most southeastern states have adopted some form of "regulated riparianism" to address water shortages and conflicts, whereby states, through statutory requirements, develop permitting systems to regulate water withdrawals and allocate water use rights based on "reasonableness" criteria (American Society of Civil Engineers, 2004; Dellapenna, 2011). States have tailored the overall approach to meet their circumstances, contributing to the patchwork of drought-related activities. Florida has developed the most comprehensive system, which includes a variety of drought mitigation measures (see Appendix E; Klein et al., 2009); others have taken a more limited or incremental approach (Zellmer & Amos, 2021). While the regulated riparian system can help create

[1] Assessments providing more specific information and context about individual state processes, water resource stressors, and other considerations include Alabama (Elliott, 2017); Florida (Klein et al., 2009); Georgia (Barmeyer, 2015); Louisiana (Davis & Wilkins, 2011); North Carolina (McLawhorn, 2009); South Carolina (Taylor, 2015); and Virginia (Reynolds, 2015).

mechanisms for long-term planning (American Society of Civil Engineers, 2004), a recent assessment found that only five states in the region (Arkansas, Florida, Georgia, South Carolina Virginia) had comprehensive state water legislation at the time (Dyckman, 2016). Nationally, of the 26 states with state water planning legislation, planning elements varied considerably in terms of comprehensiveness and whether they included drought provisions (Dyckman, 2016).

Don't Forget the Other Levels and Sectors

States generally prefer for decisions to be made at the level closest to the resource, and typically by water systems, municipalities, counties, or regional planning entities. States want to avoid an overly broad response given that specific impacts are often experienced locally. States have supported this preference for local decisions through, for example, committee structures and establishment of drought regions.

Response actions typically focus on non-essential water use such as lawn irrigation and car washing. By default then, community water systems and local governments are the primary entities for managing drought response and communications. In that sense, drought response plans and actions can tend to be "siloed" within the water management sector.

Managers of major reservoirs in the region (e.g., federal agencies such as the Army Corps of Engineers, Tennessee Valley Authority; private and public utilities generating hydropower) play an important role in drought management and response by regulating water movement and availability. Beyond that, many are active in state monitoring processes (e.g., Alabama, North Carolina, South Carolina) or regional networks (e.g., Apalachicola-Chattahoochee-Flint [ACF] DEWS). They also conduct their own communications and outreach with stakeholders (e.g., U.S. Army Corps of Engineers, Mobile and Wilmington Districts; Tennessee Valley Partnership) and coordinate drought response with water users (e.g., Duke Energy Drought Management Advisory Groups), activities that can support interstate communication and collaboration. Interviews indicated the value of these types of engagement for the states.

The Value of Structure

Interviews indicated that effective approaches for drought response struck a balance between providing structure and allowing decision-making flexibility. Having known, established, and/or formal roles and responsibilities were particularly useful when monitoring conditions, making declarations, communicating with the public and affected areas or sectors, and sharing information between agencies. Formally requiring and/or providing resources for dedicated staff (e.g., Kentucky, South Carolina), committees (e.g., North Carolina Drought Management Advisory Council), and/or a regular monitoring process (Alabama, Kentucky, North Carolina, Virginia) help to facilitate routines, consistency, and decision maker networks. In addition, both

the document analysis and interview process suggest that drought plans (state or local) are typically not reviewed or revised unless required. Having such requirements may need to be included in a drought-specific statute or regulation or incorporated into broader water planning processes.

Other examples provided by interviewees were more informal and discussed in the context of interstate efforts. Monthly webinars for the ACF DEWS (now the Southeast Climate Monthly Webinar) provide a forum for states and other entities to talk with and learn from one another. Routine events are valued for building understanding of drought conditions and impacts in different states or places. Regularly scheduled meetings allow participants to stay updated on current conditions and connected to the network.

The Value of Flexibility

Interviews also indicated that having flexibility is helpful, and necessary, to enable states and other entities to respond to different circumstances that arise with each unique drought. State regulations or plans that provided more general guidance about which indicators to use in monitoring or allowed the consideration of multiple types of information were viewed positively. Such flexibility can also facilitate the adoption of new indicators and monitoring tools as they are developed. Triggers or threshold values codified in administrative codes or other rules and regulations offer less flexibility and can be difficult to change.

Conclusions: Opportunities for States and the SE DEWS

Although states have independent policies and procedures for state drought response and mitigation planning, interviews suggest some areas where SE DEWS activities could support state and interstate planning and preparedness.

US Drought Monitor

The US Drought Monitor (USDM) is an important tool for monitoring drought, as well as triggering response actions at the state and local level and disaster assistance from the federal government (see Appendix F). Although states contribute to and use the USDM in different ways, several interviewees valued it as a process that facilitates between- and within-state communications, particularly where entities coordinate on the input and where a state agency or committee can help bridge the USDM and state processes. Since the USDM is an existing and ongoing process, efforts to support greater interagency and interstate coordination could set the stage for other monitoring or preparedness-oriented collaborations in the future.

Drought Indicators for the Southeast

Many state plans and procedures were developed years ago, before "flash drought" became increasingly recognized as a distinct type of drought hazard. In addition, some statewide monitoring processes may be using "outdated" indicators or have not been able to keep up with the development of new indicator and monitoring tools; soil moisture is one example (see Appendix C for list of indicators required by state plans and regulations). As developing and evaluating new tools and information can be difficult to accomplish at the individual state level, an assessment of the new data sources and indicators could help identify which are "best" for the Southeast region (or a sub-region). Such an assessment could consider different seasons or time frames and different drought scenarios.

Engagement and Planning When There Is No Drought

As suggested above, state and local drought plans tend to be neglected without requirements or incentives to use, review, or update them. Drought spurred and motivated action in the drought and water policy, planning, and management arenas in the 1980s and after the 1998-2002, 2007-2009, and 2011-2012 events. Notwithstanding recent flash droughts (2016, 2017, 2019), interviewees indicated that other concerns (e.g., water quality) and hazards (e.g., floods, hurricanes) temper interest in drought planning. Activities such as tabletop exercises are one way to engage decision makers and generate ideas about how to enhance drought planning and response before the next drought. South Carolina has had success with this approach; it could potentially be replicated in other states or multiple states.

Looking Forward

Currently, drought monitoring and the risk assessments conducted as part of hazard mitigation planning both rely on historical data and observations and tend to reflect past conditions, not what is currently happening or expected to happen. In terms of operational plans and response, many interviewees indicated interest in exploring how forecasts and forecasting tools can be used in communications, monitoring, and reservoir operations and water management. For longer-term drought resilience, identifying ways to address and incorporate climate change could be useful for state water and climate adaptation planning processes. Virginia has made recent efforts in this area, using climate change scenarios and demand projections to identify areas of potential future water shortages.

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Abbreviations

Abbreviations used throughout the report and appendices

Abbreviation	Full Text	State (if applicable)
ADAPT	Alabama Drought Assessment & Planning Team	Alabama
AOWR	Alabama Office of Water Resources	Alabama
CMI	Crop Moisture Index	
DEP	Department of Environmental Protection	Florida
DEQ	Department of Environmental Quality	Virginia
DMAC	Drought Management Advisory Council	North Carolina
DMTF	Drought Monitoring Task Force	Virginia
DRC	Drought Response Committee	South Carolina
EPD	Environmental Protection Division	Georgia
KBDI	Keetch Byram Severity Index	
MIG	Monitoring & Impact Group	Alabama
NWFWMD	Northwest Florida Water Management District	Florida
NWS	National Weather Service	
NWS SRCS	National Weather Service Southern Region Climate Services Branch	
NWS WFO	National Weather Service Weather Forecast Office	
PDSI	Palmer Drought Severity Index	
SCO	State Climate/Climatologist Office	
SE DEWS	Southeast Drought Early Warning System	
SCDNR	South Carolina Department of Natural Resources	South Carolina
SFWMD	South Florida Water Management District	Florida
SJRWMD	St. Johns River Water Management District	Florida
SRWMD	Suwannee River Water Management District	Florida
SWFWMD	Southwest Florida Water Management District	Florida
TDEC	Tennessee Department of Environment & Conservation	Tennessee
USDM	United States Drought Monitor	
USGS	U. S. Geological Survey	
WMD	Water Management District	Florida

List of Appendices

Appendix A. Drought Monitoring and Response Authorities

Appendix B. Statewide Drought Monitoring and Declaration Processes

Appendix C. Indicators Used in State Monitoring Processes

Appendix D. Drought Emergencies

Appendix E. Drought-related Policies and Plans in Florida's Water Management Districts

Appendix F. United States Drought Monitor

Appendix G. Interview Approach and Questions

Appendix A. Drought Monitoring and Response Authorities

This appendix lists and summarizes the key state-level executive orders, statutes, regulations, and plans that establish drought monitoring, response, and planning responsibilities, decision-making processes, and activities.

Table A1 summarizes the key authorities and documents that are **specific** to statewide drought monitoring, response, and planning decisions and activities. Florida is included in the summary table (Table A-1); more specific information is located Appendix E, "Drought-related Policies and Planning in Florida".

Tables A2-A7 (Southeast Drought Early Warning System [SE DEWS] states) and A8-A10 (other southeastern states) provide additional information about state statutes, regulations, and plans guiding state-level monitoring, response, planning, and related activities. These tables include pertinent **drought-related** legislation and regulations for some states (Arkansas, Louisiana) that have not developed **drought-specific** laws, regulations, and/or plans.

Tables A2-A10 also indicate any requirements or recommendations for review of or revisions to the drought policies, plans, and processes included in these tables.

Table A-1. Drought Specific Legislation, Regulations, and Plans (Summary)

Dates indicate when the documents and authorities listed here were enacted or most recently revised. Note: Mississippi is not included in the state tables.

State	Executive Order	Act, Legislation, Statutes	Administrative Codes, Rules, Regulations	Plan
SE DEWS states				
Alabama	Alabama Executive Order No. 19 (2011)	Alabama Drought Planning and Response Act (Alabama Code § 9-10C [2014])	Alabama Administrative Code Chapter 305-7-13 (2016)	Alabama Drought Management Plan (2018)
Florida	not applicable	Florida Water Resources Act (Chapter 373, Florida Statutes), Declaration of Water Shortage, § 373.175 (1995)	Florida Administrative Code Rule 62-40.411; Ch. 40A-21; Ch. 40B-21; Ch. 40C-21; Ch. 40D-21; Ch. 40E-21	not applicable

State	Executive Order	Act, Legislation, Statutes	Administrative Codes, Rules, Regulations	Plan
Georgia	not applicable	Georgia Code § 12-5-8 (2008)	Rules and Regulations of the State of Georgia, Subject 391-3-30, The Drought Management Rules (2015)	not applicable
North Carolina	not applicable	NC General Statute 143.355.1 (2011)	15A NCAC 02E .0600 (Water Use During Droughts and Water Supply Emergencies; 2007)	Drought Assessment and Response Plan (NC Emergency Operations Plan, Annex B, Appendix 3; 2021)
South Carolina	not applicable	SC Drought Response Act (S.C. Code Ann. § 49-23-10, et. seq., amended 2000)	SC Drought Regulations (S.C. Code Ann. Regs. 49-23-10 et seq. [2001])	Drought Response Plan (SC Emergency Operations Plan, Appendix 10; 2017)
Tennessee	not applicable	not applicable	not applicable	Drought Management Plan (2010)
Virginia	Executive Order 39 (The Virginia Water Supply Initiative, 2002)	not applicable	not applicable	The Virginia Drought Assessment and Response Plan (2003)
Other southeastern states				
Arkansas	not applicable, no statewide drought plan or process note: state table includes information about water allocation during a water shortage			
Kentucky	not applicable	Kentucky General Assembly Resolution (07 RS SJR 109/SCS [2007])	not applicable	Kentucky Drought Mitigation and Response Plan (2008)
Louisiana	not applicable, no statewide drought plan or process			

	note: state table includes information about groundwater emergency authority
Mississippi	not applicable, no statewide drought plan or process note: no state table included in this Appendix

SE DEWS States

Table A-2. Alabama: Drought Authorities

Alabama	
State, Authorities, and Plans	**Explanation**
Executive Order	Alabama Executive Order No. 19 (2011) established the Alabama Drought Assessment and Planning Team (ADAPT) to advise the Alabama Department of Economic and Community Affairs (ADECA) Office of Water Resources (AOWR) in the development and implementation of all drought-related activities.
Act	The Alabama Drought Planning and Response Act (Alabama Code § 9-10C [2014]) establishes ADAPT's responsibilities, the drought declaration process, and state and local planning requirements.
Administrative Code / Regulations	Alabama Administrative Code Chapter 305-7-13 (2016) codifies and describes ADAPT's responsibilities, the drought declaration process, and state and local planning requirements.
Plan	The Alabama Drought Management Plan (2018) describes the monitoring, communications, and coordinating activities that AOWR, ADAPT, and the Monitoring and Impact Group (MIG) should take at increasingly severe drought levels.
Review and Revision	The Drought Planning and Response Act requires the Drought Management Plan to be reviewed and updated every 5 years at minimum.

