THE WATER INSTITUTE OF THE GULF

USACE SOUTHWESTERN DIVISION STRATEGIC RESPONSE PLAN

Interim Workshop Synthesis

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PREFACE

In 2020, the U.S. Army Corps of Engineers (USACE) Southwestern Division (SWD) worked with The Water Institute of the Gulf (the Institute) and ILSI-Arcadis to develop the USACE SWD Civil Works Strategic Plan (CWSP). This plan establishes a vision, goals, objectives, and priorities for the long-term evolution of the Civil Works program within SWD. In 2022, USACE SWD asked the Institute to help facilitate a workshop to further advance implementation of the CWSP. The workshop, held as a hybrid in-person and virtual event on June 8–9, 2022, focused on eliciting input from external stakeholders and USACE personnel. This report summarizes and synthesizes the outcomes of that workshop.

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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) Southwestern Division (SWD) works toward a safe, reliable, sustainable, and resilient water future for the communities it serves and the value these communities provide to the nation. As such, SWD strives to meet the increasing challenges and demands on the region's water resources through an integrated approach to their management. This approach is outlined in a strategic plan, the "USACE Southwestern Division Civil Works Strategic Plan (CWSP)" (USACE, 2020). To continue operationalizing the SWD CWSP, a regional workshop was held for the review and analysis of the CWSP to identify the long-range known and potential obstacles that could impact water resource management. It was also used to identify gaps in technology and innovation that could be incorporated into the plan and parlayed to develop Integrated Water Resource Management (IWRM) solutions. This summary and synthesis report developed by the Institute captures the presentations and conversations during the USACE SWD 2-day workshop held on June 8–9, 2022. The workshop summary is based on meeting minutes from the main sessions as well as the breakout sessions, and the workshop synthesis includes a list of key knowledge gaps, hurdles, and commitments to overcome these gaps and hurdles as described during the workshop. This synthesis will be used to inform the Strategic Response Plan that is currently under development by SWD.

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LIST OF ACRONYMS

Acronym	Term
ANRC	Arkansas Natural Resources Commissioners
ARPA	American Rescue Plan Act
ASA	Assistant Secretary of the Army
CAP	Continuing Authorities Program
CDC	Center for Disease Control and Prevention
CWSP	Civil Works Strategic Plan
DEQ	Department of Environmental Quality
DOT	Department of Transportation
EDAP	Economically Depressed Areas Program
ERDC	Engineering Research and Development Center
EWN	Engineering With Nature
FIF	Flood Infrastructure Fund
FIRO	Forecast Informed Reservoir Operations
FRM	Flood Risk Management
GLO	General Land Office
HAB	Harmful algal bloom
HEC	Hydraulic Engineering Center
IWR	Institute of Water Resources
IWRM	Integrated Water Resource Management
KWO	Kansas Water Office
LCRA	Lower Colorado River Authority
LNO	Liaison Officer
LULC	Land Use/Land Cover
NBS	Nature Based Solution
NETMWD	Northeast Texas Municipal Water District
NFS	Non-Federal Sponsor

Acronym	Term
NOAA	National Oceanic and Atmospheric Administration
NTCOG	North Central Texas Council of Governments
NTMWD	North Texas Municipal Water District
NWA	Northwest Arkansas Planning Commission
NWS	National Weather Service
OWRB	Oklahoma Water Resources Board
PAS	Planning Assistance to States
RPEC	Regional Planning and Environmental Center
SWD	Southwestern Division
SWIFT	State Water Implementation Fund for Texas
SWPA	Southwestern Power Administration
S&T	Science and technology
TDIS	Texas Disaster Information System
TIFF	Texas Integrated Flooding Framework
TWDB	Texas Water Development Board
USACE	US Army Corps of Engineers

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) Southwestern Division (SWD) works toward a safe, reliable, sustainable, and resilient water future for the communities they serve and the value these communities provide to the nation. As such, SWD strives to meet the increasing challenges and demands on the region's water resources through an integrated approach to their management. This approach is outlined in a strategic plan, the "USACE Southwestern Division Civil Works Strategic Plan (CWSP)" (USACE, 2020). To continue operationalizing the SWD CWSP, a regional workshop was held for the review and analysis of the CWSP to identify the long-range known and potential obstacles that could impact water resource management. It was also used to identify gaps in technology and innovation that could be incorporated into the plan and parlayed to develop Integrated Water Resource Management (IWRM) solutions. The objectives of this 2-day workshop held on June 8–9, 2022, are four-fold:

1) Gain greater insight and understanding of what future/strategic activities other agencies are engaged in to maintain and influence water resource management practices at the state and watershed level.
2) Collectively evaluate future water resource risks in the SWD region and build a shared understanding of the biggest challenges.
3) Collaborate with partners to identify gaps in understanding and develop joint efforts to gain and share knowledge.
4) Collectively identify hurdles that prevent effective partnerships and achievement of IWRM, then remove those roadblocks to successfully accomplish shared water resource goals in the region.

Section 2.0 summarizes the content of the hybrid virtual and in-person workshop and Section 3.0 provides a synthesis of key challenges, opportunities, and commitments as described during workshop presentations and discussions (Figure 1). Workshop attendees, agendas, presentation materials, and other information are compiled in the Appendices of this report.

Figure 1. USACE SWD CWSP Workshop photographs, highlighting the virtual (left) and in-person (right) workshop approach. Photographs by Hunter Merritt. Left Photo: meeting participants with Mandy McGuire; Right Photo: Jennifer Hoggatt presenting the Missouri Water Plan.

2.0 WORKSHOP SUMMARY

This section summarizes the discussions and materials of the Workshop.

2.1 WORKSHOP DAY 1: JUNE 8, 2022

The first day of the Workshop consisted of opening remarks, a series of presentations from each state, and a wrap-up.

2.1.1 Opening Remarks

An introduction by Mr. Al Lee was given on the importance of IWRM for USACE and its partners working in water resource management, emphasizing the three R's of USACE: ready, responsive, and relevant (Figure 2). This session also introduced the CWSP. The goal of this workshop as articulated by USACE SWD was to identify approaches to remain responsive and relevant to the needs of all communities served, recognizing the diverse goals and objectives of partner organizations including industry, academia, non-governmental organizations, and others. Furthermore, the USACE Chief Engineer and the Assistant Secretary of the Army (ASA) Civil Works have each placed renewed emphasis on partnerships in determining what is delivered by USACE and how it is delivered in response to growing workload within SWD. In closing, it was emphasized that there are more commonalities than differences in IWRM across USACE and its partners.

Figure 2. Opening remarks by Mr. Al Lee on June 8, 2022. Photograph by Hunter Merritt.

2.1.2 Session Topic: Texas Presentation and Q&A

Presentation Overview: Kathleen Jackson of the Texas Water Development Board (TWDB) presented on the state of water for Texas in a presentation titled *Water for Texas: Water for the Future*. See Appendix C for the associated slide presentation.

Extreme weather (drought and pulses of extreme flooding) and population growth were identified as key challenges and risk drivers for Texas, emphasizing that responsible water management is required to promote resiliency. Activities such as water conservation, reuse, brackish groundwater desalinization, seawater desalinization, aquifer storage and recovery, and reservoirs were highlighted as priorities. However, it was noted that implementation of conservation practices is not always feasible across the entire geography of Texas (i.e., a desalinization plant is appropriate in a coastal city such as Corpus Christi, but not for inland areas). Partner collaboration, particularly with downstream partners, on water use (e.g., for agriculture) was identified as a required component for effective management of reservoirs and aquifers. Ongoing efforts to quantify and understand positive and negative impacts of IWRM on

communities were also noted as important. Recent successes in structured regional water planning efforts were presented, describing the bottom-up planning processes that were used alongside key datasets (e.g., population projections) to understand the future of available groundwater resources for the State.

This presentation identified financial assistance programs that have been leveraged to address flood issues and to provide assistance to communities for planning for water shortages and flooding; these programs are offered at the state (the State Water Implementation Fund for Texas [SWIFT], Flood Infrastructure Fund [FIF], Development Fund, the Economically Distressed Areas Program [EDAP], Agricultural Program) and federal (Clean Water State Revolving Fund, Drinking Water State Revolving Fund) levels. Current projects were highlighted, including the Economically Distressed Areas Program that provided first-time wastewater service as well as water system improvements to local communities in the Montana Vista area. SWIFT funded projects were also discussed, including the North Texas Bois d'Arc Lake Project ($1.5B), Houston Area Regional Partnership Luce Bayou Project ($4.5B), and the Tarrant and City of Dallas Integrated Pipeline ($440M). Notably, half of total financial commitments have gone towards rural communities.

- Overarching Challenges and Opportunities Identified for Texas:
    - **Challenge:** Planning for an uncertain future must address these questions: "How many Texans will there be? How much water will be required? How much water do we have? Do we have enough? What can we do to get more? And how much will it cost?"
    - **Challenge:** Personnel shortages hindering project implementation. More program managers and engineers are needed to increase efficiency and robustness of project implementation. Work is ongoing to promote virtual work opportunities.
    - **Opportunity:** Expanding the call for "future-proofing" Texas (particularly related to hurricanes and associated flooding and land use/land cover [LULC] changes).
    - **Opportunity:** Continued partnerships with neighbors upstream and downstream to promote resiliency.
    - **Opportunity:** Ongoing need for regional flood planning efforts to strategically inform the full State-wide flood plan, which is anticipated to be released by 2024 (https://www.twdb.texas.gov/flood/planning/regions/schedule.asp).

In terms of data and knowledge availability, the presentation highlighted the role of the TWDB as the data repository for all Texas water data (https://2022.texasstatewaterplan.org/statewide). TWDB also engineers and finances projects up to a 5-year horizon and assists in bottom-up planning processes. Additional online resources cited include the Flood Decision Support Toolbox and the FIF Project Reporting Dashboard. Gaps in data and understanding were also outlined, including: 1) research into aquifers; 2) feasibility of promoting desalinization plants for water supply resiliency; 3) updated and improved data quality, particularly LiDAR and digitized maps; in particular, more accurate data are needed to better quantify regional flood plan components that identify risk based on hazard, exposure, and vulnerability; and 4) education and community engagement; specifically, community engagement

with these new tools is necessary to better characterize emergency response and management at the local level.

Key Discussion Points:

- How do we use science and technology (S&T) to manage existing available water supplies more efficiently and effectively?
    - The better the data, the better the science, the better the policy. Work began with the data and the science, and the legislature supported that effort. Real-time weather information was made available online, mapping aquifers of Texas and how they are changing is ongoing, and efforts are underway to identify water resources that could be used alongside desalinization, including identifying productivity zones for moving forwards with those types of facilities. The TWDB is looking at what projects are best suited across the landscape because it is not appropriate to apply one solution to the entire State of Texas. There is a commitment to work with others on third party evaluations to identify potential avenues where additional data can inform efficiencies, conservation, and so forth.
- Will the USACE accept flood data provided by the TWDB for project planning? Is it the same standard?
    - The expectation is that the flood planning groups and the communities moving forward with flood mitigation projects will use TWDB data as an additional tool alongside other forms of available data (e.g., FEMA). **Note: Data sharing and standards is an issue that was discussed on Day 2.*
- How does sector demand on water supply feed into growth projections from an energy/ industrial/ commercial perspective? How is it accounted for in these projections?
    - Water supply demands are defined for municipalities and there is ongoing work to understand and define usage factors for other sectors. There are 3300 water user groups across sectors, and work is ongoing to identify their water supply needs. A recent effort has just been completed to review water usage by oil & gas, mining, and agriculture, and work is ongoing to determine the amount of water actually used over time. TWDB is also working to engage communities to help identify areas of concern. A data-driven approach is key, but there are opportunities for planning groups to be involved in this process.
- In relation to the starting point of these planning efforts, what sort of difference is there between water supply groupings/jurisdictions vs. flood planning? What factors helped differentiate?
    - Water supply plans are based on political subdivisions but operate basin-wide. Flood planning is basin/watershed based.
- Are there lessons to be learned about how water is being managed in the Western U.S., where severe drought and usage pressures are being realized?
    - There are always lessons to be learned. Community engagement and listening to the concerns of the public are highlighted as important lessons learned.

- With the designation of floodplain management through establishment of development standards at a city/county level, there is a great disparity to the approaches/policies across communities. As the State's flood planning effort evolves, is there a plan by the TWDB to take a state-level role in the future to influence the consistencies of flood management policies and approaches across the State or is that not part of the flood planning process?
    - TWDB notes that this is not part of the state-wide effort, however this is something that individual flood planning groups can review. These types of flood planning efforts are not eligible for State Water Implementation Fund for Texas (SWIFT) because water supply and flood plain efforts are separate.
- Do most board members of the TWDB go out and give talks?
    - The TWDB is charged by the legislature to bring our work to the public and engage stakeholders in the conversation. Sharing available resources and emphasizing planning for the future will benefit many.
- Rural communities are running into challenges of financing projects to meet water quality standards. How does a small community take a loan for a 30-year projection if their population might reduce over time? Is there a plan or thoughts related to that?
    - The TWDB has resources of the State Revolving Fund which is a combination between a loan and a grant program. Upcoming infrastructure funding stipulates that 49% must be for rural communities, which provides TWDB and others additional opportunities to provide financing. If qualified as disadvantaged, 70% funding with 30% grant is available to complete projects. TWDB is committed to providing the knowledge, data, governance, and other resources to small communities to facilitate strategic planning and investments for water resource projects, both for populations that may experience decreasing numbers as well as those that are growing.

2.1.3 Session Topic: Arkansas Presentation and Q&A

Presentation Overview: Ryan Benefield of the Arkansas Department of Agriculture presented on the state of water for Arkansas in a presentation titled *Arkansas State Water Plan*. See Appendix C for the associated slide presentation.

This presentation centered on water planning efforts for the State of Arkansas. The Arkansas Department of Agriculture Water Resources Management Division is devoted to the following programs: water planning, water and wastewater loan and grant programs, dam safety, floodplain management, groundwater protection and management, nonpoint source pollution management, non-riparian water use permitting, hypoxia, state climatology, and water-related tax credits. The state of water in Arkansas was described as a flood waiting for a drought.

An overview of the Arkansas State Water Plan cycle was then provided. The original plan was developed in 1939, then updated in 1975, 1990, and 2014. The 2014 plan highlighted the key role of public participation in the planning process. The 2014 Arkansas State Water Plan assessed water quality and quantity as well as readiness of water infrastructure in the State to accommodate population growth and declines through the year 2050. Water demand projections were highlighted, articulating the

challenges faced around regional differences in water supply across the State; in Arkansas, there are abundant surface water resources whereas groundwater resources are much more limited. It was noted that a significant amount of available groundwater (80%) is used by agriculture, specifically rice cultivation, which places pressure on the Mississippi River Valley alluvial aquifer. The current trend in groundwater resource use has resulted in a critical need to review the status of aquifers across Arkansas, noting an ongoing need to strategically plan water usage around more abundant surface water resources.

- Overarching Challenges and Opportunities Identified for Arkansas:
    - **Challenge:** Understanding water use needs across the State to address groundwater depletion via extraction from alluvial aquifers. By 2050, groundwater depletion is forecasted to be 8.2M acre-feet per year (AFY) above sustainable yield in eastern Arkansas primarily. Additional work is needed to promote use of non-riparian surface water resources, particularly for industrial use (i.e., hydraulic fracturing).
    - **Challenge:** Creating infrastructure to promote regionalization of water and wastewater systems. Addressing this challenge, through actions such as diversions and tax incentives/credits, would bring surface water resources to locations where it is needed. This is particularly important for bringing drinking and wastewater infrastructure to rural locations where there are significant barriers (funding to build and maintain), particularly for northwest Arkansas which has experienced increasing rates of population growth. However, not enough funding is available through grants and water use reporting is insufficient.
    - **Challenge:** Maintaining and improving water quality for both surface and groundwater. Data are needed to identify watersheds with nutrient issues and determine strategic focal points for water quality monitoring.
    - **Opportunity:** Implementation of certain projects or land management practices for agriculture may have increased aquifer recharge, however more analysis is needed to disentangle potential confounding variables (e.g., increasing precipitation rates for the region).
    - **Opportunity:** Modernizing agricultural practices to conserve groundwater resources.
    - **Opportunity:** Planning for the future: ongoing development of drought preparedness. Drought contingency planning is underway.
    - **Opportunity:** Groundwater education is a critical need. Education and public engagement efforts are planned (e.g., the Arkansas Conservation Partnership Groundwater Summit). Efforts are ongoing to develop training programs for utility boards of directors to educate decision-makers on water systems.

This presentation also highlighted key funding programs in place to facilitate strategic infrastructure planning for the State. Existing programs such as the State General Obligation Bond Program is in place for state-level planning, and other financial incentive programs are in place to promote regional infrastructure/flood control plans for smaller communities (e.g., locally managed Arkansas River Levees projects). Other collaborative projects were highlighted, including a project dedicated to navigation and

another to stormwater management. Although navigation was noted to be a minor focus of Arkansas water resource planning, the Southwest Arkansas Navigation Study was presented as an example of a partnership between multiple states working together to understand regional navigation needs. In a partnership with Oklahoma, a stormwater management project is underway to identify key focal areas in which to implement projects aimed at slowing the flow of stormwater runoff; the goal of that effort is to mitigate increasing surface nutrient run-off because of increased precipitation in the region.

Key Discussion Points:

- Is the Arkansas Water Plan a living document? How often is it updated?
    - The 2014 Arkansas Water Plan is not currently set up on a regular update schedule. The recent 2014 update was a legislative-funded opportunity and additional appropriations would be needed to do another update. The State is working to analyze the impacts of implemented projects to show groundwater recharge improvements, which may lead to future plan updates.
- How was the assessment of nutrients done for Arkansas watersheds?
    - Trend analyses are based on nutrient projections due to the lack of available observational data. Work is ongoing to incorporate a downstream view in addressing nutrients in the State, focusing on watersheds with excess nutrients to see in-stream nutrient reductions.
- If you could get one thing to get IWRM for Arkansas, what do you need?
    - Funding is required.
- Where would you find the money?
    - Irrigation infrastructure is needed to address the pressures from agriculture. Work must be done to identify strategies to move surface water across the State to alleviate pressure on groundwater resources. Additionally, surface-derived water needs to be available at a price cheaper than groundwater to provide users an incentive. The State can regulate the use of groundwater, but it's not currently appealing for consumers as it leads to downstream price increases, for instance increases in the price of rice. Additional funding is also needed to put more people on the ground to implement projects, to increase partnerships, and to expand technical resources. More work is needed to target available funding strategically and efficiently.
- How is the State moving on the identified action items? Who has authority for this?
    - In Arkansas, people like to be in control of their own water and to remain independent, but small communities can't afford big water and sewer systems. Some options call for forced regionalization, but we are focusing on incentivizing local communities.
- Have you developed a 5-year plan? It's difficult to plan staff not knowing a 5-year outlook. What are you doing for planning?
    - There are ongoing plans to work with the Little Rock District for long-term planning. Other planning requires localized and more engagement with other partners (e.g., levees).
- What about levees?

