

South Carolina Drought Tabletop Exercise

July 24, 2019
South Carolina Emergency Operations Center
West Columbia, SC

Final Report

REPORT PREPARED BY

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PLANNING TEAM AND EVENT SPONSORS



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Abbreviations

CISA	Carolinas Integrated Sciences and Assessments
CMI	Crop Moisture Index
CUA	Capacity Use Area
DIR	Drought Impact Reporter
DMA	Drought Management Area
DRC	Drought Response Committee
EOP	Emergency Operations Plan
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
KBDI	Keetch-Byram Drought Index
LIP	Low Inflow Protocol
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDSI	Palmer Drought Severity Index
POD	Point of Distribution
SC SCO	South Carolina State Climatology Office
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCEMD	South Carolina Emergency Management Division
SEOC	State Emergency Operations Center
SERT	State Emergency Response Team
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDM	United States Drought Monitor

Introduction: About the Exercise

The South Carolina Drought Tabletop Exercise was held on July 24, 2019 at the Emergency Operations Center in West Columbia, South Carolina. 92 individuals from 48 organizations and agencies attended, representing the water, energy, agriculture, emergency management, and other sectors. Participants learned about roles and responsibilities in drought response, exercised drought preparedness and response actions, and identified areas for improvements. This report provides a summary of the exercise and highlights lessons learned and recommended actions.

Motivation, Goals, & Objectives

Existing drought plans, ordinances, and procedures are important tools in guiding state-, basin-, and local-level response to drought. South Carolina has experienced several droughts over the past two decades, highlighting the need for multiple agencies and organizations to work together to effectively manage water resources during these events.

In September 2017, the first statewide Drought Tabletop Exercise was conducted to review the State's drought response processes and identify strengths and areas for improvement. Key needs and action items identified by participants included:

1. filling Drought Response Committee (DRC)¹ vacancies;
2. updated drought response plans and procedures to ensure a coordinated and timely response to droughts;
3. greater educational opportunities to enhance agencies' familiarity with the Drought Response Program and their role in drought response and mitigation;
4. more effective communications before, during, and after drought events, across agencies and with the public; and
5. enhanced data and information products that can be used to build common understanding of drought risks, impacts, and vulnerabilities.

After the 2017 exercise, several efforts were undertaken to address participants' recommendations. For example, the Governor appointed fourteen new committee members. To increase awareness of drought issues and improve communications, the South Carolina State Climatology Office (SC SCO), South Carolina Department of Natural Resources (SCDNR), and the Carolinas Integrated Sciences and Assessments (CISA) team developed the scdrought.com website and new informational resources. The drought portal launched in May 2018 and received the [Notable State Document](#) award in the Websites and Apps category from the South Carolina State Library.

However, other needs and gaps identified in 2017 remain. Ongoing challenges include still-open DRC positions (eighteen of forty-eight seats designated for local DRC members remain vacant), lack of understanding about the differences between the U.S. Drought Monitor and South Carolina drought

¹ The South Carolina Drought Response Committee is the State's major drought decision-making entity ([Appendix C](#)). It consists of five state agency members and forty-eight local members who are appointed by the Governor and organized into four Drought Management Areas. Members represent a variety of sectors (agriculture, water supply, power generation, industry). For the last several years, approximately 50% of the local member positions have been vacant.

monitoring processes, and mismatches between different water and drought management boundaries and jurisdictions.

Following recommendations from 2017 participants that a statewide drought exercise be conducted every one to two years, the planning team prepared a second, statewide exercise. Holding regular drought-focused events aligns with other hazards, such as hurricanes, that are routinely exercised, and provides an opportunity for new DRC members and other agency representatives to learn about their drought response responsibilities and share information with colleagues.

Similar to 2017, the goal of the 2019 exercise was to enhance South Carolina's drought preparedness and capacity to address water shortage emergencies due to drought. Specific objectives included:

1. Exercise the South Carolina drought monitoring and response process
2. Identify gaps in existing processes and prioritize follow-up actions
3. Increase awareness of participants' roles and responsibilities for drought response and planning within their agencies and organizations

Participation

Participants were asked to be prepared to discuss their organization's drought plans and procedures and actively consider how their organization would respond to drought conditions of increasing severity and activation of the State's Emergency Operations Plan (EOP). The exercise convened various groups responsible for drought response. Invited participants included DRC members, the State Emergency Response Team (SERT), emergency managers, water managers, and others with responsibility for drought monitoring and response. [Appendix A](#) shows the full list of participants.

Format

The exercise was organized as follows:

- The **Introduction** provided participants with an overview of relevant legislation, plans, and programs.
- Participants then walked through **four drought scenarios**, reviewing the actions that would occur at increasingly severe stages of drought (Table 1). Scenarios 1 and 4 involved full-group discussions, and Scenarios 2 and 3 were considered in breakout groups organized by Drought Management Areas.
- The concluding **Hot Wash** entailed an after-action evaluation of the exercise.

Table 1. Format and focus of the four drought scenarios

Scenario	Drought Alert Phase	Impacts	Response Actions	Discussion Format
1) June 2021	Moderate	Impacts increase in severity	<ul style="list-style-type: none"> Review plans, triggers Voluntary conservation 	Full group
2) August 2021	Severe		<ul style="list-style-type: none"> Review plans, triggers Voluntary and mandatory conservation Increase communications 	Breakouts by Drought Management Areas
3) May 2022	Extreme		<ul style="list-style-type: none"> Review and curtail non-essential water use 	
4) August 2022	Public safety, health, and welfare are threatened		<ul style="list-style-type: none"> Activate Emergency Operations Plan 	Full group

During each of the drought scenarios and the Hot Wash, questions to elicit dialogue and deliberation about South Carolina’s drought response process were presented to the participants. [Appendix B](#) includes the exercise agenda and the full set of narratives and discussion questions that accompanied each scenario. Participants received this full agenda prior to attending the exercise.

Mentimeter, an interactive presentation software program, was used to engage participants and encourage discussion.² During the introduction session, the audience was asked about their drought response challenges and knowledge of the Drought Response Committee and process. During the Hot Wash, participants were asked to share their drought-related concerns and takeaways. All responses were anonymous. [Appendix I](#) includes the Mentimeter questions, responses, and visualizations of the response data.

New for the 2019 exercise, a series of **handouts** was developed as a reference for participants as they considered the information and the various scenarios presented in the exercise. These are located in Appendices C-H and are referenced later in this report.

Appendix C	<i>The South Carolina Drought Response Process</i>
Appendix D	<i>Monitoring and Measuring Drought: Indicators and Indices</i>
Appendix E	<i>Monitoring and Measuring Drought: Alert Phases and Impacts</i>
Appendix F	<i>South Carolina Drought Response: Managing Water Use and Shortages during Drought</i>
Appendix G	<i>Drought Management and Basin-Level Plans</i>
Appendix H	<i>The South Carolina Drought Response Plan: State Emergency Operations Plan, Appendix 10</i>

² <https://www.mentimeter.com/>

Exercise Feedback

The planning team circulated a **post-exercise feedback survey** to obtain feedback from participants about the exercise. 25 participants responded, for a 27.2% response rate. Responses were anonymous. Based on the assumption that the 13 planning team members and student assistants did **not** complete the survey, the adjusted response rate equals 31.6% (25/79). [Appendix J](#) provides the full set of survey questions and responses.

Of the 25 participants that responded to the post-exercise feedback, almost all indicated that they found the exercise beneficial and that they would attend another, similar exercise in the future. The respondents provided valuable information that can be used to guide efforts to improve South Carolina’s drought response processes as well as inform future exercises (Table 2).

Table 2. Select comments from the feedback survey

Feedback on the exercise format
<ul style="list-style-type: none">• “We need more communication between drought response entities, and more exercises like this. Thanks for organizing it!”• “The holistic approach at a state level was great to learn about actions and plans of those in other basins. Coordination at the basin level also seems extremely important - and the tabletop exercise provided a nice balance between state and basin coordination.”
What do you consider the most important takeaways from the exercise?
<ul style="list-style-type: none">• “The resources and points of contact available were invaluable. Will note these in our plan. Documented several improvements to incorporate into our plan - revise triggers and communication templates to customers.”• “Meeting people”• “Insight into drought response on a more granular level than I had before, opportunity to hear other sectors describing issues and actions from different perspectives than mine.”
Please share information about those action items, or additional drought planning and preparedness measures you or your organization might take.
<ul style="list-style-type: none">• “Revise our drought triggers and conservation goals, collaborate and tabletop drill with other utilities for consistency and knowledge sharing, got some ideas on communication templates (brochure in particular to simplify expectations for the customer), review our town ordinance, participate in CoCaRaHS³ and national drought reporting.”• “I will be talking to my Board about whether they want to create a drought response plan internally, or at least discuss how we might approach a significant drought event as an organization.”

³ The Community Collaborative Rain, Hail & Snow (CoCoRaHS; <https://www.cocorahs.org/>) network consists of citizen scientist volunteers who measure and record daily precipitation values.

The Exercise

Introduction to Relevant Legislation, Plans, and Regulations

The purpose of the Introduction was to present the goals and objectives of the exercise and provide an overview of South Carolina’s drought and relevant water legislation, regulations, and planning programs.

Drought Response Act and Regulations

The Drought Response Act⁴ and Regulations⁵ establish the State’s drought monitoring and response process, describe the membership and responsibilities of the Drought Response Committee (DRC), and require public water suppliers to develop and implement drought management plans and response ordinances (Figure 1; Appendix C).

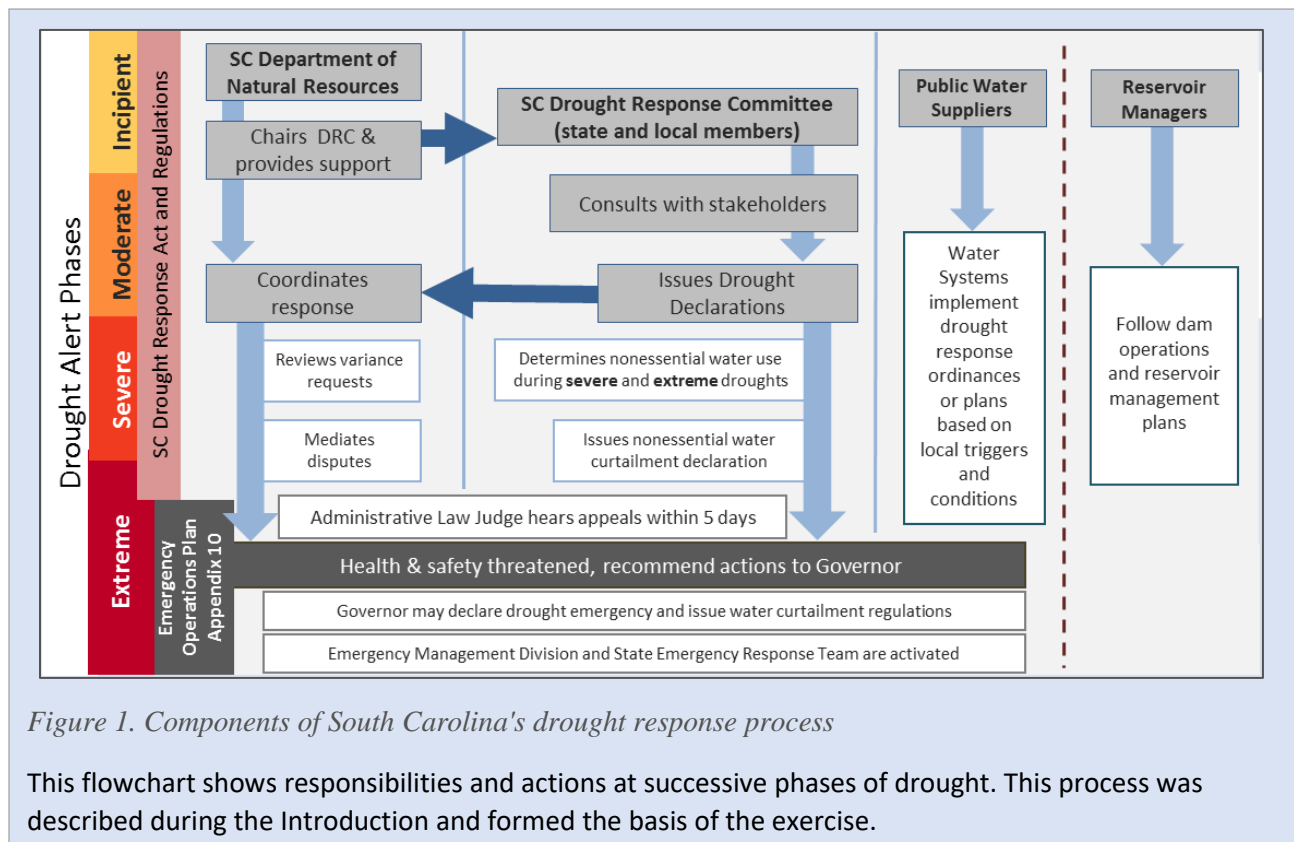


Figure 1. Components of South Carolina's drought response process

This flowchart shows responsibilities and actions at successive phases of drought. This process was described during the Introduction and formed the basis of the exercise.

The DRC consists of state agency representatives and local members that represent water utilities, soil and water conservation districts, power generation, industry, agriculture, and domestic users. The DRC is chaired and supported by the South Carolina Department of Natural Resources and the State Climatology Office.

The **DRC’s key responsibilities** include evaluating drought indicators and determining county-level drought status as defined by the Drought Response Act; consulting with stakeholders about conditions and impacts; and determining when drought conditions warrant measures beyond the scope of local

⁴ South Carolina Drought Response Act. South Carolina Code of Laws. 1976. § 49-23-10 et seq., as amended.

⁵ South Carolina Drought Response Regulations 121-11.1 - 121-11.12, for §49-23-10 et seq., S.C. Code of Laws.

actions, including mandatory water use reductions, curtailment of non-essential water use, or activation of the South Carolina Drought Response Plan.

The Act and Regulations establish four drought severity levels, the indicators and quantitative measures that correspond to each level, and the associated response actions.

- At the **Incipient Drought Alert Phase** SCDNR notifies the DRC, increases monitoring activities, and begins to disseminate information to the public.⁶ Water utilities review local drought plans and ordinances.
- At the **Moderate Drought Alert Phase** the DRC meets as needed and evaluates conditions to determine the need for action beyond the scope of local government. The DRC may make recommendations for voluntary or mandatory water use reductions and more involvement by State agencies in monitoring drought conditions and impacts.
- At the **Severe and Extreme Drought Alert Phases** the DRC may recommend mandatory reduction or curtailment of non-essential water use. SCDNR is responsible for disseminating a curtailment declaration, reviewing variance requests, and mediating disputes from competing demands for water. Affected water users can appeal to the Administrative Law Court.
- During all phases of drought, **public water systems** monitor the indicators and triggers for their systems and implement response plans as conditions warrant.

Drought Response Plan, Appendix 10 of the State Emergency Operations Plan

SCEMD implements the Emergency Operations Plan and leads multi-agency response to hazard events, including drought. The Drought Response Plan describes the actions when drought conditions have reached a level of severity beyond the scope of the DRC and local entities. It may be activated when drinking water supplies are at risk of being depleted; public health, safety, and welfare are threatened; local resources and actions are unable to provide for citizens' safety; or state-level actions and resources are necessary to provide relief from impacts (Figure 1; [Appendix H](#)).

- Upon determining that state-level response is needed, the DRC recommends activation of the **Emergency Operations Plan (EOP; specifically Appendix 10, Drought Response Plan)** to the Governor and the South Carolina Emergency Management Division (SCEMD).
- Upon activation of the Drought Response Plan, the **Emergency Management Division and State Emergency Response Team** coordinate to disseminate information to the public and assist affected communities and sectors. The Drought Response Plan identifies the types of actions that will be necessary to help local level organizations secure and distribute water supplies for domestic, municipal, and agricultural use; suppress fires and protect lives, property, and the environment; and maintain power production.
- **The Governor** may declare a State of Emergency or a Drought Emergency by Executive Order. The Governor can assist with managing impacts by seeking disaster declarations by the U.S. Department of Agriculture (USDA), activating the National Guard to assist with wildfire suppression, and issuing emergency curtailment of water withdrawals and use.

⁶ Actions taken during the Incipient Drought Alert Phase were reviewed during this Introduction portion of the exercise but were not included in the scenarios.

Basin and Regional Drought Plans

In many of South Carolina's river basins, drought management plans and Low Inflow Protocols (LIPs) provide the triggers and actions to guide hydropower operations and reservoir releases during drought ([Appendix G](#)). These management plans and protocols are managed by entities such as the U.S. Army Corps of Engineers, Duke Energy, and Dominion Energy.

Water Resources Programs and Plans

Brief presentations from Department of Health and Environmental Control (SCDHEC) and Department of Natural Resources staff familiarized participants with relevant water management programs and plans in the State.

Surface Water Withdrawal, Permitting, Use and Reporting (Act⁷ and Regulations⁸). The Act (2011) and Regulations (2012) establish the system of rules and regulations for the registration, permitting, and reporting of surface water withdrawals within the State. The regulations apply to those entities withdrawing surface water in excess of 3 million gallons per month, to include water systems, industry, power generation, and agriculture. The Regulations require that withdrawers have contingency plans; public water suppliers must follow their drought plans as required by the Drought Response Act. Agricultural withdrawers are required only to register and report agriculture water use; they are not subject to the requirements related to permitting, minimum instream flows, or contingency planning.

Groundwater Use and Reporting Program. The Groundwater Use and Reporting Act⁹ established this program¹⁰ in the 1970s. Groundwater users located in Capacity Use Areas (CUAs) of the State's Coastal Plain, and using over 3 million gallons in any given month, are issued permits and required to report their use annually. Users located outside of CUA boundaries must register their wells if they use over 3 million gallons in any month. The purpose of the CUA designations and program are to protect the long-term integrity of the groundwater system and address threats such as saltwater intrusion.

State Water and River Basin Planning Processes. The State Water Plan provides a foundation of sound science and informs the legislature about the State's water use and resources. The first and second editions were published in 1998 and 2004, respectively. In 2014 SCDNR initiated the process (currently underway) to develop regional water plans for the State's eight major river basins. This process has included assessments of surface water and groundwater resources, development of water demand projections, and creation of a framework document to guide the river basin planning processes.¹¹ The River Basin Plans will review current supplies and changes in demands, coordinate with SCDHEC policies already in place, and ultimately contribute to a new State Water Plan. SCDNR initiated the first basin planning process in the Edisto River Basin in fall 2019; the exact timeline for beginning the process in the State's other seven basins will depend on available funding.

⁷ South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act. South Carolina Code of Laws. 1976. §49-4-10 et seq., as amended.

⁸ Surface Water Withdrawal, Permitting, Use, and Reporting Regulation 61-119, for §49-4-10 et seq., South Carolina Code of Laws.

⁹ The Groundwater Use and Reporting Act. South Carolina Code of Laws. 1976. §49-5-10 et seq., as amended.

¹⁰ <https://www.scdhec.gov/environment/water-quality/groundwater-use-reporting>

¹¹ <http://hydrology.dnr.sc.gov/water-planning.html>

Overview of the Drought Scenarios

The planning team developed four hypothetical scenarios to provide a realistic set of deteriorating conditions and impacts over a two-year period.

- Each scenario consisted of **drought indicator levels and impacts** representative of the different drought alert phases.
- The **response actions** that accompany each phase, as outlined in South Carolina’s Drought Response Act and Regulations and the Drought Response Plan, formed the basis of the exercise (Figure 1).
- The planning team developed **scenario-specific questions** to facilitate discussion about the strengths and areas of improvement for each scenario and drought phase ([Appendix B](#)).