Table A-3. Georgia: Drought Authorities

Georgia	
State, Authorities, and Plans	**Explanation**
Statute	Georgia Code § 12-5-8 (2008) required that the Board of Natural Resources adopt new drought management rules and regulations, to include provisions for a drought response committee, drought indicators and triggers, a drought declaration process, and state and local predrought mitigation strategies and drought response strategies.
Rules and Regulations	Rules and Regulations of the State of Georgia, Subject 391-3-30, The Drought Management Rules (2015) codifies and describes the responsibilities and process for drought monitoring and declaration of drought response levels.
Review and Revision	Georgia's drought policies and rules changed during the 2007-2009 drought, through passage of House Bill 1281 in 2008. Per Georgia Code § 12-5-8, rules and regulations "shall be revised from time to time as the board deems appropriate."

Table A-4. North Carolina: Drought Authorities

North Carolina	
State, Authorities, and Plans	**Explanation**
Statute	North Carolina General Statute 143.355.1 (2011) establishes the Drought Management Advisory Council (DMAC) and describes its responsibilities and the state's drought monitoring process, including the requirement that drought categories are based on those used by the U.S. Drought Monitor.
Administrative Code	15A NCAC 02E .0600 ("Water Use During Droughts and Water Supply Emergencies"; effective March 2007) details requirements for water shortage response planning for water systems and state agencies, annual water use reporting, and default water use reduction measures during NC DMAC extreme and exceptional drought designations.
Plan	The Drought Assessment and Response Plan is part of the North Carolina Emergency Operations Plan, Annex B, Appendix 3. It describes the coordinating actions to be taken by federal, state, and local agencies and private sector organizations when significant drought impacts North Carolina, namely when the Governor declares a State of Emergency because of drought.
Review and Revision	The Drought Assessment and Response Plan was last updated in December 2021. North Carolina General Statute 143.355.1 requires that the DMAC provide an annual report that reviews the issued drought advisories and includes recommendations to improve agency coordination and the management and mitigation of drought impacts.

Table A-5. South Carolina: Drought Authorities

South Carolina	
State, Authorities, and Plans	**Explanation**
Act	South Carolina Drought Response Act (S.C. Code Ann. § 49-23-10, et seq., amended 2000) establishes the Drought Response Committee (DRC) and describes the responsibilities of the DRC and the Department of Natural Resources (SCDNR) for monitoring, drought declarations, determining response actions, and communications. The Act also establishes categories of essential and non-essential water use, authorizes the SCDNR to restrict non-essential water use if conditions warrant, and requires public water suppliers to develop local drought plans and ordinances.
Regulations	South Carolina Drought Regulations (S.C. Code Ann. Regs. 49-23-10 et seq. [2001]) establish and describe the procedures through which drought and water supplies are monitored, drought severity phases are determined, and response actions are implemented.
Plan	The South Carolina Drought Response Plan (2017) is part of the South Carolina Emergency Operations Plan (EOP), Appendix 10, and describes the procedures to be followed if drought threatens health and safety and conditions have reached a level of severity beyond the scope of the DRC and local communities.
Review and Revision	The Drought Response Plan was reviewed and updated in June 2017 as part of other EOP updates. Neither the Act nor the Regulations requires or recommends review or revision of the legislation, regulations, or processes.

Table A-6. Tennessee: Drought Authorities

Tennessee	
State, Authorities, and Plans	**Explanation**
Statute	No state statute or Act establishes drought-specific requirements or responsibilities. The Drought Management Plan notes that the authority for the plan is based on related Tennessee statutes including the Water Resources Division Act of 1957 (T.C.A. 69-8-101 et seq.), Water Resources Information Act of 2002 (T.C.A. 69-8-301 et seq.), Tennessee Safe Drinking Water Act of 1983 (T.C.A. 68-221-701 et seq), and the Tennessee Water Quality Control Act of 1977 as amended (T.C.A. 69-3-101 et seq.).
Plan	The Tennessee Drought Management Plan defines drought, gives a history of drought events and impacts in Tennessee, and describes local, state, and federal agency responsibilities for drought monitoring, response, and planning. It also requires community water systems to develop drought management plans. However, it is not an operational plan as it does not specify monitoring indicators nor the threshold values that would trigger drought declaration levels and response actions.
Review and Revisions	The Plan does not require or recommend review or revision of the Plan or any of the Plan components.

Table A-7. Virginia: Drought Authorities

Virginia	
Executive Order	Executive Order 39 (The Virginia Water Supply Initiative, 2002) authorized the Governor's Drought Coordinator to prepare a preliminary drought response assessment and plan and directed state agencies (Commerce and Trade, Health and Human Resources, Natural Resources) to coordinate their respective water supply functions and develop proactive water planning efforts.
Plan	The Virginia Drought Assessment and Response Plan (2003) describes the state's monitoring process, thirteen (13) evaluation regions, indicators and thresholds to use for monitoring, drought severity levels and declaration process, and the types of response actions to be taken by state and local agencies at different drought levels.
Review and Revision	The Plan does not require or recommend a review and revision process for the Plan.

Other Southeastern States

Table A-8. Arkansas: Drought Authorities

Arkansas	
State, Authorities, and Plans	**Explanation**
Statute (Drought-related)	The Arkansas Code Annotated (A.C.A. § 15-22-205) authorizes the Arkansas Natural Resources Commission to allocate surface water among users during periods of shortage and to promulgate rules. A.C.A. § 15-22-217 indicates the Arkansas Natural Resources Commission may allocate the available water from the stream to the affected needs in an equitable manner during a water shortage, in the following order of priority: agriculture, industry, minimum streamflow, hydropower, recreation. The following priorities shall be reserved before allocation: domestic and municipal domestic and federal water rights.
Administrative Code	The Arkansas Administrative Code (003. UTILIZATION OF SURFACE WATER (TITLE 3), 138 00 CARR 003) details the procedures through which available water is allocated during a period of shortage.
Plan	Not applicable
Revisions and Updates	No requirements or recommendations included in the noted (above) state statute or administrative code.

Table A-9. Kentucky: Drought Authorities

Kentucky	
State, Authorities, and Plans	**Explanation**
Resolution	Kentucky General Assembly Resolution 07 RS SJR 109/SCS (2007) required the Environmental and Public Protection Cabinet to form a Drought Mitigation and Response Advisory Council and develop a drought mitigation and response plan.
Plan	The Kentucky Drought Mitigation and Response Plan (2008) contains the state's monitoring process, indicators and thresholds to use for monitoring, drought severity levels and declaration process, and required agency actions at different drought levels. The Plan also includes a list of mitigation measures to undertake to improve drought preparedness and future response.
Revisions and Updates	The Plan recommends periodic updates to the Plan and other measures to take advantage of new approaches and improve overall effectiveness of the state's drought response.

Table A-10. Louisiana: Drought Authorities

Louisiana	
State, Authorities, and Plans	**Explanation**
Statute (Drought-related)	Louisiana R.S. § 38:3097.1 et seq. includes authority for the Commissioner of the Department of Natural Resources Office of Conservation to declare a groundwater emergency during periods, including drought events, when groundwater resources are threatened. The Commissioner may then place restrictions on groundwater use.
Revisions and Updates	No requirements or recommendations included in the noted (above) state statute.

Appendix B. Statewide Drought Monitoring and Declaration Processes

Three summary tables (Tables B1-B3) provide state-by-state comparisons regarding lead state agencies and responsibilities, monitoring committees, and monitoring and declaration processes. Tables B4-B9 provide details for the states with plans or rules that specify drought indicators, triggers or threshold values for drought levels, and the process to determine drought levels (Alabama, Georgia, Kentucky, North Carolina, South Carolina, and Virginia). Find Florida-specific information in Appendix E, "Drought-related Policies and Planning in Florida."

Table B-1. Lead State Agencies and Information Sources (Summary)

Website Information	Document	Lead State Agency	Responsibilities
Alabama | https://adeca.alabama.gov/drought/			
Drought Information Center: links to GIS Drought Data Portal showing streamflow conditions and to other monitoring information	The Alabama Drought Management Plan (2018)	Department of Economic and Community Affairs (ADECA), Office of Water Resources (AOWR)	Monitoring Declarations Coordination Communications Local Planning and Reporting Oversight
Georgia | https://epd.georgia.gov/watershed-protection-branch/drought-management			
Drought Indicator Reports: precipitation, streamflow, groundwater, and reservoir levels compared to historic levels	The Drought Management Rules (GA Rules & Regulations Subject 391-3-30 [2015])	Department of Natural Resources, Environmental Protection Division (EPD)	Monitoring Declarations Communications Variance Requests
Kentucky | https://eec.ky.gov/Environmental-Protection/Water/FloodDrought/Pages/Drought.aspx			
Kentucky Drought Viewer: drought status using soil moisture, stream flow, and precipitation indicators	The Kentucky Drought Mitigation and Response Plan (2008)	Kentucky Energy and Environment Cabinet (EEC), Department for Environmental Protection, Division of Water	Monitoring Coordination Communications Declarations Local Planning and Technical Support

Website Information	Document	Lead State Agency	Responsibilities
North Carolina | https://www.ncdrought.org/			
US Drought Monitor Map of North Carolina: weekly conditions and links to the primary information used by the DMAC	North Carolina General Statute 143.355.1 (2011)	Department of Environmental Quality (DEQ), Division of Water Resources	Coordination Communications Local Planning, Reporting Oversight, Technical Assistance
South Carolina | http://scdrought.com/index.html			
Drought in South Carolina: the most recent drought designations made by the Drought Response Committee and links to SC's main indicators	The Drought Regulations (S.C. Code Ann. Regs. 49-23-10 et seq. [2001])	Department of Natural Resources (SCDNR), State Climatology Office (SCO)	Monitoring Coordination Communications Local Planning and Reporting Oversight Variance Requests Mandate Restrictions Mediate Disputes
Tennessee | https://www.tn.gov/environment/program-areas/wr-water-resources/drought-updates.html			
Drought website: shows water systems currently impacted by drought, links to US Drought Monitor and other resources	The Tennessee Drought Management Plan (2010)	Department of Environment & Conservation (TDEC) Emergency Management Agency (TEMA)	Monitoring Coordination Communications Local Planning and Technical Assistance
Virginia | https://www.deq.virginia.gov/water/water-quantity/drought			
Drought Conditions Map: status of VA's four indicators by Drought Evaluation Region, automatically updated daily, links to additional DEQ drought information and resources	The Virginia Drought Assessment and Response Plan (2003)	Department of Environmental Quality (DEQ)	Monitoring Coordination Communications

Table B-2. Monitoring Committees and Process (Summary)

Members	Other Responsibilities	Process Overview
Alabama | Monitoring and Impact Group (MIG), Alabama Drought Assessment and Planning Team (ADAPT)		
Federal, state, local agencies Other water resources professionals	Assists with recommendations for drought declarations, mitigation efforts	AOWR and MIG routinely monitor data and information. Entering or nearing the Drought Watch stage accelerates monitoring. ADAPT and MIG meet no less than twice a year, more frequently if conditions warrant. Additional evaluation of conditions and appropriate actions occur if any one indicator in any one or more of the Drought Management Regions experiences a defined condition for two consecutive months.
Georgia |		
No standing committee		EPD (State Climatologist Office, Watershed Protection Branch) analyzes weather, climate, and water supply data weekly. EPD issues Drought Indicator Reports semi-annually and monthly when the USDM indicates severe or higher drought conditions for two consecutive months.
Kentucky | Kentucky Drought Mitigation Team (KDMT), Climate and Water Resources Data (CWRD) Team		
KDMT: State, federal, local agencies Other water resources professionals and interests	Declarations Agency coordination	The Division of Water and CWRD Team (state, federal agencies) monitor conditions as part of their agency missions. At the Drought Advisory level, the KDMT will activate to monitor conditions, determine drought level status, and facilitate coordination and communications.