    - The Arkansas Department of Agriculture has a non-regulatory role and cannot force anything related to levees.
- How are you approaching stormwater mapping in advance of flooding?
    - Work is ongoing with Little Rock District on a dashboard for inundation mapping. There is no capacity on staff to accomplish this in Arkansas. There may be funding through FEMA.

2.1.4 Session Topic: Missouri Presentation and Q&A

Presentation Overview: Jennifer Hoggatt of the Missouri Geological Survey presented on the state of water for Missouri in a presentation titled *Missouri Water Resources Plan*. See Appendix C for the associated slide presentation.

This presentation centered on water planning efforts for the State of Missouri, specifically the Missouri Water Resources 2020 Plan developed by the Missouri Department of Natural Resources. The prior State water plan was updated in partnership with USACE Kansas City District. The 2020 plan focuses on water needs, water supplies (and water quality as it impacts supply), and water infrastructure. The 2020 plan identified multiple major uncertainties and drivers, including population growth, unplanned outages, interstate diversions, regulatory framework, agricultural output, technology changes, municipal water use, economic conditions, water treatment level, and future climate. Overall, irrigation for agriculture is the biggest water use in Missouri; it requires more than double the water than other major water systems. This usage is also reflected in the regional differences in water use across the State. Groundwater use is much higher in southern Missouri compared to northern Missouri, where surface water sources are more heavily relied upon.

While the main agency focus as it relates to water is centered around water resource planning, the agency notes that it can help implement projects on the ground, particularly when engaged through strategic partnerships. For example, a successful partnership with the University of Missouri resulted in an assessment of water resource needs that identified which sectors draw the greatest demand on water resources.

- Overarching Challenges and Opportunities Identified for Missouri:
    - **Challenge:** Regional disparities in water resource availability and needs (groundwater vs. surface water) across the State present an obstacle for state-wide planning.
    - **Challenge:** Understanding and mitigating water resource demands into the future in the context of shifting precipitation patterns (flooding and drought). Projected wastewater and drinking water infrastructure needs are upwards of $8B over the next 20 years.
    - **Challenge:** More data are needed to better characterize current water use.
    - **Challenge:** Develop capacity within Missouri to act proactively rather than reactively when faced with water resource challenges and opportunities.
    - **Opportunity:** Scenario planning is ongoing to characterize existing water resources (surface and groundwater) and to forecast what water resources (precipitation/drought)

might be like in the near-term as well as into the future. This will enable an adaptive management approach to water resource planning.

- **Opportunity:** Legislative opportunities are becoming available to fund:
  - Water resource planning and development, particularly around reservoir expansion (i.e., the American Rescue Plan Act [ARPA]).
  - Revival of the Flood Resiliency Act. Although not passed in a prior legislative session, work is ongoing to use this as a mechanism to bring flooding resiliency to rural communities.
  - Data centralization of hydrology data at the Missouri Hydrology Information Center. Efforts are ongoing to create this as a one-stop shop for data and resources devoted to water resource planning in Missouri, particularly for developing a long-term focus for regional planning across states.

Key Discussion Points:

- How are non-consumptive uses integrated into the 2020 plan? Could you expand on how those are included in planning?
  - Non-consumptive water uses are presented narratively in the 2020 plan rather than in quantitative terms. Non-consumptive water uses are relevant here in terms of temperature regulation by industrial entities, which is an important consideration on the Missouri River. These water uses directly impact water quality parameters and more data are needed to understand non-consumptive water usage by industry.
- Is groundwater extraction permitted by the State?
  - According to Missouri statutes, anyone with the ability to withdraw 100 gallon/day is required to register their usage. In this case, water usage data is requested but there is no mechanism to enforce it. It is acknowledged that the resulting data is incomplete, however regulations are not attractive to residents and permitting is considered regulatory. However, it is important to consider water use projections to get ahead of major uncertainties and stressors on water availability, locally and with other states. Missouri needs to be assertive about state water rights otherwise other states who have spent more time and resources on strategic planning will leave Missouri out.
- On the stated lack of data and resistance to regulation in Missouri: What are the challenges in planning for uncertainties and future water demand? How is that managed given the uncertainty?
  - It is recognized that the entire system must be managed better, particularly non-consumptive uses. Missouri is working in a reactive capacity rather than proactively, which sets Missouri behind other neighboring states. The Missouri River Basin has served as a wakeup call for Missouri. People are starting to really realize the value of water as a critical resource. Aqueducts and water pipelines are ideas that are gaining traction in the State, particularly as water resources increase in price. Navigation on the Missouri River is also an issue; a responsibility/mandate to maintain a navigation channel is needed.

- On the issue of non-consumptive use: the Missouri River could end up being most of the Mississippi River water supply in a dry year, which may result in significant impacts to navigation. Altering flow always has unintended consequences. Kansas and Oklahoma would be impacted as well.
- Excess ARPA funds can be used as cost-share for water resources; USACE is drafting a legal opinion about this that can be shared.
- Missouri is working to implement small rural water/sewer systems in a similar fashion as Arkansas regionalization plan.

2.1.5 Session Topic: Oklahoma Presentation and Q&A

Presentation Overview: Owen Mills of the Oklahoma Water Resource Board presented on the state of water for Oklahoma in a presentation titled *Oklahoma Comprehensive Water Plan*. See Appendix C for the associated slide presentation.

This presentation outlined the development and content of the 2012 Oklahoma Comprehensive Water Plan, a plan developed by the Oklahoma Water Resources Board (OWRB) and partially funded by USACE. One of the key objectives of the OWRB is identifying and building strategic partnerships across states to enable the implementation of successful water management practices. The role of the 2012 plan is simple: data, engagement, and recommendations. Contrasted against water plans developed by states with more abundant funding resources for water management (e.g., Texas), the planning process of the Oklahoma Comprehensive Water Plan was not a bottom-up process nor were there any incentives to develop the plan.

A central thread of this presentation was the concept that "you can't manage what you don't measure", a clear consideration when discussing water management in Oklahoma. One of the roles of the 2012 plan is to identify key components of critical water management in the State for consideration by the State legislature due to the current lack of authority by the OWRB to: require regional water planning, meter water use, directly fund projects (only finance), enforce on interference, consider environmental flows in issuing permits, or deny a permit if requirements are met. OWRB *does* have authority for water rights permitting (groundwater is private whereas surface water is public), water quality/quantity monitoring, enforcement of Department of Environmental Quality (DEQ) regulations, modeling/provision of data for groundwater and surface water, licensing of wells/dams, licensing of dam construction and maintenance, negotiating interstate compacts, and projecting state-level supply and demand.

Work is ongoing by the OWRB to better understand the existing water resources within Oklahoma and to engage with water users directly (e.g., the public) to identify where the challenges are. Emphasis is placed on partnerships rather than regionalization and multiple systems for water management in Oklahoma.

- Overarching Challenges and Opportunities Identified for Oklahoma:
    - **Challenge:** Lack of funding to elevate important issues and build trust across different economic sectors (i.e., agriculture) and the public.
    - **Challenge:** Engaging small, rural communities that are averse to regionalization.
    - **Challenge:** Uncertainties related to data reliability for water use due to an honor-based reporting system and a lack of ground truthing.
    - **Opportunity:** OWRB has robust datasets of water quantity and quality for streams, lakes, and groundwater collected since 1985. Work is ongoing to conduct assessments of water supply hot spots, trend analysis, and additional modeling. Making this data available will help the OWRB and partners identify critical gaps in water management, setting the stage for direct community engagement.
    - **Opportunity:** A call for a single voice in water management with emphasis on partnerships and centralization.
    - **Opportunity:** 2025 Oklahoma Comprehensive Water Plan under development, building from the 2012 plan and other state plans.

Key Discussion Points:

- Please elaborate on the reservoir reliability study.
    - The State worked with a consultant to review prior USACE (and other agency) studies to generate updated values for reservoir levels and use. A validation study was conducted to ground truth those values as some of the studies leveraged were conducted in the 1960s. Work was done to test the assumptions and update the costs.
- Speaking to this goal/desire to get everyone speaking with one voice to gain some traction, is the full breadth of water uses represented in the State plan? How are these different users with their unique objectives dealt with in the plan in efforts to build a coalition behind a single voice? What about non-consumptive uses (e.g., navigation, hydropower, etc.)?
    - The Oklahoma Water Resource Board has no authority for non-consumptive use in its statute. A coalition (e.g., similar to an approach used in North Dakota) is necessary to overcome the political challenges blocking funding for non-consumptive use studies and project implementation. A similar program to the Texas SWIFT is encouraged for Oklahoma but requires funding.
- What are some of the themes that you're trying to capture?
    - Working to demonstrate the value of water management in small towns to the State legislature. With political support in 10–5 locations around the State, this would help communicate the value of these projects.
- Is there anything new on the USACE side (SWD has more water supply contracts than any other division) for funding opportunities applicable to Oklahoma?
    - USACE is drafting a report on water supply for Congress building from the Water Resources Development Act (WRDA), however it is still very complicated when navigating State's rights, etc. The portion of WRDA in which partners can identify projects has been gaining attention from Congress. Civil Works appropriations on the

federal side have never been higher, but the needs have also never been higher. WRDA is well positioned but needs State support on lobbying/advocacy for these components.

2.1.6 Session Topic: Kansas Presentation and Q&A

Presentation Overview: Matt Unruh of the Kansas Water Office presented on the state of water for Kansas in a presentation titled *Water Planning in Kansas*. See Appendix C for the associated slide presentation.

This presentation centered on water planning efforts for the State of Kansas by the Kansas Water Office in coordination with the Kansas Water Authority. These two entities review water laws, make recommendations for legislation, and develop and implement the Kansas Water Plan. An overview of the Kansas Water Office mission, agency purpose, and extent of authority related to water planning, drought monitoring, and public water supply programs was given. The State Water Plan Fund, coordinated across State water management entities and agency partners, provides annual budget recommendations to implement the State Water Plan on a 5-year cycle.

The key challenges facing Kansas water management were described to include groundwater declines, reservoir sedimentation, water quality issues and shifting precipitation patterns across the State. These issues are critical to face both now and for ascertaining future water resource needs. Challenges of groundwater declines in the High Plains Aquifer and reduced capacity of reservoirs due to sedimentation (e.g., Redmond Reservoir, the Verdigris River Basin, and the Neosho River Basin) were discussed in detail. Changes in precipitation patterns were also described to differ across the State. Kansas has high vulnerability to extreme weather events, with drought and heat as significant stressors that are increasing over time. However, there is variability of flood and drought hazards within the State itself. Kansas often sees exceptional drought and flooding in different parts of the State at the same time. Southwest Kansas is currently in exceptional drought. Kansas also has similar agricultural needs and compressed timeframes for water use as Missouri and Arkansas; 90-day irrigation windows are common in the agricultural parts of the State, and water supply for those windows is already a concern.

This presentation emphasized opportunities for collaboration: studies, research, planning, demonstration, and implementation of efforts such as in-lake reservoir sediment management and flexible reservoir management strategies. Collaboration was emphasized as an efficient and strategic way to identify critical data gaps and develop strategies to improve forecasting (particularly relevant to flooding/drought, sediment transport, and navigation support).

- Overarching Challenges and Opportunities Identified for Kansas:
    - **Challenge:** Water supply issues differ across the State, especially drought/flooding due to extreme weather events and aquifer/reservoir supply. Notably aquifer declines are significant in the Ogallala Aquifer.

- **Challenge:** Identification of key data needs must occur to improve water quality forecasting for rivers (including harmful algal blooms [HABs]) and increase understanding of sediment transport into reservoirs.
- **Opportunity:** Collaboration with USACE and others identified as a key driver for increasing resiliency of Kansas water supply issues through implementation of the Kansas Water Plan.
- **Opportunity:** Work ongoing to update the plan. Themes of the draft plan include conserve and extend the high plains aquifer; secure, protect, and restore the reservoirs; improve water quality; reduce vulnerability to extreme events; and increase awareness of Kansas water resources.

Key Discussion Points:

- Could you describe the dredging methods utilized in Kansas reservoirs?
  - In the case of Redmond, the dredging mode utilized was hydraulic dredging (running sediment to a disposal system). Three disposal cells received dredged material directly. That project allowed the State of Kansas to understand how that method works within that system. However, a key consideration is the lack of available public land to place dredged material. Kansas is the second highest state in private land ownership and this dredging method relies on private property to construct disposal facilities. There is no appetite to purchase land from private owners for this process, which then requires reclamation plans and legal agreements. The Redmond project produced fertile sediments from dredging with no detected water quality impacts, providing three years of additional water storage capacity in that reservoir. Work is ongoing to understand the overall system needs (e.g., agriculture, nuclear, etc.). Unfortunately, the project in Redmond is likely not a viable solution for sustainable long-term reservoir management across the entire State of Kansas.
- If sediment removed from the reservoir was high quality, did you find a potential market for that material?
  - This is under consideration for longer-term viability of reservoir dredging in Kansas. Some opportunities were identified to bring this material to market, possibly for use in State-wide transportation and construction projects. Work is ongoing to identify the on-land opportunities for that material.
- Was the sediment that was removed originally intended for use in agriculture/cover crop?
  - Yes. This material has also been used for shoreline stabilization. Additional water and sediment planning is ongoing to identify upstream efforts that could reduce sedimentation at its source.
- As there has been a shift to greener power generation has there been any discussions of converting current reservoirs into hydropower generation facilities in addition to serving their current purposes? If so, what were the implications to other water resource needs would you need to be ready to address?
  - The area of hydropower generation has not been explored significantly. Wind power has been considered, but no discussion on hydropower development in Kansas.

2.1.7 Day 1 Wrap-Up

State presentations were concluded by remarks from Trish Anslow, Chief of Planning, SWD, emphasizing cross-State synergies identified from the state presentations (Figure 3). Opportunity for discussion was provided.

Cross-State Synergies:

- Economic constraints are important for water management and project implementation. Strategic partnerships offer avenues for cooperative planning and increased overall success.
- The year 2019 was a wake-up call that revealed the importance of being forward-thinking. Science and data are critical for managing water resources in an uncertain future.
- Governance structures are complex and therefore no single approach to water management can be successfully applied across different states.
- Water supply and demand can differ significantly across state geographies.
- More data and data sharing are needed to better understand consequences of project implementation and prioritize new efforts.

Figure 3. Wrap-up remarks by Trish Anslow, Chief of Planning, SWD on June 8, 2022. Photograph by Mel Ellis.

Key Discussion Points:

- Is the future of energy an over-stated risk?
    - Discussion identified that this is an important consideration that is not commonly thought of in concert with water resource management. It is important to consider not only how energy impacts water, but also how water impacts energy.
- A risk factor not discussed in detail is regional scale climate change biome shifts as it relates to IWRM, and associated impacts of climate changes on fish and wildlife activity and critical habitat functions. This is in the context of federal/state regulatory agency oversight. These considerations could have significant influences on other water management objectives and priorities. In addition, it is important to consider how ecosystem restoration and benefits to natural resources interact with flooding resiliency.
    - Some discussion was had related to minimum flow allotments for wildlife and also for water users. Tradeoff analyses and cost/benefit analyses are important in these decisions.
- Navigation was a risk driver not discussed in significant detail in state presentations. Any additional comments about water use and navigation?
    - Navigation will be discussed more in breakout sessions.
- Two more considerations: 1) It would be useful to document from today's discussion the data and science gaps and uncertainties for pursuing priority closure through available authorities and programs, and 2) What are the discontinuities between State Water Plans, which describe

how individual states intend to manage water, that could cause regional friction points that we all want to avoid.

- Workshop minutes will be captured in a post-workshop synthesis and disseminated to all participants.

2.2 WORKSHOP DAY 2: JUNE 9, 2022

The second day of the USACE SWD CWSP Workshop emphasized cross-agency knowledge sharing related to challenges, opportunities, and resources around IWRM. A series of hybrid breakout discussions were held to characterize these key components and identify actions to advance IWRM in the SWD region (Figure 4).

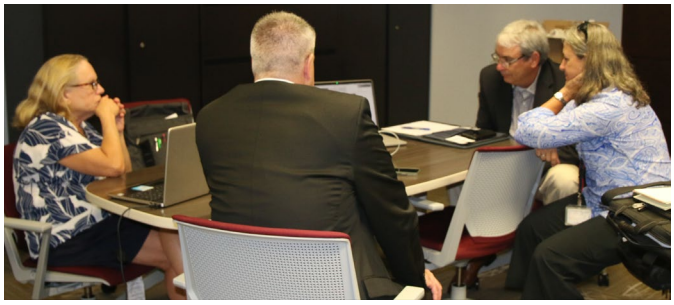


Figure 4. Example of a hybrid virtual and in-person breakout session with stakeholders and Trish Anslow. Photograph by Mel Ellis.

Six groupings of attendees were developed by USACE SWD. Attendees were assigned to groups based on the risk drivers from the CWSP: Rapid Population Growth & Urbanization, A Changing Regional Landscape, Extreme Weather: Floods and Drought, Uncertain Future of Energy, Increasing Demand on Water Resources, and Aging Infrastructure.

The morning sessions all covered the same content, responding to the prompts in Section 2.2.1 below based on the state presentations from Day 1.

The afternoon sessions were intended to cover each risk driver and to advance IWRM discussions based on that particular driver. However, the risk drivers were discussed all day, and attendees merged several of the breakout groups in the afternoon to have a wider-ranging discussion.

2.2.1 State Presentation Breakout Discussions

Prompt: What are the biggest priorities and opportunities related to IWRM?

1) Flood management
    a. Potential coordination mechanisms: Water Resources Council for management at watershed scales; Region C Water Planning Group; the Center for Disease Control and Prevention (CDC) flood hazard reporting in coordination with the National Weather Service (NWS) “Turn Around Don’t Drown®” campaign .
    b. Role of management (state and federal): less regulatory and more emphasis on partnerships.
    c. Engaging with rural communities.
2) Water supply
    a. Addressing pressures of supplying water to populations that are expanding (e.g., Wichita, KS) and dwindling. Additional priority is to maintain existing water supply.
    b. Maintaining availability of water for industry (e.g., hydropower generation) and planning for expansion of such industries.

c. Emphasis on partnerships with other water authorities optimize water delivery systems to places with high demand; resource sharing; money/permitting/transportation power for water supply transfer to leverage opportunities in places where water is abundant.
d. Serving low- and middle-income populations and engaging with rural communities.
e. Reservoir management for supply sustainability (specifically Kansas).
f. Planning considerations must include near-term and long-term scenarios and uncertainty.