Drought Indicators and Impacts

The drought indicator values and visualizations were modeled on the information typically presented at Drought Response Committee meetings and calls (Figure 2; [Appendix D](#); [Appendix E](#)). This information includes the major indicators and indices used by South Carolina for monitoring drought:

- Percent of normal rainfall
- U.S. Drought Monitor (USDM)
- Palmer Drought Severity Index (PDSI)
- Crop Moisture Index (CMI)
- Keetch-Byram Drought Index (KBDI)
- Streamflow, groundwater, and reservoir levels

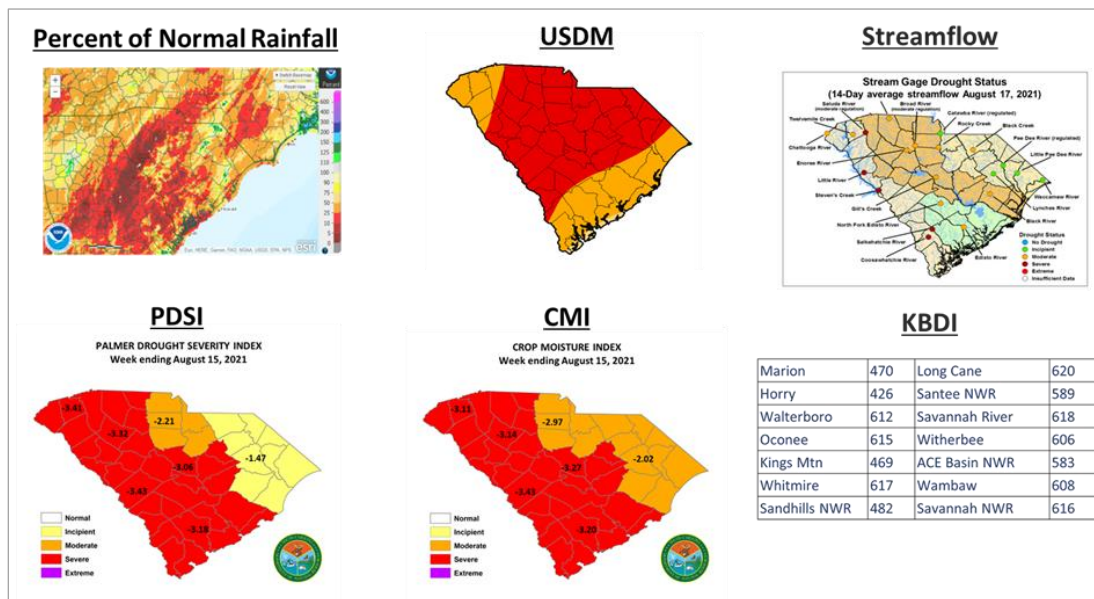


Figure 2. Drought indicator values and visualizations for Scenario 3 (Severe Drought Alert Phase)

Photos and other visuals were used to demonstrate typical impacts for each drought alert phase (Appendix E). Information to develop the South Carolina impact examples came from the National Drought Mitigation Center's Drought Impact Reporter (DIR) database.¹² Figure 3 shows impacts historically experienced in South Carolina that correspond to Severe Drought.

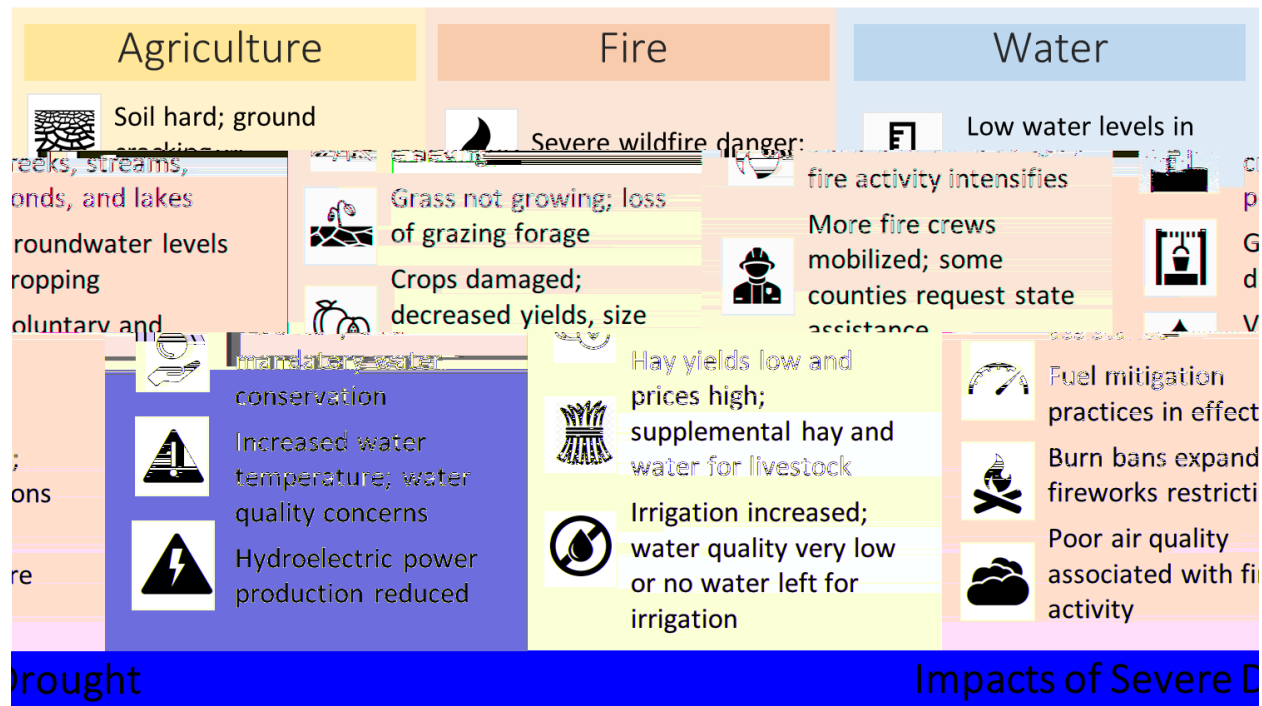














Figure 3. The types of impacts to expect across South Carolina during the Severe Drought Alert Phase

¹² <https://droughtreporter.unl.edu/map/>. This database is a national-level repository of drought-related reports; sources include media articles and individual submissions. South Carolina reports were downloaded for the period from 1/17/2011 to 12/7/2018 (n=1404). The impacts were matched to U.S. Drought Monitor drought intensity levels (D0 to D4), assigned an impact category (agriculture, fire, water resources, plants and wildlife, economic, and public health), and further categorized by Drought Management Areas based on the county location associated with each report.

Response Actions and Participant Discussions

The full group of participants discussed Scenario 1 (Moderate Drought) and Scenario 4 (activation of the Drought Response Plan). During Scenario 2 (Severe Drought) and Scenario 3 (Extreme Drought), attendees were divided into groups based on the State’s four Drought Management Areas (DMAs). In general, discussions centered on the actions taken by different entities during each drought phase, communications, and the challenges associated with the State’s drought monitoring and response processes and procedures (Table 3).

Table 3. Summary of the questions considered by exercise participants during all scenarios

All Participants	
	What, and how, is your organization communicating with the public?
	Do you have the necessary information, personnel, and/or resources to respond to each drought phase?
	What would help your organization more effectively respond to and prepare for drought?
Drought Response Committee Members	
	What aspects of the monitoring and response process could be improved?
	Do you have the information you need to evaluate drought conditions?
Public Water Systems	
	Are the information and actions included in your drought response plan and ordinance up-to-date, adequate, and effective?
	What challenges do you face at each drought phase?
State Agencies and Other Organizations	
	How is your agency, organization, or sector affected by drought?
	Does your agency, organization, or sector have a plan in place for monitoring, responding to, and preparing for drought? How does your organization or sector respond?
SERT Members and Other Organizations Involved in the Emergency Operations Plan Activation	
	What challenges do you foresee in implementing the Emergency Operations Plan and activating the SERT?
	How will South Carolina coordinate with other states, recognizing that extreme drought conditions will likely affect our neighbors as well?
	How are SERT members affected by and responding to drought during the earlier phases of drought?

Breakout Groups

DRC members and participants working in a specific DMA were assigned to their DMA. Other attendees were distributed evenly among the DMAs to the extent possible; this included multiple attendees from the same organization or sector (e.g., SERT member agencies with statewide responsibilities). These breakout groups allowed for more interaction among participants (Figure 4). Each breakout group had a facilitator and note taker.

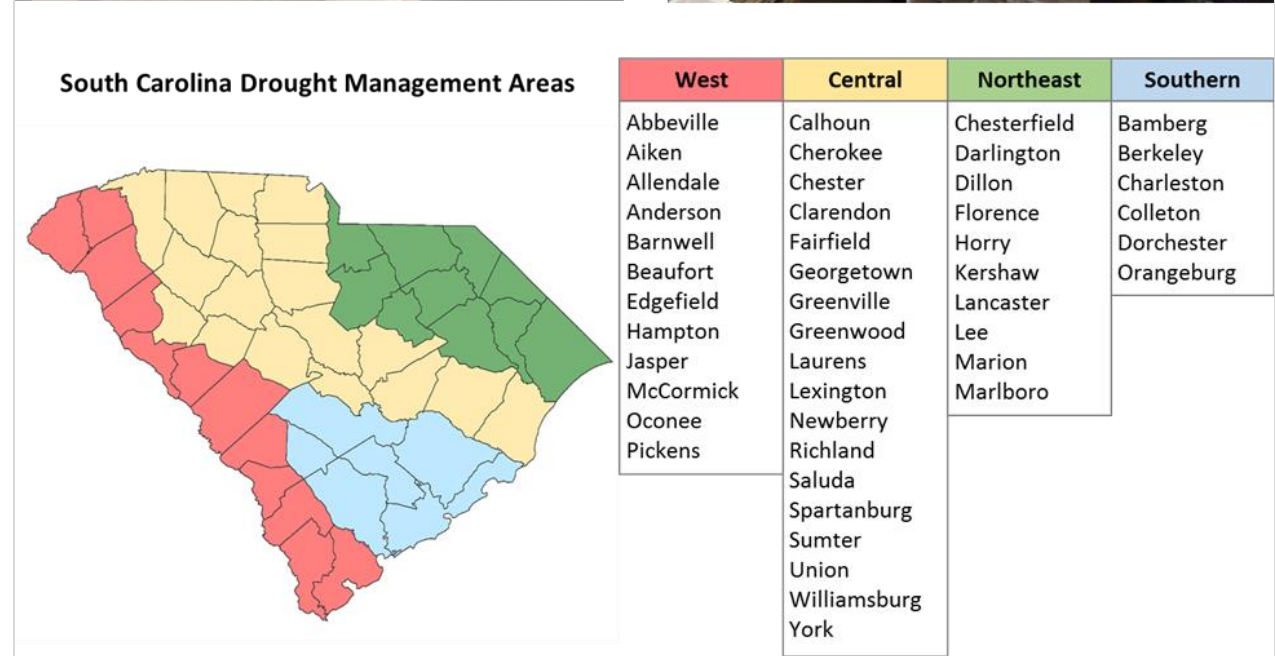


Figure 4. Breakout groups, organized by Drought Management Areas, discussed Scenarios 2 and 3

Breakout group conversation revealed the complexities of coordinating drought response between the various entities that rely on, use, and manage water resources. Issues that emerged during the participant discussions are highlighted below. [Appendix G](#) shows the overlapping boundaries of the Drought Management Areas, water planning basins, and dams, basin-level plans and protocols, with direct influence on flows in South Carolina.

- The **West DMA** includes the counties that border the Savannah River. Major reservoirs in the upper part of the basin are managed by the U.S. Army Corps of Engineers (USACE) and Duke Energy for power generation and many other purposes. Duke Energy and the USACE coordinate to ensure that downstream reservoirs and water uses receive adequate flows. Participants noted that management of the upper and lower parts of the basin can be disconnected. For example, water users in lower reaches of the river may be affected by different types of impacts (e.g., saltwater intrusion) and communicating upstream management priorities and processes can be challenging. Coordinating and communicating with Georgia entities is an additional complication.
- The **Central DMA** is the largest DMA in terms of number of counties and population size, making overall coordination difficult. The Catawba-Wateree Low Inflow Protocol details the coordinated actions to be taken by Duke Energy, water utilities, and other major water users in the Catawba basin during different drought phases.
- The **Southern DMA** includes three different river basins: the Edisto, the Salkehatchie, and the Santee. On the Edisto River, participants expressed concerns about the effects of water withdrawals for agricultural use on instream flow, particularly during times of drought. Water management in the Santee basin is complex and involves multiple federal (USACE, U.S. Geological Survey), state (Santee Cooper), local (Charleston Water System), and private (Dominion Energy) entities. During drought, the management of Lake Moultrie water releases is important for maintaining adequate freshwater supplies for downstream users.
- The **Northeast DMA** is a large, mostly rural area, and participants indicated that this can make communications difficult. In addition, the major reservoirs that affect water levels in the Yadkin-Pee Dee River are located in North Carolina, highlighting a need for more information about upstream conditions, as well as a need for more regular communications between North Carolina and South Carolina.

Scenario 1 (Moderate Drought, June 2021)

Table 4. Summary of Scenario 1 indicators, impacts, response actions, and discussion prompts

Indicators and Impacts
<ul style="list-style-type: none"> Throughout spring 2021, South Carolina experienced abnormally dry conditions statewide and little to no rainfall in some areas. An early season heat wave and above-normal temperatures also contributed to increasing water demands and use. Indicators show low soil moisture levels. Agricultural reports note that non-irrigated crops are withering and may not survive if dryness continues. Other impacts include increased wildfire danger, higher than normal fire activity, and declining streamflow trends.
Response Actions
<ul style="list-style-type: none"> The DRC and SCDNR monitor and evaluate drought conditions, communicate and disseminate information to the public, and alert water suppliers and users to review their drought plans. Some water systems request voluntary conservation to help manage increased water demands from customers. Reservoir managers reduce water releases to help maintain lake storage.
Discussion Prompts
<ul style="list-style-type: none"> What aspects of the Drought Response Committee process could be improved? Does your agency or organization have a drought plan? How is your organization affected at this drought phase? How is your organization responding? What works well/what does not work well at this drought phase?

Participant Discussions: Communications

The discussion focused primarily on how different agencies and organizations **communicate** with their constituents and with one another.

For the **Drought Response Committee members**, not only is it important to communicate effectively with the public, but it is also imperative that they receive information from the communities, sectors, and Drought Management Areas they represent. It is particularly challenging to obtain information and generate interest during the earlier phases of drought, when impacts are generally not as severe. Information about local conditions is essential at this point, as it helps to ensure that different perspectives and locales are represented in the drought monitoring process.

Connecting to farmers, others in the agricultural sector, and the public is important at this drought phase. There can be confusion about different monitoring processes and maps, for example, the U.S. Drought Monitor map and the South Carolina drought map developed by the DRC. One participant suggested using this stage of drought as an **educational opportunity** to increase public awareness about how drought affects different sectors and how it is monitored.

Identifying and using the most **effective communications channels** should be a priority. The new scdrought.com website, informational materials, and handouts are helpful resources. Opportunities to

leverage other tools and networks should be explored. For example, the SC SCO would welcome help from organizations such as Clemson Extension and the USDA to reach agricultural producers efficiently, through mechanisms such as direct mail, email lists, and outreach. The SC SCO is working with the South Carolina Department of Agriculture and National Drought Mitigation Center to encourage use of the Drought Impact Reporter as a way for producers to communicate about drought-related conditions and impacts.

Several **water suppliers and reservoir managers** discussed how they would respond and communicate at this drought phase. Most water systems will have adequate water supplies (i.e., water supply conditions often lag the DRC declaration for a given area), but they will activate their plans and begin to communicate with their customers (including wholesale and irrigation customers) and neighboring utilities. Some participants indicated that they would request voluntary water conservation from their customers, while others focus on internal operations and preparations if the drought increases in severity.

Duke Energy follows the Low Inflow Protocols (LIPs) for the projects they manage. LIP drought levels and triggers do not align exactly with South Carolina's drought indicators. During South Carolina's Moderate Drought Alert Phase, Duke Energy would activate the Drought Management Advisory Groups in affected river basins, conduct regular meetings, and disseminate information about lake levels and drought status. Public water suppliers participating in the LIPs would initiate Stage 1 in their drought plans; this level entails voluntary water use reductions.

Scenario 2 (Severe Drought, August 2021)

Table 5. Summary of Scenario 2 indicators, impacts, response actions, and discussion prompts

Indicators and Impacts
<ul style="list-style-type: none"> • Prolonged dry weather has contributed to the increasing severity of drought conditions; sporadic, localized afternoon storms produced the only rainfall throughout the summer. • Agricultural impacts include lost crops, lack of feed and forage for livestock, and low levels in irrigation ponds. All 46 counties are expected to meet the USDA Secretarial disaster designation status. • The Forestry Commission reports increasing numbers of fires, and more intense fires, requiring more personnel and equipment to control. • Streamflows are below the 10th percentile of historical values, and major lakes are below target levels for this time of year. Groundwater monitoring wells and reservoir levels demonstrate declining trends.
Response Actions
<ul style="list-style-type: none"> • The DRC and SCDNR continue to monitor conditions and disseminate information to the public. • Burn restrictions and bans have been enacted due to heightened fire risks. • At this drought phase, the DRC may request that the Governor encourage voluntary water conservation and may consider requiring mandatory reductions or curtailment of non-essential water use.
Discussion Prompts
<ul style="list-style-type: none"> • How does your organization coordinate with others? • How do inconsistencies between different organizations and communities affect the effectiveness of drought response? • What challenges does your Drought Management Area or sector face at this drought phase?

Participant Discussions: Impacts

How are different sectors and organizations affected at the severe drought phase?

- At the severe drought alert phase, the **agriculture sector will experience the brunt of impacts**. Increasing wildfires are also expected to be an issue. Otherwise, the extent to which other water users and water supplies are affected is variable. Some water utility participants indicated that their water supplies may not be affected at this drought phase, while other participants noted that upstream uses (or non-use) begin to affect downstream users and uses. Coastal water resources may experience increasing salinity levels. Consequently, coordination and communications between water managers and different users is increasingly important.

Participant Discussions: Drought response plans and procedures

What are different agencies and organizations doing?

- In general, **water systems** reported that they **monitor their supplies and communicate both internally and externally** (for example, to customers, wholesale customers, and other constituents).

However, the timing and types of response and communications appear to vary. Voluntary, and some mandatory, water use reductions are now in place. Utilities may not request or require all possible water use reduction measures until conditions reach the extreme drought phase; the amount of reductions requested may differ as well. Response plans and triggers vary due to differences between the water utilities – the nature and robustness of their water source (or sources), the major water uses and type of community (or communities) they serve, and their business operations. Enforcement of water use restrictions is possible at this stage, if the process and criteria are detailed in an ordinance or contract (e.g., wholesale customers, customers with irrigation taps). Utilities that withdraw water from the Catawba basin have response plans that align with Duke Energy’s LIP.

- Participants involved in **energy production** and/or **reservoir management** reported that as lake levels decline, their organizations have **internal discussions**, as well as with partners, about reservoir releases and management of energy production.

Challenges and needs pertaining to monitoring and response

- Many participants questioned how the process to move from severe to extreme drought, and the corresponding response actions, would actually work in practice. Participants expressed uncertainty about how this would actually happen. For example, participants asked exactly when and at what drought level SCEMD personnel, local-level emergency managers, and federal entities and regulators would become involved. This would include personnel involved in various Emergency Support Functions (ESFs) and namely ESF 15, the Public Information function. It is unclear if this involvement can only be initiated through the Governor’s emergency declaration or if other triggers and/or requests from the DRC can launch additional assistance and response actions at the severe drought phase. As areas move into upper stages of drought, one suggestion was for greater representation of emergency managers on the DRC calls, in order to involve them earlier in the process.
- State agencies may be limited in providing assistance or guiding response actions at the earlier drought phases. For example, SCDHEC communicates and interacts with water utilities about the status of their water supplies and water quality. At the severe drought level stage, SCDHEC cannot compel utilities to implement plans or water conservation measures, but the agency does encourage systems to review their plans and respond to water shortages if necessary. Meanwhile, some utilities may want the state to provide more pressure and advocate for water use restrictions, so they can point to state-level authority if they ask customers to reduce water use.
- Addressing varying types and extent of impacts is a challenge. Water systems may face economic pressures to continue to meet the water demands of water-dependent industry, businesses, and wholesale customers, while also looking to conserve and extend water supplies in the event of an enduring drought. One participant asked if the economic impacts and cascading effects of drought, especially in rural areas, were being adequately addressed.
- Some new water uses (e.g., water parks) may not be in local drought plans, ordinances, and communications plans, if those plans and ordinances have not been updated recently.

Participant Discussions: Communications

What are different agencies and organizations doing?

- **State and federal agencies increase communications and outreach** to the public; affected sectors, water utilities, and communities; and partners with whom they need to coordinate response and mitigation activities.
- For the **agriculture sector**, the SC Department of Agriculture serves as liaison between the DRC and farmers. The USDA Farm Service Agency (FSA), USDA Natural Resources Conservation Service (NRCS), and Clemson Extension also actively communicate and work with farmers at this time.
- **SCDHEC** reaches out to water utilities to monitor and assist with any water supply or water quality issues (e.g., taste issues, algal blooms, and dissolved oxygen) and to industries and those with National Pollutant Discharge Elimination System (NPDES) permits for any potential problems with low flows and discharges.
- **SCEMD** starts to prepare for a possible Executive Order and other statewide actions that might be necessary. Non-profit organizations such as the Red Cross also begin to reach out to agency and community partners; they may assist communities affected by wildfires.

Challenges and needs pertaining to communications

- Because water systems and communities experience disparate impacts at the severe drought phase (or might not be affected at all), neighboring systems and communities may have very different responses and messaging, including what is being communicated, to whom and when. This can cause confusion when an area has multiple water utilities or different customer bases. The public may not know exactly which messages pertain to them.
- It is challenging to communicate about lagging indicators and impacts. For example, groundwater tends to respond more slowly than surface water to drought conditions; the agriculture sector is typically affected before drinking water supplies. The reasons for the spatial variability of impacts (i.e., when different drought levels are reported for relatively small areas) is difficult to explain to the public.