Members	Other Responsibilities	Process Overview
North Carolina | Drought Management Advisory Council (DMAC)		
State, federal agencies Reservoir managers	Declarations Agency coordination	The DMAC meets weekly, collectively examines a variety of data and information, and determines drought levels, using the USDM "convergence of evidence" approach.
South Carolina | Drought Response Committee (DRC)		
State agencies Local representatives (water suppliers, local government, industry, power generation, agriculture, Soil and Water Conservation Districts, public)	Declarations Recommend water restrictions, state response actions, emergency actions	The SCO routinely collects information and monitors conditions. The DRC monitors conditions and meets when necessary; local representatives from four (4) Drought Management Areas designate drought levels.
Tennessee |		
No standing committee		The Tennessee Department of Environment & Conservation (TDEC), Emergency Management Agency (TEMA), and TEMA's Drought Task Force monitor conditions and impacts. However, the Drought Management Plan does not provide set triggers or processes for determining drought severity and/or response levels.
Virginia | Drought Monitoring Task Force (DMTF)		
State, federal agencies	Recommends drought declarations	DEQ monitors the USDM during normal conditions. The DMTF activates when any area reaches USDM D1. When two of the four main indicators used exceed a drought stage threshold (precipitation, streamflow, groundwater, streamflow), the DMTF evaluates other indicators and information to make a drought stage recommendation.

Table B-3. Making Declarations (Summary)

Note: Most states have flexibility under "spatial scale," e.g., single counties, river basins, or other affected areas. Details about drought levels and spatial scale are in the individual state tables (Tables B4-B9). Appendix C contains additional information about the indicators states use for monitoring.

Responsibility	Specified Indicators & Thresholds	Drought Levels	Spatial Scale
Alabama			
ADAPT (interagency, Cabinet-level body) makes recommendations. AOWR issues declarations.	The Plan specifies 9 indicators used for monitoring, but a wide range of information is used to determine levels and response actions.	Drought Declaration Levels (4), based on severity of conditions Drought Advisory, Drought Watch, Drought Warning, Drought Emergency	Nine (9) Drought Management Regions
Florida			
The Governing Boards of the state's five Water Management Districts designate affected areas.	Indicators and thresholds vary, specific to each Water Management District (see Appendix E)	Water Shortage Designations and Phases (4), based on water supply conditions and demand reduction goals Moderate, Severe, Extreme, Critical	Typically, counties
Georgia			
The EPD Director declares drought; may convene and consult with a Drought Response Committee and determine members.	The Rules specify several drought indicators for monitoring but not numeric values to correspond to drought response levels.	Drought Response Levels (4), signify water withdrawal permittees' water use reduction actions Non-Drought, Level 1 (public information campaign), Level 2 (some outdoor use restrictions), Level 3 (outdoor use suspended, some exceptions)	EPD Director designates affected areas (most recent designations = county)

Responsibility	Specified Indicators & Thresholds	Drought Levels	Spatial Scale
Kentucky			
The Kentucky Drought Mitigation Team (KDMT; interagency body) makes recommendations. The Energy and Environment Cabinet (EEC) issues drought level declarations, as well as water shortage watches and warnings.	The Drought Mitigation and Response Plan describes the five (5) primary indicators (precipitation deficits, stream flows, soil moisture, US Drought Monitor, reservoir storage) and the thresholds at which monitoring actions are triggered and the KDMT considers appropriate response actions. The Plan does not specify thresholds or trigger levels for 1) other indicators that may be used or 2) determining declaration levels.	Drought Action Levels (4), driven by physical measures of drought conditions and the severity and extent of impacts Drought Advisory, Level I Drought, Level II Drought Level III Drought	Fifteen (15) Areas Development Districts
North Carolina			
Made by the DMAC	The Statute indicates the types of information to be used in monitoring but does not require specific indicators or thresholds for determining levels.	Drought Classifications (5), follow US Drought Monitor levels D0 (abnormally dry), D1 (moderate), D2 (severe), D3 (extreme), D4 (exceptional)	County

Responsibility	Specified Indicators & Thresholds	Drought Levels	Spatial Scale
South Carolina			
Made by the DRC	The Regulations specify 7 indicators required for monitoring and determining levels, also allow consideration of other information.	Drought Alert Phases (5), based on severity of conditions Normal, Incipient, Moderate, Severe, Extreme	County
Tennessee			
The Tennessee Drought Management Plan does not provide set triggers or processes for determining drought severity and/or response levels.			
Virginia			
The Commonwealth "Drought Coordinator" (Deputy Secretary of Natural Resources) makes final decision	The Plan specifies 4 indicators required for monitoring and lists other types of information that should be evaluated during each DMTF meeting and deliberations about drought levels. This includes indicators and data products from DMTF member agencies (NOAA-NWS, USACE, USGS, VDH, VDACS, VDWR, VDEM) to help ensure evaluation of conditions across sectors and water uses when making drought advisory recommendations.	Drought Stages (4), based on severity of conditions Normal Conditions, Drought Watch, Drought Warning, Drought Emergency	Thirteen (13) Drought Evaluation Regions

Table B-4. Alabama: Components of the Drought Monitoring and Declaration Process

Alabama	
Component	**Explanation**
Lead Agency and Responsibilities	Alabama Department of Economic and Community Affairs (ADECA), Office of Water Resources (AOWR) AOWR produces the drought plan, chairs and conducts ADAPT meetings, coordinates monitoring and data collection, issues drought declarations, and provides relevant drought information to the public.
Committees and Responsibilities	Alabama Drought Assessment and Planning Team (ADAPT) is an interagency, Cabinet-level body that advises on the development of the drought plan, assesses drought conditions, advises Governor when a drought emergency exists, makes recommendations for mandatory water withdrawal restrictions or reductions, facilitates interagency coordination. Monitoring and Impact Group (MIG) is a technical subcommittee of ADAPT, charged with analyzing data and assisting with recommendations for drought declarations and mitigation efforts. Members include federal, state, and local agencies and other water resources professionals.
Specification of Indicators, Triggers, and Drought Levels	The Alabama Drought Management Plan lists the various types of information for use in drought monitoring and specific indicators and values (ranges) that trigger additional monitoring, assessment of impacts, and consideration of a drought declaration. If any one indicator in any one or more of nine Drought Management Regions experiences a defined condition for two consecutive months, additional evaluation of conditions and appropriate actions occurs. Specified indicators and triggers can help to determine drought levels, but drought status should be verified through multiple sources. No quantifiable criteria exist for the declaration levels, to allow for the varying nature and impacts of individual droughts.
Making Drought Declarations	ADAPT, through the MIG Technical Committee, makes recommendations, and AOWR issues declarations. AOWR and MIG routinely monitor and analyze data and information. Entering or approaching the Drought Watch stage accelerates monitoring. ADAPT and MIG meet no less than twice a year, and more frequently if conditions warrant. Additional evaluation of conditions and appropriate actions occur if any one indicator in any one or more of the Drought

	Management Regions experiences a defined condition for two consecutive months. Drought status is verified through multiple sources. No quantifiable criteria exist for the declaration levels, to allow for the varying nature and impacts of individual droughts.
Drought Designations	Drought Declaration Levels (4) Represent the severity of drought, based on a compilation of the established drought indicators and other information related to local conditions and drought impacts, as submitted to the Office of Water Resources Drought Advisory, Drought Watch, Drought Warning, Drought Emergency
Spatial Scale	Nine (9) Drought Management Regions Each region consists of 2 or more counties, "to assess and respond to drought conditions in the most effective manner." However, there is flexibility for drought management efforts or drought declaration levels to be made for smaller areas, such as a county or watershed, if conditions warrant.

Table B-5. Georgia: Components of the Drought Monitoring and Declaration Process

Georgia	
Component	**Explanation**
Lead Agency and Responsibilities	Georgia Department of Natural Resources, Environmental Protection Division (EPD) The EPD Director (or designee) monitors conditions, assesses drought occurrence and severity and any impacts on public water systems' ability to provide adequate water supplies, makes drought declarations, and communicates drought conditions and response status to water withdrawal permittees and the public. Within EPD, the Office of the State Climatologist collects and monitors weather and climate data and conditions. The Watershed Protection Branch monitors and analyzes climate and water supply conditions and hosts the Drought Management website. EPD is also responsible for reviewing variance requests for systems desiring to impose more, or less, stringent water use restrictions than those in the Drought Management Rules.
Committees and Responsibilities	No standing committee During the process to develop and/or implement drought response and mitigation strategies, the EPD Director may convene and consult with a Drought Response Committee, the members of which shall be determined by the Director. The Director may consult with state and federal agencies with drought expertise (State Climatologist, NOAA, USGS, US Army Corps) prior to making drought response level declarations.
Specification of Indicators, Triggers, and Drought Levels	The Drought Management Rules (GA Rules & Regulations Subject 391-3-30 [2015]) list several types of indicators to be used in drought monitoring but does not provide specific thresholds or numeric values for different drought levels. EPD issues Drought Indicator Reports semi-annually and monthly when the US Drought Monitor indicates severe or higher drought conditions for two consecutive months.
Making Drought Declarations	The EPD Director determines drought response level designations and declarations, based on indicators and in consultation with agencies including but not limited to the State Climatologist, NOAA, USGS, and

	Army Corps. The EPD Director may convene and determine members of a Drought Response Committee.
Drought Designations	Drought Response Levels (4) Correspond to the severity of conditions and the strategies and actions water withdrawal permittees shall take to reduce water use Non-Drought Level 1 (public information campaign) Level 2 (some outdoor water use restrictions) Level 3 (suspension of outdoor water use, with some exceptions)
Spatial Scale	Up to the discretion of the EPD Director "The Director shall designate the geographical boundary of the affected drought area(s). The geographic delineation of a drought response level shall be based upon the severity of climatic indicators and condition of water supplies occurring within all or a portion of defined hydrologic units, counties, or other areas." In the past, official Drought Response declarations have been made for the county level.

Table B-6. Kentucky: Components of the Drought Monitoring and Declaration Process

Kentucky	
Component	**Explanation**
Lead Agency and Responsibilities	Kentucky Energy and Environment Cabinet (EEC), Department for Environmental Protection, Division of Water The EEC provides leadership, technical assistance, and information related to water assessments, use, conservation, and management. The EEC chairs the Kentucky Drought Mitigation Team (KDMT) and is responsible for activating the KDMT, communicating to the public, and leading the KDMT in the collection, review, and distribution of drought information and the coordination and recording of the state's response activities.
Committees and Responsibilities	The KDMT monitors drought, determines drought action levels, and facilitates coordinated response between state, federal, and local entities. Designated members consist of state agencies; other invited participants include federal agencies; statewide water, utility, county, and city associations; universities; and representatives of different water interests (electric power generation, water utilities, industry, environment, recreation). Drought Assessment Teams support and implement the KDMT's work: The Climate and Water Resources Data Team collects data and assesses conditions. Other teams help to identify drought impacts and assist affected areas and sectors: Agriculture and Natural Resources, Drinking Water and Public Health, Drought and Water Emergency.
Specification of Indicators, Triggers, and Drought Levels	The Kentucky Drought Mitigation and Response Plan describes the five (5) primary indicators (precipitation deficits, stream flows, soil moisture, US Drought Monitor, reservoir storage) and the thresholds at which additional monitoring actions are triggered. The Division of Water and Climate and Water Resources Data Team continually monitor conditions as part of their agency missions. At the Drought Advisory level, the KDMT will activate to monitor conditions, determine drought level status, and facilitate coordination and communications.

	The Plan includes threshold levels for primary indicators. When at least three of five indicators meet trigger thresholds for Drought Levels I-III, the Climate and Water Resources Team should evaluate other indicators, and the KDMT considers the appropriate drought recommendations and level of drought response. The Plan does not specify thresholds or trigger levels for 1) the other indicators or 2) declaration levels.
Making Drought Declarations	The KDMT makes recommendations, and the EEC issues drought level declarations, as well as water shortage watches and warnings. As every drought is different, the Plan provides flexibility to the KDMT, EEC, and participating agencies to use multiple indicators and adapt to any unique circumstances, conditions, and/or impacts.
Drought Designations	Drought Action Levels (4) Driven by physical measures of drought conditions and the severity and extent of impacts. Additionally, a water shortage watch may be issued when a potential for water shortage exists; a warning signifies an imminent critical water shortage. Drought Advisory, Level I Drought, Level II Drought, Level III Drought
Spatial Scale	Fifteen (15) Area Development Districts Districts correspond to local and regional planning boundaries. To prevent overly broad response, state response measures are considered within individual regions, or within individual counties or municipalities if applicable.