3) Infrastructure
    a. Increasing available water supply, protection, and restoration of existing infrastructure: Flood Risk Management (FRM) and other opportunities.
    b. Understanding and managing energy infrastructure influences on water flow and water quality.
    c. Supplying infrastructure and maintaining aging infrastructure, particularly in small, rural, and disadvantaged communities (funding constraints noted).
4) Regulation
    a. Regulatory consistency and certainty.
    b. Engaging with rural communities where there is less attention on water management.
    c. Cross-agency collaboration to alleviate pain points around working with threatened and endangered species during project implementation.
5) Data
    a. Identifying data needs and promoting consistency.
    b. Facilitating data sharing.
    c. Promoting projects at multiple scales: local to state-wide studies.
    d. Creation of a flood information database based around partnerships.
    e. Expanded application of numerical models.
    f. Collecting data on a timeline that allows for scenario building.
6) Partnerships
    a. Collaboration with USACE to 1) better understand the current and future status of water resources across the region; 2) identify alternatives/actions to extend the life of water supply sources; and 3) foster cross-state partnerships that can accomplish IWRM across different planning processes and governance structures.
    b. Cross-agency collaboration to increase speed and efficiency in project execution.
    c. Engagement with the state legislature to advance state water planning.
    d. Facilitating solutions even when USACE or another agency does not directly implement them.
7) Funding opportunities
    a. Funding for small communities. Need to provide assistance to those communities so that they may acquire that funding. Too many barriers and lack of local expertise to navigate the application requirements.
    b. Funding is available for project implementation, but less is available to conduct studies, particularly in small communities.
    c. Leveraging co-benefits in project planning and implementation.

8) Educating decision-makers on water supply challenges and opportunities

Prompt: What are the key themes, cross-agency/cross-state issues and opportunities, barriers to IWRM identified from state presentations?

Cross-Agency/Cross-State Issues and Opportunities:

- Bridging state and USACE district boundaries for more holistic IWRM. Important to identify the range of water-related issues facing different regions within a given state, although the solutions in one area will not be the same for another. The region must work cooperatively to address states' rights issues to water. Moving water resource planning outside of authority lines (i.e., state lines) and becoming more goal driven is a key opportunity to shift from competition to collaboration. Cross-agency and cross-state data sharing would promote access to accurate data and facilitate better IWRM. Education on data access is needed.
- Engaging FEMA on FRM at state and local levels; provides mapping and insurance programs; and can implement storage reclamation to lessen flooding impacts that sometimes result in greater flooding.
- States differ in perceived urgency related to understanding water needs (both current and into the future).
- Energy demands on water resources are typically considered as an afterthought by water management agencies. Industrial power plants drawing water and experiencing degradation are seen as threats to other water uses. Opportunities to engage the Southwestern Power Association (SWPA) that markets the power generated from USACE dams. Water storage can sometimes compete with hydropower storage; one solution may require pumping from downstream to upstream which could be very costly.

Barriers to IWRM:

- Lack of knowledge of existing plans and priorities across different agencies/groups hinders efficient IWRM. More communication is needed to coordinate timing of water management plans to connect existing supplies for more efficient water delivery.
- Difficulties navigating funding mechanisms exist at city/local levels and there is a lack of local knowledge and expertise. In addition, funding applications take time, money, and effort, all of which are in short supply, particularly in rural areas.
- Lack of understanding related to existing infrastructure and aquifer storage needs in broader, cross-state contexts, specifically the interaction between LULC change and aquifer recharge potential.
- Lack of transparency in flood control authority and accountability.
- Challenges of addressing management of different water bodies/forms (rivers vs. lakes vs. ground) differently. For example, riverine issues can be more incremental which requires a more robust understanding to address more localized (sub-county/city-level) needs. One standard approach may not be appropriate.

- Different regulatory frameworks for surface water and ground water across different states. Challenges involving disparate regulations across aquifers that span multiple states.
- Balancing competing interests/conflicting needs related to water use can be challenging for IWRM. This is true locally as well for upstream and downstream water users. Minimum flows out of dams for downstream uses can result in impacts to energy generation, an additional consideration that often results in tensions. If local jurisdictions could establish a consistent way of evaluating demand (addressing an issue that cities predict per capita use differently), this would be helpful for IWRM.
- Balancing maintenance of aging infrastructure with development of new infrastructure (e.g., need funding for dam safety upgrades).
- Lack of predictive capacity of tools and data, perpetuated by a lack of funding for weather forecasting. Difficulties faced in gaining cross-agency agreement on water resource projections that must be resolved for increased buy-in for long-term IWRM.
- Need more opportunities to increase water supply safety net (e.g., more reservoirs to store more water).
- Communication gaps between local communities, agencies, and government levels hinder IWRM. Communication is also noted to be a difficult thing to sustain over time.
- Need to overcome infrastructure backlog due to lack of congressional appropriations.
- Lack of funding. A more robust budget would enable more opportunities.

<u>Overcoming Barriers:</u>

- Increasing inter-agency work for predictive research into future conditions. It is important to engage regularly, not only in response to extreme weather events.
- USACE guidance may help demonstrate the benefits and consequences of water management practices based on science. Work should be done to help facilitate project development with local leadership and to increase local buy-in, however, there is often mistrust between the public and the government.
- Value of a third-party coordinating entity to assist city/local communities through the technical process of funding applications and subsequently through managing incoming funds for strategic/efficient project implementation.
- Opportunities for partnership specifically for research and development to monitor and understand water uses and challenges, including supply and demand balanced against ecosystem requirements.
- Identifying co-benefits (particularly for wildlife) is an opportunity to increase opportunities for implementation through cross-agency collaboration.
- More opportunities for workshops (like this one) would help cross-agency communication of existing plans and priorities. For example, the Texas Water Conservancy Association meets three times per year for water suppliers to discuss their needs and coordinate; this association also interfaces with USACE and other federal agencies. This is an example of a successful model to follow.

Prompt: In terms of knowledge sharing, are there identified knowledge gaps related to IWRM?

Data centralization: Workshop participants agreed that data sharing is occurring, but discussions are ongoing to understand data acceptability across agencies. In some states (e.g., Kansas), there is no centralized location for water data. Development of centralized and accessible data portals was identified as a key need to promote knowledge sharing. Notably raising funds for data collection is a significant roadblock, particularly where data from more remote/less populated do not exist. USACE is an important partner in generating regional data/maps/models for cross-state use. Multiple data repositories exist across the different agencies which can cause difficulties in locating data (a central cross-agency database or index may be beneficial). However, it is important that data centralization ultimately does not impede access (due to concerns such as bandwidth, security, etc.).

Data scale: A clear understanding of the relevant spatial and temporal scales of data are important for IWRM and for justifying project implementation. Uncertainties in data availability timelines can create delays and less effective floodplain management, particularly for locations where maps are old and outdated. Agencies must work collaboratively with local communities who may be apprehensive about what updated data might show and what it might mean for their futures.

Data standards: Data collected at the state level must meet certain quality standards for use by federal agencies due to permitting reasons. Partnerships with USGS are highlighted to increase funding for gauges or other measurement devices. USGS also highlighted as a good model for data format standards.

Data-driven tools: NOAA and the NWS are constantly developing new tools for forecasting, however there is reluctance in sharing those tools due to concerns over misuse or misinterpretation of findings. Opportunities exist to partner with them during tool development to foster collaboration and greater understanding. This may also facilitate beta testing or other opportunities for providing feedback/input on tool development to promote efficiency and utility.

Data types to fill knowledge gaps:

- Water quality: Water quality monitoring upstream of reservoir systems is needed, particularly related to HABs. While data are collected within the reservoirs, more of a focus on upstream and downstream waters is necessary. LULC change forecasts are also identified as useful data to better understand the influence of landscape changes on water quality. Long-term data collection is emphasized as a key method to promote proactive action rather than reactive action in terms of water quality issues.
- Water use: Better data spanning all potential water uses (consumptive and non-consumptive) would be helpful for managing demand 5, 10, and 20 years into the future.
- Impacts of conservation projects: Additional follow-up studies are necessary as programs are implemented to better understand how much water is saved and for how long.

- Floodplain mapping: While LiDAR may be available for some states (e.g., Texas), more mapping is needed in others (e.g., Oklahoma). Updated maps are also critical for FEMA flood insurance purposes, etc.
- Aquifer recharge: Additional studies and data are needed to better understand aquifers as a whole as well as the dynamics between surface water and groundwater interactions. This may necessitate partnerships with USGS to identify priority recharge locations.
- Future climate projection data: Data related to precipitation and temperature are necessary for scenario analysis, including times of drought as well as less frequent freeze events. These data can also be used to inform risk tolerance. Data and forecasting tools are needed, and emphasis is placed on development of these tools in an open and collaborative process. Climate projection data are also important for understanding the range of uncertainty that the future holds related to water resources. Opportunities for collaboration with NOAA and universities could accelerate the filling of these knowledge gaps.
- Co-benefits & multi-use: Additional data are needed to better understand the multiple co-benefits of water management projects as well as opportunities for multiple uses. This also relates to better understanding of who will benefit (not only monetarily) and who will not benefit – must understand impacts of water resource management across different groups.

Examples of knowledge sharing includes the Texas Integrated Flooding Framework (TIFF) which is coordinated across Texas, the Texas Disaster Information System (TDIS), NOAA datasets, and the General Land Office (GLO) which facilitates maintenance and distribution of statewide knowledge.

Prompt: Sustainable Points of Contact

Hiring of younger associates into water management agencies is considered an important mechanism for ensuring continuity of contact amongst water management agencies and collaborators. Hiring of such people to work alongside those with expansive existing knowledge would help facilitate transitions and promote knowledge continuity. The following points of contact were identified during the workshop:

- **Eric Vewers**, Deputy District Engineer, USACE Fort Worth (Eric.W.Verwers@usace.army.mil).
- **Kathy Spillane**, SWF Chief, Civil Works, Fort Worth District (kathleen.m.spillane@usace.army.mil).
- **Edith Marvin**, Director, Environment and Development, North Central Texas Council of Governments (EMarvin@nctcog.org).
- **RJ Muraski**, Assistant Deputy Director CIP, North Texas Municipal Water District (rmuraski@ntmwd.com).
- **Brad Brunett**, Lower/Central Basin Regional Manager, Brazos River Authority (brad.brunett@brazos.org).
- **Richard Rockel**, Water Resource Planner, Kansas Water Office (Richard.Rockel@kwo.ks.gov).

- **Joshua McClure**, Halff & Associates (jmcclure@halff.com).
- **Owen Mills**, Director, OWRB (Owen.Mills@owrb.ok.gov).
- **Loretta Turner**, SWT Chief, Civil Works, USACE Tulsa District (Loretta.J.Turner@usace.army.mil).
- **Rachel Ickert**, Director of Water Resource Engineering, Tarrant Regional Water District (rachel.ickert@trwd.com) *contact for integrated water resources planning and management (policy level).*
- **Zach Huff**, Director of Water Resources Engineering, Tarrant Regional Water District (zach.huff@trwd.com) *contact for demand projections and technical aspects of water supply planning.*
- **Nicole Rutigliano**, Water Supply Manager, Tarrant Regional Water District (Nicole.rutigliano@trwd.com) *– for demand projections and technical aspects of water supply planning.*

2.2.2 Risk Driver Discussion: Rapid Population Growth & Urbanization

Prompt: Identify key challenges related to this risk driver and IWRM over the next 15-20 years

- Climate variability (storm intensity and frequency, temperature extremes) and impact on population centers that may increase vulnerability.
- Uncertainty in regulatory environments can make investment decisions at the state and federal levels more challenging. More flexibility in policy is needed to implement creative solutions.
- Serving rural populations and providing water supply and flood protection in areas with increasing and decreasing population. Population change can also result in uncertainties/risk if funding is population-based.
- Supplying water where it is needed from places with abundant supply. In terms of urbanization and bringing water to large urban centers, there is the additional challenge of wastewater.
- Downstream effects of Flood Risk Management (FRM).
- Water quality challenges. Impaired water bodies are identified in every major metro area within the SWD.
- Engineering with nature (EWN) solutions have limitations. More space required for nature-based solutions (NBS) than for hardened structure. Ongoing challenges of robustly characterizing these solutions with cost-benefit analysis.
- Lack of funding. More staffing is needed to write grant/loan applications.
- Lack of skilled workforce. More experienced engineers are required to implement projects.

Prompt: What resources (e.g., data, information, funding, authority) can be provided to affect change on this risk driver?

- Collaboration and coordination are needed across USACE and agencies/stakeholders to advocate for and discuss integrated water solutions with Congressional delegations.
- Collaboration with educational institutions to advance development of a skilled workforce to fill gaps and accelerate project implementation. This should encompass a range of skills including engineering, landscape architects, planners, and so forth. Incentives should also be provided to bring in and retain expertise.
- Leveraging legislation to fund projects in disadvantaged communities (expanding the Continuing Authorities Program [CAP] and the Planning Assistance to States [PAS] program), however there is often a disconnect between urban and rural areas for funding.
- Leveraging federal data (e.g., LiDAR data) for flood hazard and water use planning in disadvantaged/rural areas with limited resources. Potential to solve this with cost sharing.

Prompt: What are the biggest gaps in affecting change on this risk driver and how can those gaps be closed?

- Creation of a centralized data/information hub.
- Cross-agency collaboration to identify unified missions and reduce competition of interests. This will more effectively overcome challenges (e.g., zoning restrictions, local ordinances, development patterns).
- Promote complementary policies/processes to streamline the regulatory environment.
- Create flexibility in authority and policy to promote solutions, recognizing one solution does not solve the same problem across regions.
- Education and outreach on water usage and flooding (e.g., NWS "Turn Around Don't Drown®" campaign), including consistent messaging across metropolitan areas.
- Stronger partnerships and resource sharing.

Prompt: Identify key datasets, knowledge, points of contact, or other resources to affect change on this risk driver

- Key datasets: Trinity River Common Vision Program (corridor development certificate).
- Knowledge resources: Mechanisms to share water resource success stories, with particular attention to strategies employed to navigate regulatory processes; coordinated mechanisms to publicly share information; bringing business lines together for more focused conversations; maintaining a contact list (roster) from workshops and conferences.
- Points of contact: Brian Harper, Kathy Spillane, Matt Unruh (Kansas Water Office).
- Other resources: USACE data library (centralized location) and a publicly accessible website.

2.2.3 Risk Driver Breakout Discussion: A Changing Regional Landscape

Prompt: Identify key challenges related to this risk driver and IWRM over the next 15–20 years

- Understanding impacts of LULC change on water supply and use. Specifically, there is a need to understand how changes from grassland/prairie/pasture/distributed livestock to monoculture crops impact nutrient run-off and sedimentation of reservoirs and other water bodies. This is the same for understanding impacts of urbanization on increasing impervious surfaces.
- Lack of tools/data that could enable population change forecasts. Understanding directionality (population increases/decreases) is important for understanding land use shifts and better anticipating future water management opportunities and challenges.
- Lack of tools/data to identify landscape corridors suitable for development inhibits proactively planning for future water supply and directing water to where it needs to go. Challenges compounded when planning around potentially competing land use entities (business development, agriculture, and industry).
- Lack of strategic and efficient land use planning around existing water resources. Better planning may reduce the burden of provided water supply to locations without a natural water supply.
- Lack of communication. Communication (to the public, stakeholders, elected officials) is an important part of the solution. Must address how to handle perceptions of water availability and common understanding of water terms (i.e., what is an aquifer? What happens when it dries?).
- Lack of coordination in planning efforts around energy generation, specifically planning for infrastructure and land reclamation as industry comes in and leaves.
- Challenge of implementing well-informed projects when there is resistance from legislature to fund studies.
- Need to ground truth self-reported data to create more holistic and accurate pictures of water use across states.
- Discontinuity of knowledge sharing as the current workforce retires and new employees are brought on. This also includes other associated workforce challenges, particularly for smaller areas.

Prompt: What resources (e.g., data, information, funding, authority) can be provided to affect change on this risk driver?

- <u>Resources & Information:</u>
    - Maps: Floodplain mapping is being developed rapidly, especially for less-developed areas. Additional data (i.e., models) are also being developed. May require additional steps/metadata to promote usability. State LiDAR datasets under development and eventually will be available for public download. Suggestion to leverage ArcMAP and

ESRI services to centralize land cover data and explore possibility of using artificial intelligence to accelerate the process of data classification and consolidation. Coordination with universities for knowledge/data gathering/research can promote efficiency in project design.

  - Promote partnerships with EPA for water quality data collection and to pin-point key sampling locations. Can follow EPA standards for reporting to promote data translation across agencies.

- Authority:
  - In Kansas, the State water planning fund has funding authority. Division of water resources is regulatory.
  - In Texas, there is not much centralized authority (Water Development Board, Brazos River Authority, others).
  - In Oklahoma, the Oklahoma Water Resources Board serves as a water plan fund with some authority for where the money goes. Emphasis on partnership with USACE to foster cost-share or cross-agency work.
  - In Missouri, the Division of Water Resources conducts flood planning.

Prompt: What are the biggest gaps in affecting change on this risk driver and how can those gaps be closed?

- Education of public/decision-makers on water (key terms, processes, etc.) to enable them to ask more informed questions. Must collectively work to identify what components should be included in this education. The goal of this education campaign should be to promote tolerance around the constraints faced by USACE and other agencies of providing water. Make all products at 3rd-5th grade reading level to make this information easily understandable. Public understanding can promote more funding for projects.
- Incentives to work proactively, not reactively, which could be accomplished through funding.

Prompt: Identify key datasets, knowledge, points of contact, or other resources to affect change on this risk driver

- Overall, limited state authority exists to perform effective and efficient IWRM as it relates to LULC. More collaboration and cross-agency work is needed.

2.2.4 Risk Driver Breakout Discussion: Extreme Weather, Floods & Drought | Aging Infrastructure | Increasing Demand on Water Resources

Prompt: Identify key challenges related to this risk driver and IWRM over the next 15-20 years

- Lack of understanding related to the scope of water management problems for both present day as well as future water resource management.
- Uncertainty related to the pace and scope of climate change (specifically temperature and precipitation regime shifts) across the region.
- Funding to address aging infrastructure is lacking, specifically for dams and dam safety. However, practices related to infrastructure maintenance differ across states and differ across dam size. Hydropower infrastructure contends with different challenges, particularly if hydropower is discontinued in the future (aging infrastructure can lead to a flood risk management problem).
- Lack of centralized information regarding existing infrastructure. There is a recognized need for inventories (dam, service lines) as well as a place to share best practices.
- Reallocating water while maintaining a balance between the environment and people, now and into the future, while accounting for uncertainties related to drought/flooding.
- Supply and demand. Recognizing challenges in identifying how to move water from flood storage into water supply. Possibilities to consider while political appetite for new reservoirs is low: allocating supply from the top of the watershed down to the bottom; leveraging stormwater to offset potable water demands; and alternative flood storage measures.
- Identifying co-benefits of preserving water supply and other decisions about releases and operations (recreation, navigation, natural resources, etc.).

Prompt: What resources (e.g., data, information, funding, authority) can be provided to affect change on this risk driver?

- Federal funding for USACE reservoirs and water supply, with consistent operations and maintenance support year to year. Note, larger costs for major repair come from different allocations.

Prompt: What are the biggest gaps in affecting change on this risk driver and how can those gaps be closed?

- Weather forecasting (temperature, precipitation) and research is needed, however must be cognizant of data accuracy. This can be used to develop better tools for tradeoff analysis, especially to incorporate uncertainty.
- Knowledge needed to understand favorable and unfavorable conditions for dam operations (i.e., impact of wet vs. dry watersheds on dam performance).