Scenario 3 (Extreme Drought, May 2022)

Table 6. Summary of Scenario 3 indicators, impacts, response actions, and discussion prompts

Indicators and Impacts
<ul style="list-style-type: none"> Over the past year, the state has experienced one of the driest and warmest periods on record. The statewide average precipitation in 2021 was 35 inches, 12 inches below normal. Two tropical storms provided rainfall in the fall, but not enough to make up the deficit. 2022 is on track to be as dry and hot as 2021. The State is experiencing widespread impacts to agriculture, fire risks, water resources, and water-dependent industries and businesses.
Response Actions
<ul style="list-style-type: none"> As conditions deteriorate, the DRC decides that State-level measures are necessary to address existing, and projected, effects of drought. The DRC reviews essential and non-essential water uses and makes recommendations regarding the curtailment of water use.
Discussion Prompts
<ul style="list-style-type: none"> What challenges does the Drought Response Committee face at this phase of drought, as conditions increasingly warrant state-level response action to protect water resources? What measures will your community or organization take to implement mandatory water use reductions or curtail water use? What challenges does your Drought Management Area or sector face at this drought phase?

Participant Discussions: Impacts

How are different sectors and organizations affected at the severe drought phase?

- Agricultural producers and businesses** are expected to experience adverse effects earlier and more severely than other sectors. By this phase, it is unlikely that the agriculture sector will have many options to mitigate impacts; producers will likely be looking for aid (e.g., through a Fast Track USDA Secretarial disaster designation¹³) or other types of assistance.
- It is expected that **surface and ground water source levels** will be declining by this phase of drought, necessitating action by water utilities and their customers to conserve water and reduce demand. However, some participating utilities noted that even at the extreme drought phase, they have robust supplies and the capacity to meet their system demands. In terms of their water supply status, they may not need to implement and enforce mandatory water use reductions.

¹³ https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/FactSheets/archived-fact-sheets/emergency_disaster_designation_and_declaration_process_may2017.pdf

Participant Discussions: Drought response plans and procedures

What are different agencies and organizations doing?

- **Water system participants** conveyed that they would be focusing on efforts to reduce their systems water use. Specific actions include mandatory reductions for customers, enforcing water use restrictions with fines and violations, and increasing communications to their customers. Some participants noted having tiered water rates to incentivize lower usage. System-wide actions may include lowering water system pressure or placing a moratorium on new water taps or extensions.
- **Reservoir managers and power generating facilities** will follow their plans and protocols to manage reservoir levels and releases, mitigate impacts such as saltwater intrusion in downstream areas, and ensure that energy production needs and demands are met.
- **State and federal agencies** reported that they will increasingly coordinate with other agencies, utilities, and affected communities to identify and address any issues with water supplies, power generation or fire suppression. They will provide and support public awareness and education campaigns to enhance water conservation efforts.
- **SCEMD**, as well as SERT members (i.e., state agencies and non-profits who support ESFs) will prepare for activation of the Emergency Operations Plan and assist with water conservation communications and other response actions. Non-profits (such as the Red Cross and Salvation Army) and agencies involved in the Mass Care ESF will ramp up their activities and mobilize resources to address severe impacts and emergencies associated with fire safety and suppression, water and food distribution, and shelter services.

Challenges and needs pertaining to monitoring, response actions, and communications

- All committee members and other organizations with drought response responsibilities should be **actively participating** in DRC calls and meetings. This would include members of the agriculture community, state and federal agencies, private entities such as energy utilities, and SERT members.
- The DRC should **coordinate with energy producers**, particularly if they consider the curtailment of non-essential water uses, as power generation is included as a non-essential use. Water rationing could destabilize the electric grid and adversely affect water uses that are considered essential.
- **Data to better monitor and assess drought effects on water resources** and utilities will be necessary. This includes details about interconnections (i.e., which systems and/or communities may be able to share water supplies), which populations are being most affected, and where intakes are in relation to water levels. Such information can help identify areas most at risk to water shortages and guide any mitigative or emergency response activities.
- Some communities or other entities may look to **SCEMD or county emergency managers** prematurely for aid at this phase; however, it may not be within their purview to provide assistance for impacts that are not directly threatening public health and safety.
- The **DRC should communicate and coordinate with other networks** to disseminate drought information. For example, Clemson Extension has agents in every county of the State. The SCEMD emergency alert system, NOAA weather radio, and the National Weather Service offices' alerts are available tools.
- The **DRC should be in contact with Georgia and North Carolina**, as what our neighbors do and how they respond will affect South Carolina's water resources.

Challenges and need pertaining to water use restrictions and curtailment

- Some **water utilities** found that requests for water use reductions in previous droughts were too effective. For example, requests for water conservation during droughts have led to reduced water use over the long-term; in some places, this “demand hardening” may limit the extent to which water use can be feasibly reduced. In other situations, customers’ water conservation led to revenue reductions and ultimately rate increases for those customers. Communications about water conservation can be challenging if customers associate conservation with rate increases.
- During an extreme drought, **conditions may necessitate that the DRC assess the effectiveness of voluntary water use reductions and recommend mandatory water restrictions.** It was unclear to many participants what criteria would be used to limit or curtail water usage, particularly as state-mandated restrictions have not occurred in the past. It is expected that certain industries and businesses would be affected by curtailment more than others would. It was suggested that those who can afford to would pay fines to continue their water usage, which is counterproductive to the goal of extending water supplies until the drought ends. The assessment process should be transparent, identify and evaluate different options, and balance a number of different considerations. For example, how will economic harm be determined and who will be most affected, which entities have the greatest ability to reduce water use, and which are already operating efficiently?
- **Enforcement** of mandatory water use restrictions or curtailment will be difficult without a Governor declaration. This may include mandatory water use restrictions at the local/water utility level and implementation of water use contingency plans (e.g., those required with groundwater or surface water permits).

Scenario 4 (Emergency Operations Plan, August 2022)

Table 7. Summary of Scenario 4 indicators, impacts, response actions, and discussion prompts

Indicators and Impacts
<ul style="list-style-type: none"> Statewide, exceptional drought conditions persist and continue to worsen. Safety, health, and welfare are threatened.
Response Actions
<ul style="list-style-type: none"> The DRC notifies SCEMD that drought conditions have progressed to a level that requires activation of the Emergency Operations Plan (Appendix 10, Drought Response Plan). The State Emergency Response Team develops a Drought Emergency Executive Order for the Governor’s signature and activates the State Emergency Operations Center (SEOC). SERT, with the DRC, works with local emergency management directors and water suppliers to develop response and recovery measures. At this stage, the Governor may issue emergency regulations to require curtailment of withdrawals; state agencies are required to reduce water use by 10%.
Discussion Prompts
<ul style="list-style-type: none"> What resources, information, or additional capacity does the Drought Response Committee need to assess conditions and recommend activation of the Emergency Operations Plan? What challenges do State Emergency Response Team members foresee in implementing the Emergency Operations Plan? What additional resources or information will be necessary? Will additional executive or legislative action be required?

Participant Discussions: Drought response plans and procedures

What are different agencies and organizations doing?

State and federal agencies involved in the SERT were asked to describe in more detail what they would do at this point of drought response. Highlights from the DMA breakout groups also helped to inform discussion about this final stage in the exercise.

- Similar to the management of other hazards or events, **SCEMD** would convene with other agencies to monitor the event, track indicators, and identify when to transfer response to the EOP and SCEMD. They have clear indicators that show when needs surpass local resources (water, shelter, etc.). They have regular meetings with the Governor. They use the same process and operations for all emergencies; their model can be applied to drought, but it might require some modifications. For example, there might be less involvement of the full SERT during a drought.
- State agencies** (including those on the DRC and SERT) coordinate on disseminating information to the public. The **Emergency Support Function 15** (Public Information) initiates a public information campaign to provide updates on drought status, actions being taken, and relief programs available at the State and Federal levels. **SCDHEC** members of the SERT can assist with public health messaging, as well as issue public information to support the curtailment of water use and other response actions.

- The **Department of Social Services** assists counties, Red Cross, FEMA, and other entities with opening points of distribution (PODs) and shelters. The Forestry Commission works with partners from the Southeastern Forest Fire Compact, a compact with neighboring states to provide aid in emergency situations. Federal agencies, such as the US Forest Service and National Park Service, may provide firefighting resources as well. Clemson Extension provides advice and counseling to support farmers.
- Once the SERT is activated, **federal agencies** are asked to assist with providing drought relief and informational resources. Agencies listed in the Emergency Operations Plan include the U. S. Army Corps of Engineers, the National Oceanic and Atmospheric Administration (NOAA), and the U. S. Department of Agriculture. USACE will be involved with the SEOC and coordinate with SCEMD to reach out to affected communities to identify those who need assistance with water delivery. USACE can provide water and drill wells, if certain criteria are met.
- **Energy utilities and reservoir managers** implement their response plans. Impaired water supply and quality conditions would have implications for water utilities and power plant operations; recreational flows and non-essential uses would be limited or curtailed. Additional meetings convening state agencies and municipalities may be necessary to find alternate energy and water sources (e.g., extend water intakes) and/or curtail certain energy generation and water uses.
- **Non-governmental organizations (NGOs)** can help synchronize communications coming from the DRC and SERT with those groups not directly involved with either group (e.g., private, public, and faith-based groups).

Hot Wash

The Hot Wash provided an opportunity for participants to share final thoughts and questions about the drought response process. Scott Brown (SCEMD) led the discussion to synthesize and evaluate the key lessons learned and action items from the exercise. Participants used the Mentimeter software to share their drought-related concerns and takeaways from participating in the exercise. This section provides a few highlights from the final discussion; specific needs and recommendations are incorporated into the following section ([Key Themes from the Exercise](#)).

Who Was Missing?

Participants were asked to identify organizations and groups who were not present at the exercise and/or are not currently involved in the State's drought response process but who should be included in future conversations. Suggestions included:

- More diverse representation from other sectors
 - Large industries and manufacturers that use wet process(es)
- Professional news media
- Elected officials
 - South Carolina Legislature
 - Local officials, agencies, and organizations to help make connections with water users at the local level
- Other state agencies
 - SC Department of Insurance
 - SC Department of Employment and Workforce to assist sectors, workers, and livelihoods affected by drought (e.g., agriculture, car wash companies, landscaping, recreation) and to collect data about the economic losses to these lines of work
 - SC State Fire Division; Department of Labor, Licensing and Regulation (LLR)
 - SC Department of Parks, Recreation and Tourism
- Other states
 - Neighboring states¹⁴
 - Other states and regions that have recently experienced extreme drought (e.g., Texas, California) to share lessons learned about issues such as code enforcement, mandatory water restrictions, and effectiveness of consumer self-policing and peer pressure for water conservation efforts

Recap of Important Issues

The final discussion focused on needs related to **communications** and **plans and procedures**, mirroring the responses submitted through the Mentimeter polls. For example:

- 72 exercise attendees provided responses to the question, “What are some of the challenges you face?” The most frequently mentioned challenges were related to *communication* (39 responses), *money (cost, revenue)* (17 responses), and the *law (legal)* (12 responses). (Figure 5)

¹⁴ Note: A North Carolina Drought Management Advisory Council member attended the exercise. Georgia was invited but unable to attend.

- 47 attendees provided responses to the question, “What are your biggest concerns?” The most commonly cited concerns were *enforcement* (16 responses), *politics* (8 responses), and *communication* (8 responses). (Figure 6)

Communications

Hope Mizzell (SC SCO) reviewed the existing **communications mechanisms** and then the group revisited some of the key questions raised during the exercise. At the moderate, severe, and extreme drought alert phases SCDNR issues press releases, letters to all water systems, and public notices in newspapers to disseminate information about the State’s drought status. A drought listserv¹⁵ and the scdrought.com website are also used to provide information.

The hot wash discussion highlighted needs related to the timing and content of drought messaging. Drought is a complex hazard, and it can be difficult to explain complicated response processes and procedures. Participants suggested that state agencies and other information providers start earlier compared to current practices to communicate about drought and to work together to provide consistent communications. Messages should be clear about the types and location of impacts being experienced, how reported conditions and impacts may affect the public and other audiences (such as the agricultural community), how to respond at different levels of drought, and where to find more information.

Plans and Procedures

Final comments pertained to **DRC representation** and needs for **greater awareness and use of drought plans**. As almost 50% of Committee seats are vacant, having a representative and full DRC is important for facilitating information sharing with affected sectors, communities, and organizations. In addition, members should be able to represent their own sector and organization, as well as other water users in their DMA.

Furthermore, there was a sense that many plans are not reviewed or implemented regularly. Drought plans are important tools for public and private entities as they prepare and respond to droughts and water shortages. Effective and timely drought response also requires coordination among multiple agencies, sectors, water users, and interests. Efforts to review and update local, basin, and statewide plans are necessary to ensure that South Carolina’s drought response processes are relevant and adequate to address changing circumstances and new information.

¹⁵ Readers interested in joining the drought listserv should contact the South Carolina State Climatology Office.



Figure 5. Mentimeter word cloud shows responses to the question, "What are some of the challenges you face?"



Figure 6. Mentimeter word cloud shows responses to the question, "What are your biggest concerns?"

Summary of Key Themes

The exercise provided an opportunity for participants to identify what works well; what existing activities and resources to build upon; and what gaps and challenges need to be addressed. This section synthesizes the key themes that were discussed throughout the exercise.

Plans and Procedures

Drought Response Committee

- Some participants voiced concerns about the **lack of representation** in the DRC and the DRC calls. The amount of DRC vacancies is one aspect of this challenge; some areas and sectors are not as well represented as others. Filling the existing DRC vacancies should be a priority and will help ensure that different stakeholder groups are represented adequately.
- Communications with the monitoring processes in **Georgia and North Carolina** are necessary to ensure that shared water resources are sustained, particularly during extreme drought events.

Drought Response Act and Regulations

- One major challenge is that the Drought Response Act, Regulations, and guidance for local plans and ordinances were **last updated in 2000-2001**. It is unclear how any changes would coordinate with other legislation (for example, the Surface Water Withdrawal, Permitting, Use and Reporting Act and Regulations) or activities (for example, the State and River Basin Planning processes).

Transitioning between Drought Alert Phases

- While the Drought Response Act and Regulations establish the objective indicators, triggers, and actions to be taken at the four drought alert phases, some participants raised overarching questions about the **timing of drought declarations and messaging**. The DRC does not want to appear over reactive to short-term conditions nor be too quick to change drought status or skip drought levels (i.e., move from Incipient to Severe Drought, or vice versa). In addition, drought declarations in the winter, when water demand and public attention are low, are potentially counterproductive. These types of considerations are embedded in the decision process; one critique is that the process should be less subjective and adhere to specific indicators and triggers. While there was no overarching conversation or consensus about how to improve the current process, the DRC might consider these questions at future meetings or exercises.
- Interest in the drought response process typically increases as droughts increase in severity; however, participants noted a need for **early and consistent engagement in the monitoring and response process by affected sectors and agencies**. Suggestions included more engagement with the agriculture sector at early stages of drought. Furthermore, more attention should be paid to conditions during spring and early summer, and communications should be more frequent, particularly when water demand is high and agriculture may be most vulnerable to dry conditions.
- Participants expressed uncertainty regarding how the **transitions into increasingly severe levels of drought** (i.e., severe, extreme, and activation of the Emergency Operations Plan) would actually work. Current plans lack clear procedures to guide when and how emergency agencies will ramp up their activities and when communications between the DRC, the SCEMD, and SERT will be initiated. Greater involvement of county emergency managers and/or SERT members at the severe and extreme drought phases (rather than waiting until the EOP is activated) may help to facilitate coordination as a drought progresses.

- The exercise highlighted a need for better understanding of the conditions under which **federal assistance** is available to affected entities. Federal agencies and programs must meet certain criteria before they can provide assistance or aid. For example, the US Drought Monitor must show D2 (severe drought) for eight consecutive weeks before the USDA may declare a secretarial disaster designation and the Farm Service Agency may provide financial aid. The USACE can assist with water provision by drilling wells or trucking in water. However, these should be last-resort measures to save lives or protect property; federal assistance is neither unlimited nor free. Communities are eligible for assistance but not industries. The federal government expects to be reimbursed for any well-drilling services (well owners are eligible for loans, to be paid in 30 years); federal funds can pay for trucking in water, with a 30-day maximum.

Determining and Curtailing Non-Essential Water Use

- Participants raised many questions and concerns about the **challenges associated with fairly determining and restricting non-essential water uses**. No specific criteria exist to guide such an assessment. It is unclear how various water uses would be prioritized for curtailment, given that “not all non-essential water uses are equal.” For example, non-food agricultural production tops the non-essential water use list and ranks as a higher priority over uses such as energy generation. Several participants recommended that energy generation be considered an essential rather than a non-essential use, due to the adverse effects power shutdowns would have on public health and safety and the overall economy.
- It is unclear how the **economic costs of restrictions and emergency measures** will be considered during this process. Curtailment of non-essential water use is expected to have significant economic effects on individual communities, water utilities, businesses, and industries. How might manufacturers, who are already efficient and minimizing their water usage, curtail their water use, without suffering major economic impacts? Larger water utilities may face challenges in reducing water use, if smaller utilities and well users turn to them when their water resources are depleted. If conditions warrant water use curtailments, clear and concise messaging to explain why, when, how, and by what criteria different water uses are being curtailed will be a critical need.

Enforcement

- Breakout group discussions revealed some of the **complexities involving the enforcement of drought restrictions and curtailment**, particularly during the severe and extreme drought phases. The ability for different agencies to enforce water use reductions, or take other response actions, is uneven. Although the DRC may recommend mandatory conservation and water use curtailment when conditions warrant, there is no statewide enforcement capability, and individual agencies may not be able to implement many activities until the Governor makes an emergency declaration. On the local level, the implementation and enforcement of mandatory water use restrictions varies tremendously between local water utilities and communities.

Coordination

- The exercise identified important **coordination mechanisms that support drought response**. For example, the Southeastern Forest Fire Protection Compact encourages mutual aid in the event of forest fires; South Carolina is one of the Compact’s ten member states. Drought management plans and Low Inflow Protocols (LIPs) for many of South Carolina’s major reservoirs and large energy

projects establish set procedures for monitoring and protecting shared water resources during drought. Because so many water users, agencies, and stakeholders may be affected by these contingency plans, it is important that communications and discussions about operational changes or deviations occur as early as possible.

- Breakout group discussions also revealed how various **entities and networks work together informally** to communicate and provide assistance to affected communities. Examples include programs and networks that assist agricultural producers (Clemson Extension, USDA NRCS and Farm Service Agency), information sharing among neighboring water utilities to compare drought response actions and messaging, and consultations between upstream and downstream users to ensure that multiple water uses are met during low flow conditions.
- **Challenges** occur when different types of plans appear to be inconsistent or unfair, or to work at cross-purposes with drought response and water conservation. For example, homeowner associations' (HOA) covenants and requirements for maintaining lawns and landscaping may conflict with water utility requests for water conservation. On the state level, laws and regulations establish different requirements for drought contingency planning and water use reduction for different water users and uses. For example, under the current Drought Response Act and Regulations, requirements for response and conservation fall to public water utilities and their water customers; private sector entities have no requirements or responsibilities until the DRC determines that mandatory restrictions or curtailment is necessary. Under the South Carolina Surface Water Withdrawal Permitting, Registration and Use Program agriculture withdrawers are subject to minimum flows but have no requirements for drought response and contingency plans.

Local-level Planning

- There is a need to **update local response plans and ordinances**. The State has over 600 water systems, and many have not reviewed or updated their plans and ordinances recently. Water systems that regularly use, review, and/or exercise their plan, such as systems that follow the Catawba-Wateree LIP and Mount Pleasant Waterworks (conducted a system-specific drought exercise in 2019), are examples of exceptions. Local plans should be reviewed periodically to account for changing conditions and new information.¹⁶ Examples noted at the exercise include the addition of major water users to a system (e.g., water parks); new interconnections, purchase agreements, or contracts between utilities; and modifying communications strategies to incorporate new tools such as social media.

Data and Information

Timely and Localized Information

- Many participants noted that more should be done at **earlier stages of drought** to help agricultural producers and other affected water users respond to potential impacts. Currently the DRC may not be receiving all the information it needs, and at the times when that information would be most useful, for example before or during planting and growing season. As agricultural producers may be

¹⁶ Brown, C. and Maddaus L. (2019) *Drought preparedness and response*. Manual of Water Supply Practices-M60, Second Edition. Denver, CO: American Water Works Association.

affected by only 3-4 weeks of drought, increasing the frequency of DRC calls was suggested as a way to obtain and provide more timely information for that sector.