Table B-7. North Carolina: Components of the Drought Monitoring and Declaration Process

North Carolina	
Component	**Explanation**
Lead Agency and Responsibilities	North Carolina Department of Environmental Quality (DEQ), Division of Water Resources DEQ establishes, chairs, and coordinates the activities of the Drought Management Advisory Council (DMAC). The Division of Water Resources carries out these responsibilities. DEQ has the authority to require that public water suppliers implement more stringent water conservation measures, or implement the next tier of response measures, if conditions warrant. DEQ also oversees the reporting of water conservation measures by public water suppliers.
Committees and Responsibilities	The DMAC is primarily responsible for assessing conditions, determining drought levels, and facilitating agency coordination. It consists of organizations with expertise or responsibility in meteorology, hydrology, reservoir management, water system operations, emergency response, or other subject areas related to drought impacts and management. Other groups may be invited.
Specification of Indicators, Triggers, and Drought Levels	North Carolina General Statute 143.355.1 indicates the types of information to be used for drought monitoring (hydrological and water supply conditions, weather forecasts, time of year, effects on crops, and wildfire activity) but does not require specific indicators or provide numeric values that correspond to each drought level.
Making Drought Declarations	The DMAC meets weekly, collectively examines a variety of data and information, and determines drought levels, following the US Drought Monitor “convergence of evidence” approach.
Drought Designations	Drought Classifications (5) Classifications follow those used by the US Drought Monitor to represent levels of drought intensity and impacts D0 (abnormally dry), D1 (moderate), D2 (severe) D3 (extreme), D4 (exceptional)
Spatial Scale	County 143-355.1(e) states that the NC DMAC "may issue drought advisories that designate specific areas of the State" that are experiencing drought or are facing impending drought. 143-355.1(f) states that the USDM drought designation are NC's default designations, and these are to be published for each county. A county's drought designation shall be the highest drought designation that applies to at least 25% of that county's land area.

Table B-8. South Carolina: Components of the Drought Monitoring and Declaration Process

South Carolina	
Component	**Explanation**
Lead Agency and Responsibilities	South Carolina Department of Natural Resources (SCDNR), State Climatology Office SCDNR collects, assesses, and communicates information about drought conditions and impacts to the Drought Response Committee (DRC); coordinates state drought response with the DRC; and publicizes drought status to water systems, other appropriate agencies, and the public. SCDNR is also authorized to develop regulations to specify nonessential water uses, mandate curtailment of those uses during severe or extreme drought, review variance requests pertaining to curtailment declarations, and mediate disputes arising from competing demands for water.
Committees and Responsibilities	The Drought Response Committee (DRC) consists of state agency and local representation. The DRC evaluates drought conditions, decides drought levels, and determines if there is a need for response action beyond the scope of local government. The DRC can recommend actions, such as restrictions on non-essential water use, for the SCDNR to implement and, if drought affects the safety, health, or welfare of an area, request that the Governor authorize emergency action.
Specification of Indicators, Triggers, and Drought Levels	The Drought Regulations (S.C. Code Ann. Regs. 49-23-10 et seq. [2001]) specify seven (7) indicators to be used to monitor conditions and the numeric values (ranges) that correspond to each drought phase. Drought levels may be declared if any of the indices meet a trigger level, but indication by only one index does not mandate a declaration. The DRC verifies conditions using multiple indicators and information sources.
Making Drought Declarations	The SCO and other SCDNR divisions routinely collect information and monitor conditions. The DRC convenes as necessary to monitor and review conditions and designate drought levels. County designations are made by the DRC's four (4) Drought Management Area (DMA) committees.
Drought Designations	Drought Alert Phases (5) Phases represent the severity of drought conditions, using quantified indices Normal, Incipient, Moderate, Severe, Extreme
Spatial Scale	County

	The DMAs generally follow major river basins, but county lines determine the boundaries. DMAs are represented by local members of the Drought Response Committee and are intended to "prevent overly broad response to drought."

Table B-9. Virginia: Components of the Drought Monitoring and Declaration Process

Virginia	
Component	**Explanation**
Lead Agency and Responsibilities	Virginia Department of Environmental Quality (DEQ) The DEQ Division of Water Planning, Office of Water Supply, monitors and evaluates hydrologic and water supply conditions and leads the Drought Monitoring Task Force (DMTF). The Deputy Secretary of Natural and Historic Resources typically serves as the official "Commonwealth Drought Coordinator" (selection made by each administration) and collaborates with the DEQ Director and Office of Water Supply Director to make the final decision on drought status declarations, using the four main drought indicators as well as other DEQ drought tools and models and information from partner agencies and other sources.
Committees and Responsibilities	The DMTF monitors and evaluates natural resource and water supply conditions and the effects of drought, produces drought status reports, and makes recommendations to the Virginia Drought Coordinator regarding drought stage declarations. It consists of technical representatives from state and federal agencies.
Specification of Indicators, Triggers, and Drought Levels	The Virginia Drought Assessment and Response Plan (2003) details four (4) indicators (precipitation deficits, streamflow, groundwater levels, reservoir storage) and the thresholds at which different drought levels and additional monitoring actions are triggered. The Plan allows for the consideration of additional information. The Plan does not specify thresholds or trigger levels for 1) the other indicators or 2) declaration levels.
Making Drought Declarations	DEQ monitors the USDM during periods of normal moisture conditions. The DMTF activates when any area reaches USDM D1. When two of the four main indicators used exceed a drought stage threshold (precipitation, streamflow, groundwater, streamflow), the DMTF evaluates other indicators and information to make a drought stage recommendation. The Deputy Secretary of Natural and Historic Resources typically serves as the official "Commonwealth Drought Coordinator" and collaborates with DEQ to make the final decision on drought declarations.
Drought Designations	Drought Stages (4) Stages reflect the severity of drought conditions

	Normal Conditions, Drought Watch, Drought Warning, Drought Emergency
Spatial Scale	Thirteen (13) drought evaluation regions Regions were established based on different parameters: river basins, climatic divisions, physiographic provinces, major geomorphologic features, and major water supplier service areas. Boundaries correspond to local government boundaries to simplify plan implementation.

Appendix C. Indicators Used in State Monitoring Processes

Under each information type, Column 1 indicates information specified or required in a state document for use in determining drought levels. Column 2 indicates additional information listed in plans, shown on drought program websites, provided in committee or agency reports, and/or noted by interviewees.

For North Carolina: North Carolina General Statute 143.355.1 indicates the types of information to be used for drought monitoring (hydrological and water supply conditions, weather forecasts, time of year, crop conditions, wildfire activity) but does not require specific indicators. Information on the ncdrought.org website is listed under "2."

For Virginia: Virginia also evaluates ecological drought risk, using DEQ tools and VDWR reports.

For agricultural impacts and conditions: Most states rely on a variety of information sources, including USDA National Agricultural Statistics Service (NASS) Crop and Weather Reports, Cooperative Extension, Farm Service Agents, or their own state Department of Agriculture.

For streamflow (hydrological) indicators: All states use USGS stream gage data. Some use state-run monitoring networks if available.

For reservoir levels: Unless indicated otherwise, most states rely on information from reservoir operators, such as the Army Corps of Engineers, Tennessee Valley Authority, and energy utilities (e.g., Duke Energy, Dominion Energy, Alabama Power).

For groundwater information: States rely on USGS and/or state monitoring networks.

For water supply conditions: States rely on a variety of information sources, including state agencies with responsibilities for water quality and water system operations, community water systems, industry, domestic users and private well owners, and others.

For forestry and wildfire impacts and conditions: Most states rely on information from their state forestry agency (i.e., Forestry Commission, Forest Service).

For forecasts and outlooks: Most states specify forecasts, outlooks, and similar data products provided by NOAA and the National Weather Service.

Please note: This is not an exhaustive list; states may use other indicators and information in their monitoring and deliberation processes, in addition to those listed here.

Please note: This list includes only those states with plans or regulations that specify indicators to be used in state monitoring processes (Alabama, Georgia, Kentucky, North Carolina, South Carolina, Virginia).

Table C-1. Indicators Used in State Monitoring Processes

State	Precipitation		Agriculture & Soil Moisture	
	1	2	1	2
Alabama	180-day, 60-day rainfall		Crop Moisture Index Lawn and Garden Moisture Index	Impacts, conditions
Georgia	Prior 3, 6, 12 months, compared to historical values		Soil moisture	VIC Soil Moisture Percentiles
Kentucky	30-, 60-, 90-, 120-day deficits 6- and 12-month deficits		Soil moisture status Crop Moisture Index Impacts, conditions	
North Carolina		Current and recent records 60-, 90-day percent of normal		Crop Moisture Index Impacts, conditions
South Carolina	SPI	Current and recent records 30-, 60-day percent of normal	Crop Moisture Index	Impacts, conditions
Virginia	Current amounts compared to long-term average values	Water year to date, compared to long-term normal values SPI Current and recent records 30-, 60-, 90-, 120-day percent of normal		Crop Moisture Index Impacts, conditions

State	Climate / Drought Indicators		Hydrology	
	1	2	1	2
Alabama	PDSI[2]		28-day average streamflow compared to historical streamflow for day of year 60- and 90-day streamflow	
Georgia	USDM[3]		Streamflow Groundwater Reservoir levels	Reservoir levels
Kentucky	USDM		28-day average stream flows compared to historic flow statistics Storage in small-, medium-, and large-sized reservoirs where data is available and pertinent	
North Carolina		SPEI[4]		Streamflow conditions Reservoir conditions and lake levels Groundwater conditions
South Carolina	PDSI USDM		Average daily streamflow, 2-week period Static aquifer water levels, 2-month period	Reservoir conditions and lake levels
Virginia		PDSI	Streamflow (USGS) Groundwater levels (USGS) Reservoir storage (DEQ, USACE)	Reservoir conditions and lake levels

[2] Palmer Drought Severity Index

[3] US Drought Monitor

[4] Standardized Precipitation-Evapotranspiration Index

State	Water Supply Conditions		Fire & Forestry		Forecasts & Outlooks	
	1	2	1	2	1	2
Alabama		Yes	KBDI[5]	Forestry, wildfire conditions	Projected, forward-looking forecasts	
Georgia	Yes				Short-term climate predictions	Seasonal temperature, precipitation, drought outlooks
Kentucky		Yes		Wildfire conditions		Outlooks
North Carolina		Yes		KBDI Forestry, wildfire conditions		Seasonal drought outlook Weather information
South Carolina		Yes	KBDI	Forestry, wildfire conditions		Weather forecasts Seasonal temperature, precipitation, drought outlooks
Virginia		Yes		VDOF reports KBDI Cumulative Severity Index[6] Wildfire conditions		Monthly and seasonal precipitation outlooks 6-10, 8-14 day forecasts

[5] Keetch-Byram Drought Index

[6] Index used by the Virginia Department of Forestry (VDOF)

Appendix D. Drought Emergencies

The tables in this appendix provide information about if and where states have policies, procedures, and/or plans for a drought emergency.

All states have emergency operations plans and statutes authorizing their Governors' and emergency management agencies' emergency powers and responsibilities. The relevant state statutes and plans are included in the state tables (Tables D2-D11). Only North Carolina and South Carolina have a Drought Plan included as an Annex or Appendix within the more comprehensive state emergency operations or management plan.

Table D-1. Triggers and Processes for Declaring a Drought Emergency (Summary)

Note: Florida is included in this summary table, but not in the individual state tables (see Appendix E, "Drought-related Policies and Planning in Florida").

State	Are there specific triggers or thresholds associated with the drought emergency level?	Process for transitioning to the emergency level
SE DEWS States		
Alabama	Yes, located in the Drought Management Plan	AOWR issues the declaration and coordinates with ADAPT and the Governor's Office on communications and response actions.
Florida **(Water Management Districts [WMD])**	No, some WMDs have adopted by rule the indicators, data, and information to be used in monitoring, evaluating conditions, and determining levels; however, these rules are not self-executing for an emergency declaration (see Appendix E)	In consideration of a water shortage emergency, WMDs evaluate drought indicators as well as effects on public health, safety, or welfare; the health of animals, fish or aquatic life, or a public water supply; and commercial, industrial, agricultural, recreational, or other essential or reasonable-beneficial uses. The Governing Board may declare a water shortage emergency, water use restrictions, and other response actions. The Executive Director may have authority to make such declarations in an emergency if later ratified by the Governing Board.