- Need water demand forecasts that are *trusted* (by USACE and other partners), which could be improved by standardization. Collaboration necessary, possibly mediated by a neutral third party, to reach consensus on this issue and to build trust.
- Need for public education on water conservation practices.
- Need to reduce build time for infrastructure.
- Need for a consensus-based, regional strategy for major infrastructure rehabilitations across all business lines. This can leverage cost-sharing from state DOTs and other sources.
- Need better collaboration with navigation partners impacted by FRM to get investments in transportation infrastructure for waterborne commerce.

Prompt: Identify key datasets, knowledge, points of contact, or other resources to affect change on this risk driver

- Build on successful water conservation messaging campaigns (e.g., Texas).
- Best to avoid decision-making that weighs people against the environment as rulings typically favor the interests of the people.
- Encouragement to hold more workshops and for attendees to circulate to other workshops as well (e.g., Interstate Council on Water Policy).

2.2.5 Risk Driver Breakout Discussion: Uncertain Future of Energy

Prompt: Identify key challenges related to this risk driver and IWRM over the next 15-20 years

- Climate uncertainty (extreme weather, drought, freeze, etc.) and impacts to energy generation (e.g., hydropower).
- Balancing water demand from industry with other priorities, particularly during surges for water resources (e.g., natural gas extraction requires high water demand).
- Uncertain in ability to predict natural gas extraction rates and energy needs.
- The need to recognize indicators for industry transitions, including changes in political administration, to better prepare for shifting water demands. Importance of maintaining flexibility to adapt quickly potentially every four years.
- Not enough existing infrastructure to handle greater reliance on hydropower.

Prompt: What resources (e.g., data, information, funding, authority) can be provided to affect change on this risk driver?

- USACE and SWPA: Water storage and impacts need to be valued and appropriately incorporated into the analyses; investment in hydropower infrastructure (funding required).

- Industry does not have authority to allocate water supply from reservoirs.
- Public Service Commission may be a source for data related to water demand.

Prompt: What are the biggest gaps in affecting change on this risk driver and how can those gaps be closed?

- Electricity taken for granted and lack of incentive to pay higher costs, particularly for older generations.
- Lack of understanding drives resistance to change, particularly about reliability of alternative forms of energy.

Prompt: Identify key datasets, knowledge, points of contact, or other resources to affect change on this risk driver

- SWPA can provide data related to energy outage impacts. USACE tools – climate-impacted hydrology: https://www.usace.army.mil/corpsclimate/Public_Tools_Dev_by_USACE/Climate-Impacted_Hydrology/.

3.0 WORKSHOP CONCLUSIONS & SYNTHESIS

Work is ongoing by USACE towards the goal of "one door to the Corps," and this workshop facilitated the sharing of important challenges and opportunities realized across all five states in the SWD. Discussions affirmed the importance and relevance of the six risk drivers identified in the CWSP, with key similarities in concerns and opportunities (as well as relevant differences) identified across states.

3.1 KEY TAKE-HOME MESSAGES:

- Navigating variability in authority and governance at state and federal levels is an ongoing challenge to address collectively.
- Partnerships and collaboration enhance the success of strategic solutions and innovation through targeted projects and data collection activities. Such partnerships and data sharing solutions can lead to better accounting for all water uses (consumptive and non-consumptive) to strategically prepare for present and future uncertainty scenarios.
- A shift from a reactive to a proactive stance on water resource planning is critical. Plans that incorporate adaptive management to meet water use requirements across multiple users and stakeholders will be beneficial.
- Education efforts are needed to help communicate the importance of IWRM to the public and to key decisionmakers.

3.2 ACTION ITEMS:

- USACE SWD is working to compile a list of key organizations for members to participate in. This will continue fostering of collaboration (e.g., Interstate Water Policy Council, National Water Supply Alliance, Western States Water Council, etc.) after this workshop. Participants are asked to send a list of such organizations to the workshop organizers (Melanie Ellis, Melanie.J.Ellis@usace.army.mil). This list will be catalogued on the CWSP website.
- USACE SWD (Hunter Merritt, Institute of Water Resources, hunter.merritt@usace.army.mil) to work with Liv Haselbach (Lamar University, lhaselbach@lamar.edu) towards advancing collaboration with academia, and work with academic representatives to develop an outreach/education/communication framework related to IWRM, recognizing the importance of educating the public and key decisionmakers.
- USACE to advance work in disadvantaged communities, incentivized with flood planning funding. USACE headquarters is working to get money out to districts to implement projects in these communities. USACE SWD to continue collaboration with partners and stakeholders at the state and federal level to identify priority projects to be implemented through this funding mechanism.

- USACE SWD to identify how to accept non-federal funds from Non-Federal Sponsor (NFS) to accelerate project implementation. Becky Moyer (USACE SWD, rebecca.j.moyer@usace.army.mil) to circulate ARPA legal opinion.
- Working towards a central database of data, model repositories, and lessons learned. Workshop participants are asked to provide a list of any such databases they are aware of to begin identifying the right solution for IWRM. List of databases should be sent to Tom Jester (USACE SWD, thomas.s.jester@usace.army.mil).
- WRDA 2020 and the Expanding Continuing Authorities Program (CAP), Section 155. Maria Wegner (USACE SWD, maria.m.wegner@usace.army.mil), to circulate fact sheets to the USACE districts and Tom Jester (USACE SWD, thomas.s.jester@usace.army.mil) to send additional guidance.
- Recognizing the success of this workshop, USACE SWD to begin plans for the next meeting which may be focused on different business lines (e.g., water supply, navigation) with the full group meeting every other year.

4.0 REFERENCES

USACE. (2020, October 22). USACE Southwestern Division Civil Works Strategic Plan. Developed through a coordinated effort of the USACE Southwestern Division and the Fort Worth, Galveston, Little Rock, and Tulsa Districts. In conjunction with the ILSI/Arcadis Joint Venture and the Water Institute of the Gulf.

APPENDICES

APPENDIX A. WORKSHOP ATTENDEES

Table A-1. Summary of Workshop attendees.

Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
USACE Leadership and Elements			
Director, Civil Works	Alvin B. Lee	alvin.b.lee2@usace.army.mil	I
Engineer Research and Development Center (ERDC) - SWD Liaison Officer (LNO)	Dr. Edmund Russo	edmond.j.russo@usace.army.mil	V
Institute of Water Resources (IWR)	Hunter Merritt	hunter.merritt@usace.army.mil	I
Hydraulic Engineering Center (HEC)	Christopher Dunn	christopher.n.dunn@usace.army.mil	V
ERDC - SWD LNO	Patrick Deliman	patrick.n.deliman@usace.army.mil	V
ERDC - Operations Program Manager	Tim Raines	tim.a.raines@usace.army.mil	V
Regional Planning and Environmental Center (RPEC) Director, Civil Works	Brian Harper	brian.k.harper@usace.army.mil	I
ERDC - Forecast Informed Reservoir Operations (FIRO)	Cary Talbot	Cary.A.Talbot@usace.army.mil	
Academia			
Lamar University	Liv Haselbach	lhaselbach@lamar.edu	V
Non-Governmental Agencies			
Halff & Associates	Josh McClure	jmcclure@halff.com	V
	Stephanie Griffin	sgriffin@halff.com	V
Freese and Nichols	Anthony Risko	anthony.risko@freese.com	V
	Thomas Haster	th@freese.com	V
Stakeholders			
NRCS	Robert Gosnell	Robert.j.gosnell@usda.gov	V

Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
North Central Texas Council of Governments (NTCOG)	Edith Marvin, Director Environment and Development	EMarvin@nctcog.org	V
Brazos River Authority	Brad Brunett, Lower/Central Basin Regional Manager	brad.brunett@brazos.org	I
Trinity River Authority	Glenn Clingenpeel	ClingenpeelG@trinityra.org	V
Dallas Water Utilities	Dennis Qualls	denis.Qualls@dallascityhall.com	I
	Sarah Standifer	Sarah.Standifer@dallascityhall.com	V
North Texas Municipal Water District (NTMWD)	R.J. Muraski, Assistant Deputy Director CIP	rmuraski@ntmwd.com	I
	Galen Roberts, Technical Support Manager - Water	groberts@ntmwd.com	I
	Jerry Allen, R&D Manager	jallen@NTMWD.COM	I
Tarrant Regional Water District	Dan Buhman, General Manager	dan.buhman@trwd.com	I
	Rachel Ickert, Director of Water Resource Engineering	rachel.ickert@trwd.com	V
	Craig Ottman, Water Resources Engineer	craig.ottman@trwd.com	V
Northeast Texas Municipal Water District (NETMWD)	Walt Sears, General Manager	netmwd@aol.com; hogmang@aol.com	I
	George Otstott, President and Director	netmwd@aol.com; hogmang@aol.com	I
	Robert Speight	rspeightnetmwd@aol.com	V
Southwestern Power Administration (SWPA)	Ashley Corker, P.E. Director, Division of Water Resources and Rates	ashley.corker@swpa.gov	I
	Tyler Gipson, Civil Engineer	Tyler.Gipson@swpa.gov	V
	Michael Denny, Division of Resources and Rates	Michael.Denny@swpa.gov	I
Texas Department of Transportation (TXDOT)	Rose Marie Klee, H&H Section Director	RoseMarie.Klee@txdot.gov;	V
	Edra Brashear, Transportation Engineer	edra.brashear@txdot.gov	I

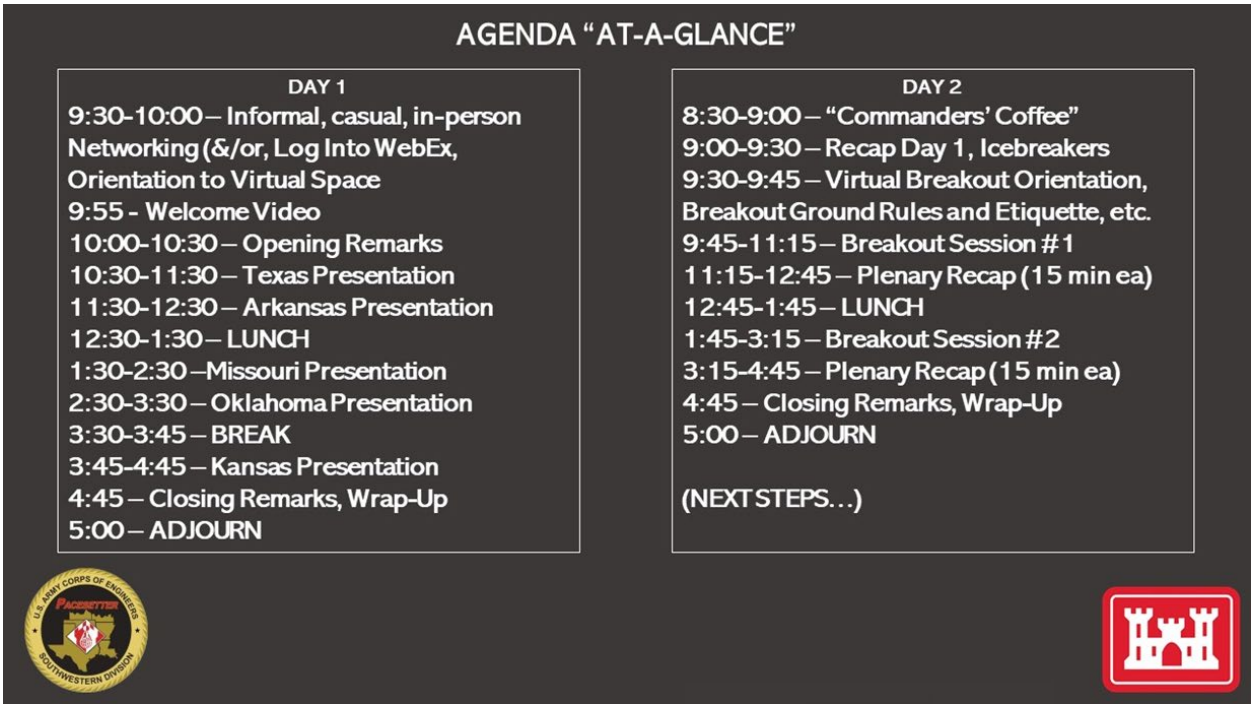
Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
	Zenia De Leon, Transportation Engineer II	zenia.deleon@txdot.gov	V
Texas General Land Office (GLO)	Jett Hays, Deputy Director for Integration-Community Recovery and Revitalization	Jet.Hays.GLO@recovery.texas.gov	V
Port of Catoosa	David Yarbrough, Director	david@tulsaport.com	V
Port of Houston	Garry McMahan, Director - Channel Operations	gmcmaha@porthouston.com	I
	Chris Gossett, Coordinator - Channel Operations	cgossett@porthouston.com	I
Port of Corpus Christi	Dan Koesema, P.E. Director of Channel & DMPA Development	Dan@pocca.com	I
Port of Freeport/Texas Ports Association	Phyllis Saathoff, Executive Director	saathoff@portfreeport.com	V
	Jason Hull, Director of Engineering	hull@portfreeport.com	V
Emerging/Gulf Ports Association	Pat Younger, Executive Director	gulfportsaa@aol.com	V
Northwest Arkansas Planning Commission (NWA)	Elizabeth Bowen, Project Manager/Regional Planner	ebowen@nwarpc.org	V
Arkansas Natural Resources Commissioners (ANRC)	Ryan Benefield, Deputy Director	ryan.benefield@arkansas.gov	I
Missouri DOT	Jennifer Hoggatt	jennifer.hoggatt@modot.mo.gov	I
Oklahoma Water Resource Board (OWRB)	Julie Cunningham, Executive Director	jmcunningham@owrb.ok.gov	V
	Owen Mills, Director	Owen.Mills@owrb.ok.gov	I
Kansas Water Office (KWO)	Connie Owen, Director	connie.owen@kwo.ks.gov	V
	Matt Unruh, Assistant Director	matt.unruh@kwo.ks.gov	I
	Richard Rockel, Water Resource Planner	Richard.Rockel@kwo.ks.gov	I
	Nathan Westrup, Manager, Public Water Supply Programs	Nathan.Westrup@kwo.ks.gov	V

Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
Port of Catoosa	David Yarbrough, Port Director	david@tulsaport.com	V
Port of Muskogee	Kimbra Scott, Port Director	kimbra@muskogeeport.com	V
Texas Water Development Board	Kathleen Jackson, Director	Kathleen.Jackson@twdb.texas.gov	I
	Nelun Fernando	nelun.fernando@twdb.texas.gov	V
	John Zhu, Hydrologist	john.zhu@twdb.texas.gov	V
Missouri Department of Natural Resources	Hannah Humphrey	hannah.humphrey@dnr.mo.gov	V
Lower Colorado River Authority (LCRA)	Ron Anderson	Ron.Anderson@LCRA.ORG	V
Beaver Watershed Alliance	Becky Roark, Executive Director	becky@beaverwatershedalliance.org	V
Presenters (Day 1)			
Texas	Kathleen Jackson	Kathleen.Jackson@twdb.texas.gov	I
Oklahoma	Owen Mills	Owen.Mills@owrb.ok.gov	I
Kansas Water Office (KWO)	Matt Unruh	matt.unruh@kwo.ks.gov	I
Missouri	Jennifer Hoggatt	jennifer.hoggatt@dnr.mo.gov	I
Arkansas	Ryan Benefield	Ryan.Benefield@agriculture.arkansas.gov	I
Facilitators			
The Water Institute	Allison DeJong	adejong@thewaterinstitute.org	V
	Abby Littman	alittman@thewaterinstitute.org	V
	Erin Kiskaddon	ekiskaddon@thewaterinstitute.org	V
	Ann Weaver	aweaver@thewaterinstitute.org	V
	Alli Haertling	ahaertling@thewaterinstitute.org	V
	Eva Windhoffer	ewindhoffer@thewaterinstitute.org	V
USACE SWD Participants			
USACE SWD	COL Kenneth Reed, SWD Commander	kenneth.n.reed@usace.army.mil	I
	Rex Ostrander, SWD Programs Directorate	rex.w.ostrander@usace.army.mil	I

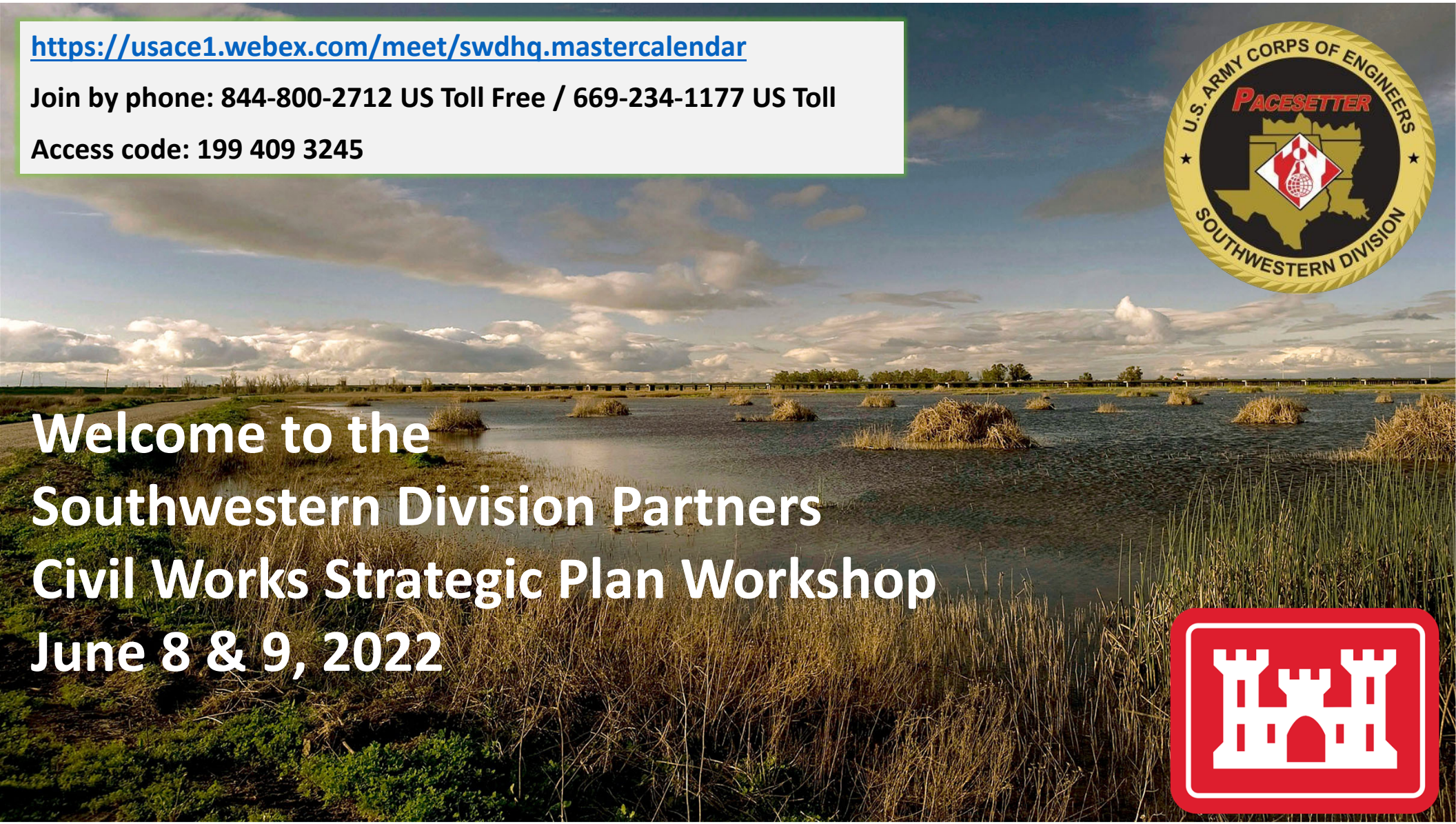
Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
	Becky Moyer, SWD Deputy Programs Director	rebecca.j.moyer@usace.army.mil	I
	Trish Anslow, SWD Chief, Planning Division	patricia.m.anslow.civ@army.mil	I
	Andrea Catanzaro, SWD RPEC	andrea.k.catanzaro@usace.army.mil	V
	Maria Wegner, SWD Interim Chief, Planning Division	maria.m.wegner@usace.army.mil	I
	Tom Jester, SWD Planning Division	thomas.s.jester@usace.army.mil	V
	Joyce McDonald, SWD Chief, Operations Division	Joyce.M.McDonald@usace.army.mil	I
	Michael Sterling, SWD Civil Engineer, Business Tech Division	michael.c.sterling@usace.army.mil	V
	Randy Roberts, SWD, Chief Real Estate	randy.l.roberts@usace.army.mil	V
	Kevin DaVee, SWD, RPEC	kevin.davee@usace.army.mil	V
	Jerry Cotter, SWF Chief, Water Resources	jerry.l.cotter@usace.army.mil	I
	Melanie Ellis, SWD Outreach Coordinator	Melanie.J.Ellis@usace.army.mil	I
	Kathy Spillane, SWF Chief, Civil Works	kathleen.m.spillane@usace.army.mil	V
	Eric Verwers, SWF DDPM	Eric.W.Verwers@usace.army.mil	I
	Matt Hays, SWF Chief of Staff	matthew.k.hays@usace.army.mil	I
	COL Jonathan Stover, SWF Commander	jonathan.s.stover@usace.army.mil	I
	Tom Gresback, SWF Intergovernment Affairs Officer	thomas.r.gresback@usace.army.mil	I
	COL Scott Preston, SWT Commander	scott.s.preston@usace.army.mil	I
	Lee Conley, SWT DDPM	johnl.l.conley@usace.army.mil	V
	Loretta Turner, SWT Chief, Civil Works	Loretta.J.Turner@usace.army.mil	I