- The DRC, and the monitoring process in general, would benefit from more **localized reports and input**, for example, firsthand accounts from farmers' (and other affected groups') about their experiences and better information and reporting about rainfall variability. Such information is necessary to ensure that drought designations are as accurate as possible.
- The SC SCO and SC Department of Agriculture are partnering with the National Drought Mitigation Center to encourage the use of its **drought impact reporting app**. It allows producers to submit short descriptions and photos of how drought is affecting their location. This new tool is in the early stages of being applied to drought monitoring, and improvements will be made as producers and other users provide feedback. This tool may be able to provide better coverage of the Drought Management Areas. In general, more reliable and regularly collected impacts data is expected to improve drought monitoring, response, and planning activities.

Impacts and Costs

- Currently no systematic effort exists to track or assess who or what is affected by drought, how different entities are responding, and what costs are incurred. There is a need for **reliable data about the monetary costs** of various response actions. For example, if a hay lift is necessary, who pays for the cost of the hay, the shipping and transportation, and the logistics of distribution? If water use restrictions are invoked, what are the short- and long-term costs on revenue for water utilities and affected businesses? What methodologies are most appropriate to identify, compare, and prioritize different types of mitigation actions? These data and information gaps make it difficult to identify and understand the full costs of drought, plan effectively, and develop consistent messaging about drought's effects on South Carolina.

Thresholds and Transitions

- In order for different sectors to be better prepared for drought, identifying the **critical thresholds** for different sectors and types of drought events would be beneficial. As impacts to different sectors do not occur on similar timescales, it may be useful to assess if particular impacts associated with agricultural drought, for example, could serve as early warning to other sectors that are typically affected at later drought phases.

Communications

Audience and Messaging

- There is a **difference between public and professional communications**, but these differentiations were not always made during the exercise. Some participants discussed communications intended to educate and increase public awareness. Others discussed more targeted communications with managers of neighboring or peer organizations and with community leaders in order to promote more coordinated and effective drought response. Future communications discussions should clarify the target audience (public or professional) and purpose (general education and awareness, drought status updates from the DRC messaging, water use restrictions from water utilities, etc.).

Challenges

- **Drought is a complex hazard**, as are the management decisions to respond and prepare for drought. It can be difficult to explain these complicated processes to the public. For example, the DMA-breakout groups discussed how varying conditions and impacts affects how organizations communicate about and respond to conditions. West DMA participants asked for a more effective way to communicate about impact lags and the different responses that occur at different time points amongst different sectors.
- Larger water systems are likely to have communications strategies and plans developed in advance and possess adequate personnel and resources to disseminate information to customers. It is unclear whether **smaller systems** have similar capacity to respond. **Social media** is a useful tool, but it can be challenging to monitor and correct any misinformation that is disseminated, especially for those systems with fewer resources.
- Many participants noted that **communications often lack consistency and coordination between the various entities** (agencies at local, state, and federal levels; water utilities; volunteer and non-governmental organizations) that provide drought information, partly due to the varying types and extent of impacts that may be experienced during any given drought. For municipal water users, local level messaging is frequently inconsistent as neighboring water utilities and communities often have different drought triggers and response actions in their plans; this can be confusing for water customers.

Employing Best Practices

- More drought-focused communications need to take place **before drought begins and at the earlier drought phases**, particularly to vulnerable communities and sectors (such as agriculture). Water conservation messages communicated before drought can help to condition desired behaviors when a drought occurs.
- **Consistent and coordinated communication messages** should be developed when and where possible. Just as ESFs provide consistent communication and messaging throughout other emergency events, the same should apply through all phases of a drought. Audiences will know what to expect, and how to respond, if a consistent process is used.
- **Clear and understandable information** can help audiences know what types and location of impacts are occurring, how reported conditions and impacts may affect them, what they should or could do in response, and where to find more information. Users may find infographics and visuals more useful than text.
- **Many existing tools and resources** could be leveraged for future drought communications, for example emails and listservs, paper mailers, listserv, social media, press releases, bill inserts, conference calls, meetings and workshops, and websites. Greater use of social media, broadcast meteorologists, and the National Weather Service may be ways to expand the dissemination of drought alerts and related information. A reverse 911 system may be appropriate for targeting messages to groups such as water utility customers to provide instructions about water restrictions, to agricultural producers to provide guidance about obtaining aid, or to communities affected by water shortages or wildfire activity.

Evaluation

- Communications tools and messages should include a mechanism for **user feedback** so that information providers can better understand how recipients perceive, understand, and apply those messages and then improve subsequent communications. Formal evaluations could assess the most effective methodologies to use in communications and messaging and monitor response actions, such as short- and long-term behavior changes by water users to specific messaging regarding water use reductions.

Education and Awareness

Drought decision makers and agency officials

- Participants noted that **professionals and agency staff** responsible for water management and/or drought response would benefit from greater familiarity with South Carolina's Drought Response Program and the procedures outlined in the Drought Response Act and Regulations.
- Participants suggested a need to improve awareness that drought response is included in the State Emergency Operations Plan.
- **Regular, statewide or basin-level tabletop exercises** can help to keep agency personnel informed and prepared for future events.

Other audiences

- Participants noted a need for more educational resources to promote drought understanding and awareness for **general and K-12 audiences**.
- **Enhanced ways to inform and educate about drought before conditions reach the extreme level** are needed. Suggestions included pamphlets, or similar types of resources, that explain drought categories and declarations. These could be similar to those produced for other hazards (hurricanes, for example) and be targeted to more general and/or K-12 audiences. The South Carolina Ag-Watch Manual may be an appropriate resource for sharing drought information with the agriculture sector.

Recommended Action Items

Listed below are recommended action items from the 2019 Drought Tabletop Exercise. These were synthesized from the participant discussions and responses to the post-exercise feedback survey. Suggested actions range from the very specific and tangible (i.e., fill DRC vacancies) to those that will require longer-term commitments to policy and regulatory changes, engagement with the multiple entities affected by drought and involved in drought response, and research efforts to improve understanding of drought processes and impacts.

Plans and Procedures

- For SCDNR and the State Climatology Office, continue to work with the Governor's office on new DRC appointments.
- Continue to use the scdrought.com website as the primary platform for sharing information as drought conditions change. Enhance 2-way communications between the DRC and the sectors and organizations that would like to be more involved in the DRC process. Regularly check the website to ensure that DRC contact information is accurate and up-to-date; provide information or instructions about how stakeholders can or should communicate with DRC members. Work with DRC members to identify other information networks (for example, Clemson Extension, Yadkin-Pee Dee Drought Management Advisory Group) with which to connect and to ensure that clear lines of communications are established and working, before a drought event.
- Review and update the Drought Response Act and Regulations. Specific components discussed at the exercise included procedures to transition between Drought Alert Phases, determine and curtail non-essential water use, and enforce mandatory water use restrictions.
- Update the local drought plan and ordinance guidance document.¹⁷ Identify groups (for example, Councils of Governments or professional associations) to help work with local governments on updating their plans.
- Support and encourage local planning and preparedness efforts, particularly as planning for and responding to hazards typically starts at the local level. Utility-specific or county-level tabletop exercises can be used to assess local drought response. More extensive pre-event monitoring, communications, and mitigation actions may help to increase preparedness when a drought occurs.
- Integrate drought policy and planning into broader state water plan and upcoming river basin planning processes.

Data and Information

- Continue to promote and test the drought impact reporting app with South Carolina producers. Test the app with sectors other than agriculture.
- Conduct research to improve understanding of the transitions between different drought phases and identify critical thresholds. Develop informational resources to better explain and communicate drought's cascading effects and the impacts to expect at different time scales and different times of the year.

¹⁷ The CISA team is currently working on project to assist with this.

- Identify data sources and most effective methods to collect information about the economic and monetary costs of drought.

Communications

- Leverage resources such as scdrought.com and the SCEMD¹⁸ website, important platforms and vital communication tools, to centralize information sharing and synchronize messaging and communications efforts.
- Identify and use different mechanisms and tools to ensure that messages get to the right people, in the right context, and through trusted sources. Social media, apps, broadcast meteorologists, and other agency websites may be ways to expand the dissemination of drought alerts and information.
- Tailor information to the target audience(s) and create communications that are timely, specific, consistent, and understandable. Short, fact-based messages; pictures and other visuals; and positive messaging, such as “use water wisely” rather than negative messaging, may be more likely to facilitate understanding and interest and lead to desired responses.
- For general audiences, develop information to describe the *type(s)* of drought that South Carolina experiences (i.e. meteorological, agricultural, hydrological), best practices for water conservation and actions to take during drought, and how droughts end (i.e., typically not with one rainfall event).
- For agriculture, work with Clemson Cooperative Extension to develop materials about South Carolina’s drought response plans and procedures for producers. Identify the most effective way(s) to disseminate this information.
- For water utilities, encourage systems in the same media markets to develop preplanned messages that can be used to educate customers about water conservation and drought response. Collect and publicize lessons learned about drought response from South Carolina utilities and communities.
- Conduct studies to test specific communications messages. Assess methods and mechanisms for sharing information, as well as the effectiveness of the provided messages to different audiences.

Education and Awareness

- Conduct similar tabletop exercises in the future to promote understanding of drought response processes and the responsibilities of different entities.
- Develop informational resources to help South Carolina’s citizens be more aware of and better prepared to respond to drought. This could include developing new or enhancing existing informational resources (such as those available on the scdrought.com website) to provide to farmers, water customers, businesses, elected officials, and the public.¹⁹

¹⁸ <https://www.scemd.org/>

¹⁹ The CISA team has developed a draft drought guide for emergency managers; when completed, it may be posted to the SCEMD and scdrought.com websites.

Appendix A. Participant List

First Name	Last Name	Organization
Frank	Alzheimer	National Weather Service, Columbia
Ekaterina	Altman	Carolinas Integrated Sciences & Assessments
Raymond	Ammarell	Dominion Energy South Carolina, Inc.
Bill	Argentieri	Dominion Energy South Carolina, Inc.
Tim	Armstrong	National Weather Service, Wilmington
David	Baize	SCAWWA/WEASC
Steven	Batson	SC Emergency Management Division
Colt	Bowles	US Army Corps of Engineers
Rebecca	Bowyer	City of Rock Hill
Tyler	Brown	SC Department of Natural Resources
Scott	Brown	SC Emergency Management Division
Sara	Brown	US Army Corps of Engineers
Jerome	Brown	USDA NRCS
Edward	Bruce	Duke Energy
Rob	Burton	SC Emergency Management Division
Doug	Busbee	Edisto Concerns
Alex	Butler	SC Department of Health & Environmental Control
Brian	Callahan	Clemson Extension Service
Fred	Castles	Chester Metropolitan District
Deanna	Coffey	SC Emergency Management Division
Whitney	Cofield	SC Department of Health & Environmental Control
Jay	Daniels	SC Department of Health & Environmental Control
Eleanor	Davis	Carolinas Integrated Sciences & Assessments
Patricia	DeHond	Clemson Extension Service
Rob	Devlin	SC Department of Health & Environmental Control
Kirstin	Dow	Carolinas Integrated Sciences & Assessments
Clint	Elliott	Grand Strand Water & Sewer Authority
David	Evans	Milliken & Company
Cassidy	Evans	SC Farm Bureau Federation
Susan	Featherstone	City of Rock Hill
Melissa	Griffin	SC Department of Natural Resources
Scott	Harder	SC Department of Natural Resources
Michelle	Harris	Carolinas Integrated Sciences & Assessments
Randy	Hawkins	Catawba River Water Supply Project
Brian	Head	Mount Pleasant Waterworks
Katherine	Helms	SC Department of Agriculture
Blair	Holloway	National Weather Service, Charleston
John	Irwin	Clemson Extension Service (retired)
Karen	Jackson	Clemson Extension Service
Wendy	Jeffcoat	Lexington County EMD
JJ	Jowers	Edisto Engineers and Surveyors
Darrell	Kershaw	SC Department of Social Services
Hugo	Krispyn	Friends of the Edisto
Kirsten	Lackstrom	Carolinas Integrated Sciences & Assessments
Jeff	Lineberger	Duke Energy
Lev	Looney	SC Department of Natural Resources
Brian	Lynch	Santee Cooper

First Name	Last Name	Organization
Robin	Mack	SC Department of Health & Environmental Control
John	Madrid	American Red Cross
Paul	Matthews	SC Emergency Management Division
Charly	McConnell	Clemson Extension Service
Caleb	Miller	Betty Allen Farms
Jill	Miller	SC Rural Water Association
Tommy	Mills	SC Forestry Commission
Hope	Mizzell	SC Department of Natural Resources
Dennis	Mobley	USDA NRCS
Leigh Anne	Monroe	SC Department of Health & Environmental Control
Priyanka	More	SC Department of Natural Resources
Josh	Morton	Saluda County EMD
Michael	Mosley	Dominion Energy South Carolina, Inc.
Stafford	Mullin	Carolinas Integrated Sciences & Assessments
Meredith	Muth	NOAA/NIDIS
Heather	Nix	Greenville Water
Eric	Odom	Orangeburg Department of Public Utilities
Mike	Patterson	The Salvation Army-North & South Carolina
Jeffrey	Phillips	Greenville Water
Betsy	Polk	SC Emergency Management Division
Melissa	Potter	SC Emergency Management Division
KC	Price	Laurens County Water & Sewer Commission
Jacob	Ramthun	Carolinas Integrated Sciences & Assessments
Chris	Rasco	Powdersville Water
Ken	Rentiers	SC Department of Natural Resources
John	Shelton	USGS South Atlantic Water Science Center
Stan	Simpson	US Army Corps of Engineers
Gregory	Sprouse	Central Midlands Council of Governments
Bill	Stangler	Congaree Riverkeeper
Kim	Stenson	SC Emergency Management Division
Allen	Stewart	SC National Guard
Athena	Strickland	Domtar Paper
Kayla	Stroman	USDA Farm Service Agency
Alan	Stuart	Duke Energy
Jason	Thompson	Charleston Water System
Ken	Tuck	Spartanburg Water
Leonard	Vaughan	National Weather Service, Columbia
Thomas	Walker III	Clemson University SC Water Resources Center
Rebecca	Ward	State Climate Office of North Carolina
John	Westcott	Spartanburg Water
Alexandra	Whitehill Smith	SC Department of Agriculture
Stephen	Wilkinson	National Weather Service, Greenville-Spartanburg
Scott	Willett	Anderson Regional Water
Aaron	Wood	SC Department of Agriculture
Megan	Wood	SC Emergency Management Division

Appendix B. Agenda and Discussion Questions

South Carolina Drought Tabletop Exercise Agenda

9:15	Registration
9:30	<p>Welcome and introductions</p> <p>Goals and objectives for the exercise</p> <p>Challenges and opportunities for drought response</p> <p><i>Progress and updates since the 2017 exercise</i></p> <p>Review of relevant legislation, plans, and programs</p> <p><i>Drought Response Act and Regulations</i></p> <p><i>Emergency Operations Plan – Appendix 10 (Drought Response Plan)</i></p> <p><i>Surface Water Withdrawal, Permitting, Use and Reporting (Act and Regulations)</i></p> <p><i>Groundwater Use and Reporting Program</i></p> <p><i>State Water and River Basin Planning Processes</i></p>
10:45	Break
11:00	<p>Introduction to the scenarios</p> <p>Scenario 1 – June 2021, Moderate drought</p> <p><i>Full group discussion</i></p>
11:45	<p>Scenario 2 – August 2021, Severe drought</p> <p><i>Breakout into Drought Management Area groups for discussion</i></p>
12:30	Lunch
1:15	<p>Scenario 3 – May 2022, Extreme drought</p> <p><i>Breakout into Drought Management Area groups for discussion</i></p>
2:00	<p>Scenario 4 – August 2022, Activation of the Emergency Operations Plan</p> <p><i>Full group discussion</i></p>
2:45	<p>Hot Wash</p> <p><i>Group provides feedback on exercise and suggestions for action items</i></p> <p>Closing Remarks</p>
3:30	Adjourn

Scenario 1 Narrative and Discussion Questions

Scenario 1 - June 2021, Moderate Drought

La Niña conditions contributed to lower-than-normal rainfall during the winter and early spring. Throughout the spring, the state has been experiencing **incipient** drought conditions, including abnormally dry conditions statewide and little to no rainfall in some areas. An early season heat wave and high temperatures are also contributing to increasing water demands and use.

- Indicators show low soil moisture conditions, and reports note that non-irrigated crops are withering and may not survive if dryness continues.
- There is increased wildfire danger and higher than normal activity; >30 Class C (10-99 acres) occur per day.
- Most streams are showing in declining trends. Reservoir managers have reduced water releases to help maintain lake storage. Some water systems requested voluntary conservation to help manage increased water demands from customers.

All participants

- a. What, and how, is your organization communicating with the public?*
- b. Do you have the necessary information, personnel, and/or resources to respond to this stage of drought? If not, what would help your organization more effectively respond to and prepare for drought?*

Drought Response Committee members

- a. What aspects of the monitoring and response process could be improved?*
- b. Do you have the information you need to evaluate drought conditions?*

Local water systems

- a. How current is the information in your local drought response plan and ordinance? (For example, water system information, drought triggers and response actions, and contact information)*
- b. What currently works well at this stage?*
- c. What does not work well at this stage?*

State agencies and other organizations

- a. Does your organization have a plan in place for monitoring, responding to, and preparing for drought?*
- b. How is your organization affected at this stage of drought? How is your organization responding?*

Scenario 2 Narrative and Discussion Questions

Scenario 2 – August 2021, Severe Drought

Breakout group discussion: challenges associated with inconsistent communications and response

Prolonged dry weather has contributed to the increasing severity of drought conditions; sporadic, localized afternoon storms produce the only rainfall throughout the summer.

- Agricultural impacts include lost crops, lack of feed and forage for livestock, and low levels in irrigation ponds. All 46 counties are expected to meet the USDA Secretarial disaster designation status.
- Increasing numbers of fires, and more intense fires, require more personnel and equipment to control. Burn restrictions and bans have been enacted.
- Streamflows are <10% of normal, and major lakes are below target levels, for this time of year. Groundwater monitoring wells and reservoir levels show declining trends.

All participants

- a. What, and how, is your organization communicating with the public?*
- b. Do you have the necessary information, personnel, and/or resources to respond to this stage of drought? If not, what would help your organization more effectively respond to and prepare for drought?*
- c. How do inconsistencies at different organizational levels affect drought response and communications at this stage? For example:*
 1. State level: The DRC typically encourages voluntary conservation and implementation of local ordinances and plans but does not recommend or require mandatory restrictions.
 2. Local level: Water systems ask for no, voluntary, or mandatory restrictions.
 3. Basin level: Many basins have Low Inflow Protocols (LIPs) or other reservoir management plans and procedures; others do not have a coordinated approach.

Drought Response Committee members

- a. What aspects of the monitoring and response process could be improved?*
- b. Do you have the information you need to evaluate drought conditions and make recommendations regarding water use restrictions?*

Local water systems

- a. Are local ordinances and plans up-to-date and consistent with other drought plans in your area (i.e., wholesale customers, neighboring communities) or basin (i.e., LIPs)?*
 1. Are actions at the severe drought stage, as outlined in the plans, adequate and effective?
 2. Are wholesale customers required to implement conservation?
 3. To what extent are ordinances and restrictions coordinated across neighboring water systems and communities?

State agencies and other organizations

- a. How is your organization or sector (agriculture, forestry, industry) responding to drought at this stage?*
- b. What challenges are evident?*

Scenario 3 Narrative and Discussion Questions

Scenario 3 – May 2022, Extreme Drought

Breakout group discussion: mandatory reductions and curtailment of non-essential water use

Over the past year, the state has experienced one of the driest and warmest periods on record. The statewide average for 2021 was 35 inches, 12 inches below normal. Two tropical storms provided rainfall in the fall, but not enough to make up the deficit. 2022 is on track to be as dry and hot as 2021. As a result, the State is experiencing widespread impacts to agriculture, fire risks, water resources, and water-dependent industries and businesses. *Conditions are deteriorating and the DRC decides that State measures are necessary to address existing, and projected, effects of drought. The DRC reviews essential and non-essential water uses and makes recommendations regarding the curtailment of water use.*

All participants

- a. *What, and how, is your organization communicating with the public?*
- b. *Do you have the necessary information, personnel, and/or resources to respond to this stage of drought? If not, what would help your organization more effectively respond and prepare?*

Drought Response Committee members

- a. *As the DRC evaluates conditions to determine if State action is needed, are existing plans and procedures effectively guiding the transition from local to state-level response? For example:*
 1. The Forestry Commission requests that the Governor activate the National Guard for state duty, to assist with fire suppression.
 2. The DRC recommends that the Governor issue public statements about drought conditions, including recommendations for mandatory restrictions on water use and withdrawals.
 3. The DRC evaluates non-essential water uses that can be curtailed and submits recommendations to DNR.
- b. *What challenges exist in determining the equitable allocation of water? (DRA Sec. 49-23-80)*
- c. *If the DRC requests restrictions on or curtailment of water use, will affected parties appeal to the Administrative Law Judge, which has 5 days to hear the case?*
 1. How will this affect timeliness and effectiveness of conservation and response efforts?