State	Are there specific triggers or thresholds associated with the drought emergency level?	Process for transitioning to the emergency level
Georgia	No, not included in the Drought Management Rules	O.C.G.A. § 12-5-7(a)(2) allows for a political subdivision of the state or local government authority to impose water use restrictions in the case of an emergency that threatens public health, safety, or welfare.
North Carolina	No, North Carolina General Statute 143.355.1 establishes the types of information to be used for drought monitoring but does not specify emergency triggers	North Carolina General Statute 143.355.3. describes water shortage emergency powers and allows the DEQ Secretary to request that the Governor declare a water shortage emergency for an affected water system or area, based on an assessment of water supplies and system conditions.
South Carolina	No, the Drought Regulations establish triggers and numeric values for each drought phase but not for an emergency level	The Drought Response Committee (DRC) recommends emergency proclamations, regulations to curtail water withdrawals or allocate water on an equitable basis, or other actions to the Governor when drought threatens public health, safety, and welfare and local-level action alone cannot address impacts.
Tennessee	No, the Drought Management Plan does not provide specific triggers for drought status or declaration levels, including the emergency level	The TN Department of Environment and Conservation (TDEC), TN Emergency Management Agency (TEMA), the Governor can take action(s) to address water conflicts, water quality problems, or other emergencies when the Governor makes an Emergency Declaration.
Virginia	Yes, the Drought Assessment and Response Plans provides threshold values for the state's "Drought Emergency" level	The Governor declares a statewide or regional Drought Emergency by Executive Order.

State	Are there specific triggers or thresholds associated with the drought emergency level?	Process for transitioning to the emergency level
Other southeastern states		
Arkansas	Not applicable, no statewide drought plan or process	The Natural Resources Commission may declare a water shortage emergency if public health, safety, or welfare is significantly affected.
Kentucky	No, the Drought Mitigation and Response Plan does not provide triggers for a Drought Emergency level	The Governor may declare a State of Emergency if a local or state agency determines that conditions are critical and requests an emergency declaration.
Louisiana	Not applicable, no statewide drought plan or process	The Commissioner of the Department of Natural Resources Office of Conservation may declare a groundwater emergency during drought events, if groundwater resources are threatened.
Mississippi	Not applicable, no statewide drought plan or process	

SE DEWS States

Table D-2. Alabama: Drought Emergency Triggers and Process

Alabama	
Policies and procedures	**Explanation**
Emergency Triggers	The Alabama Drought Management Plan lists indicators and threshold values for the Drought Emergency level. Moisture indicators are approaching or achieving record dry levels and near the lowest two percent of recorded historical conditions. Impacts are also considered. ● Crop Moisture Index, -4.0 or less ● Palmer Drought Severity Index, -4.0 or less ● Keetch-Byram Drought Index, greater than 650 ● USGS, below normal 28-day average streamflow compared to historical streamflow for the day of year, at or near record lows ● AOWR Drought Streamflow Portal, regulated and unregulated stream gages, 60- and 90-day streamflow, 5th percentile or less ● Precipitation: 180-day rainfall, 10th percentile or less; 60-day rainfall, 2nd percentile or less
Process	Upon reaching the Drought Emergency level, AOWR and ADAPT coordinate with the Governor's Office to disseminate information and recommend actions related to drought conditions, which may include public statements, disaster declarations, implementation of water conservation and drought emergency ordinances.
Emergency Authority	The Alabama Emergency Management Act of 1955 Section 31-9-1, et seq. establishes the Governor's emergency powers to address an emergency related to drought.
Emergency Operations Plan	The State of Alabama Emergency Operations Plan (2022) includes drought in the Hazard Analysis table and in the Fire Fighting Emergency Support Function Annex.
Related Information	The Drought Management Plan describes the wildfire conditions that may trigger a Drought Emergency, or "No Burn Order," by the Governor. Decisions and actions are undertaken in conjunction with the State Forester.

Table D-3. Georgia: Drought Emergency Triggers and Process

Georgia	
Policies and procedures	**Explanation**
Emergency Triggers	The Drought Management Rules (Subject 391-3-30) do NOT specify triggers, procedures, or response actions to follow in a water shortage or drought-related emergency. However, as provided by O.C.G.A. § 12-5-7(a)(2), the Rules allow for a political subdivision of the state or local government authority to impose more stringent water use restrictions than those required in the case of an emergency which threatens public health, safety, or welfare. Emergency restrictions shall not exceed seven days, unless the GA EPD Director grants a variance.
Process	
Emergency Authority	O.C.G.A. § 12-5-7(a)(2) allows for a political subdivision of the state or local government authority to impose water use restrictions in the case of an emergency that threatens public health, safety, or welfare. Georgia Rules and Regulations (Subject 391-3-6-.07 (12)) provides rules and provisions for surface water permittees' actions during an emergency water shortage. Georgia Code 38-3-22 establishes the Governor's emergency management powers and duties.
Emergency Operations Plan	The Georgia Emergency Operation Plan (2017, updated 2019) includes drought in the hazard identification table, in conjunction with wildfire and extreme heat.

Table D-4. North Carolina: Drought Emergency Triggers and Process

North Carolina	
Policies and procedures	**Explanation**
Emergency Triggers	North Carolina General Statute 143.355.1 establishes the drought monitoring process and the types of information to be used for drought monitoring but does not specify triggers, including those for drought or water shortage emergencies.
Process	North Carolina General Statute 143.355.3. describes water shortage emergency powers. Based on an assessment of water supplies and water system conditions, the DEQ Secretary can request that the Governor declare a water shortage emergency for an affected water system or area. The Secretary would then have authority to require provision of any excess water supply from one system to another and adopt water conservation rules for the water emergency area.
Emergency Authority	Chapter 166A of the NC General Statutes, the NC Emergency Act, establishes the authority and responsibilities of the Governor, state agencies, and local governments to prevent, prepare for, respond to, and recover from natural or man-made disasters.
Emergency Operations Plan	The North Carolina Emergency Operations Plan (2021) provides the policy framework and guidance for state and local disaster preparedness, response, recovery, and mitigation operations. The Drought Response and Assessment Plan is part of Annex B (“Event Specific Plans”). Specifically, the Plan outlines the responsibilities and procedures that occur when the Governor declares a State of Emergency due to drought. The NC Department of Public Safety and NC Emergency Management, DEQ, DMAC, and State Emergency Response Team (SERT) agencies coordinate on drought assessment and response. Task forces (agriculture, economic impacts, energy loss, health, water sources) may be formed to expedite the assessment of drought conditions, impacts, and response capabilities. The ”Sequence of Drought Actions” section indicates that the DMAC may request SERT activation if drought conditions and impact warrant greater state involvement at the Severe Drought level (i.e., USDM D2).

Table D-5. South Carolina: Drought Emergency Triggers and Process

South Carolina	
Policies and procedures	**Explanation**
Emergency Triggers	The Drought Regulations specifies triggers and numeric values for each drought phase but not for an emergency level.
Process	According to the Drought Regulations, upon an Extreme Drought Alert Phase declaration, the Drought Response Committee (DRC) may recommend the Governor issue a public statement and impose water restrictions. The Drought Response Act (§ 49-23-80) describes emergency actions that may be taken by the Governor when the DRC determines that public safety and health are threatened. Actions may include issuing emergency proclamations and regulations to curtail water withdrawals or allocate water on an equitable basis so long as conditions continue to threaten public health, safety, and welfare. The DRC shall provide the Governor with a priority list of recommended actions.
Emergency Authority	The South Carolina Code of Laws authorizes the Governor to issue emergency proclamations and regulations (S.C. Code Ann. § 25-1-440) and establishes the duties of the SC Emergency Management Division (SCEMD; S.C. Code Ann. § 25-1-420).
Emergency Operations Plan	The SC Drought Response Plan is part of the SC Emergency Operations Plan (2017), Appendix 10, and describes the procedures to be followed if drought threatens health and safety and conditions have reached a level of severity beyond the scope of the DRC and local communities. It describes the actions to be taken by SCEMD, the DRC, and State Emergency Response Team (SERT) agencies. It also provides information about other federal and non-federal programs available to support drought response. According to the Plan, the DRC may determine and recommend that state-level action, in addition to local measures, is necessary to ensure adequate water supplies at the Severe or Extreme phases. Many response measures may require a Declaration of a State of Emergency by the Governor.

Table D-6. Tennessee: Drought Emergency Triggers and Process

Tennessee	
Policies and procedures	**Explanation**
Emergency Triggers	The Drought Management Plan does not provide specific triggers for drought status or declaration levels, including the emergency level.
Process	The Department of Environment and Conservation (TDEC), TN Emergency Management Agency (TEMA), and TEMA's Drought Task Force monitor conditions and impacts. TDEC, TEMA, and the Governor can take action(s) to address water conflicts, water quality problems, or other emergencies when the Governor makes an Emergency Declaration.
Emergency Authority	Tenn. Code. Ann. §§ 58-2-103 through 58-2-107 provide the authority for TEMA's and Governor's emergency management roles and responsibilities. Tenn. Code. Ann. § 68-221-710 authorizes the TDEC Commissioner to act in emergency circumstances to ensure the provision of safe drinking water.
Emergency Operations Plan	The Tennessee Emergency Management Plan (2018) includes drought as one of thirteen (13) Hazards of Prime Concern, upon which the Core Plan and Supplemental Annexes were based.

Table D-7. Virginia: Drought Emergency Triggers and Process

Virginia	
Policies and procedures	**Explanation**
Emergency Triggers	The Drought Assessment and Response Plan lists triggers for the Drought Emergency level, for the four main indicators: ● Precipitation: <55%-65% of normal precipitation, depending on months analyzed ● Groundwater: Levels <5th percentile for historic levels ● Streamflow: Daily streamflows <5th percentile for return flow frequencies ● Reservoir levels: Usable storage for four major reservoirs; storage of <60 days represent emergency conditions
Process	The Drought Assessment and Response Plan lists the actions that will generally be taken under Drought Emergency conditions, to include a Governor's Executive Order, emergency notifications and communications, mandatory water use restrictions, and activation of the Virginia Emergency Operations Plan and State Emergency Response Team (SERT).
Emergency Authority	The Code of Virginia (§§ 44-146.13 through 44-146.29:3; "Commonwealth of Virginia Emergency Services and Disaster Law of 2000") establishes the duties and responsibilities of the Governor and Department of Emergency Management during natural or man-made emergencies.
Emergency Operations Plan	The Virginia Emergency Operations Plan (2021) provides the structure for coordinating state functions during emergency response and recovery operations in the event of a major disaster, to include drought.

Other Southeastern States

Table D-8. Arkansas: Drought Emergency Triggers and Process

Arkansas	
Policies and procedures	**Explanation**
Emergency Triggers	Not applicable / no statewide drought management and response plan
Process (Drought-related)	The Arkansas Administrative Code (003. UTILIZATION OF SURFACE WATER (TITLE 3), 138 00 CARR 003) authorizes the Arkansas Natural Resources Commission to declare a water shortage emergency if the "shortage of water is so severe that an allocation or minimum streamflow is insufficient such that public health, safety or welfare is significantly affected" and modify allocations or minimum streamflows to minimize impacts (Section 313.2).
Emergency Authority	Arkansas Code Annotated (A.C.A. § 12-75-101 et seq.) establishes the Governor's authority and Division of Emergency Management's responsibilities during disasters.
Emergency Operations Plan	The Arkansas Comprehensive Emergency Management Plan (2021) includes one (1) reference to drought in the Catastrophic Incident Annex, noting that severe and prolonged drought conditions can cause irreparable damage to water resources.

Table D-9. Kentucky: Drought Emergency Triggers and Process

Kentucky	
Policies and procedures	**Explanation**
Emergency Triggers	The Kentucky Drought Mitigation and Response Plan does not provide triggers for a Drought Emergency level. The Governor may declare a State of Emergency if a local or state agency determines that conditions are critical and requests an emergency declaration.
Process	Kentucky Revised Statutes (KRS 151.200) authorizes the Energy and Environment cabinet to temporarily allocate available water among water users and restrict withdrawals rights, upon a water emergency declaration of the Governor.
Emergency Authority	Kentucky Revised Statutes Chapter 39A through 39G establish the responsibilities of the Governor, emergency response agencies, and other organizations.
Emergency Operations Plan	The Kentucky Emergency Operations Plan (2014) is an all-hazards plan that defines organizational roles and responsibilities and describes the activities to be taken during an emergency, disaster, or technological incident. The Kentucky Drought Mitigation and Response Plan is included in Annex D (Support Plans).