Organization	Name, Position	Contact Email	Attended Virtually (V) or In-Person (I)
	Tony Clyde, SWT 408 Manager	tony.clyde@usace.army.mil	V
	COL Timothy Vail, SWG Commander	timothy.r.vail@usace.army.mil	V
	Byron Williams, SWG DDPM	Byron.D.Williams@usace.army.mil	I
	Jeff Pinsky, SWG Division Chief	jeffrey.f.pinsky@usace.army.mil	V
	COL Eric Noe, SWL Commander	eric.m.noe@usace.army.mil	I
	Craig Pierce, SWL DDPM	Craig.Pierce@usace.army.mil	I
	Dana Coburn, SWL	dana.o.coburn@usace.army.mil	V
	Amanda McGuire, RPEC	Amanda.McGuire@usace.army.mil	I
Congressional			
Oklahoma	Congressman Markwayne Mullin (OK-2)	brooke.starr@mail.house.gov	V
	Congresswoman Stephanie Bice (OK-5) (represented by Mitchell McDonald)	graham.mcdonald@mail.house.gov	V
Texas	Congressman Michael McCaul (TX-30)	carrie.coxen@mail.house.gov	V
	Congressman Ronny Jackson (TX-13)	jeff.billman@mail.house.gov	V
	Congressman Troy Nehls (TX-22)	mary.davis@mail.house.gov	V
	Congresswoman Eddie Bernice Johnson (TX-30)	murat.gokcigdem@mail.house.gov	V
	Congressman John Kevin (Jake) Elizey Sr. (represented by Julie Loose and Bob Carretta)	bob.carretta@mail.house.gov; Julie.Loose@mail.house.gov	V

APPENDIX B. WORKSHOP AGENDA



APPENDIX C. WORKSHOP PRESENTATIONS



https://usace1.webex.com/meet/swdhq.mastercalendar

Join by phone: 844-800-2712 US Toll Free / 669-234-1177 US Toll

Access code: 199 409 3245

Welcome to the Southwestern Division Partners Civil Works Strategic Plan Workshop June 8 & 9, 2022

AGENDA "AT-A-GLANCE"

DAY 1

9:30-10:00 – Informal, casual, in-person Networking (&/or, Log Into WebEx, Orientation to Virtual Space
9:55 - Welcome Video
10:00-10:30 – Opening Remarks
10:30-11:30 – Texas Presentation
11:30-12:30 – Arkansas Presentation
12:30-1:30 – LUNCH
1:30-2:30 –Missouri Presentation
2:30-3:30 – Oklahoma Presentation
3:30-3:45 – BREAK
3:45-4:45 – Kansas Presentation
4:45 – Closing Remarks, Wrap-Up
5:00 – ADJOURN

DAY 2

8:30-9:00 – "Commanders' Coffee"
9:00-9:30 – Recap Day 1, Icebreakers
9:30-9:45 – Virtual Breakout Orientation, Breakout Ground Rules and Etiquette, etc.
9:45-11:15 – Breakout Session #1
11:15-12:45 – Plenary Recap (15 min ea)
12:45-1:45 – LUNCH
1:45-3:15 – Breakout Session #2
3:15-4:45 – Plenary Recap (15 min ea)
4:45 – Closing Remarks, Wrap-Up
5:00 – ADJOURN

(NEXT STEPS…)

Day 1 – Wednesday, June 8, 2022
10:00-10:30am

Opening Remarks

Southwestern Division (SWD) Civil Works Strategic Plan (CWSP)

- **What is the CWSP Strategic Plan? Why have this Workshop?**

The U.S. Army Corps of Engineers (USACE) and the state partners in the Southwestern Division (SWD) footprint have collaboratively developed this two-day, hybrid forum to promote robust discussion on the CWSP, and ideas on implementing elements of the plan in the immediate, near-term, and more distant future.

Day 1 – Wednesday, June 8, 2022
10:30-11:30am

Texas Presentation

Kathleen Jackson, Director
Texas Water Development Board

Water for Texas

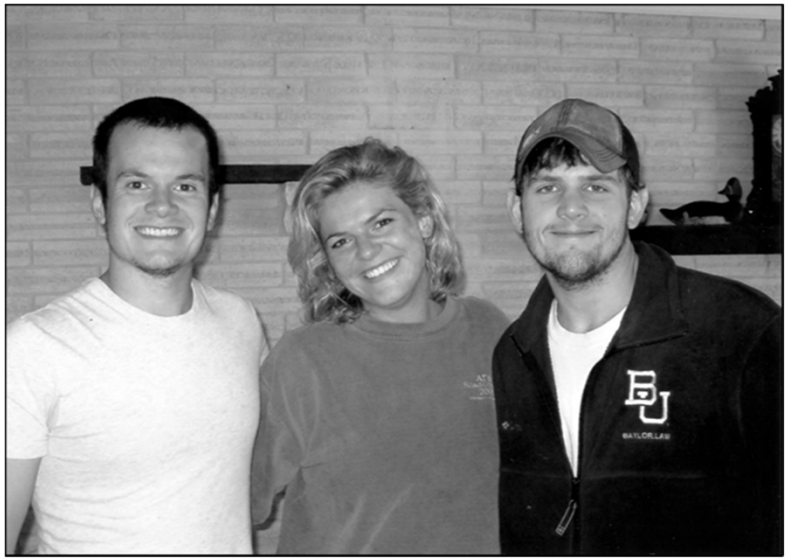
Water for the Future

Kathleen Jackson, P.E.
U.S. Army Corps of Engineers
Southwestern Division Civil Works Strategic Plan Workshop
June 8, 2022

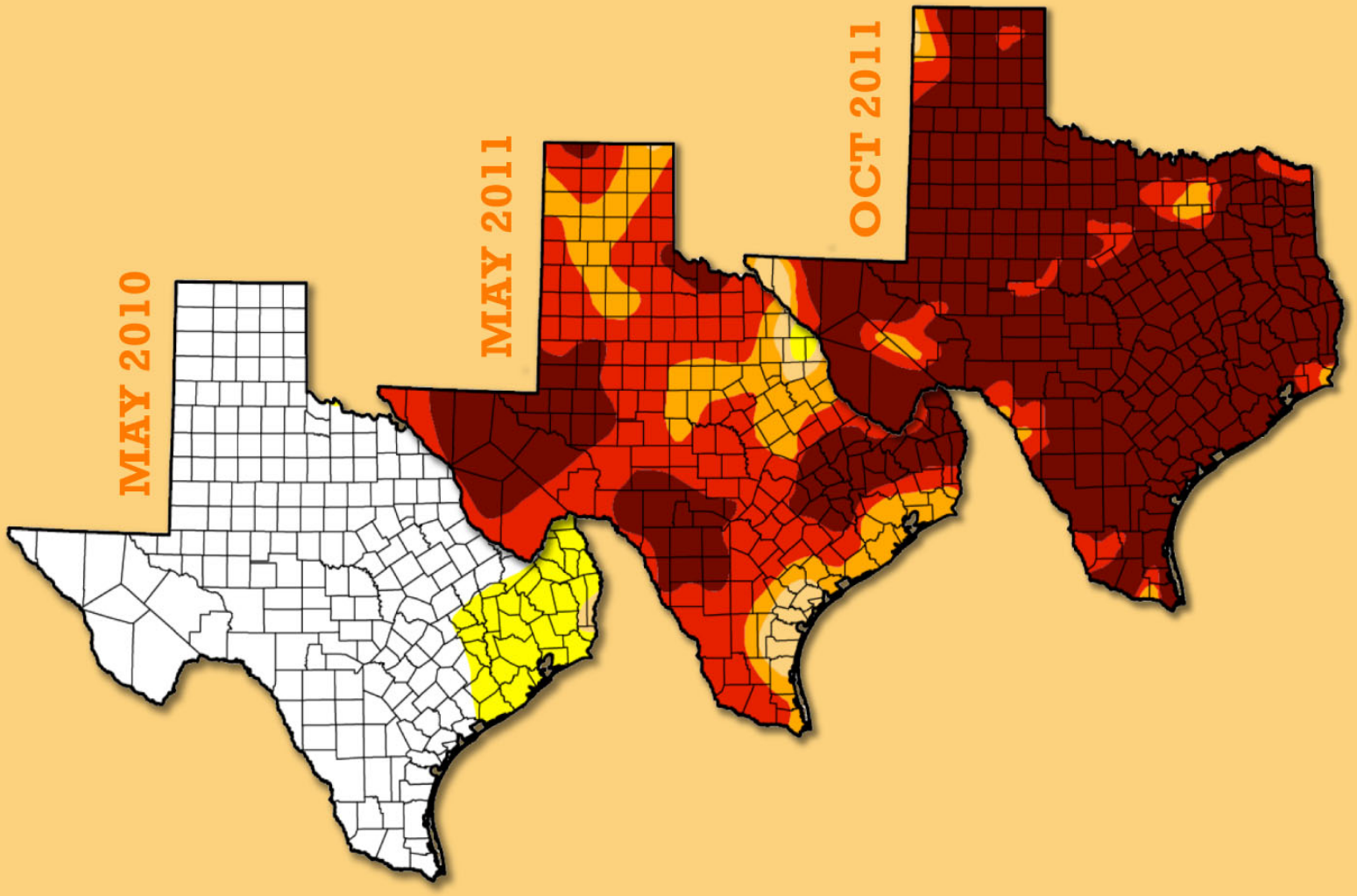
Texas Water Development Board

TEXAS WATER DEVELOPMENT BOARD

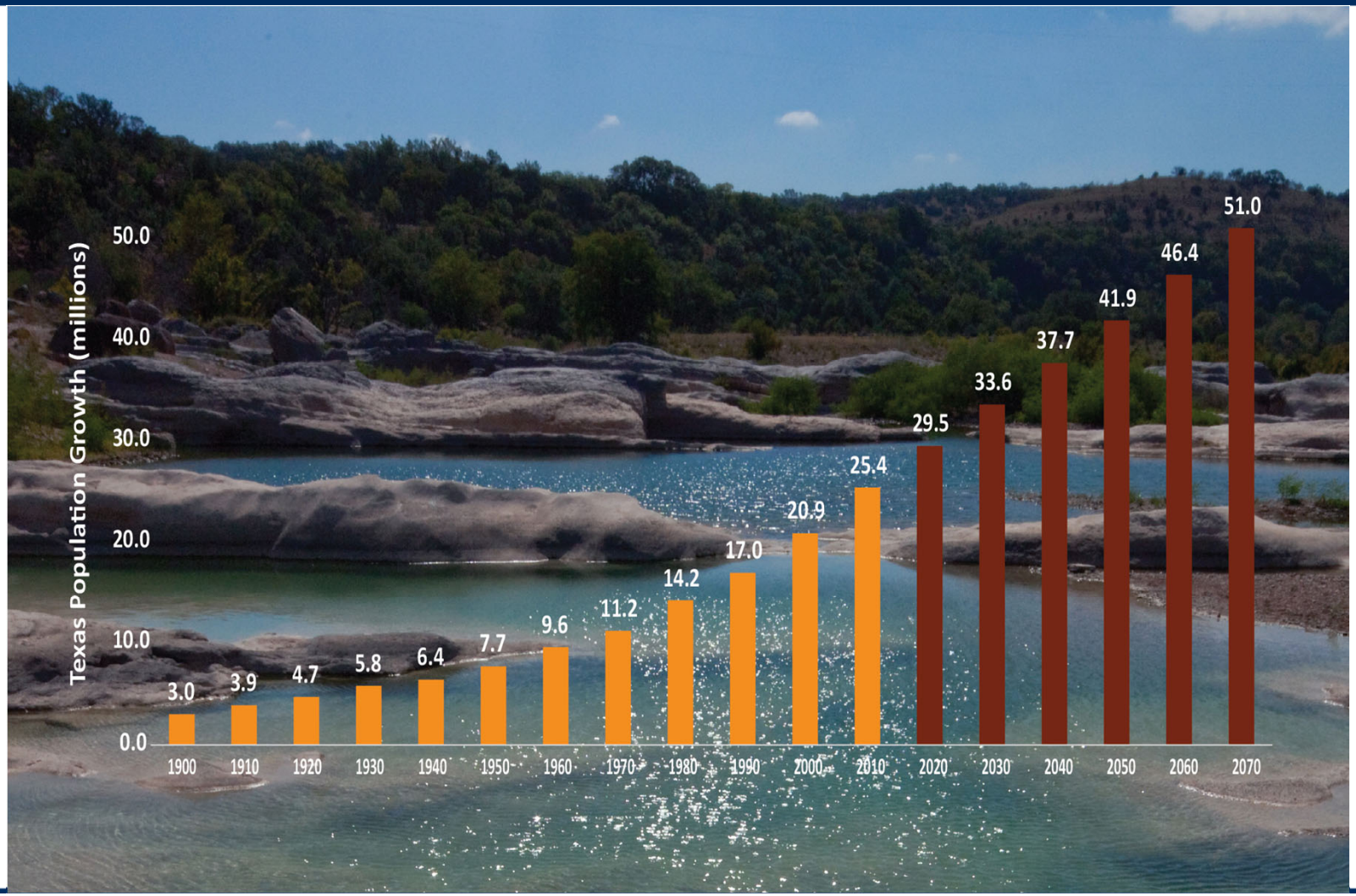
Lead the State's Efforts in Ensuring a Secure Water Future for Texas and its Citizens



DROUGHT IN TEXAS



HISTORIC AND PROJECTED TEXAS POPULATION GROWTH



HOW CAN WE PROMOTE RESILIENCY?

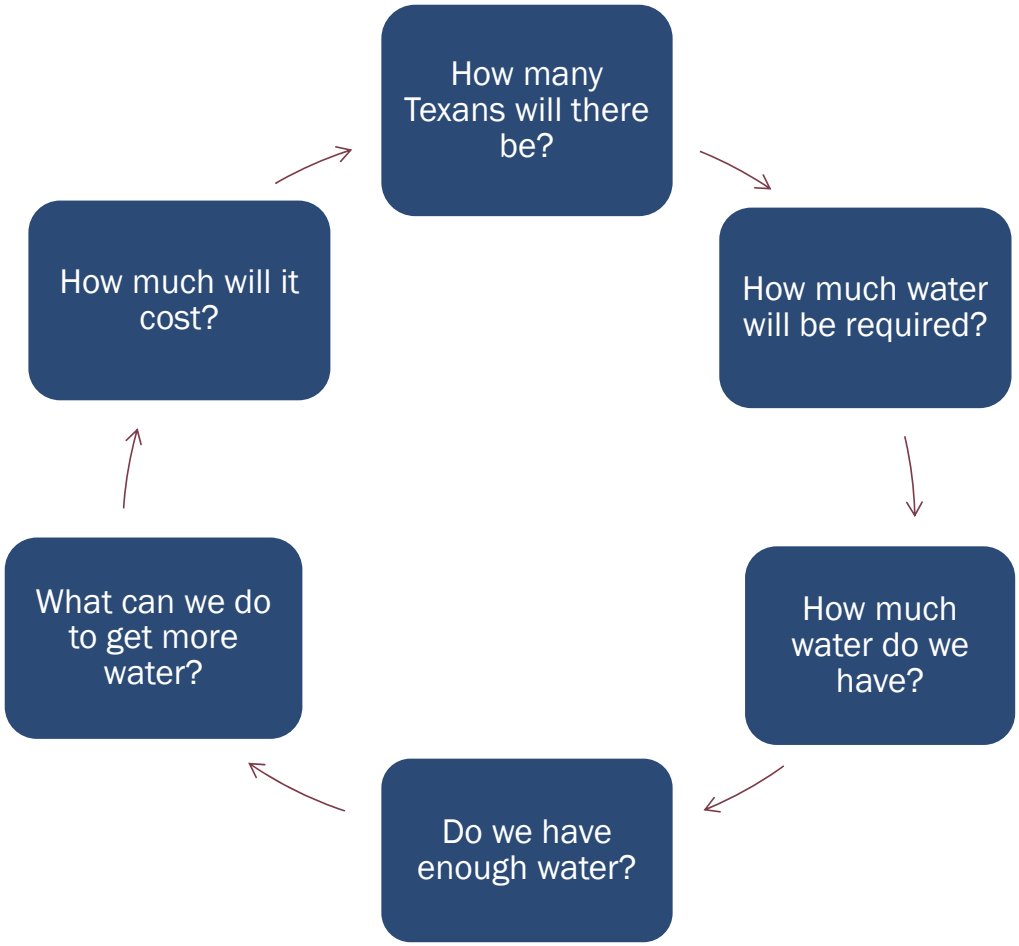
- **Conservation**
- **Reuse**
- **Brackish Groundwater Desal**
- **Seawater Desal**
- **Aquifer Storage and Recovery**
- **Aquifers**
- **Reservoirs**