Local water systems

- a. *Are actions at the extreme drought stage, as outlined in your water system plan and ordinance, adequate and effective? What challenges are evident?*

State agencies and other organizations

- a. *How is your agency, organization, or sector (agriculture, forestry, industry) responding to drought at this stage?*
- b. *How are industry and individual businesses responding?*
 1. What challenges do water-dependent businesses face? They are not required to have a drought plan, but might be considered a non-essential water use and required to curtail their water use. Will they appeal to the Administrative Law Judge?
- c. *What other challenges are evident at this drought stage?*

Scenario 4 Narrative and Discussion Questions

Scenario 4 – August 2022, Emergency Operations Plan (EOP) is activated

Statewide, exceptional drought conditions persist and continue to worsen. *Safety, health, and welfare are threatened.* DRC notifies SCEMD that drought conditions have progressed to a level that requires activation of the EOP. The State Emergency Response Team (SERT) develops a Drought Emergency Executive Order for Governor’s signature. SERT, with the DRC, works with local emergency management directors and water suppliers to develop response and recovery measures. The Governor may issue emergency regulations to require curtailment of withdrawals. State agencies are required to reduce water use by 10%.

All participants

- a. *What, and how, is your organization communicating with the public?*
- b. *Do you have the necessary information, personnel, and/or resources to respond to this stage of drought? If not, what would help your organization more effectively respond to and prepare for drought?*

Drought Response Committee members

- a. *What resources, information, or additional capacity does the DRC need to assess conditions and recommend activation of the Emergency Operations Plan?*

SERT members and other organizations

- a. *What challenges do you foresee in implementing the Emergency Operations Plan and activating the SERT?*
 1. For a drought event, activation could last for months, or longer.
 2. What additional resources or information may be necessary to enact aid and assistance programs?
- b. *Does the Governor seek a federal disaster declaration?*
 1. If so, what information is needed?
- c. *What legislative action might be required?*
- d. *How will SC coordinate with other states, recognizing that extreme drought conditions will likely affect our neighbors as well?*

Appendix C. Handout 1

1. The South Carolina Drought Response Process

Overview

South Carolina has a long history of state-level drought response and management, with early efforts initiated in the 1980s. The **South Carolina Drought Response Act** (enacted in 1985, amended in 2000) and the supporting **Regulations** establish the procedures through which the State monitors and responds at the incipient, moderate, severe, and extreme drought alert phases. The **South Carolina Drought Response Plan**, located in Appendix 10 of the State's Emergency Operations Plan, describes actions when conditions have reached a severity level beyond the scope of local communities.

Formal plans and procedures can help water managers and users monitor, conserve, and manage the State's water resources in the best interest of all South Carolinians.

The South Carolina Drought Response Committee (DRC)

The DRC is the major drought decision-making entity in the State. Key responsibilities include:

- Evaluating drought indicators and determining county level drought status as defined by the Drought Response Act
- Consulting with stakeholders about drought conditions and impacts
- Determining when drought conditions warrant measures beyond the scope of local actions, including mandatory reductions, curtailment of non-essential water use, or activation of the South Carolina Drought Response Plan

The DRC is composed of statewide and local members. It is chaired and supported by the South Carolina Department of Natural Resources (SCDNR) and the State Climatology Office (SCO). Local members are organized according to four Drought Management Areas (DMAs). Other organizations, such as the National Weather Service and U.S. Army Corps of Engineers, are often invited to DRC meetings to report on drought conditions and impacts, depending on their areas of expertise and which areas of the State are affected.

Drought Response Committee members vote county by county to determine drought level.

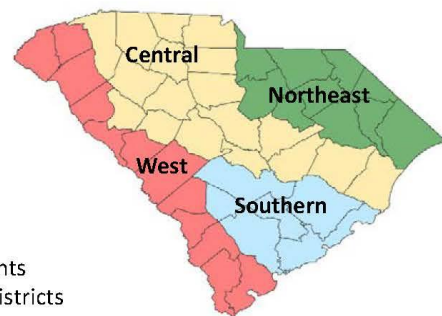
Statewide members

Department of Agriculture
Department of Health and Environmental Control
Department of Natural Resources
Emergency Management Division
Forestry Commission

Local members

Agriculture
Commission of Public Works
Counties
Domestic User
Industry
Municipalities
Power Generation Facilities
Private Water Supplier
Public Service District
Regional Council of Governments
Soil and Water Conservation Districts
Special Purpose District

SC Drought Management Areas



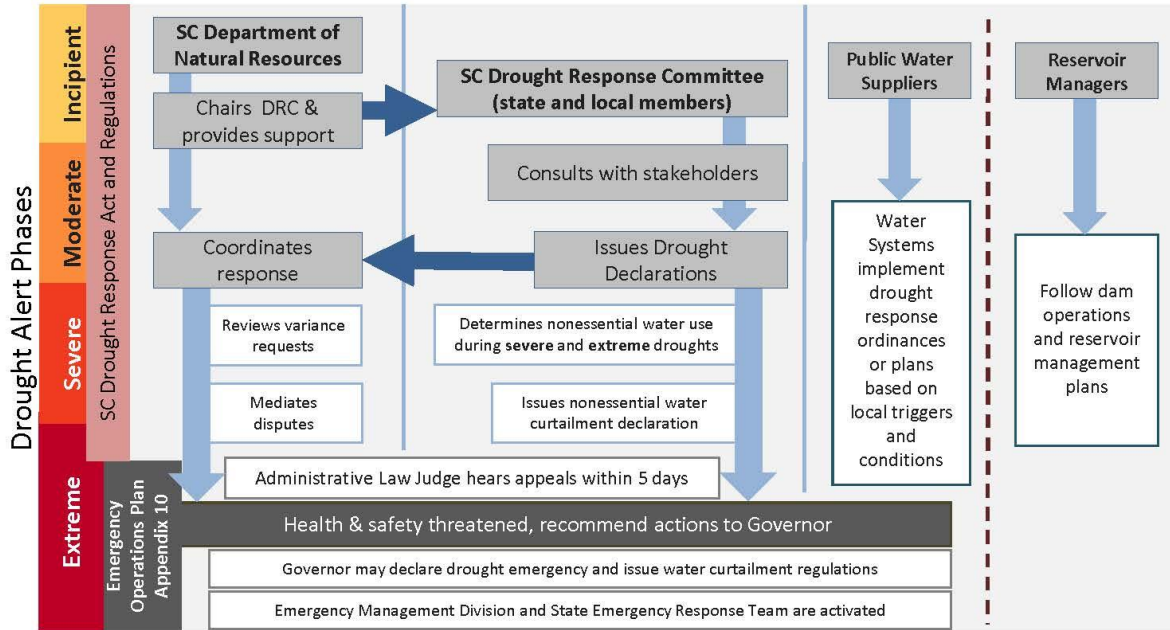
Find information about the Drought Response Committee membership at <http://scdrought.com/committee.html>.

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Components of South Carolina's Drought Response Process

Legislation, regulations, and plans establish recommended and required response actions at different levels of drought. SCDNR and SCO constantly monitor drought conditions across the state, and as impacts become more severe, activities increase accordingly.



Alert Phase	Actions and Responses
Incipient	SCDNR notifies the DRC, increases monitoring activities, and begins to disseminate information to the public. Water utilities review local drought plans and ordinances. Response actions increase accordingly as conditions warrant.
Moderate	The DRC meets as needed and evaluates conditions to determine the need for action beyond the scope of local government; including recommendations for voluntary or mandatory water use reductions and more involvement by State agencies in monitoring drought conditions and impacts.
Severe	These actions may happen at severe and extreme levels:
Extreme	<ul style="list-style-type: none"> • The DRC may require mandatory reduction or curtailment of non-essential water use. SCDNR is responsible for disseminating a curtailment declaration, reviewing variance requests, and mediating disputes from competing demands for water. • Upon determining that state-level response is needed, the DRC recommends activation of the Drought Response Plan (EOP, Appendix 10) to SCEMD and the Governor. • Governor may assist with managing impacts, including requesting disaster declarations by the US Dept. of Agriculture and activating the National Guard to assist with wildfire suppression.

References

South Carolina Drought Response Act. Code of Laws of South Carolina. 1976. § 49-23-10 et seq., as amended.
 South Carolina Drought Response Regulations 121-11.1 - 121-11.12, for §49-23-10 et seq., S.C. Code of Laws.
 South Carolina Drought Response Plan, Appendix 10 of the South Carolina Emergency Operations Plan.



Prepared by:

Appendix D. Handout 2

2. Monitoring and Measuring Drought Indicators and Indices

Overview

Measuring drought is difficult because drought can span large regions, vary in severity and duration, and affect different water uses and sectors at differing time scales. Because South Carolina normally experiences considerable variability in annual rainfall, it can be difficult to know exactly when a drought is beginning, worsening, or ending.

In contrast to other extreme weather events, droughts develop slowly over a period of weeks, months, or years. Droughts are often associated with or exacerbated by, heat waves. For example, the multi-year drought that began in 2007 was accompanied by high summer temperatures and affected the entire Southeast region.

The South Carolina Drought Response Act defines drought as

“a period of diminished precipitation which results in negative impacts upon the hydrology, agriculture, biota, energy, and economy of the State.”



Indicators and Indices

South Carolina uses multiple indicators and indices to determine drought severity

- **Indicators** are values used to describe drought conditions, using precipitation, stream flow, groundwater and reservoir levels, or soil moisture information.
- **Indices** are computed numerical representations of drought severity, using climatic or hydrological data as inputs. For example, South Carolina uses the Palmer Drought Severity Index (PDSI), Crop Moisture Index (CMI), and Keetch-Byram Drought Index (KBDI).

Drought severity is best evaluated using multiple indicators; a single indicator typically cannot capture the complexities associated with water availability for any given sector or region.

For example, some indicators depict **meteorological drought** – an extended period of departure from average rainfall for a specific location or region. Others depict **agricultural drought**, when plants lack adequate moisture to grow and develop, or **hydrological drought**, indicated by declines in streamflow, reservoir, lake, and groundwater levels.








Evaluating drought conditions is one of the primary responsibilities of the State Climatology Office (SCO) and Drought Response Committee (DRC). The SCO routinely monitors climatic conditions and regularly updates drought information at <http://scdrought.com/current.html>.

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South Carolina's Indicators and Indices

These are the primary indicators and indices used by the South Carolina SCO and DRC to determine drought status in the State. However, other indicators and monitoring tools may also be used. See <http://scdrought.com/current.html#> for links and examples.

Indicators and Indices		Explanation
	Percent of Normal Rainfall	<i>Depicts cumulative dryness or wetness compared to long-term averages</i> A deficit is determined using the normal amount of rainfall that would be expected for a specific location or region, over a given time period. The National Weather Service provides this information for a variety of time scales (7-, 14-, 30-, 60-, 90-, 180-, and 365-day time periods).
	Crop Moisture Index (CMI)	<i>Depicts short-term (up to 4 weeks) abnormal dryness or wetness</i> The index is calculated using weekly precipitation, weekly mean temperature, and previous week's CMI value. It is used to monitor agricultural conditions and impacts, particularly during the growing season.
	Palmer Drought Severity Index (PDSI)	<i>Depicts prolonged (months, years) abnormal dryness or wetness</i> This index is calculated using monthly temperature, precipitation, and soil moisture values. It was developed to identify and monitor droughts affecting agriculture but has been used for a variety of applications. Due to how it is calculated, the PDSI values may lag situations where drought is rapidly emerging.
	Keetch-Byram Drought Index (KBDI)	<i>Depicts daily moisture deficiencies in the upper layers of the soil</i> This index is calculated using daily maximum temperature and daily precipitation values. It is used to monitor fire danger and also indicates the amount of rainfall needed to saturate the soil and reduce drought stress.
	U.S. Drought Monitor (USDM)	<i>Provides a weekly, national-scale view of drought extent and severity</i> USDM authors synthesize a variety of drought indicators, indices, and other products, available from multiple sources, to create the map. They may consider dozens of indicators as well as drought impact information. The USDM uses a scale of five severity levels (D0-D4).
	Average daily streamflow	<i>Considers average streamflow over two consecutive weeks, as compared to historic minimum flows for those same weeks</i> SC DNR (Hydrology Section) uses data from the U.S. Geological Survey (USGS) to calculate 14-day average streamflow values. Statewide maps, and hydrographs for affected stations, are typically shown at DRC meetings. SC DNR also provides information about lake level deficits/surpluses for 10 major reservoirs in the State.
	Ground Water, static water level in an aquifer	<i>Considers groundwater levels over two consecutive months, as compared to historic levels for those same months</i> Data comes from the SC Groundwater Drought Monitoring Network, which is maintained by SC DNR. Statewide maps, and hydrographs for affected stations, are typically shown at DRC meetings.

References

South Carolina Drought Response Act. Code of Laws of South Carolina. 1976. § 49-23-10 et seq., as amended.
South Carolina Drought Response Regulations 121-11.1 - 121-11.12, for §49-23-10 et seq., S.C. Code of Laws.
World Meteorological Organization (WMO) and Global Water Partnership (GWP). 2016. *Handbook of Drought Indicators and Indices*.



Appendix E. Handout 3

3. Monitoring and Measuring Drought Alert Phases and Impacts

Drought Alert Phases and Severity Levels

The South Carolina Drought Response Act and Regulations establish four drought severity levels: incipient, moderate, severe, and extreme. Incipient drought means that the drought indices demonstrate a threat of drought. The moderate, severe, and extreme drought phases represent increasingly severe conditions. Each phase also triggers a range of responses that increase accordingly.

South Carolina uses multiple indicators and information sources to evaluate and determine the State's drought status.

Indicator values and trigger levels for South Carolina's four drought alert phases

For each drought indicator, the Regulations specify the quantitative measures that correspond to each drought phase. Individual indicators are anticipated to show different levels of severity at a given point in time. For example, indicators representing hydrological conditions may lag indices that express soil moisture conditions.

The Regulations state that a given drought phase (incipient, moderate, severe, extreme) may be declared if any of the indices indicate that severity level; however, indication by one index alone does not mandate a declaration.

The Regulations also allow DNR and the DRC to consider other relevant information such as water supply and demand, agricultural and forestry conditions, rainfall records, general historical climatological data, and forecasts and outlooks to verify the drought phase.

Indicator	Drought Alert Phase			
	Incipient	Moderate	Severe	Extreme
Crop Moisture Index (CMI)	0.00 to -1.49	-1.50 to -2.99	-3.00 to -3.99	≤ -4.00
Palmer Drought Severity Index (PDSI)	-0.50 to -1.49	-1.50 to -2.99	-3.00 to -3.99	≤ -4.00
Keetch-Byram Drought Index (KBDI)	300 to 399	400 to 499	500 to 699	≥ 700
U.S. Drought Monitor (USDm)	D0	D1	D2	≥ D3
Average daily streamflow (CW = consecutive weeks)	111-120% of the minimum flow for 2 CW	101-110% of the minimum flow for 2 CW	Between the minimum flow and 90% of the minimum for 2 CW	≤90% of the minimum flow for 2 CW
Ground Water, static level in an aquifer (CM = consecutive months)	Between 11-20 feet above trigger level for 2 CM	Between 1-10 feet above trigger level for 2 CM	Between the trigger level and 10 feet below for 2 CM	>10 feet below the trigger level for 2 CM

Find links to the drought indicators and related information used to monitor drought at <http://scdrought.com/current.html>.

South Carolina Drought
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

















Impacts – What to Expect During Drought

An **impact** is an observable loss or change at a specific time due to drought. Unlike the indicators and indices that represent the physical manifestations of drought, impacts information can tell us how prolonged dry conditions and lack of water affect people, the environment, and the economy.

The adverse effects of drought may be **direct**, such as crop loss or damage – or **indirect**, such as loss of recreation opportunities and revenue when boat ramps are closed due to low lake levels.

Behaviors may also change due to drought. For example, water demand and irrigation use increase during the incipient phase of drought. In later phases, voluntary and mandatory water use restrictions may be implemented in order to conserve water, and burning restrictions may be enacted due to higher fire risks.

Agriculture	
 Soil	Dry soil; hard, cracked ground; little subsoil moisture; dust storms, topsoil removal
 Crops	Stressed plants; delayed planting, germination, growth; damaged crops, low yields; fields left fallow; widespread crop losses at later stages; counties receive USDA Disaster Designations
 Pasture	Poor pasture conditions, cattle forage limited; reduced hay production and yields, high prices; hay and water imported for livestock
 Livestock	Low levels in water sources, supplemental protein fed to livestock; dairy operations close; high, increasing numbers of cattle sales
 Irrigation	Increased irrigation; agriculture ponds and wells dry up; water quality very low; no water left for irrigation; farmers haul water for cattle
Water Resources	
 Water demand	High water demand and use at early stages; low water pressure; alternative water sources used in later stages
 Water levels	Water levels in reservoirs, lakes, and streams trend below normal; reservoir levels near intakes; well levels decline, run dry; well owners lower pumps, dig deeper or new wells
 Water quality	Water quality changes and declines, drought progresses; algae and fungus growth increases; water temperatures rise; saltwater intrusion in coastal areas
 Conservation	Utilities enact voluntary and mandatory water restrictions; lawns brown, gardens wilt as irrigation is curtailed; water prices increase; extreme measures taken to conserve water, violators fined
Fire	
 Wildfires	Elevated fire danger, fuel loads increase; fires spread easily, difficult to extinguish; fire season begins early, lasts longer; fire activity increases, intensifies; extended fire season is destructive and costly
 Fire Management	Fuel mitigation practices are in effect; alerts and burn bans are issued; restrictions on campfires and fireworks; state forests closed to recreational use
 Fire crews	Fire crews mobilize earlier than normal, more crews on staff; not enough water to fight fires; rural and volunteer fire departments' resources are stressed; firefighting funds running out
Society and Environment	
 Power generation	Energy utilities monitor water quality and levels; hydropower production is limited or restricted; alternate sources of energy used; energy conservation requested
 Recreation	Dry hiking trails, soil erosion; swimming and fishing areas, boat ramps, close; tubing, rafting season shortened
 Business	In early phases, good conditions for construction, golf season; in later phases, landscaping businesses affected; agriculture, forestry, tourism, recreation sectors report financial losses; business increases for well drillers, water haulers
 Health and Safety	Seasonal allergies worse than normal; exposed artifacts, obstacles in water bodies; toxic algae blooms increase; wildfires raise air quality concerns
 Habitat and wildlife	Habitat, water, and food availability for wildlife is affected; wetlands dry up; wildlife seek food and water, encroach into residential areas; plant, wildlife losses; fish kills; higher susceptibility to pests, diseases

Reference: National Drought Mitigation Center, [Drought Impact Reporter](#)

Find information about the major droughts and impacts that have affected South Carolina at <http://scdrought.com/impacts.html>.



Appendix F. Handout 4

4. South Carolina Drought Response Managing Water Use and Shortages during Drought

Local Drought Response

SC DNR provides a **Model Drought Management Plan and Response Ordinance** to help water systems meet Drought Response Act requirements. Elements include:

- Description of the water system, pre-drought planning efforts, and alternate supply sources
- System-specific indicators and triggers for monitoring water shortages and the system's ability to meet demand during drought
- Water use reduction plan
- Communications and education actions
- Implementation plan and ordinance

Local entities have primary responsibility for drought response and management, to the extent possible and practical. The Drought Response Act requires all municipalities, counties, public service districts, special purpose districts, and commissions of public works engaged in the activity of supplying water for any purpose to develop and implement drought response plans and ordinances. Such documents establish the procedures for managing water supply and demand, before and during drought, with the goals of alleviating impacts, achieving the greatest public benefit from water use (domestic use, sanitation, fire protection), and allocating water for other purposes in an equitable manner.