Table D-10. Louisiana: Drought Triggers and Process

Louisiana	
Policies and procedures	**Explanation**
Emergency Triggers	Not applicable / no statewide drought management and response plan
Process (Drought-related)	Louisiana R.S. § 38:3097.1 et seq. includes authority for the Commissioner of the Department of Natural Resources Office of Conservation to declare a groundwater emergency during periods, including drought events, when groundwater resources are threatened. The Commissioner may then place restrictions on groundwater use.
Emergency Authority	The Louisiana Homeland Security and Emergency Assistance and Disaster Act (R.S. §§ 29:701 — 29:739) establishes the Governor's authority and responsibility for emergency management.
Emergency Operations Plan	The State of Louisiana Emergency Operations Plan (2019) includes drought as one of many natural hazard events faced by the state.

Table D-11. Mississippi: Drought Emergency Triggers and Process

Mississippi	
Policies and procedures	**Explanation**
Emergency Triggers	Not applicable / no statewide drought management and response plan
Process	
Emergency Authority	Mississippi's Emergency Management Law (Miss. Code. Ann. §§ 33-15-1 through 33-15-53) establish the Governor's emergency management powers and responsibilities of the Emergency Management Agency.
Emergency Operations Plan	Mississippi's State Comprehensive Emergency Management Plan (2020) includes drought as one of the many hazards faced by the state.

Appendix E. Drought-Related Policies and Plans in Florida's Water Management Districts

This Appendix provides an overview of the Florida Water Management District's (WMD) role and responsibilities for drought response and preparedness and for mitigation-related activities. It contains similar content to that provided for other states in Appendices A-D, with a focus on response and preparedness planning.

The Florida Water Resources Act of 1972 (Chapter 373, Florida Statutes) established the responsibilities of the five WMDs for water supply, water quality, flood protection and floodplain management, and natural system protection (Figure E1). Their responsibilities include issuing permits for water use and construction activities. The Department of Environmental Protection (DEP) provides oversight, but each WMD develops and routinely updates water conservation, supply, and strategic plans. Section 373.246, F.S., requires that each WMD develop an implementation plan for addressing and responding to a water shortage. Accordingly, operational drought response, planning, and preparedness occurs primarily at the Water Management District (WMD) level, rather than at the state level.

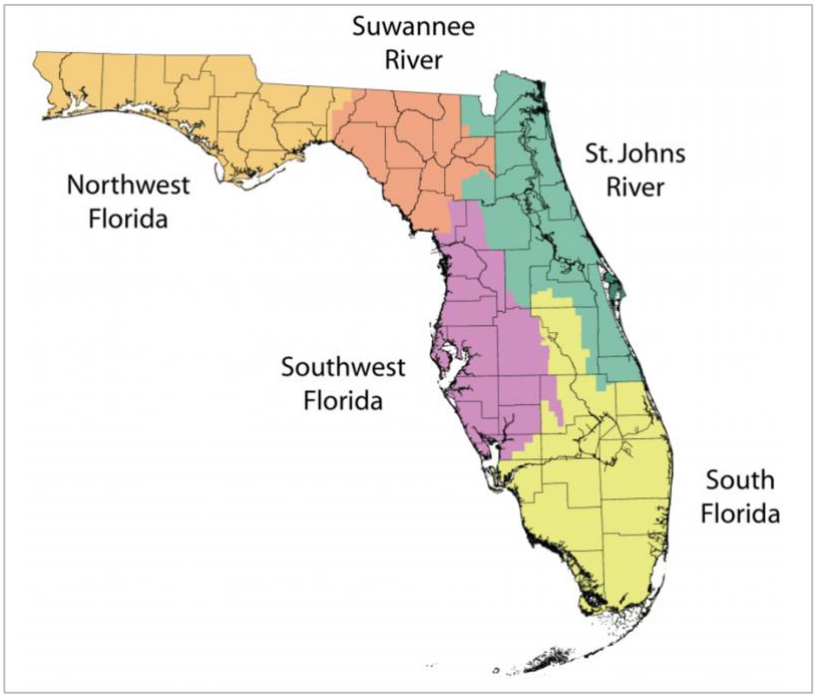

Figure E-1. Florida Water Management Districts

(Source: https://floridadep.gov/water-policy/water-policy/content/water-management-districts)

Water Management Districts: Drought-Related Authorities and Information Sources

Florida Statutes, Chapter 373

Specific to water shortages: Section 373.175 authorizes district governing boards to "by order declare that a water shortage exists within all or part of the district when insufficient ground or surface water is available to meet the needs of the users or when conditions are such as to require temporary reduction in total use within the area to protect water resources from serious harm." The governing board may then impose restrictions on water use. The executive director may issue emergency orders and actions, with concurrence from the governing board, if conditions warrant.

Section 373.246 requires that each WMD develop an implementation plan for addressing and responding to a water shortage. Each WMD has adopted water shortage rules outlining its water shortage processes. State statute requires that such rules are consistent with the state's Water Resource Implementation Rule relating to water shortage orders.

Regarding drought mitigation activities: While Chapter 373, F.S. does not address drought mitigation specifically, many of the WMDs' required activities can help mitigate drought risks, vulnerabilities, and impacts. WMD activities and responsibilities include:

- Establish minimum flows and minimum water levels, which are the limit at which further water withdrawals would significantly harm the water resources or ecology of an area, and consider consumptive and nonconsumptive water uses.
- Assess water supply, conservation efforts, and future needs, and, where needed, develop a regional water supply plan to identify future sources of water. State law requires a level-of-certainty planning goal that includes identifying the water supply needs of existing and future reasonable-beneficial uses and meeting those needs in a 1-in-10-year drought event.
- Develop and implement an annual strategic plan that outlines district's priorities and activities.
- Regulate all water uses (exempting only domestic self-supply) and require water conservation, the use of the lowest quality water source (including reclaimed water, brackish water, and saline water, among others), and compliance with WMD water shortage orders.
- Adopt lawn watering restrictions designed to ensure efficient water use for landscape irrigation. The restrictions allow enough water to maintain healthy landscapes year-round and may specify the time and days when watering may occur for residential and nonresidential locations and the amount of water that may be applied.
- Conduct hydrological monitoring to inform decisions on drought and other conditions.
- Implement the Water Shortage Plan and associated rules.

WMD plans and assessments are available through the WMD websites (see Table E1).

Many WMDs offer cost-share programs to permittees, for example to develop alternative water supplies or implement water conservation programs, activities that can help water users be more resilient to drought.

Additionally, Florida heavily promotes and incentivizes the Florida-Friendly Landscaping Program. The University of Florida Institute of Food and Agricultural Sciences (IFAS) and local extension agents implement this program and promote water conservation statewide. This includes model ordinances, public education, and design manuals for irrigation system installation. Section 373.185 ("Local Florida-friendly landscaping ordinances") requires WMDs to design and implement programs that incentivize local governments and water users to establish and develop landscapes that "conserve water, protect the environment, are adaptable to local conditions, and are drought tolerant."

- Florida-Friendly Landscaping, https://ffl.ifas.ufl.edu

The full text of Chapter 373 (Water Resources) is available through *Online Sunshine*, the official website of the Florida Legislature.

- http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0373/0373ContentsIndex.html

Florida Administrative Code

The Florida Administrative Code (F.A.C.) Chapter 62-40 (Water Resource Implementation Rule) provides the implementation goals, objectives, and guidance for the development of water resource programs, rules, and plans based on statutory policies and directives established in Chapter 373, F.S., and other Chapters related to water resources. WMD rules must be consistent with Chapter 62-40.

- https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-40

Specific to water shortages: Chapter 62-40.411 notes that districts "shall achieve a consistent approach to water shortage restrictions" to the extent practical and describes required elements, including a minimum of three and maximum of four phases of severity and the factors and water use classifications to consider when implementing water use restrictions.

For Additional Information

Annual reports, story maps, and additional information and links related to the WMDs and water supply planning is available through Florida DEP's Office of Water Policy website.

- https://floridadep.gov/water-policy
- Regional Water Supply Planning 2020 Annual Report, https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=432a39dd369e4c87936fd89bfec40d28

Water Shortage Plans and Processes

The Florida Department of State provides online access to the Florida Administrative Code & Florida Administrative Register. Title 40 (see Table E1) contains WMD-specific rules, policies, and plans, including the Water Shortage Plans.

- https://www.flrules.org/Gateway/Department.asp?toType=&DeptID=40

Table E-1. Florida Water Management Districts, Websites, and Water Shortage Plans

Note: The Title and Chapter No. corresponds to the naming and numbering conventions used in the Florida Administrative Code & Florida Administrative Register.

Water Management District / Division Name*	Website (home page)	Title and Chapter No. for the Water Shortage Plan
Northwest Florida Water Management District (NFWMD)	https://www.nwfwater.com/	40A 40A-21
South Florida Water Management District (SFWMD)	https://www.sfwmd.gov/	40E 40E-21
Southwest Florida Water Management District (SWFWMD)	https://www.swfwmd.state.fl.us/	40D 40D-21
St. Johns River Water Management District (SJRWMD)	http://www.sjrwmd.com/	40C 40C-21
Suwanee River Water Management District (SRWMD)	https://www.mysuwanneeriver.com/	40B 40B-21

Each WMD's Water Shortage Plan details the types of information to be used for monitoring and evaluating water resource conditions (see Tables E2-E6) and the procedures for declaring a water shortage, declaring a water emergency (see Table E7), implementing and enforcing any water restrictions, and approving variance requests.

Tables E2-E6 provide, for each WMD, the website where data and other monitoring information can be found; water shortage designations with triggers or water use reduction goals, if specified in the Water Shortage Plan; and any information, indicators, and/or threshold values specified by the Plan.

In general, the Water Shortage Plans provide considerable flexibility in terms of the information and data that can be used to evaluate water resources conditions and determine if water shortage conditions exist. Only two plans provide specific triggers and threshold values for water shortage levels (the Southwest Florida and St. Johns River WMDs). According to the Plans, evaluations primarily consider water supply and demand conditions. Other important

factors used to make water shortage declarations and noted in the Plans include saltwater intrusion; cones of depression; water quality impacts; impacts to fish, wildlife, or ecology; and effectiveness of water restrictions.

WMD staff continually monitor water supply sources, water use demands, and regional climate and water resources conditions and provide status reports to their governing boards at monthly meetings. This information is also available to the public through a data and monitoring (or similar) page on each WMD website (see links in Tables E2-E6).

Individual WMDs conduct a variety of year-round public outreach programs (e.g., to promote water conservation and efficiency) but also develop more specific messaging and resources during water shortages. For example, South Florida WMD initiated a series of "Water Resource Forums" to engage the public during the 2020 dry period and now continues them due to the positive dialogue it generated with stakeholders.