REGIONAL WATER PLANNING GROUPS

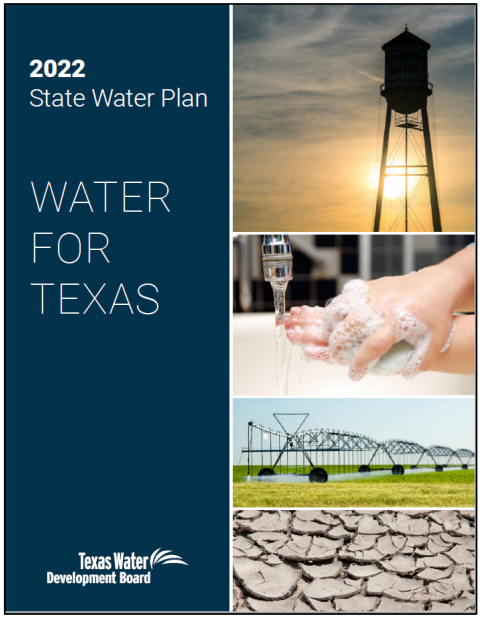
Region C

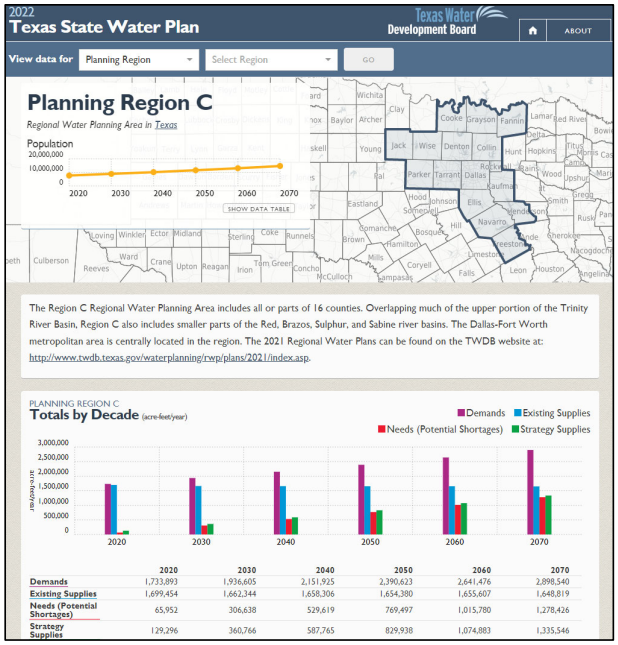
- Local Political Subdivision serves as administrator
- Public, consensus-driven
- Local/regional decision-making process

REGIONAL WATER PLANNING



INTERACTIVE 2022 STATE WATER PLAN





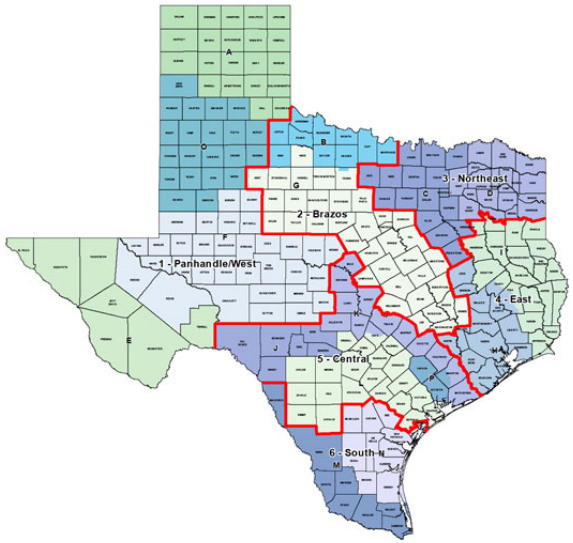
- Texas' population is projected to increase 73%
- Water demand is projected to increase 9%
- Existing water supplies are expected to decline 18%
- Potential water shortages during a drought of record: 6.9M ac-ft

https://2022.texasstatewaterplan.org/statewide

REGIONAL WATER PROJECT DEVELOPMENT

Regional Project Teams

- Manager
- Financial Analyst
- Engineer
- Attorney
- Project Reviewer

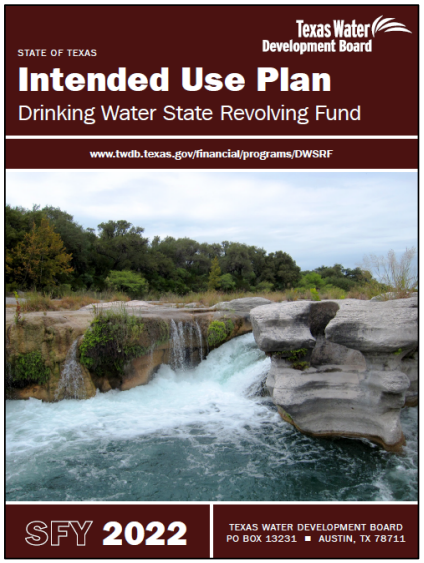


FINANCIAL ASSISTANCE PROGRAMS

- State Programs
  - SWIFT
  - FIF
  - Development Fund
  - EDAP
  - Agriculture Program

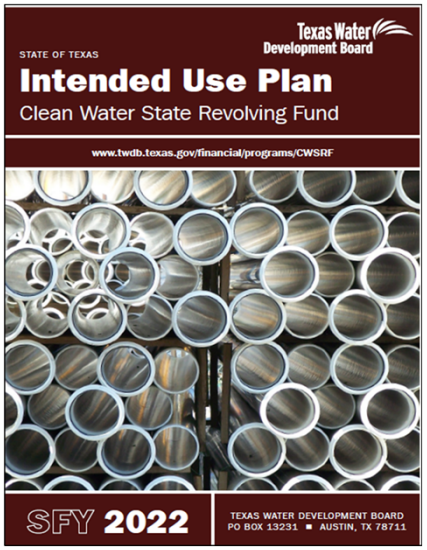
- Federal Programs
  - Clean Water State Revolving Fund
  - Drinking Water State Revolving Fund

TEXAS DRINKING WATER SRF PROGRAM CAPACITY



Funding Option	Allocation
Disadvantaged Community – as Principal Forgiveness	$16,000,000
Disadvantaged Community – for Small / Rural only – as Principal Forgiveness	$2,000,000
Subsidized Green (incl. Water Conservation) – as Principal Forgiveness	$2,000,000
Very Small Systems – as Principal Forgiveness	$2,000,000
Very Small Systems – "Securing Safe Water Initiative – as Principal Forgiveness	$1,000,000
Emergency Preparedness - for Severe Weather – as Principal Forgiveness	$3,000,000
Urgent Need – "Securing Safe Water" Initiative / Contaminants (Lead, Radionuclides, Arsenic) – as Principal Forgiveness	$2,000,000
Urgent Need – Other than Contaminants (Disasters, etc.) – as Principal Forgiveness	$2,000,000
Bonds/Loans	$120,000,000
Total	**$150,000,000**

TEXAS CLEAN WATER SRF PROGRAM CAPACITY



Funding Option	Allocation
Disadvantaged Community – as Principal Forgiveness	$17,000,000
Disadvantaged Community – Small / Rural only – as Principal Forgiveness	$2,000,000
Subsidized Green (incl. Reuse/Water Conservation) – as Principal Forgiveness	$4,600,000
Emergency Preparedness - for Severe Weather – as Principal Forgiveness	$3,000,000
Urgent Need – as Principal Forgiveness	$2,000,000
Bonds/Loans	$221,400,000
Total	**$250,000,000**

ECONOMICALLY DISTRESSED AREAS PROGRAM

Abridged Application Period Closed on May 13

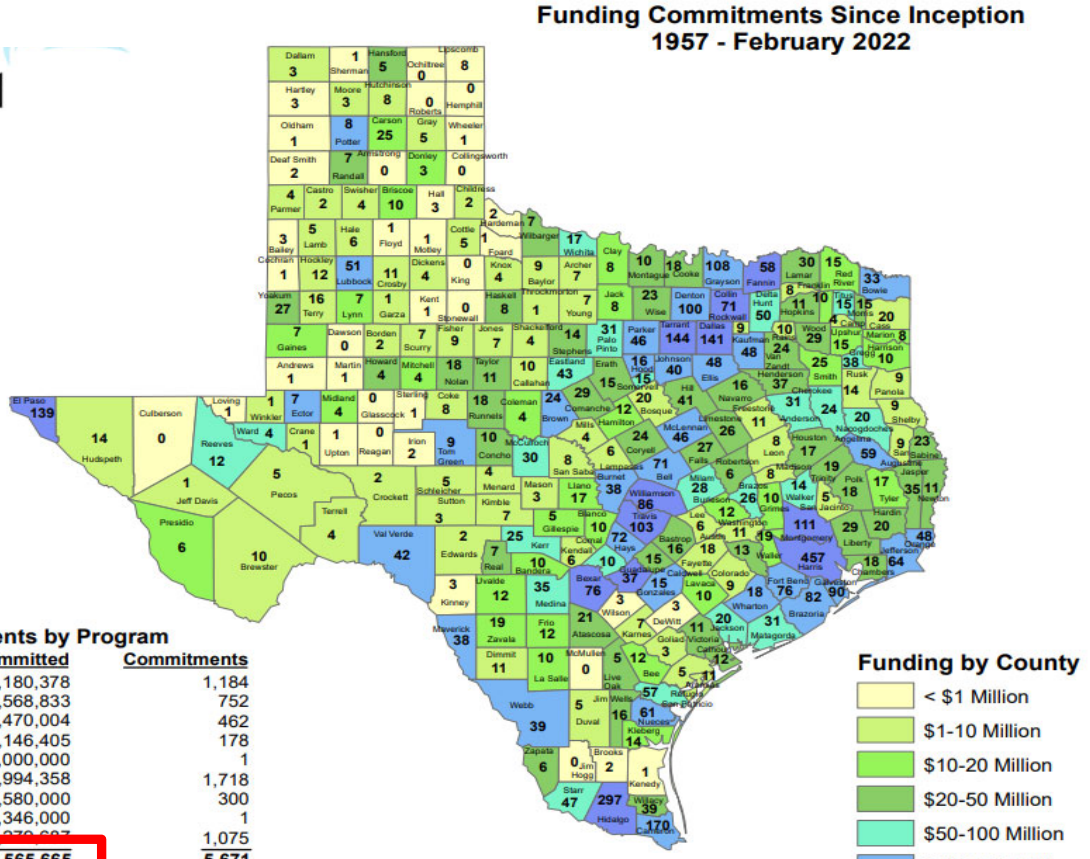
Montana Vista area
First-Time Wastewater Service
El Paso Utilities Public Service Board
On behalf of the City of El Paso

City of Brady
Water System Improvements
New treatment plant, water transmission lines,
elevated and ground storage facilities

http://www.twdb.texas.gov/financial/programs/EDAP/index.asp

COMMUNITIES TURNING PLANNING INTO PROJECTS!

Development Board



Funding and Commitments by Program

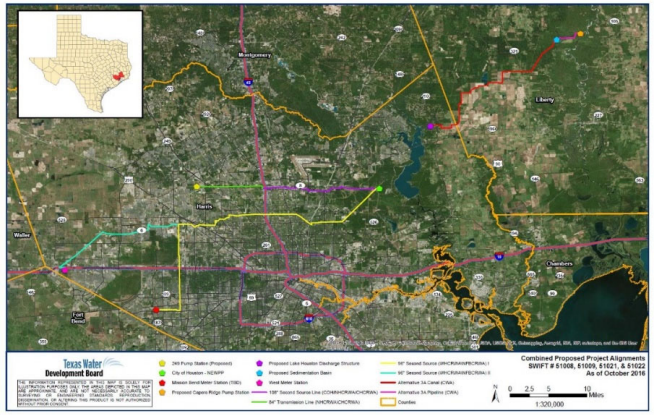
Program	Amount Committed	Commitments
CWSRF	$11,086,180,378	1,184
DWSRF	3,588,568,833	752
EDAP	912,470,004	462
FIF	396,146,405	178
FLOOD	30,000,000	1
STATE	5,373,994,358	1,718
SWIFT	9,252,580,000	300
WIIN	3,346,000	1
Historical Federal Program	[illegible]	1,075
Total	**$32,522,565,665**	**5,671**

Notes: The Amount Committed and the number of Commitments represent the total amount and number of initial commitments made since the Agency's inception. These amounts have not been reduced for any projects that did not close on the TWDB's financial assistance. The Historical Federal Program referenced was the Construction Grant Program, a federal grant program created to fund wastewater projects prior to the CWSRF.

TWDB SWIFT FUNDED PROJECTS

Tarrant Regional Water District & City of Dallas Water Utility
Integrated Pipeline Project
SWIFT = $440 million

North Texas Municipal Water District
Bois d'Arc Lake Project
SWIFT = $1.5 billion



Houston Area Regional Partnership
Luce Bayou Project
SWIFT = $4.75 billion

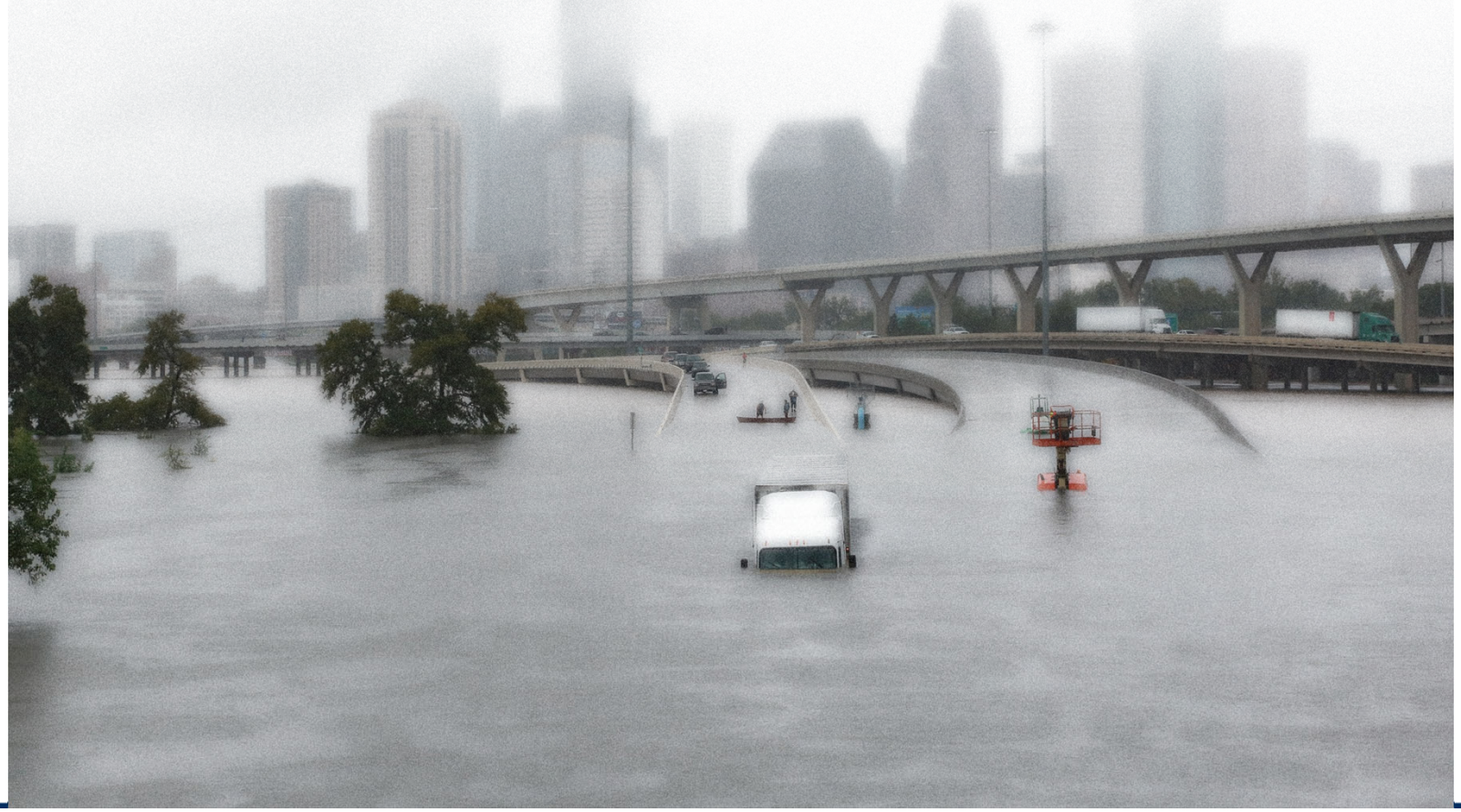
CHALLENGES AND OPPORTUNITIES

Water Planning

Flood Planning

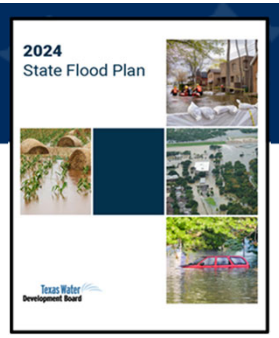
BE CHAMPIONS FOR REGIONAL COLLABORATION!