Recommended and Example Local Actions, from the South Carolina Model Drought Response Ordinance

All Drought Alert Phases | Review and implement local plans and ordinances

Communications: notify local media, water customers, and SCDNR about the status of drought conditions and the measures that customers are requested to follow

Education: encourage and educate customers to comply with water conservation; during later phases, expand efforts, emphasize fees and penalties associated with violating mandatory restrictions

Water leaks: intensify efforts to identify and correct leaks in the distribution system

Irrigation taps: cease to install new irrigation taps on the water system

Moderate Drought | Voluntary conservation measures

Water reduction goals: overall-15%; residential use-20%; commercial, industrial, institutional, irrigation-15%

Residential water use: 65 gallons/person/day; maximum of 250 gallons/household/day

Non-essential use: eliminate washing of hard surfaced areas, buildings, gutters; domestic washing of vehicles; fountains, aesthetic use

Outdoor use: reduce watering of lawns, plants, trees, gardens, shrubs; encourage watering in off-peak hours

Fire hydrant use: reduce water used for purposes other than firefighting or flushing to maintain water quality

Limit commercial/individual use: limit serving of water in restaurants; maintain minimum water levels in scenic and recreational lakes, only to support aquatic life; cease water service to customers who fail to repair leaks

Severe Drought | Mandatory restrictions on non-essential usage and voluntary for all other purposes

Water reduction goals: overall-20%; residential use-25%; commercial, industrial, institutional, irrigation-20%

Residential water use: 55 gallons/person/day; maximum of 200 gallons/household/day

Non-essential use: same as Moderate Drought; eliminate filling public, private swimming pools

Outdoor use: control landscape irrigation by customers by staggering watering times

Fire hydrant use: eliminate water use for purposes other than firefighting or flushing to maintain water quality

Commercial/individual use: stop serving water in restaurants; stop maintaining water levels in scenic and recreational lakes, except to support aquatic life; cease water service to customers who fail to repair leaks; limit golf course irrigation; limit expanding commercial nurseries, placing new irrigated agricultural land in production, planting or landscaping when required by site design review process

Extreme Drought | Mandatory restrictions for all purposes and on the times when certain usage is allowed

Water reduction goals: overall-25%; residential use-30%; commercial, industrial, institutional, irrigation-25%

Residential water use: 45 gallons/person/day; maximum of 150 gallons/household/day

Non-essential/fire hydrant/commercial/individual use: same as Severe Drought

Outdoor use: eliminate landscape irrigation by customers

Other measures (examples): place a moratorium on issuance on new water service connections and contracts for new water main extensions; reduce water system pressure; implement excessive water use rate schedule; impose a drought surcharge; enforce restrictions with violations and fines

Curtailment of Water Use During Droughts

Procedures and Responsibilities













- 1) The Drought Response Committee (DRC) evaluates drought conditions and effectiveness of local actions to determine if mandatory reductions or curtailment of nonessential water use is considered necessary to ensure adequate supplies of water.
- 2) Upon such determination, the DRC reviews and determines which nonessential water uses should be curtailed. The curtailment of water use may involve adjusting the quality of water to meet the water use, adjusting the time of water use, and/or utilizing different sources of water.
- 3) SCDNR issues and disseminates a curtailment declaration to water systems and the news media. The declaration specifies the drought management areas affected and the nonessential water use to be reduced or curtailed.

During severe or extreme drought conditions, the Department of Natural Resources may require mandatory reduction or curtailment of non-essential water use in affected drought management areas if recommended by the Drought Response Committee.

- Any person adversely affected by a mandatory curtailment may seek a variance. SCDNR reviews and makes determinations regarding variance requests.
- During any drought alert phase, SCDNR shall offer its services to and mediate disputes arising from competing demands for water.
- Any entity affected by a DRC declaration has the right to appeal to the Administrative Law Court, within five days of the declaration. The Court must hear appeals within five days of the filing.

The DRC determines which categories of non-essential water use to reduce or curtail by the following standards:

- Purpose of the use
- Suitability of the use to the watercourse, lake, or aquifer
- Economic value of the use
- Social value of the use
- Extent and amount of the harm it causes
- Practicality of avoiding the harm by adjusting the use or method of use
- Practicality of adjusting the quantity of use
- Protection of existing values of water uses, land, investments, and enterprises
- Consumptive or non-consumptive nature of the use
- Impacts on essential water use

Essential Water Use Categories * Highest Priority Water Uses		Nonessential Water Use Categories	
	Firefighting purposes	Agricultural operations for nonfood production, and nonessential water users that may suffer a critical economic loss as a result of mandatory curtailment, have priority over other nonessential water users. Such users must certify to the Drought Response Committee the nature of the loss in order to qualify for the higher priority nonessential use.	
	Health and medical purposes		Agricultural operations for non-food production • Irrigation
	Agricultural operations for food production		Industrial use • Industrial domestic use • Once through cooling • Industrial process use
	Minimum streamflow requirements		Commercial use • Commercial domestic use • Commercial process use
	*Water levels in the potable drinking water supplies above and below groundwater tables		Domestic use • Inside use • Outside use
	*Use of water to satisfy federal, state, or local public health and safety requirements		Recreational use
			Electric Power Generation

References

South Carolina Drought Response Act. Code of Laws of South Carolina. 1976. § 49-23-10 et seq., as amended.
 South Carolina Drought Response Regulations 121-11.1 - 121-11.12, for §49-23-10 et seq., S.C. Code of Laws.
 SC Model Drought Management Plan and Response Ordinance (2001).

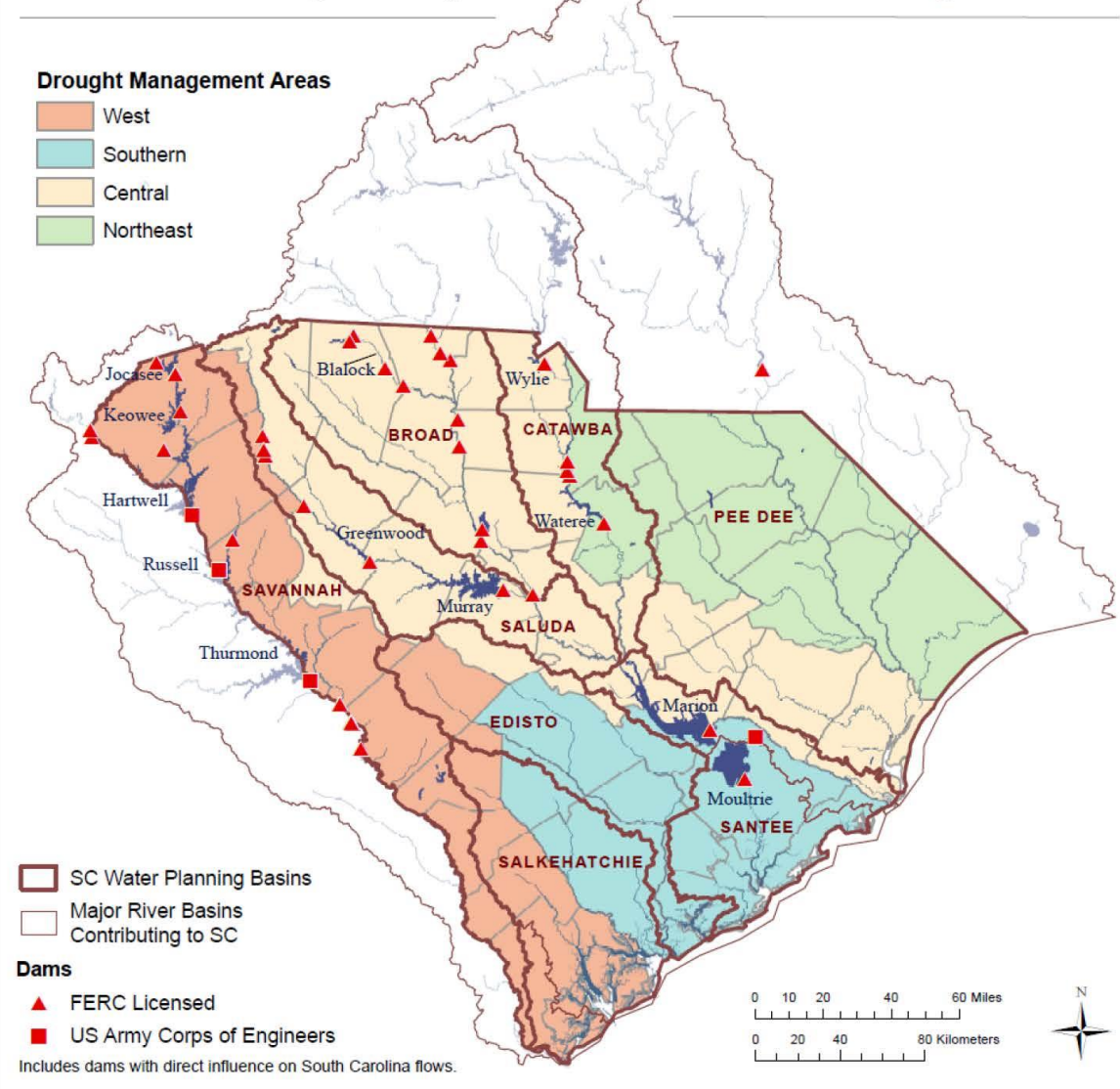


Appendix G. Handout 5

5. Drought Management and Basin-Level Plans

Overview: This map shows the overlaps and intersections between South Carolina's Drought Management Areas and the eight river basins used in South Carolina's water planning process. In many basins, dam and reservoir projects support power production, drinking water supply, recreation, wildlife habitat, and other uses. Reservoir levels and water releases can vary considerably, depending on a project's location, the uses it supports, plans and operational requirements, and weather and climate events. Drought management plans and Low Inflow Protocols (LIPs) provide guidelines for hydro operations and reservoir releases during drought; this information is typically provided at Drought Response Committee meetings.

South Carolina Drought Management and Water Planning Boundaries



Map credit: Tanner Arrington, SC Department of Natural Resources

South Carolina Drought
SC State Climate Office

Example Basin-Level Plans and Protocols

About Low Inflow Protocols (LIPs): The Federal Energy Regulatory Commission (FERC) issues 30- to 50-year licenses for nonfederal hydropower projects. Licenses establish the terms and standards for hydropower operations, reservoir levels, and release schedules. Recent relicensing processes for projects in, or affecting, South Carolina have included the development of LIPs. These protocols establish the triggers and actions for the licensees and others to follow during drought conditions, with the goal of balancing needs for, and uses of, water resources.

Upper Savannah River/West DMA

The Low Inflow Protocol for Duke Energy's Keowee-Toxaway Hydroelectric Project supports management of the Bad Creek, Jocassee, and Keowee reservoirs. Duke Energy coordinates with the US Army Corps of Engineers (USACE) to ensure that downstream reservoirs receive adequate flows and with members of the **Keowee-Toxaway Drought Management Group** to foster a unified response to drought conditions in the Savannah River Basin. Members include Duke Energy; SCDNR; SCDHEC; US Geological Survey; USACE; owners of large water intakes uses for municipal, industrial, or power plant water supply; and others.

- Information is available at: <https://www.duke-energy.com/community/lakes/drought-management-advisory/keowee-toxaway-dmag>

The **US Army Corps of Engineers, Savannah District**, manages Lakes Hartwell, Russell, and Thurmond as a coordinated system. They were constructed for a variety of purposes, including hydropower, flood control, and navigation; they also serve as important water supply and recreation resources. The **Savannah River Basin Drought Management Plan** has four trigger levels with target releases varying according to the time of year.

- Information about lake levels and drought management is available on the Savannah District Water Management page: <http://water.sas.usace.army.mil/GMAP/>

Yadkin-Pee Dee Basin/Northeast DMA

The **Yadkin-Pee Dee Low Inflow Protocol** establishes guidelines for the operation of several dams and reservoirs in North Carolina, to ensure adequate and certain downstream flows for South Carolina water users during drought. Members of the **Yadkin-Pee Dee Drought Management Advisory Group** include Duke Energy, Cube Yadkin Generation, LLC, NC Division of Water Resources, NC Wildlife Resources Commission, SCDNR, SCDHEC, US Fish and Wildlife Service, High Rock Lake Association, Badin Lake Association, SC Pee Dee River Coalition, a Lake Tillery homeowners' representative, and owners of water intakes that withdraw from one of the projects' reservoirs.

- Information is available on the Duke Energy website: <https://www.duke-energy.com/community/lakes/drought-management-advisory/yadkin-pee-dee-dmag>
- Information is available on the Cube Hydro Carolinas website: <http://cubecarolinas.com/low-inflow-protocol/>

Catawba-Wateree River/Central and Northeast DMAs

The **Catawba-Wateree Low Inflow Protocol** was developed in 2006, during the FERC relicensing process for Duke Energy's hydroelectric projects in that basin. The LIP was first implemented in 2007-2009. It details the actions to be taken by Duke Energy, water utilities, and other major water users during different stages of drought. This includes a progressive reduction of flows release from the dams, reductions to minimum lake levels, progressive water use restrictions, and increased communications customers and between Duke Energy and water utilities. **Catawba-Wateree Drought Management Advisory Group members** include SCDNR, SCDHEC, NC Division of Water Resources, NC Wildlife Resources Commission, US Geological Survey, US Fish and Wildlife Service, and owners of large water intakes. South Carolina water utility members and participants include Catawba River Water Supply Project, Chester Metropolitan District, City of Camden, City of Rock Hill, Lugoff-Elgin Water Authority, Town of Fort Mill, and York County.

- Information is available at: <https://www.duke-energy.com/community/lakes/drought-management-advisory/catawba-wateree-dmag>

Additional information about Water Planning in South Carolina can be found on the SC Department of Natural Resources website, <http://www.dnr.sc.gov/water/waterplan/index.html>.



Appendix H. Handout 6

6. The South Carolina Drought Response Plan State Emergency Operations Plan, Appendix 10

Activating the South Carolina Drought Response Plan

The South Carolina Drought Response Plan is located in Appendix 10 of the State's Emergency Operations Plan (EOP). The EOP directs state agencies and local responders during natural, technological, or human-made disasters to ensure a coordinated and effective response in the State.

The Drought Response Plan describes actions when drought conditions have reached a level of severity beyond the scope of the Drought Response Committee (DRC) and local communities.

The Drought Response Plan may be activated when:

- drinking water supplies are at risk of being depleted,
- public health, safety, and welfare are threatened,
- local resources and actions are unable to provide for citizens' safety, or
- state-level actions and resources are necessary to provide relief from impacts.

The South Carolina Emergency Management Division (SCEMD) maintains the EOP and leads multi-agency response to hazard events. Upon activation of the EOP, SCEMD and the State Emergency Response Team (SERT) assemble in the South Carolina State Emergency Operations Center (SEOC) to coordinate the State's response.

Roles and Responsibilities

Drought Response Committee

- Upon determining that state-level response is needed, the DRC provides the Governor with a priority list of actions designed to alleviate the effects of drought in the affected Drought Management Areas.
- The DRC will also notify SCEMD that drought conditions have progressed to a level that may require activation of the Drought Response Plan. SCEMD reviews conditions and activates the Plan if appropriate.

Governor

- The Governor may declare a State of Emergency or a Drought Emergency by Executive Order, issue emergency curtailment of water withdrawals and use, or seek a federal disaster declaration.

SERT, SCEMD

- SERT, with the DRC, works with local emergency management directors and water suppliers to develop response and recovery measures.
- ESF 15 (Public Information) initiates a public information campaign to provide updates on drought status, actions being taken, and relief programs available at the State and Federal levels.

State Agencies

- State agencies (including those on the DRC and SERT) coordinate on disseminating information to the public.
- Each State agency develops a list of actions to conserve internal water usage by 10%.
- All State agencies are asked to develop and refine drought response measures that they can implement. These may include developing and recommending changes to current drought legislation, providing relief or assistance to affected sectors and communities, and tracking impacts.

Federal Agencies

- Federal agencies are asked to assist with providing drought relief and informational resources. Agencies include the U. S. Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), and the U. S. Department of Agriculture (USDA).

Find links to South Carolina's drought plans, policies, and regulations at <http://scdrought.com/planning.html>.

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Activating the South Carolina Drought Response Plan – What to Expect

Activation of the plan is based on pre-identified conditions that may affect a community’s ability to provide for the safety of its citizens due to low or lack of water. These conditions include:

- Communities have initiated water restrictions or rationing.
- Community water supplies are continuing to be depleted to the level of exhaustion.
- Local utility companies have begun shutting down power generation.
- Requirements for firefighting resources are beyond the capabilities of the SC Forestry Commission.

The Drought Response Plan identifies the types of assistance and actions that will be necessary to assist local level agencies with addressing water shortage, firefighting, and agricultural emergencies.

Actions	Resource Needs	Agencies
Water for domestic and municipal use		
<ul style="list-style-type: none"> • Ration water • Truck in water • Distribute bottled water • Drill new and deeper wells • Evacuate citizens from affected areas, if other options are not viable 	<ul style="list-style-type: none"> • Critical Transportation • Housing • Mass Care Services • Health and Social Services • Coordination • Public Information and Warning 	<ul style="list-style-type: none"> • SC National Guard: support water hauling operations, evacuations; provide security staff • Department of Transportation • SCDHEC: groundwater monitoring, well drilling permits • US Army Corps of Engineers: emergency well construction, water transport • Health and Human Services agencies: public health, first aid, food assistance • Environmental Protection Agency • American Red Cross
Water for agriculture; water and feed for livestock		
<ul style="list-style-type: none"> • Bring in water, feed • Drill new and deeper wells • Evacuate animals from affected areas, if other options are not viable 	<ul style="list-style-type: none"> • Critical Transportation • Logistics and Supply Chain Management (hay procurement) • Natural and Cultural Resources (soil conservation, erosion control) • Operational Coordination • Economic Recovery 	<ul style="list-style-type: none"> • SC National Guard: support water hauling operations, evacuations; provide security staff • Department of Transportation • SC Department of Agriculture • Clemson Cooperative Extension • USDA: assistance programs • Small Business Administration: post-event assistance, loans
Firefighting		
<ul style="list-style-type: none"> • Control and suppress fires • Protect lives, property, environment • Evacuate affected individuals and communities 	<ul style="list-style-type: none"> • Fire Management and Suppression • Environmental Response, Health and Safety • Housing • Mass Care Services • Natural and Cultural Resources (forest and timber protection) • Public Health, Healthcare and EMS • Operational Coordination • Public Information and Warning 	<ul style="list-style-type: none"> • SC Forestry Commission • SC National Guard: support fire suppression, water hauling operations, evacuations • Department of Transportation • USDA: assistance programs • FEMA: fire suppression grants
Power production		
<ul style="list-style-type: none"> • Monitor water levels in reservoirs • Report loss of capability 	<ul style="list-style-type: none"> • Secondary Power Production • Economic Loss Information 	<ul style="list-style-type: none"> • SC Office of Regulatory Staff: monitor facilities, report capability loss, gather economic information

Reference

South Carolina Drought Response Plan,
Appendix 10 of the South Carolina Emergency Operations Plan.



Appendix I. Mentimeter Results

Mentimeter Methods

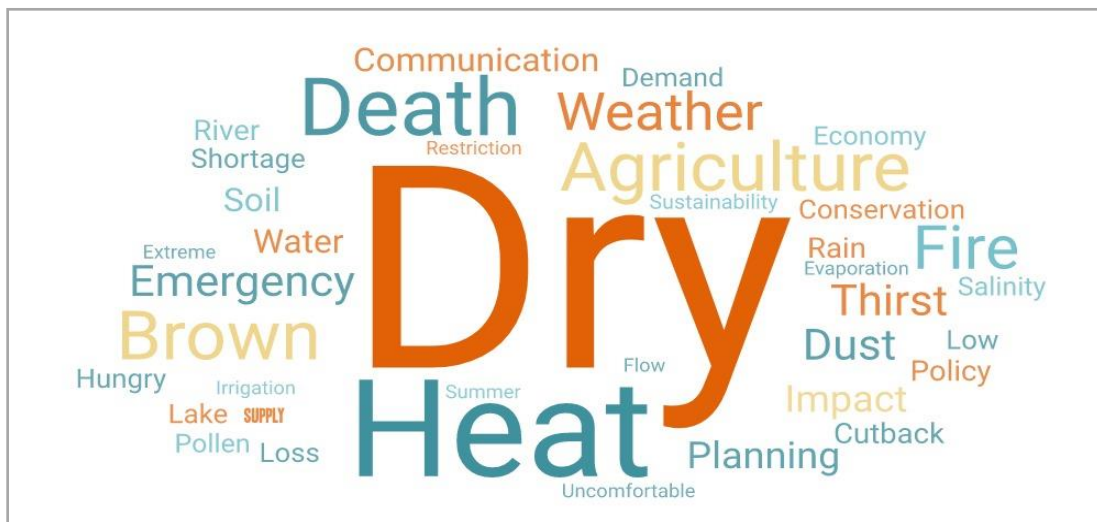
During the tabletop exercise participants shared their drought experiences and ideas using Mentimeter, an interactive software and presentation program. The software connected the audience through their smartphones to the presentation and then visualized their responses in real time. Questions during the Introduction focused on drought response challenges and audience knowledge of the Drought Response Committee and process. During the Hot Wash, the audience shared their drought-related concerns and takeaways from participating in the exercise. All responses were anonymous.