Table E-2. Northwest Florida WMD: Water Shortage Monitoring and Declarations

Northwest Florida Water Management District (NFWMD)	
Component	**Explanation**
Website	https://www.nwfwater.com/Data-Publications
Water Shortage Designations	Phase I: Moderate (15% user demand reduction) Phase II: Severe (up to 30% user demand reduction) Phase III: Extreme (up to 45% user demand reduction) Phase IV: Critical (up to 60% user demand reduction)
Information and Indicators Used	Resource monitoring data and information • historical, current, anticipated levels in surface and ground waters • historic, current, anticipated flows in surface waters • historic, current, anticipated water quality in surface and ground waters • extent to which water may be transferred from one source class to another • extent to which present water use restrictions may enhance future supplies or postpone more stringent restrictions • historic, current, anticipated demand of natural systems, to include losses due to ET and seepage and needs of fish and wildlife • historic, current, anticipated seasonal fluctuations in rainfall • other water quantity and quality factors affecting present and anticipated available water supply. Demand monitoring information • historical and estimated current and anticipated water use of permitted users and those users exempt from permitting but subject to water shortage plan • historical and anticipated seasonal fluctuations in water use • extent to which user demands may be met from other source classes • other factors
Triggers and Threshold Values	No specific triggers or threshold values included in the plan.
Source	40A-21.221 Evaluating Water Conditions 40A-21.401 Monitoring

Table E-3. South Florida WMD: Water Shortage Monitoring and Declarations

South Florida Water Management District (SFWMD)	
Component	**Explanation**
Website	https://www.sfwmd.gov/science-data
Water Shortage Designations	Phase I: Moderate (<15% demand reduction) Phase II: Severe (<30% demand reduction) Phase III: Extreme (<45% demand reduction) Phase IV: Critical (<60% demand reduction)
Information and Indicators Used	Water supply conditions • historic, current, anticipated levels in surface and ground waters • historic, current, anticipated flows in surface waters • extent to which water may be transferred from one source class to another • extent to which present water use restrictions may enhance supply or postpone more stringent restrictions • historic, current, anticipated demand of natural systems, including losses to ET and seepage • historic, current, anticipated seasonal fluctuation in rainfall • other factors Water demand conditions • historical and estimated current and anticipated water use of permitted users and those users exempt from permitting but subject to water shortage plan • current and anticipated demands of users whose supply is established by federal law • anticipated seasonal fluctuations in user demand • extent to which user demands may be met from other source classes • other factors Water supply and demand comparisons, potential harm and impacts to water resources • potential for increased saltwater intrusion or other groundwater contamination • irreversible adverse impacts on fish and wildlife • other factors Established minimum flows and levels
Triggers and Threshold Values	No specific triggers or threshold values included in the plan.
Source	40E-21.221 Evaluating Water Conditions

Table E-4. Southwest Florida WMD: Water Shortage Monitoring and Declarations

Southwest Florida Water Management District (SWFWMD)	
Component	**Explanation**
Website	https://www.swfwmd.state.fl.us/resources/data-maps
Water Shortage Designations	Phase I: Moderate (at least one indicator is moderately abnormal) Phase II: Severe (multiple indicators are moderately abnormal or one is severely abnormal) Phase III: Extreme (multiple indicators are severely abnormal or one is extremely abnormal) Phase IV: Critical (multiple indictors are extremely abnormal or at least one is critically abnormal)
Information and Indicators Used	In addition to drought indicators (see below), the plan lists other information and factors to consider in assigning Water Shortage phases. • seasonal factors and conditions • relative impacts of water withdrawals or restrictions on water users and the specific water body for which the shortage is declared • availability and practicality of alternative sources for each category of water user • extent to which the District can implement phased restrictions so to distribute the burden of restrictions among water users • potential for serious harm to natural systems as a result of the drought/water shortage • effectiveness of current and potential water use restrictions or other action • any adverse impact on public health, safety, welfare
Triggers and Threshold Values	Plan specifies “drought indicators” and includes drought levels and threshold values for: • regional rainfall (12-month moving sum, 24-month moving sum) • current streamflow (7-day moving average) • average streamflow (8-week moving average) • aquifer resources
Source	40D-21.221 Evaluating Water Conditions 40D-21.251 Water Shortage Phases

Table E-5. St. Johns River WMD: Water Shortage Monitoring and Declarations

St. Johns River Water Management District (SJRWMD)	
Component	**Explanation**
Website	http://www.sjrwmd.com/data/
Water Shortage Designations	Phase I: Moderate (at least two indicator values are moderate) Phase II: Severe (all indicator values are moderate or at least one is severe) Phase III: Extreme (two or more indicator values are severe or at least one is extreme) Phase IV: Critical (two or more indicator values are extreme or at least one is critical)
Information and Indicators Used	In addition to drought indicators (see below) other monitoring info includes: • regional surface water flows and lake levels, compared to low normal values • current and recent USDM values • NOAA CPC precipitation outlooks • public supply storage status
Triggers and Threshold Values	Plan specifies “drought indicators” and includes drought levels and threshold values for: • regional rainfall (12-month moving sum, 24-month moving sum) • groundwater levels
Source	40C-21.221 Monitoring and Evaluating Water Conditions

Table E-6. Suwanee River WMD: Water Shortage Monitoring and Declarations

Suwanee River Water Management District (SRWMD)	
Component	**Explanation**
Website	https://www.mysuwanneeriver.com/507/Water-Data-Portal
Water Shortage Designations	Water Shortage Advisory, Phase I Water Shortage, Phase II Water Shortage, Phase III Water Shortage Emergency
Information and Indicators Used	Resource monitoring data and information • levels in surface and ground waters • flows of rivers, streams, springs • demand of natural systems, to include losses due to ET and seepage • rainfall • drought indices or weather forecasts • impacts on fish and wildlife • other data Demand monitoring information • demands of permitted users and users exempt from permitting but subject to water shortage plan • demands of users who supply is established by federal law • other data
Triggers and Threshold Values	No specific triggers or threshold values included in the plan.
Source	40B-21.211 Monitoring Conditions

Table E-7. Florida: Water Shortage Emergency Policies and Procedures

Florida and Florida Water Management Districts	
Policies and procedures	**Explanation**
Emergency Triggers	WMD Water Shortage Plans list the data and information each WMD considers in its monitoring and evaluation of conditions but not self-implementing threshold values for an emergency declaration.
Process	WMDs routinely monitor the status and condition of water resources, water supply, water demand, and natural systems. Conditions under which a water shortage emergency may be considered include situations where conditions are rapidly deteriorating; if a WMD receives requests for emergency assistance; and where there are adverse effects on a) public health, safety or welfare; b) the health of animals, fish or aquatic life, or a public water supply; and c) commercial, industrial agricultural, recreational, or other essential or reasonable-beneficial uses. The Executive Director, with concurrence of the Governing Board, declares water shortage emergencies, water use restrictions, and other response actions. If drought or water shortage conditions were to exceed the capabilities of local government to cope with an emergency, the Governor may declare a state of emergency to activate and deploy state resources.
Emergency Authority	Sections 373.119 and 373.246 of the Florida Statutes grant the WMD Executive Director the authority to issue emergency orders and require action to limit, apportion, or prohibit water use. Sections 14.022 and 252.36 of the Florida Statutes authorizes the Governor's emergency powers.
Emergency Operations Plan	Each WMD Water Shortage Plan has an Emergency Provisions (or similar) Section that describes the declaration process, water use restrictions that may be enacted, and implementation • NWFWMD Water Shortage Plan 40A-21.331, 40A-21.371, 40A-21.391 • SFWMD Water Shortage Plan 40E-21.331, 40E-21.371, 40E-21.391 • SJRWMD Water Shortage Plan 40C-21.331, 40C-21.371, 40C-21.391 • SRWMD Water Shortage Plan 40B-21.651 • SWFWMD Water Shortage Plan 40D-21.331, 40D-21.371, 40D-21.391 The Florida Comprehensive Emergency Management Plan (2020) contains one (1) reference to drought as one of many hazards the state faces.

Appendix F. United States Drought Monitor

The tables in this appendix summarize how states contribute to the US Drought Monitor (USDM) process and use the USDM in their state monitoring processes.

Table F1 is a high-level summary of how states contribute to or use the USDM, primarily based on formal state documents and clarifying information from interviewees if state documents do not include or address the USDM.

Tables F2-F8 (SE DEWS states) and F9-F12 (other southeastern states) provide additional information about states' involvement in the USDM process, use of the USDM, and other notes and highlights from interviews.

Some states are very engaged with the USDM process and use the USDM, others not at all. For the latter group, contributions tend to go through/come from National Weather Services offices or university-based State Climate Offices (SCO). For the former group, there are distinct differences in how states engage with the USDM. North Carolina's drought monitoring and designation process is directly tied to the USDM; this approach allows flexibility in the data and information used, and it supports a regular (weekly) and collective (technical experts) consideration of conditions. In contrast, Alabama and South Carolina appreciate having more distinct USDM and state-level drought monitoring processes.

Contributing to the USDM:

- Two states have state statutes or regulations establishing how the state contributes to the USDM (Alabama, North Carolina).
- Three states have a state agency staff position assigned to coordinate and/or provide USDM input on behalf of the state (Kentucky, North Carolina, South Carolina). Alabama's Drought Act designates the University-based State Climatologist and the state's Office of Water Resources (AOWR) as having responsibility for providing the state's USDM input.
- For other states, input is provided by National Weather Service (NWS) personnel, often in conjunction with university-based state climate offices and/or state agencies or task forces.

Using the USDM:

- Six states have formal requirements regarding the use of the USDM (Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia). Specifically, it is used 1) as a baseline monitoring tool and trigger to initiate or increase frequency of monitoring (Georgia, Kentucky, Tennessee, Virginia) and 2) as an indicator to determine drought severity levels (Georgia, Kentucky, North Carolina, South Carolina). In North Carolina the USDM triggers implementation of response plans and reporting by community water systems.

- Five states do not formally use the USDM (Alabama, Arkansas, Florida, Louisiana, Mississippi). Except for Alabama, none of these states has an operational statewide drought plan.

Interviews suggested that coordination between different organizations (e.g., NWS, SCOs [state agency or university based], state agency representatives), both within and between states, appears to have increased over time. Drought and having new personnel/staff were cited as main triggers. Coordination can help 1) bring different perspectives and stakeholders into the process, 2) streamline input from the states or from neighboring states to the USDM authors (e.g., Georgia, North Carolina, and South Carolina have multi-state conversations), and 3) ensure that drought designations crossing interstate borders are consistent.

Abbreviations used in this Appendix include:

NWS = National Weather Service
NWS SRCS = NWS Southern Region Climate Services Branch
NWS WFO = NWS Weather Forecast Office
USDM = US Drought Monitor

Table F-1. State contributions to and use of the US Drought Monitor (Summary)

n/a = not applicable

State	Contribution required, per state document	Lead / coordinating agency or group	Use specified in a state document	Triggers actions (monitoring, communications, convening)	Informs drought levels	Other
SE DEWS states						
AL	Yes	State Climatologist (University), Alabama Office of Water Resources	No	n/a	n/a	n/a
FL	No	State Climatologist (University)	No	n/a	n/a	n/a
GA	No	NWS Southern Region Climate Services	Yes	Yes	Yes	No
NC	Yes	Drought Management Advisory Council	Yes	No	USDM levels are NC default levels	Local response and water use reporting
SC	No	Water Resource Climatologist (State Agency)	Yes	No	Yes	No
TN	No	State Climatologist (University)	No	n/a	n/a	Used informally for monitoring
VA	No	NWS Weather Forecast Office	Yes	Yes	Yes	No

State	Contribution required, per state document	Lead / coordinating agency or group	Use specified in a state document	Triggers actions (monitoring, communications, convening)	Informs drought levels	Other
Other southeastern states						
AR	No	NWS Southern Region Climate Services	No	n/a	n/a	Used informally
KY	No	Kentucky Department for Environmental Protection, Division of Water	Yes	Yes	Yes	No
LA	No	State Climatologist (University)	No	n/a	n/a	n/a
MS	No	State Climatologist (University), NWS Southern Region Climate Services	No	n/a	n/a	Used informally

SE DEWS States

Table F-2. Alabama: USDM Contributions and Use

Alabama	
USDM Activity	**Explanation**
Contribution	University-based State Climatologist and Alabama Office of Water Resources (AOWR) provides input; authorized and required by Act, Regulations, Plan ● Drought Act (2014) requires that the State Climatologist provides USDM input in coordination with the Office of Water Resources. ● Drought Regulations (2016) describes differences between weekly USDM input and declarations made by the Office of Water Resources. ● Drought Plan (2018) describes the AOWR role in developing the USDM input.
Use	No formal requirements regarding the use of the USDM, either for monitoring or declaring drought levels
Additional Notes and Highlights	● Positive: Subtle but clear separation of the USDM and state drought monitoring declaration process. ● State climatologist also contributes to the state process which is led by state agencies. ● Positive: State process considers forward-looking information, such as forecasts, in contrast to the USDM.

Table F-3. Florida: USDM Contributions and Use

Florida	
USDM Activity	**Explanation**
Contribution	Informal but established process ● University-based State Climatologist conducts and leads weekly assessments. ● Started as an informal process when the USDM began; coordination of FL input has increased over time; also coordinates with NWS SRCS.
Use	No reported or documented use at the state agency level
Additional Notes and Highlights	● Drought monitoring and management for water resources primarily conducted by Water Management Districts (WMDs). Focus is on hydrologic and meteorologic data and water resource conditions.