- "Future-proofing" Texas
- Neighbors upstream and downstream promoting resiliency



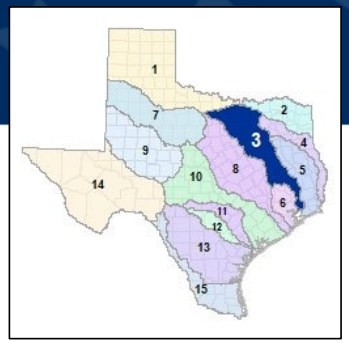
15 REGIONAL FLOOD PLANNING GROUPS

REGIONAL FLOOD PLANNING



- First-of-its-kind statewide flood plan
- Watershed-based planning regions
- Bottom-up approach to flood planning
- Transparent process with public input
- Volunteer members representing interest categories

REGION 3 – TRINITY REGIONAL FLOOD PLANNING GROUP

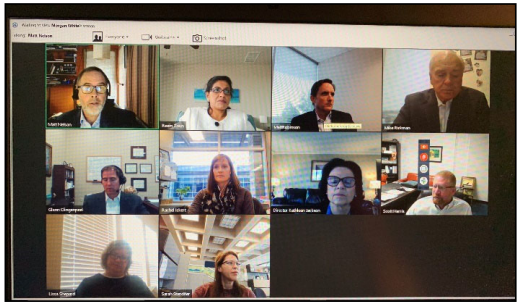


Voting Members

Name	Interest Represented
Chad Ballard	Small business
Sano Blocker	Electric generating utilities
Melissa Bookhout	Agricultural interests
Glenn Clingenpeel	River authorities
Scott Harris	Water utilities
Rachel Ickert	Flood districts
Andrew Isbell	Public
Jordan Macha	Environmental interests
Galen Roberts	Water districts
Matt Robinson	Industries
Lissa Shepard	Counties
Sarah Standifer	Municipalities

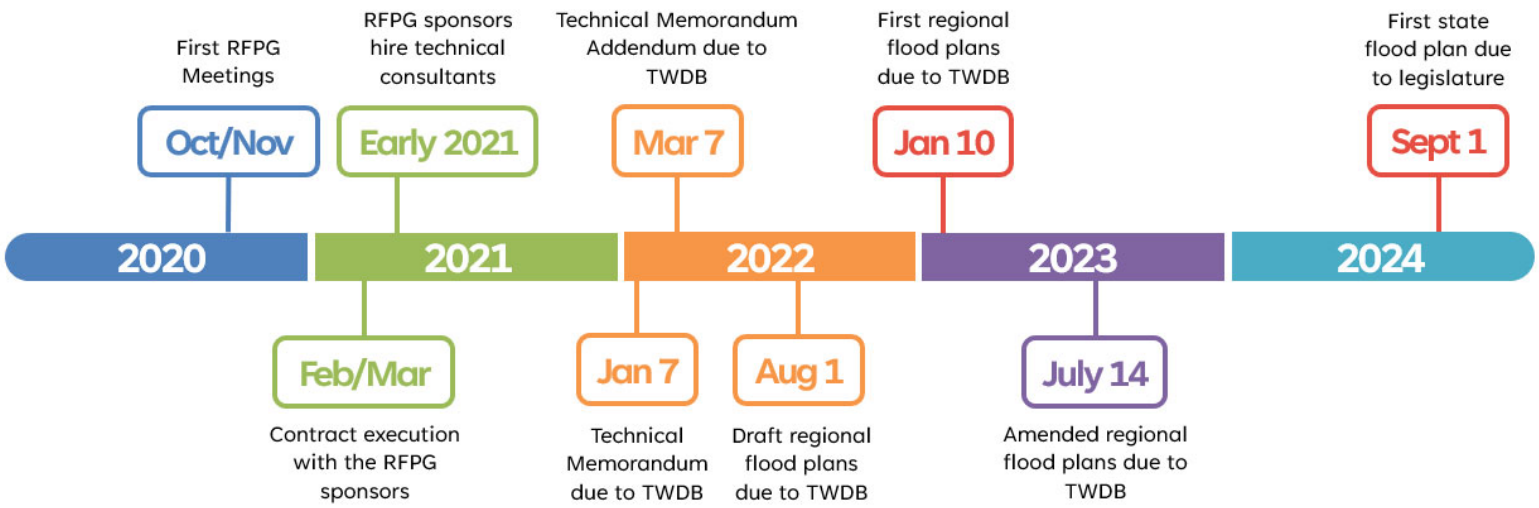
Non-Voting Members

Name	Organization
Richard Bagans	Texas Water Development Board
Rob Barthen	Texas Department of Agriculture
Steve Bednarz	Texas State Soil and Water Conservation Board
Justin Bower	Houston-Galveston Area Council
Ellen Buchanan	Neches Flood Planning Group (liaison)
Todd Burrer	Region 6 San Jacinto Flood Planning Group (liaison)
Jerry Cotter	US Army Corps of Engineers, Fort Worth Rep.
Bert Galvan	Texas Commission on Environmental Quality
Diane Howe	Federal Emergency Management Agency
Lonnie Hunt	Deep East Texas Council of Governments
Edith Marvin	North Central Texas Council of Governments
Lisa McCracken	US Army Corps of Engineers, Galveston Rep.
Kris Robles	General Land Office
Andrea Sanders	Texas Division of Emergency Management
Greg Waller	National Weather Service / West Gulf River Forecast Center
Adam Whisenant	Texas Parks and Wildlife Department

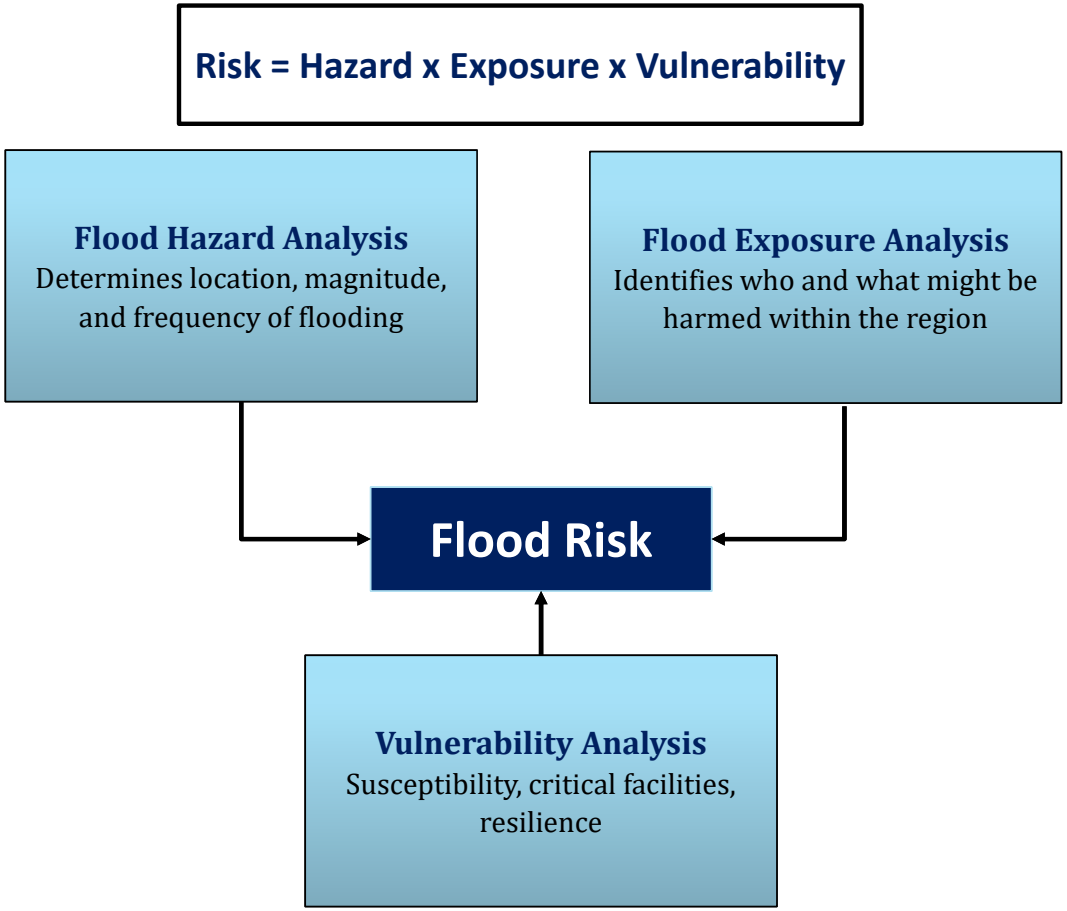


Planning Group Sponsor Contact: Trinity River Authority
Planning Group Chair: Glenn Clingenpeel, Trinity River Authority
RFPG Meetings: https://www.twdb.texas.gov/flood/planning/regions/schedule.asp

REGIONAL FLOOD PLANNING GROUP TIMELINE

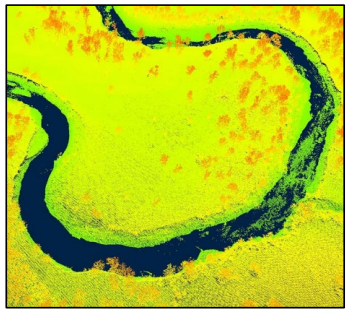


REGIONAL FLOOD PLAN COMPONENTS

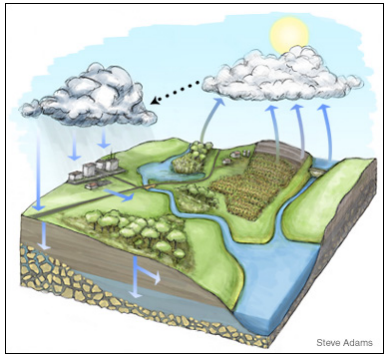


Identify specific flood risk, existing & future condition flood risk analyses

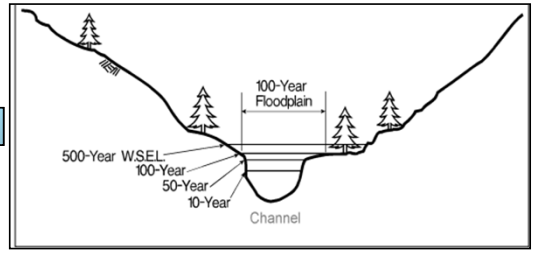
THE BETTER THE DATA, THE BETTER THE SCIENCE…
THE BETTER THE SCIENCE, THE BETTER THE POLICY!



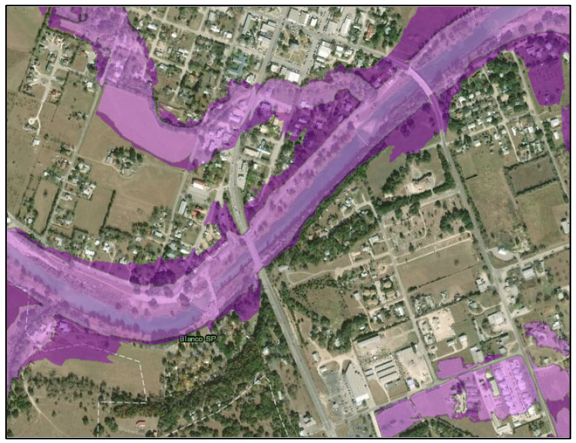
LiDAR



Hydrology



Hydraulics

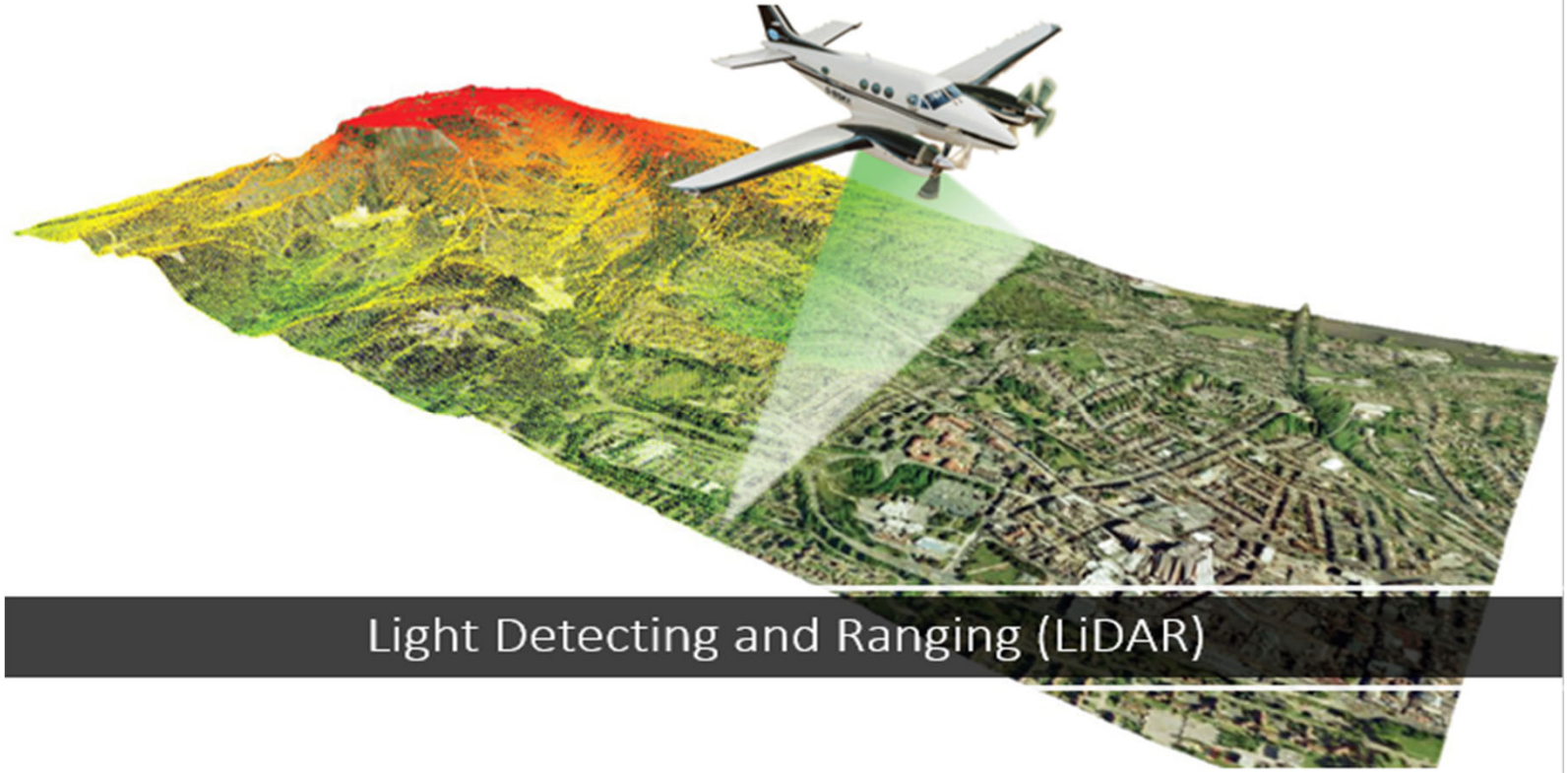


FLOOD MAP

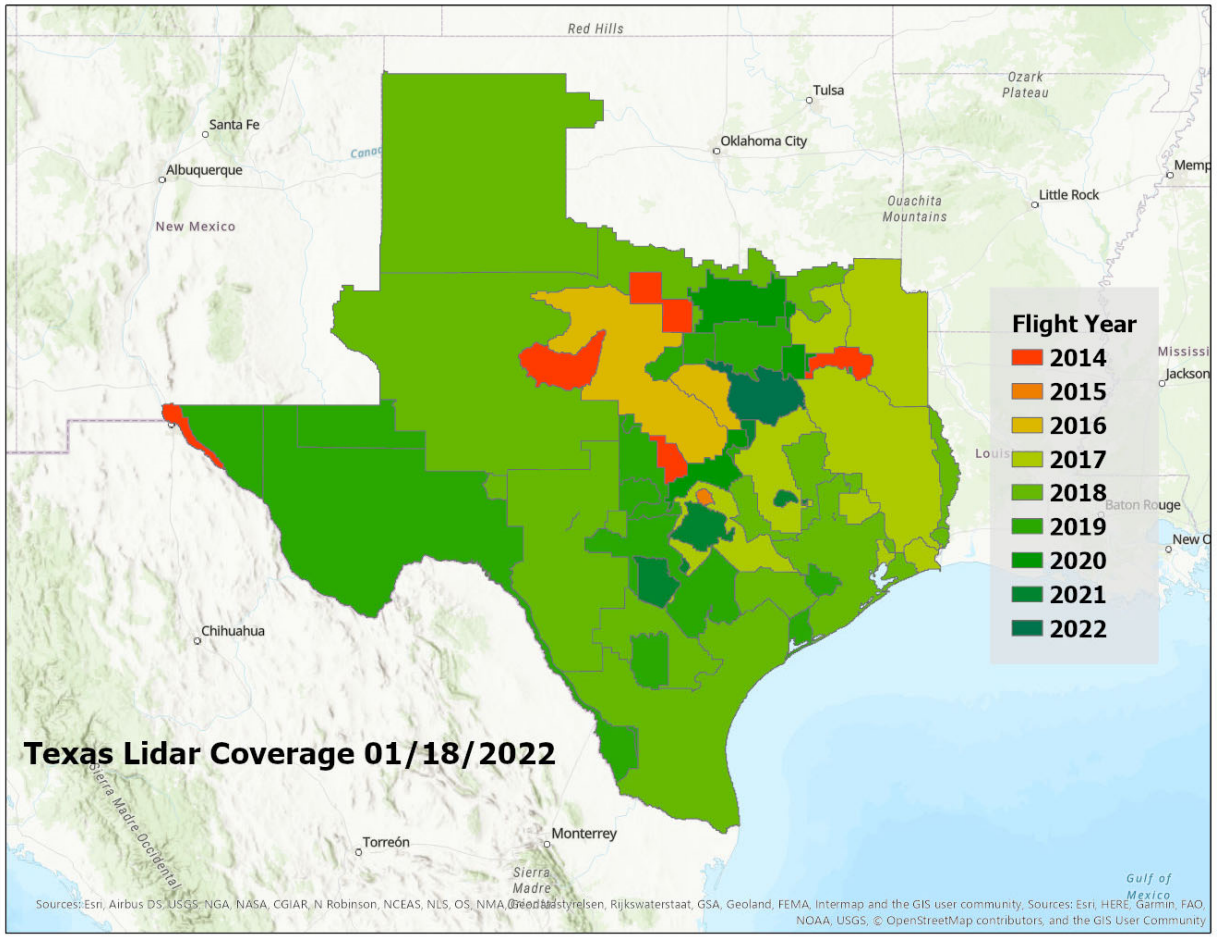
Base Level Engineering as Supporting Data for Planning

DATA DRIVES SCIENCE BASED APPROACH!