Mentimeter Results – Introduction

Q1. What are the first three words that come to mind when you hear “drought”?

of respondents = 70

# of Responses	Word
55	Dry
37	Heat
13	Death
10	Agriculture
10	Brown
8	Fire
6	Weather
4	Thirst, Dust, Emergency
3	Impact, Planning, Communication, Soil, Water
2	Shortage, Hungry, Conservation, Loss, Low, Lake
1	Irrigation, Uncomfortable, Summer, Extreme, Restriction, Supply, River, Cutback, Rain, Policy, Economy, Pollen, Salinity, Demand, Sustainability, Flow, Evaporation



Q2. What are some of the challenges you face in responding to drought?

of respondents = 72

# of Responses	Challenge
39	Communication
17	Money
12	Law
7	Politics
6	Understanding, Reduction
5	Cooperation, Messaging, Access, Awareness
4	Coordination, Consistency, Work
3	Records, Forecasts, Response, Assessment, Complaints, Conservation
2	Perception, Resources, Sources, Administration, Recognition, Water, Salinity, Certainty, Information
1	Regulation, Expectations, Education, Hunger, Competition, Attitude, Damage, Severity, Complexity, Ignorance, Restriction, Shortage, Supply, Priorities, Conflict, Equipment, Plans, Fair, Panic, Accuracy, Allocation, Calibration, Enforcement



Q3. Rank your understanding of the SC Drought Response Committee.

1 = less understanding, 5 = great understanding

of respondents = 71

Choices	Weighted average	# of Responses				
		1	2	3	4	5
Their Role	3.478873239	9	6	16	22	18
Their Responsibilities	3.211267606	8	10	26	13	14
Their Process	3.112676056	13	13	16	11	18

Mentimeter Results – Hot Wash

Q4. What are your biggest concerns?

of respondents = 47

# of Responses	Concerns
16	Enforcement
8	Politics, Communication
6	Perception, Understanding
4	Awareness, Education, Time, Monitoring, Information
3	Input
2	Coordination, Planning, Consistency
1	Consideration, Balance, Response, Participation, Engagement, Confusion, Clarity, Regulation, Equality, Outreach, Resources, Expectations, Ethics, Private Sector



Q5. What are your biggest takeaways?

of respondents = 43

Agriculture		
- Ag and utilities clash	- Agriculture (2 responses)	- Farming
Communication		
- Communicate consistently	- Communication is key (2 responses)	- Need communication plan
- Communicate constantly	- Communication needed	- Plan for improved communication
- Communication (5 responses)	- How to help communicate	
Complexity		
- Complex	- Complex issues	- Complexity of drought
Concern		
Concern	Concerns are heard	-
Coordination, Stakeholders, Networks		
- Build relationships	- Importance of networking	- Sharing information
- Cohesion	- Many stakeholders (2 responses)	- Stakeholders
- Collaboration	- Meeting committee members	- Stakeholders needed
- Cooperation (2 responses)	Networking	- Whole of community
- Coordinate locally	- Networks	- Wide diversity of stakeholders
- Coordination (3 responses)	- Representation	
Data, Information, Knowledge		
- Cross platform pub info	- Expertise	- Need Data
- Drought Alert Phase Chart	- Information	- Need for better forecasts
- Drought website	- Intermediate reporting	- Resources are ready
- Education is needed	- Knowledge	- scdrought.com
- Experience		
Impacts		
- How devastating drought	- Huge impacts	- Water demand issues
- How many areas of the eco	- Local impacts to drought	
Plans and Procedures		
- A plan	- How the agencies work	- Preparedness
- Adaptive management	- Involvement of agencies	- Problem solving
- Conservation	- Local actions are key	- Reactionary response
- DRC function	- Municipal rules and regs	- SCEMD role
- DRC importance	- Need law update	- Supportive laws
- DRC role	- Need to update plan (2 responses)	- Updates
- Drought act needs revision	- Other player roles	- We need to start now
- Drought Planning 🖱	- Plan shortfalls	- Well prepared
- Excellent state plans	- Planning	
Miscellaneous		
- Differences	- Feedback	- Sectors
- Efficiency of time	- Foresight	- The need for feedback
- Engagement	- Integration	- Time
TTX Feedback		
- A useful activity	- Groups that were not here	- Professional
- Break Out Sessions	- Hope has a great team	- Tabletop
- Discussion	- Meeting leadership	- Tabletops are useful
- Great tabletop	- Organization of breakouts	- TTX Design

Appendix J. Feedback Survey Results

Feedback Survey Methods

We used Constant Contact to send a post-exercise feedback survey invitation and link to the 92 tabletop exercise participants. The first email was disseminated on July 29, 2019; reminder emails were sent on August 2 and August 7. The survey was closed on August 12, 2019.

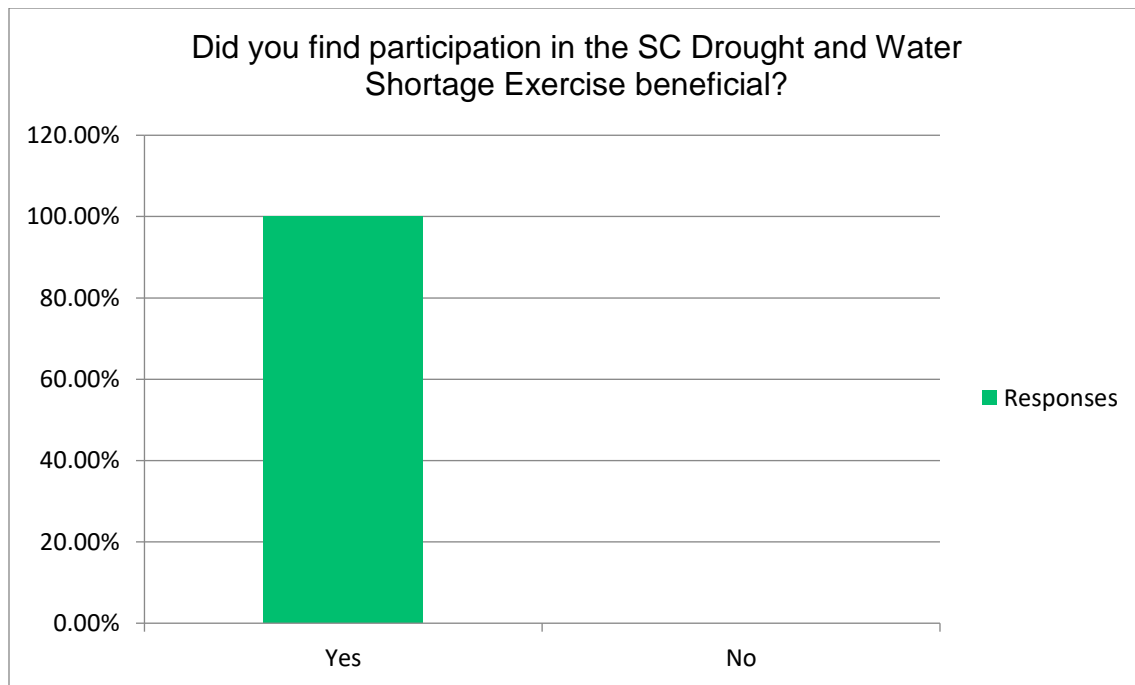
We received 25 total responses, for a 27.2% response rate. Responses were anonymous. Based on the assumption that the 13 planning team members and student assistants did **not** complete the survey, the adjusted response rate equals 31.6% (25/79).

Many survey respondents did not answer all 16 questions. We note the number of respondents who answered each question under each question heading.

Feedback Survey Results

Q1. Did you find participation in the SC Drought and Water Shortage Exercise beneficial?

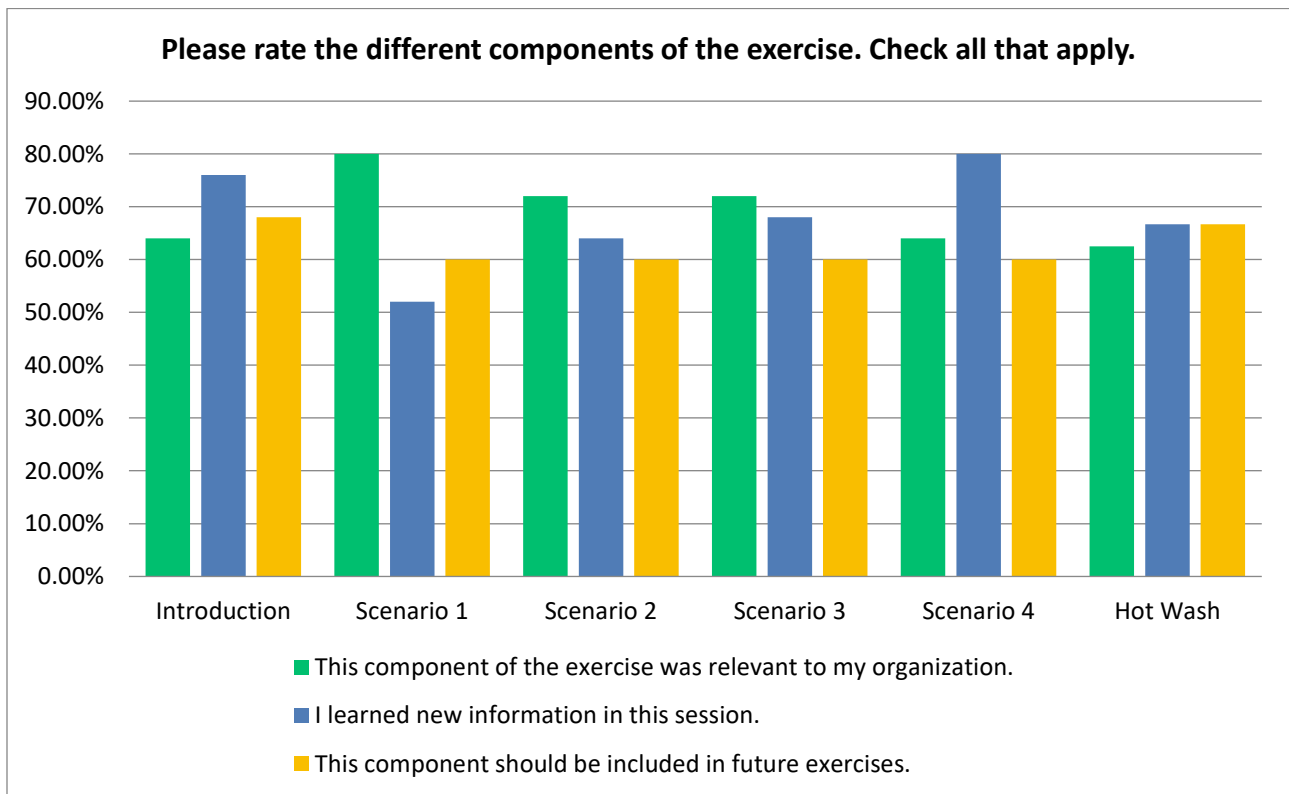
24/25 respondents answered this question.



Q2. Please rate the different components of the exercise. Check all that apply.

25/25 respondents answered this question

	This component of the exercise was relevant to my organization.		I learned new information in this session.		This component should be included in future exercises.		Total
	Percentage	Count	Percentage	Count	Percentage	Count	
Introduction: Review of relevant legislation, plans, and programs	64%	16	76%	19	68%	17	25
Scenario 1: Moderate Drought and full group discussion	80%	20	52%	13	60%	15	25
Scenario 2: Severe Drought and breakout group discussions for each Drought Management Area	72%	18	64%	16	60%	15	25
Scenario 3: Extreme Drought and breakout group discussions for each Drought Management Area	72%	18	68%	17	60%	15	25
Scenario 4: Activation of the Emergency Operations Plan (Appendix 10, Drought Response Plan)	64%	16	80%	20	60%	15	25
Hot Wash: Final discussion of drought response strengths and items requiring improvement	63%	15	67%	16	67%	16	24



Q3. Please share any comments about which parts of the exercise were more or less relevant for you.

15/25 respondents answered this question.

1. As a water utility participant, all parts were relevant.
2. I am all for protecting the Edisto and all other rivers in South Carolina and I sympathize with the plight of those individuals that are doing all they can to bring awareness to the situation. However, the drought response table talk exercise is the wrong forum for this topic.
3. The breakout discussions and hot wash were the most relevant for me because I felt like we really got into meaningful conversations and needs and actions.
4. I'd be mostly involved in communication about drought responses, disseminating information in my watershed, and acting as a point of connection between needs and resources. Thus, information about communications and organization of resources was most relevant for me.
5. I had to leave early and did not attend the last part of the exercise. I think that it would have been beneficial if it summarized the discussions of the day.
6. More relevant were the specifics under state code that would activate EOC and declaration.
7. As an operator of a hydro reservoir, it is good to hear the issues faced by the water suppliers. Also, good to hear about the State Drought Committee and how they operate.
8. 1. The overview of the drought threat and various scales for monitoring; 2. The intersection of the DTF and EOP/SERT Activation.
9. Though not directly relevant to me, I like the overview information and review of legislation. It is good to be exposed to. I really thought the breakout groups and working through the scenario was great. A nice addition from 2017.
10. I think the breakout sessions were very helpful and allowed representatives from all backgrounds to talk and interact.
11. Scenario 3 and 4 provided some additional insight.
12. Reviewing the actions of the various municipalities, USACE and other utilities during the severe and extreme drought scenarios was relevant to our operations.
13. All parts were relevant and helpful. Scenario 3 and 4 were probably some of the most thought-provoking discussions.
14. The full group discussions were more helpful than the breakouts. Some sectors are more willing to express their views than others, and they ended up taking over the breakout sessions. Maybe splitting them up by sector then coming back to large group discussions to discuss what each sector would focus on for each scenario.
15. Speaking in acronyms also irritates me especially since I don't work in the "climate world" every day. My advice, eliminate acronyms from group conversations. Speakers assume you know what acronyms mean without asking the audience which is quite presumptive. For the record, I HATE acronyms!!!!

Q4. Please share any comments about what new information you learned during the exercise.

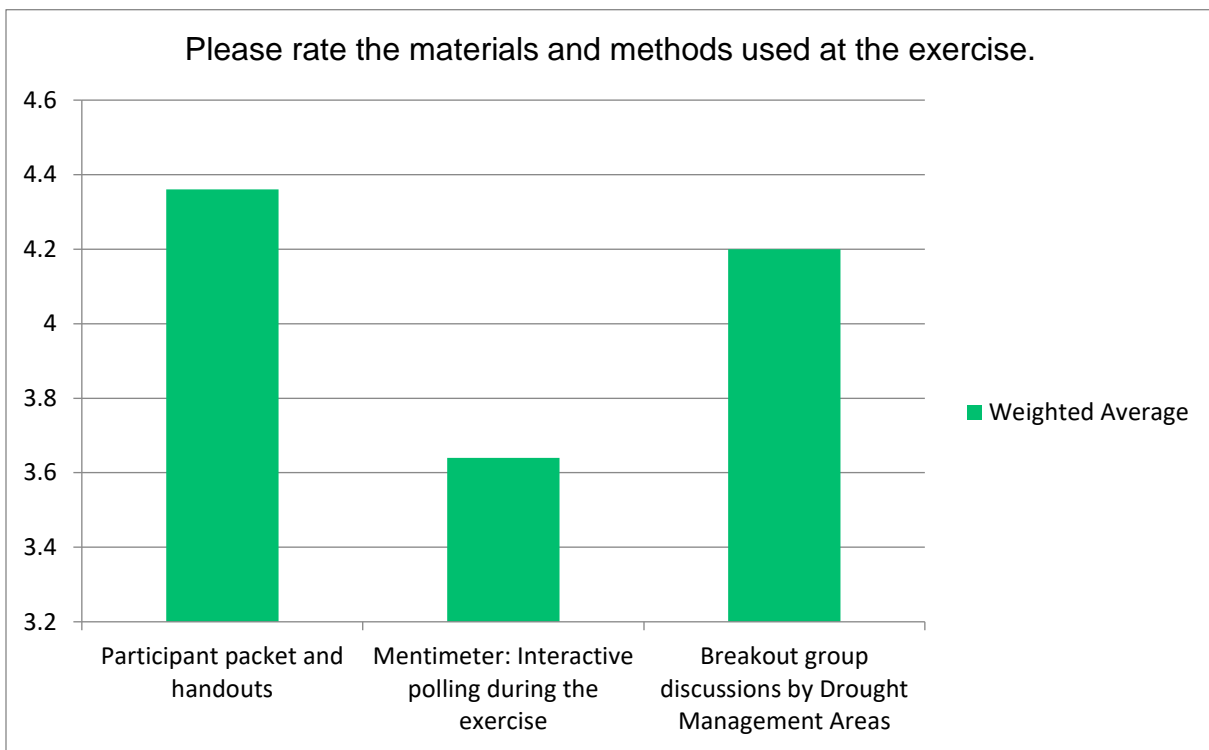
11/25 respondents answered this question.

1. New report submission to feed US Drought is beneficial tool, plan to participate in CoCoRaHS, importance of categorizing uses of water, resources available thru the SC National Guard - will note in our plan, and all of the great staff and resources thru the climatology office and DNR.
2. This being my first year on the committee and my first year attending the exercise, the best thing I learned was the basic structure of the different organizations and put faces with names which is still important even in the digital world we live.
3. How agriculture, water providers, and forestry have different triggers for drought level.
4. I learned about the downside of water use restrictions - the need to flush water lines due to chlorine residual, and the large effort it takes to enforce the restrictions.
5. There are seven different drought scales?!
6. drought monitoring program
7. I learned how hard it is to have coordinated responses to drought.
8. The requirements of Duke Energy and the USACE regarding operation of their hydroelectric project along the Savannah River.
9. Better understanding of regs, drought committees, palmer drought index, etc.
10. I learned more about drought response from other sectors.
11. Mapping exercises were informative. Glad to hear efforts are underway to access soil moisture as a more reliable indicator of actual drought conditions than stream flow. Stream flow means very little to the Agricultural community!

Q5. Please rate the materials and methods used at the exercise.

25/25 respondents answered this question.

	Not valuable		Moderately valuable		Extremely valuable		Total	Weighted Average
	%	Count	%	Count	%	Count		
Participant packet and handouts	4%	1	24%	6	72%	18	25	4.36
Mentimeter: Interactive polling during the exercise	8%	2	52%	13	40%	10	25	3.64
Breakout group discussions by Drought Management Areas	4%	1	32%	8	64%	16	25	4.2
Answered							25	
Skipped							0	



Q6. Is there any additional information that would have been helpful to have during the exercise?

7/25 respondents answered this question.

1. Probably too much to ask, but since ultimate drought response currently relies on a declaration by the Governor, it would have been good to have the Governor as a lunchtime speaker. Also, I'd like to know more about how many municipalities actually have teeth in their local ordinances to implement mandatory water use restrictions in droughts. Sounds like many don't. I'd like to know why that is.
2. I would like a more detailed review of the most recent droughts and a list of restrictions or reductions or even recommendations, where made by counties, agencies, municipalities, etc.
3. Hard to say, since I don't really know what I didn't get, so...
4. I think that with climate change resulting in more intense storms, more discussion would be helpful on how any other singular component can be addressed fairly when multiple components for determining drought may indicate an opposite condition. For example, when the crops are dying due to low soil moisture, but streams/reservoirs and groundwater are above average, how can we confidently call it a drought. Many municipalities/utilities need that support from the state in order to claim drought status when the public backlash is that the lakes are full.
5. Current water reclamation and conservation efforts.
6. Cannot think of any at this time.
7. More agricultural implications to drought versus municipalities water issues. Human water issues are important but so are Ag drought problems!

Q7. What do you consider the most important takeaways from the exercise?

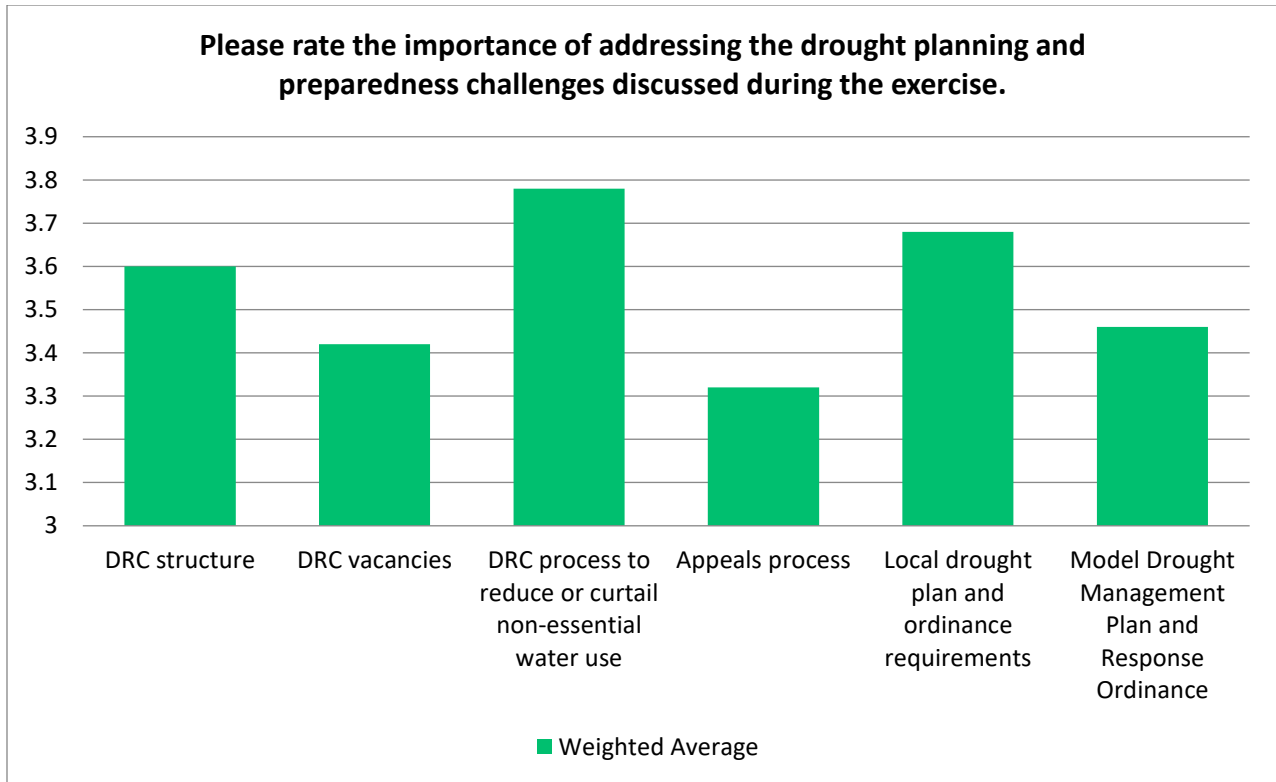
15/25 respondents answered this question.