Table F-4. Georgia: USDM Contributions and Use

Georgia	
USDM Activity	**Explanation**
Contribution	NWS SRCS is the main provider of USDM input ● The Department of Natural Resources Environmental Protection Division (EPD) has formal responsibility for the state's drought monitoring and management. ● Within EPD, the Office of the State Climatologist collects and reviews data on a weekly basis and submits information to the Watershed Protection Branch. The two offices coordinate to submit input to NWS SRCS.
Use	Triggers monitoring and communications ● The USDM is one of several indicators used for the state monitoring process and is specifically listed in GA's Drought Management Rules. ● When the USDM D2 trigger is hit the Watershed Protection Branch notifies the EPD Director, provides status reports at least monthly, and increases communications.
Additional Notes and Highlights	● GA EPD provides input to the USDM process indirectly through the information it provides to the NWS SRCS.

Table F-5. North Carolina: USDM Contributions and Use

North Carolina	
USDM Activity	**Explanation**
Contribution	Agency-based input; required by state statute ● NC General Statute § 143-355.1. requires that the Drought Management Advisory Council (DMAC) provide the State's drought conditions to the USDM. ● Like the USDM, the NC DMAC uses a "convergence of evidence" approach and meets weekly to determine drought levels.
Use	Triggers implementation of response plans and water use reporting by community water systems ● § 143-355.1(f) states that NC's designations follow the USDM levels, although exceptions are allowed if local conditions warrant. ● County designations are updated weekly on the "US Drought Monitor of North Carolina" map.
Additional Notes and Highlights	● Positive: NC legislation specifies DMAC membership, with a focus on technical experts representing different sectors and agencies (e.g., Cooperative Extension, USGS).

Table F-6. South Carolina: USDM Contributions and Use

South Carolina	
USDM Activity	**Explanation**
Contribution	State-agency based State Climatology Office coordinates state input ● Informal process started in 2019. Water Resources Climatologist hired in 2020 to lead and organize SC's weekly contributions to the USDM.
Use	Used by the SC Drought Response Committee (DRC) to monitor and determine drought levels ● The Drought Regulations (121-11.8., Drought Alert Phases) specify the USDM as one of several triggers, and the threshold values, to determine SC's drought alert phases.
Additional Notes and Highlights	● Positive: Separation of the USDM and SC DRC processes. Flexibility in the indicators and information used to provide USDM input.

Table F-7. Tennessee: USDM Contributions and Use

Tennessee	
USDM Activity	**Explanation**
Contribution	University-based State Climate Office coordinates state input ● Process is relatively new (~2 years) and informal ● State Climate Office coordinates with NWS SRCS.
Use	Informally used by state agencies for baseline monitoring ● TN Department of Environment & Conservation (TDEC) uses the USDM to monitor conditions and as an alert to reach out to water systems when USDS indicates drought-affected areas. ● TDEC posts the weekly TN USDM map to its "Drought Updates" web page.
Additional Notes and Highlights	● The TN Drought Management Plan does not specify indicators for monitoring or threshold levels for determining drought levels.

Table F-8. Virginia: USDM Contributions and Use

Virginia	
USDM Activity	**Explanation**
Contribution	NWS WFO coordinates state input ● Process is relatively new (~2 years) and informal. ● DEQ provides weekly input regarding drought intensity mapping ● Not formally connected to the state's monitoring process; however, as a Drought Monitoring Task Force (DMTF) member, NWS WFO obtains input from other DMTF members (mostly state agencies).
Use	Triggers state monitoring ● Per the VA Drought Assessment and Response Plan, the Department of Environmental Quality (DEQ) monitors the USDM during normal times. ● The DMTF is activated when USDM hits D1 and then will then monitor conditions using other, specified indicators. The DMTF remains active until USDM returns to D0, or until local areas cease to experience impacts.
Additional Notes and Highlights	● Positive: DMTF has flexibility to decide when and how frequently to meet, e.g., they may start meeting if the USDM indicates many areas in D0.

Other Southeastern States

Table F-9. Arkansas: USDM Contributions and Use

Arkansas	
USDM Activity	**Explanation**
Contribution	No state-level, formal requirements to contribute ● NWS SRCS is the main provider of USDM input. ● NWS WFO also contribute, but typically only during dry or drought conditions.
Use	Used informally for informational and communications purposes by the State Climatologist (state agency), when the listserv contains relevant information for AR audiences
Additional Notes and Highlights	● AR has no formal drought plan or response process; conducts some, but limited, monitoring at the state level.

Table F-10. Kentucky: USDM Contributions and Use

Kentucky	
USDM Activity	**Explanation**
Contribution	Informal but established, state agency-led process ● The Kentucky Department for Environmental Protection, Division of Water, coordinates input with NWS WFOs, University of Kentucky Weather Center, and State Climatologist.
Use	Triggers monitoring and used to determine drought levels ● Per the KY Drought Mitigation and Response Plan, the Division of Water and coordinating agencies accelerate monitoring when the USDM indicates abnormally dry (D0) conditions, or 30-day precipitation is <60% of normal for a drought management area. ● The state's full KY Drought Mitigation Team (KDMT) is typically activated when USDM hits D1. ● The Plan specifies the USDM as one of several indicators, and threshold values, used to monitor conditions and determine KY's Drought Action Levels.
Additional Notes and Highlights	● Positives: One point person (state agency position) coordinates the USDM input and the KDMT, providing continuity to the two processes. The state plan and process allow for flexibility in the indicators and triggers used, so similar information and data can be used for both processes.

Table F-11. Louisiana: USDM Contributions and Use

Louisiana	
USDM Activity	**Explanation**
Contribution	No state-level, formal requirements to contribute ● University-based State Climate Office provides state input. ● Uses quantitative indicators and informal networks (e.g., extension, NWS) to obtain feedback.
Use	No reported or documented use at the state agency level
Additional Notes and Highlights	● LA has no formal drought plan or response process.

Table F-12. Mississippi: USDM Contributions and Use

Mississippi	
USDM Activity	**Explanation**
Contribution	No state-level, formal requirements to contribute ● University-based State Climatologist monitors conditions and submits recommendations. ● NWS SRCS provides input.
Use	Used informally as a monitoring tool by MS Department of Environmental Quality, Water Division
Additional Notes and Highlights	● MS has no formal drought plan or response process.

Appendix G. Interview Approach and Questions

Objectives

The purpose of the interviews was to document:

- How each state's drought monitoring, response, and planning processes work in practice, including mechanisms for intra- and interstate coordination
- States' planning-related needs and gaps
- Recommendations for activities that could be taken or supported by NIDIS, the SE DEWS, and/or state and regional partners

Interviewees

Target interviewees include the state's drought coordinator, likely the state climatologist or a state agency representative. As many of the states do not have a single "drought coordinator," it was often useful to interview several individuals to capture how each state approaches response, planning, and mitigation activities. A referral, or "snowball," sampling approach was used to identify additional relevant individuals for each state.

Approach

Prior to the interview, a state-specific summary was developed based on a review of that state's drought documents (plans, state regulations and statutes) and provided to interviewees for their review. As each state approaches drought monitoring and management somewhat differently, the state-specific summaries and specific questions varied among states. Some states have well-established drought programs, while others conduct very minimal drought planning activities. The interviews were semi-structured; questions were drawn from the following list and tailored when necessary to better fit individual interviewee's roles, responsibilities, and context.

Interview Topics and Questions

1) Drought Context
    a. Please briefly describe any notable or impactful drought events experienced by the state in the past 10-20 years.
    b. How would you describe the state's approach to drought monitoring and management? Regarding the state summary: do you have anything to add or clarify?
    c. How has the state's approach evolved over time?

2) Roles & Responsibilities
    a. Please briefly describe your role in monitoring, response, planning, and/or mitigation.

b. Who is most responsible for different elements of drought management in the state: monitoring, response, planning, and mitigation? Who else should be interviewed?

3) Monitoring
   a. What information does the state use to monitor drought?
   b. How frequently are monitoring committees or task forces activated?
   c. How does your state 1) contribute to and 2) use the US Drought Monitor?
   d. Does the state monitoring process differ from the US Drought Monitor process? If yes, how?
   e. What additional monitoring information, resources, or support would benefit your efforts?

4) Elements of Drought Response
   a. Response plan
      i. If the state has a state drought response plan:
         1. Is it used? What works, or doesn't work, well? Why? Why not?
         2. Do response actions appropriately and effectively address drought effects and impacts?
      ii. If the state does not have a drought response plan:
         1. What actions has the state taken in past droughts?
   b. Indicators and triggers
      i. What indicators and triggers do you use for declaring drought in your state?
      ii. What is your approach – e.g., hard triggers or a convergence of evidence (such as that used by the US Drought Monitor)? Do you have flexibility in the interpretation of indicators and triggers? If so, what are the advantages and disadvantages of that approach?
   c. Authority (declaring drought, enforcing action, resolving conflicts)
      i. Who has the authority to declare drought? How do you declare drought in your state? By state, region, county, or sector?
      ii. What power or authority does your state have during a declared drought? For example, who has authority to require water use reductions during drought?
      iii. How is this authority enforced?
      iv. Has the state required water users, water utilities, local agencies, municipalities, or others to take action?
      v. How is the Governor involved?
      vi. How does the state address or work to resolve conflicts?
   d. Communications
      i. How do you typically communicate to the public and stakeholders in your state?

ii. Specific to communications: What has worked well? What challenges do you face or have you faced?

e. Coordination
   i. Within the state
      1. To what extent does the existence of (or lack of) a stand-alone drought response plan facilitate (or hinder) coordination and communications?
      2. Balancing needs: How do you manage state level response while considering the needs, actions, and other existing drought plans at local levels?
      3. Who and/or what sector(s) are missing from current activities and programs? What opportunities exist for increasing engagement and coordination?
   ii. With other states and entities
      1. To what extent is state-level drought response connected to or coordinated with other states?
      2. To what extent is state-level drought response connected to or coordinated with agencies and programs at other levels? For example, federal agencies (e.g., Army Corps of Engineers, Tennessee Valley Authority), national-level programs (e.g., the National Integrated Drought Information System, the United States Drought Monitor), or the private sector (e.g., energy producers and reservoir managers)?
      3. How formal, or informal, is this coordination? How would you characterize the coordination – consultation, information sharing, full integration, other?

f. Follow-up questions regarding response
   i. What has worked well? What would you recommend as "best practices"?
   ii. What changes would you make to your response plan or approach? What issues have come up that were not addressed by your plan/approach?
   iii. What additional information, resources, or support would benefit your response efforts?

5) Elements of Longer-term Planning and Preparedness
   a. Post-drought assessment
      i. Has the state conducted post-drought assessments (e.g., effectiveness of response plans, effectiveness of mitigation measures, scope and extent of impacts)? If yes, what were the results and how were they used? If no, why not?
   b. Impacts
      i. How does your state collect drought impacts information?

   ii. Do you have a system to collect, access, and use impacts information in real time?

c. Risk assessment
   i. When and how has the state conducted a drought risk assessment (e.g. as part of a Hazard Mitigation Plan update or water resources, climate change, or other planning effort)?
   ii. What additional information, resources, or support would benefit your state in assessing risks and impacts?

d. Mitigation
   i. Does your state have programs, incentives, and/or requirements for mitigating future drought impacts (actions to be taken during non-drought)?
   ii. For which sectors or groups? How are these funded?
   iii. How is drought considered in multi-hazard planning? Does the state's Hazard Mitigation Plan include drought mitigation activities? What works, or doesn't work, well? Why? Why not?
   iv. Do mitigation actions effectively address drought effects and impacts?

e. Coordination
   i. Within the state
      1. To what extent do other types of plans within the state (e.g., water management, hazard mitigation, emergency operations), and the entities responsible for those plans, interact and coordinate with one another?
      2. What mechanisms or factors are most important in *facilitating* or *hindering coordination* within the state?
      3. Who and/or what sector(s) are missing from current? What opportunities exist for increasing engagement and coordination?
   ii. With other states or entities
      1. To what extent is state-level drought planning connected to or coordinated with other states?
      2. What mechanisms or factors are most important in *facilitating* or *hindering coordination* between states and other regional entities?
      3. Who or what is missing from current activities? What opportunities exist for increasing engagement and coordination?

f. Follow-up questions regarding longer-term planning and preparedness
   i. What has worked well? What would you recommend as "best practices"?
   ii. What challenges do you face? What additional information, resources, or support would benefit your planning efforts?