1. The resources and points of contact available were invaluable. Will note these in our plan. Documented several improvements to incorporate into our plan - revise triggers and communication templates to customers.
2. Meeting people
3. Insight into drought response on a more granular level than I had before, opportunity to hear other sectors describing issues and actions from different perspectives than mine.
4. Different water use sectors respond to drought over different time frames. Challenging to coordinate a statewide drought response based on these different time frames and also because there are so many water users involved. Difficult to have consistent communication and messaging.
5. Adding other stakeholders to the group for information and real experiences.
6. The authority of the Secretary of Agriculture to issue a Disaster Declaration is as significant as The Governors and we know so little about that process and its consequences.
7. That there are a lot of moving parts and a lot of people involved. Communicating and getting information is vital.
8. Identifying key organizations who were not present this year, but should be in future years
9. Several outstanding issues with no clear path to resolve, such as basins and drought areas not aligning, etc.
10. The timing of declarations for going into a drought and coming out of a drought.
11. One of the most interesting takeaways was the difference in timing of drought impacts for agriculture vs drinking water/industry.
12. Seeing who still needs to be at the table during these exercises, and learning what everyone will be focused on in order to see where shortcomings are.
13. Drought committee, Capacity Use Committee, Basin Councils, etc. need to be adjusted for symmetry and consistency.
14. It was nice finding out that there is a way for anyone to report Drought in their area, by using the website for drought reporting.
15. Improving communication considering drought indicators. There are more accurate indicators of drought than stream flow. Again, stream flow means nothing to Agriculture.

Q8. Please rate the importance of addressing the drought planning and preparedness challenges discussed during the exercise.

25/25 respondents answered this question.

	Not important		Moderately important		Extremely important		Total	Weighted Average
Drought Response Committee structure	4%	1	28%	7	68%	17	25	3.6
Drought Response Committee vacancies	4%	1	46%	11	50%	12	24	3.42
Drought Response Committee process to determine which categories of non-essential water use must be reduced or curtailed	4%	1	9%	2	87%	20	23	3.78
Appeals process (i.e., a party affected by a declaration of the Drought Response Committee has the right to appeal that action to the Administrative Law Judge Division)	4%	1	56%	14	40%	10	25	3.32
Local drought plan and ordinance requirements (i.e., local plans and ordinances are only required for municipalities, counties, public service districts, special purpose districts, and commissions of public works engaged in the business or activity of supplying water)	4%	1	20%	5	76%	19	25	3.68
Model Drought Management Plan and Response Ordinance for water systems last updated in 2000	4%	1	42%	10	54%	13	24	3.46



Please elaborate on any of your responses.

5/25 respondents provided additional comments.

1. Our state has grown significantly since 2000. Times and technologies as well as demographic makeup has changed. Communication and education at a local level should start now to prepare the public for the next drought.
2. These are all extremely important because unity of effort means we're all on the same page.
3. Drought Response Committee vacancies should be filled as soon as possible, if they are truly necessary. Plans and programs should be updated at a minimum every 10 years. More frequently if changes occur in that district.
4. I really think filling those DRC vacancies should be a priority, and ensure there is adequate representation of the different stakeholders when they are filled.
5. Drought is serious business affecting the lives of everyone in SC

Q9. What concerns do you have regarding drought planning and preparedness that were not discussed during the exercise?

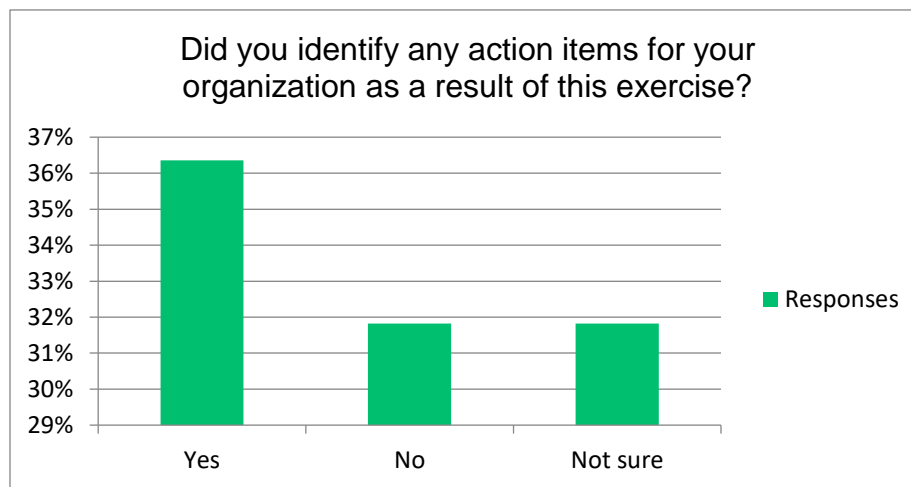
8/25 respondents answered this question.

1. I thought that the exercise was very thorough. We did seem a little rushed during the breakouts and didn't have much of an opportunity to allow the 4 groups to thoroughly debrief at the end. If possible, would like to have access to those out-briefings - our team used sticky notes. A survey of the questions in advance of the drill would be good in order to get those all compiled - would have liked to give some of them deeper thought.
2. I'd like to hear more about what municipalities actually did in droughts since 1998-2002 to conserve water. Some case studies would be useful.
3. Integrating drought policy into broader state water plan. Some surface water issues have as their remedy the imposition of the drought response act, but there's much about how that works that isn't particularly obvious or explicit. Filling in the blanks before it's an actual crisis would be illuminating.
4. We need more communication between drought response entities, and more exercises like this. Thanks for organizing it!
5. What's being done now and what we can do to store and use water more efficiently and effectively.
6. Potential for modification of the Drought Response Act and/or regulations.
7. How will restrictions required by a drought declaration be enforced?
8. Drinking water regs require periodic flushing of some water lines - is there a way to amend that during extreme droughts +/- or provide a way to capture that water and transport it to those in need (ag, or even swimming pools to help people stay cool if during the summer).

Q10. Did you identify any action items for your organization as a result of this exercise?

22/25 respondents answered this question.

Answer Choices	Responses	
Yes	36%	8
No	32%	7
Not sure	32%	7
Answered		22
Skipped		3



If so, please share information about those action items, or additional drought planning and preparedness measures you or your organization might take.

7/25 respondents provided additional information.

1. Revise our drought triggers and conservation goals, collaborate and tabletop drill with other utilities for consistency and knowledge sharing, got some ideas on communication templates (brochure in particular to simplify expectations for the customer), review our town ordinance, participate in CoCaRaHS and national drought reporting,
2. I will be talking to my Board about whether they want to create a drought response plan internally, or at least discuss how we might approach a significant drought event as an organization
3. Help organize a local tabletop drought exercise.
4. Determine the best way to make sure the power plants know what level of drought has been declared.
5. Updated drought plan
6. For us to start focusing on our strengths and see what my sector can add to preparedness, such as increased communication between our modeling and water quality sections to ensure water quality during a drought.
7. ??? Not enough time to elaborate. We had a lot in the meeting agenda that would not allow more in-depth discussion on Ag issues.

Q11. What priority action items could the planning committee address?

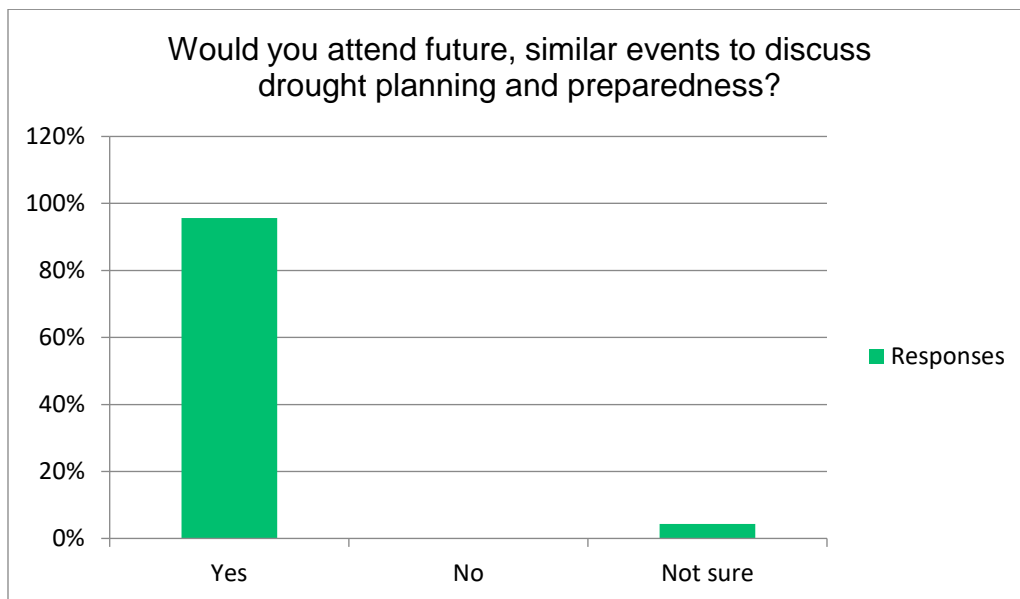
6/25 respondents answered this question.

1. The vacancy issue is a concern I would think so that all counties and segments have representation.
2. Regional/state actions vs local actions - how they can work together and how they work against each other.
3. Review old ordinances and suggest updates.
4. No specific one comes to mind.
5. Review the list of action items and at the next statewide drought tabletop exercise, make sure those items are covered or determine if they are still relevant.
6. Response to drought by all segments

Q12. Would you attend future, similar events to discuss drought planning and preparedness?

23/25 respondents answered this question.

Answer Choices	Responses	
Yes	96%	22
No	0%	0
Not sure	4%	1
	Answered	23
	Skipped	2



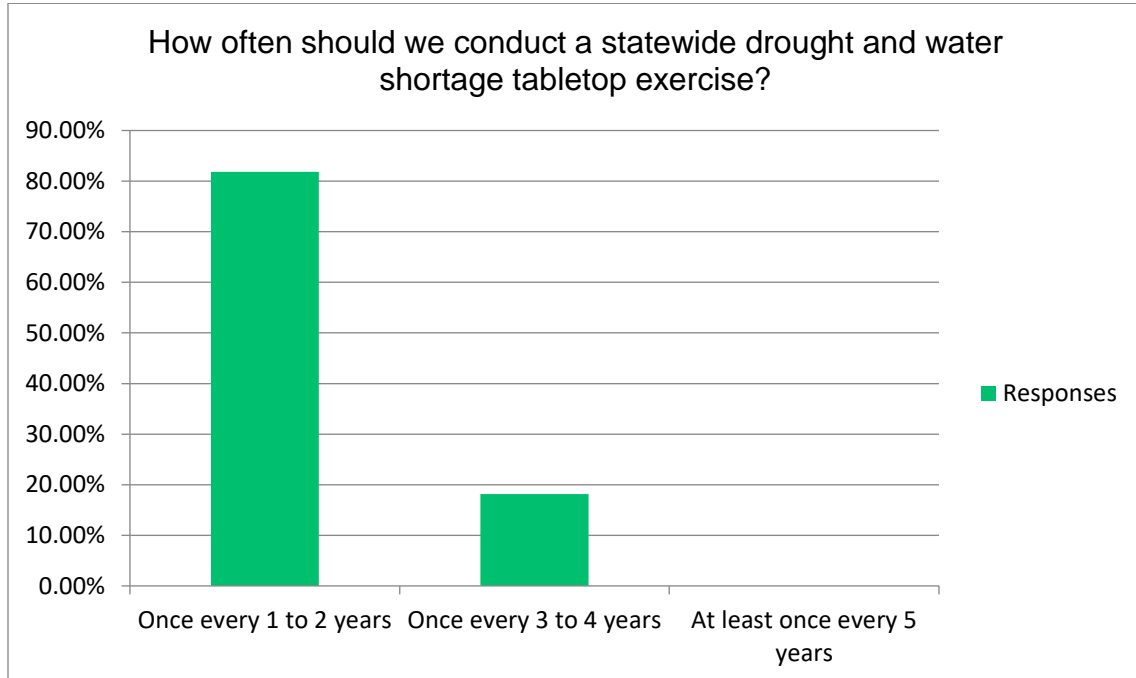
Q13. How often should we conduct a statewide drought and water shortage tabletop exercise?

22/25 respondents answered this question.

Answer Choices	Responses	
Once every 1 to 2 years	81.82%	18
Once every 3 to 4 years	18.18%	4
At least once every 5 years	0.00%	0
Other (please specify)		4
	Answered	22
	Skipped	3

Other (please specify)

1. Every 2 years seems like the sweet spot.
2. It needs to be a series with continuity, not a one off event. The relationships built are at least as important as the rest of it.
3. Every other year seems like a reasonable frequency so issues can be discussed and possible addressed.
4. Annually

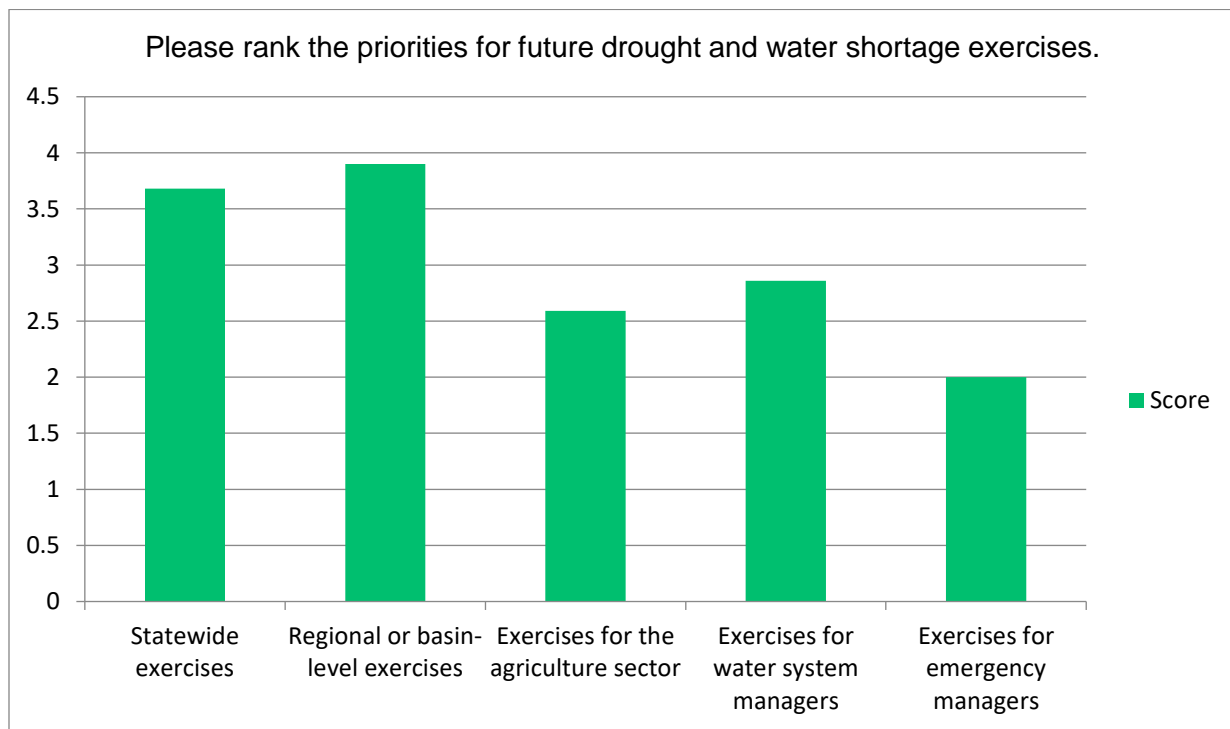


Q14. Please rank the priorities for future drought and water shortage exercises.

22/25 respondents answered this question.

1= highest priority, 5= lowest priority

	Rank										Total	Score
	1		2		3		4		5			
Statewide exercises	32%	7	32%	7	18%	4	9%	2	9%	2	22	3.68
Regional or basin-level exercises	48%	10	19%	4	14%	3	14%	3	5%	1	21	3.9
Exercises for the agriculture sector	18%	4	0%	0	32%	7	23%	5	27%	6	22	2.59
Exercises for water system managers	5%	1	36%	8	14%	3	32%	7	14%	3	22	2.86
Exercises for emergency managers	0%	0	14%	3	18%	4	23%	5	45%	10	22	2
Answered											22	
Skipped											3	



Q15. Please provide information about which specific regions, basins, and/or sectors would benefit most from a drought exercise.

12/25 respondents answered this question.

1. Agriculture seems to be the tail that wags the dog when it comes to drought conversation at least with this most recent May event. Was really enlightening listening to their dialogue. I think all the sectors benefit though. The office does a great job bringing all parties to the table and covering all regions. I personally will try to promote more cross talk within utilities sector.
2. SCDNR should rank the 8 major river basins by overall drought risk.
3. I would image those regions that haven't had a recent drought would benefit from the "refresher" that a drought exercise would bring. Regions that recently experienced a drought could benefit from revisiting what worked/didn't and areas for change or refinement.
4. Those that don't have an LIP in place.
5. Presumably all of them, particularly when they have an opportunity to share information in a plenary forum.
6. Capacity Use Areas
7. Depends on the outcome of the RBC developments.
8. Since the statewide exercise should cover all regions, basins and sectors, I'm not sure you will need individual exercises for each region, basin or sector. It could become overwhelming and cumbersome if you tried to break out various regions, basins and sectors into individual exercises on a less frequent basis, such as every 5 years. If a specific sector or basin is identified during the statewide tabletop exercise as needing more detailed assistance, you could always implement a specific exercise to target the needs that were identified.
9. The holistic approach at a state level was great to learn about actions and plans of those in other basins. Coordination at the basin level also seems extremely important - and the tabletop exercise provided a nice balance between state and basin coordination.
10. Edisto basin due to their lack of reservoir storage. Same for the Salkehatchie basin.
11. Agricultural sector on the Edisto and Salkehatchie
12. Food production and human needs are most important issues

Q16. Please provide additional suggestions you have for future planning exercises.

9/25 respondents answered this question.

1. Very well done overall. Excellent speakers and subject matter experts on hand. As mentioned, only suggestion is to perhaps lengthen or do a front-end survey in advance to compile responses and then use as talking points during the breakouts. Also, it was mentioned that we were missing other stakeholders like news, manufacturing, legislative, other states, etc. Those would be good perspectives to have. Thanks for a job well done and the ability to participate on the drought calls. Rising on the knowledge curve and great to know that our state has these resources.
2. Bring in a lunchtime speaker from another state that has been severely tested in the last 15 years by drought and what worked and didn't work in terms of drought response.
3. Plan for informal networking time. The clock is a tool.
4. none specific come to mind.
5. Have someone from the Governor's office in attendance so a discussion can take place regarding declarations that might be issued and how they might be enforced.
6. Not sure exactly where this fits in - but has there been any consideration for addressing that drought plans require percentage reductions in water use, but many water reduction strategies would be best implemented proactively over a longer period of time (e.g., rain barrel installation, low flow fixtures, etc.); however, if utilities began conservation programs, those reductions wouldn't count toward lowered water use during drought.
7. Start having more regional exercises.
8. Basin Councils need to be educated on the process in order to make better recommendations on improvements.
9. Eliminate acronyms from group presentations! Work hard to improve communication with SC Agriculture community in regards to drought assessment and actual impacts! 2019 drought is REAL in pastures in Upstate!