Texas Natural Resources Information System (TNRIS)

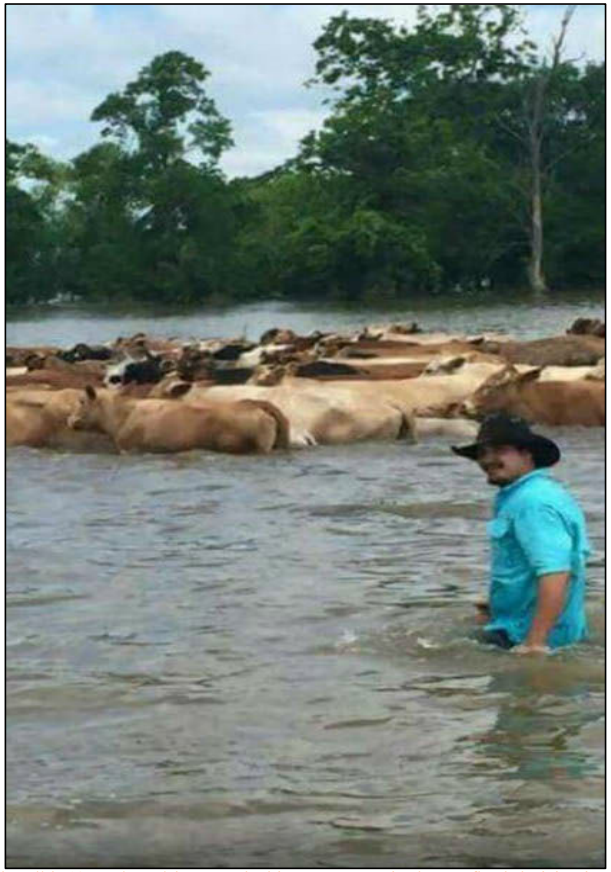


STATEWIDE LIDAR COVERAGE IS COMPLETE!



https://data.tnris.org/

TWDB TNRIS ASSISTANCE DURING EXTREME FLOODING



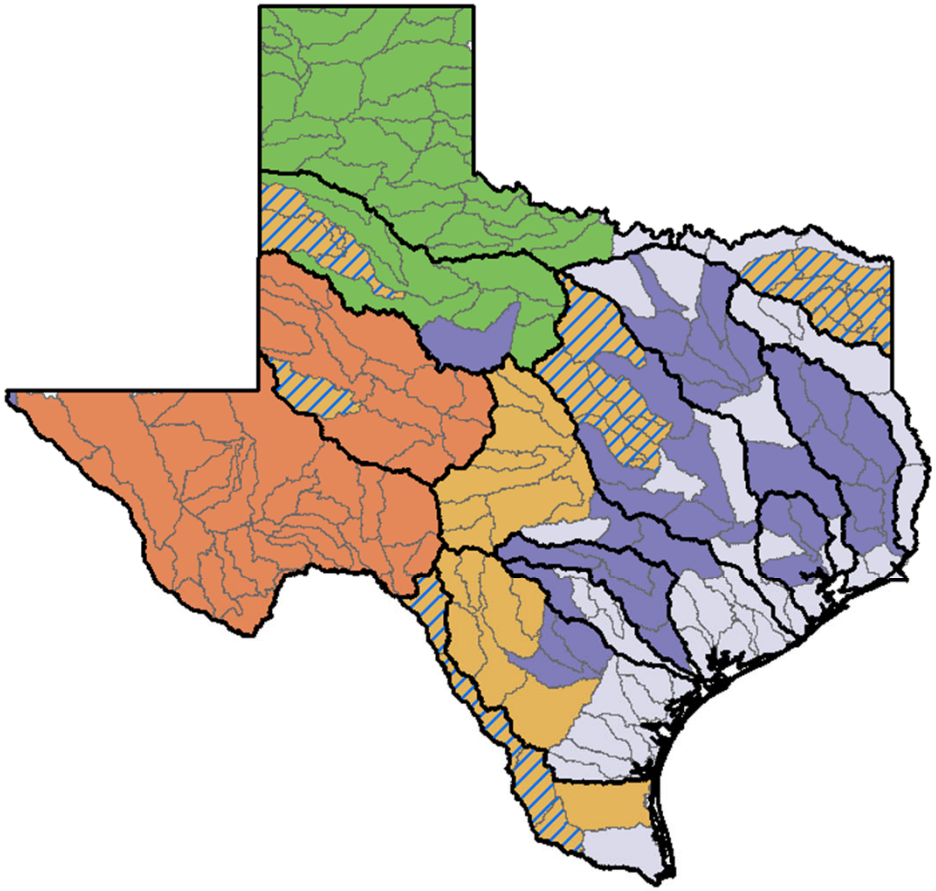
Source: http://abc13.com/news/photos-cattle-drive-to-rescue-animals-near-flooded-trinity-river/758283/#gallery-2

Source: http://www.chron.com/news/houston-texas/houston/article/Hundreds-of-cattle-stranded-in-flood-driven-6298224.php#photo-8078587

Texas Natural Resource Information System (TNRIS) helped plot the route using Geographic Information System (GIS) data to analyze the surrounding terrain, enabling a rancher to move cattle to higher ground.

Dayton, Texas

BASE LEVEL ENGINEERING (BLE) STATUS



Completed

In Progress

Next Steps

FY 2022*

FY 2023*

FY 2024*

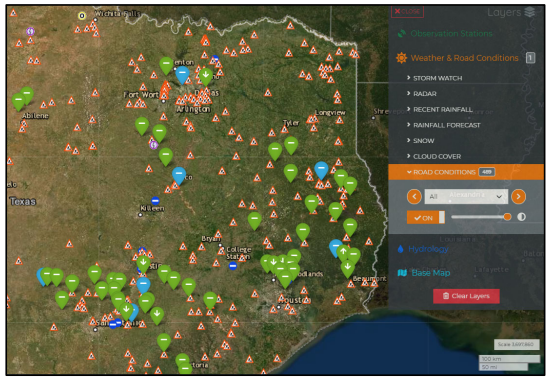
Project Assignments

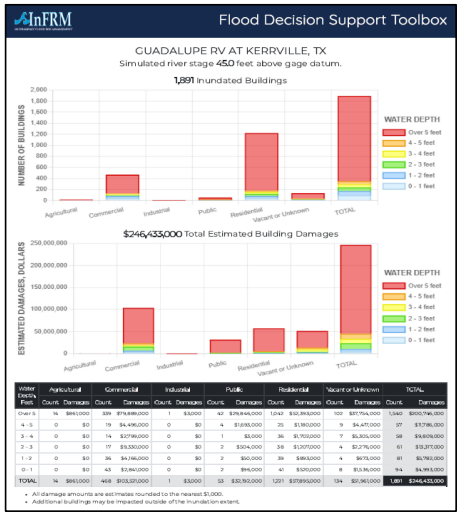
Contracted beginning February 2021

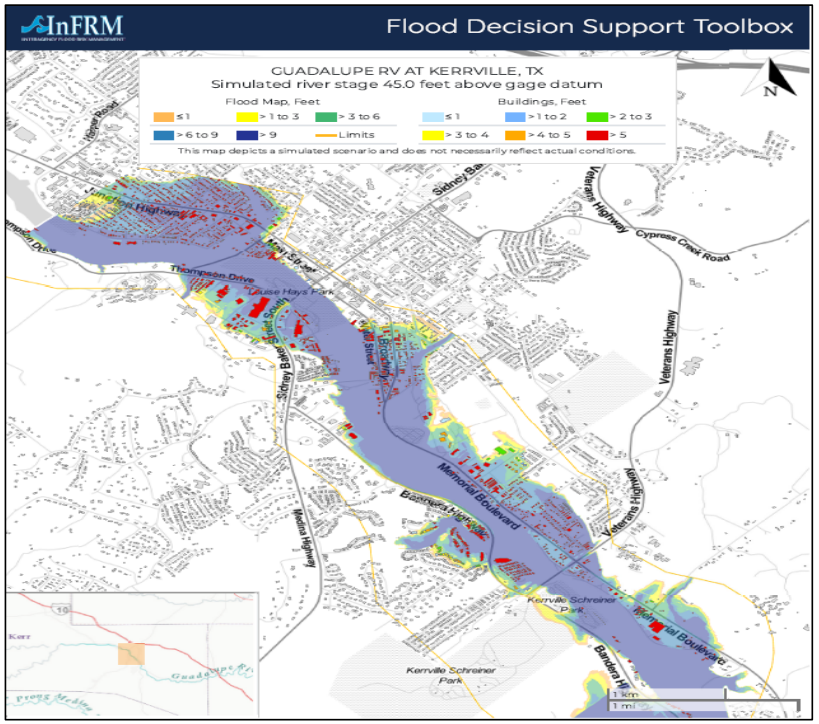
*Estimated fiscal year completion dates

Estimated Base Flood Elevation Viewer
https://webapps.usgs.gov/infrm/estBFE/

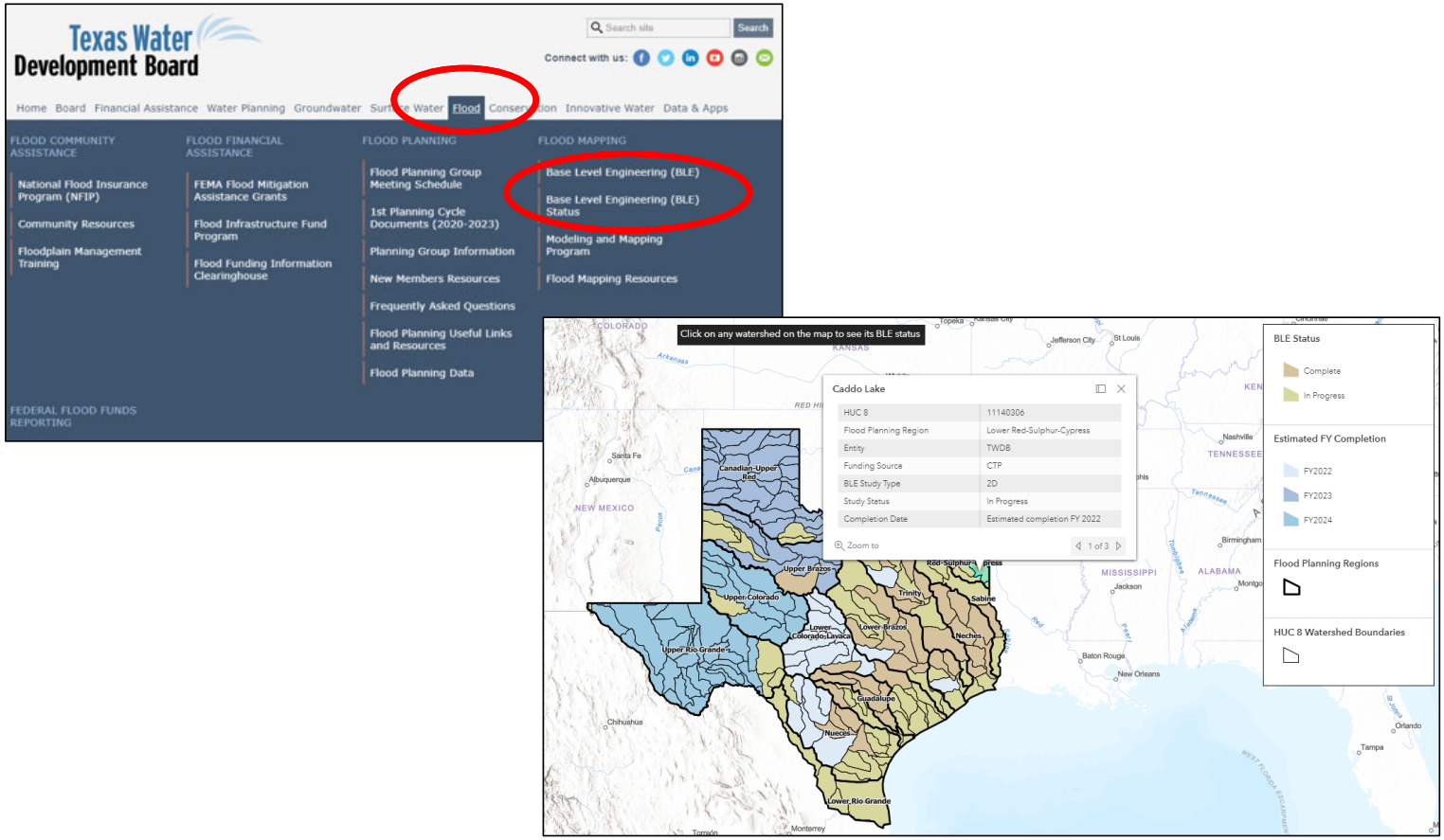
FLOOD DECISION SUPPORT TOOLBOX





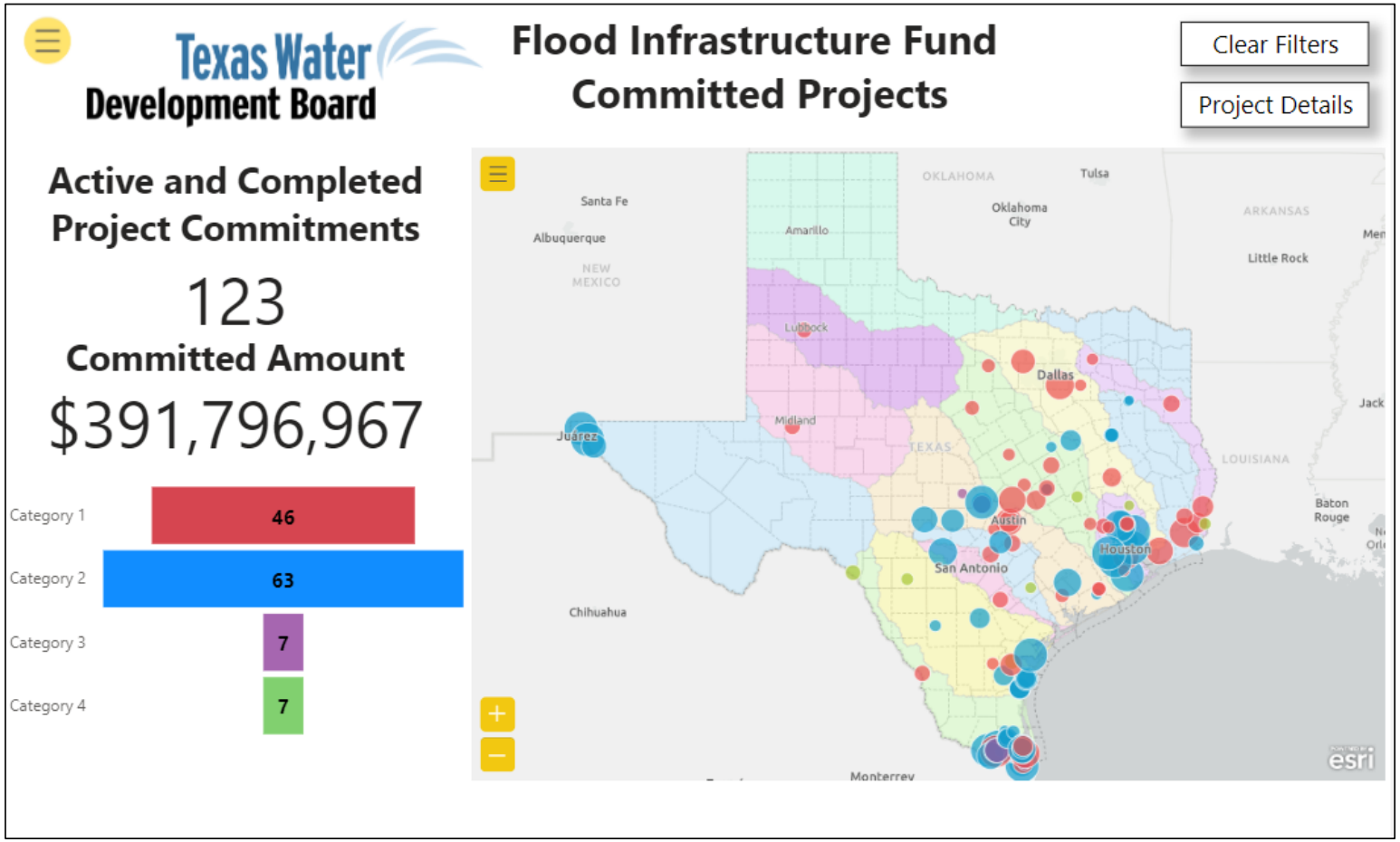


TWDB FLOOD MAPPING WEBPAGES



www.twdb.texas.gov

FLOOD INFRASTRUCTURE FUND (FIF) PROJECT REPORTING DASHBOARD

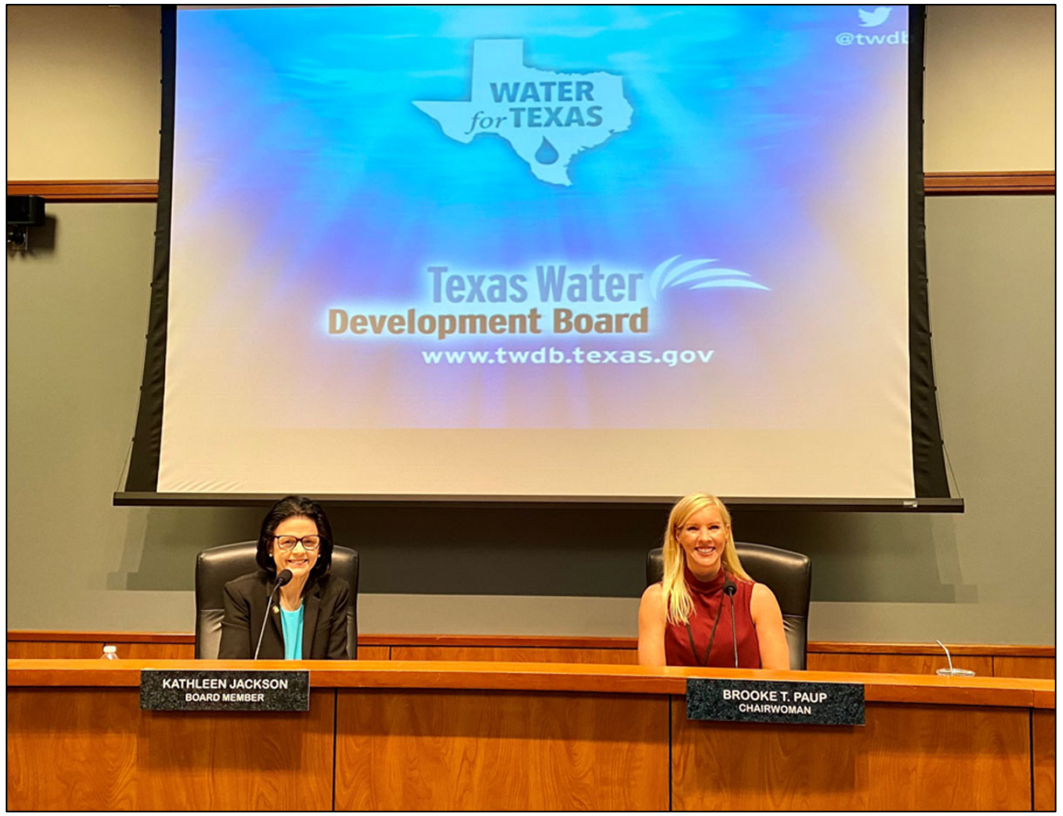


https://www.twdb.texas.gov/financial/programs/fif/dashboard.asp

BUILDING A STRONGER TEXAS

Thank You for your Continued Partnership!

HOW TO CONTACT ME



Kathleen Jackson, P.E.
@twdb_kathleen
512.463.7847
Kathleen.Jackson@twdb.texas.gov

Day 1 – Wednesday, June 8, 2022
11:30am-12:30pm

Arkansas Presentation

Ryan Benefield, Deputy Director and Chief Engineer
Arkansas Department of Agriculture
Natural Resources Division

NATURAL RESOURCES
DIVISION

ARKANSAS STATE WATER PLAN

SWD CIVIL WORKS STRATEGIC PLAN WORKSOP

JUNE 8, 2022 Ryan Benefield, P.E

MISSION

- To efficiently and responsibly manage and protect our water and land resources for the sustainability, health, safety and economic benefit of the State of Arkansas.

VISION

- To manage the State's natural resources in a sustainable manner by applying appropriate policies and best management practices (BMPs) with limited regulation and preservation of private property rights.

Natural Resources Division

Natural Resources Division Programs

- Arkansas Water Plan
- Water and Wastewater Loan and Grant Programs(5)
- Dam Safety
- Floodplain Management
- Groundwater Protection and Management Program
- Nonpoint Source Pollution Management
- Non-Riparian Water Use Permitting
- Arkansas Nutrient Reduction Strategy – Hypoxia Task Force
- Arkansas State Climatologist
- Tax Credits – Riparian and Water Use

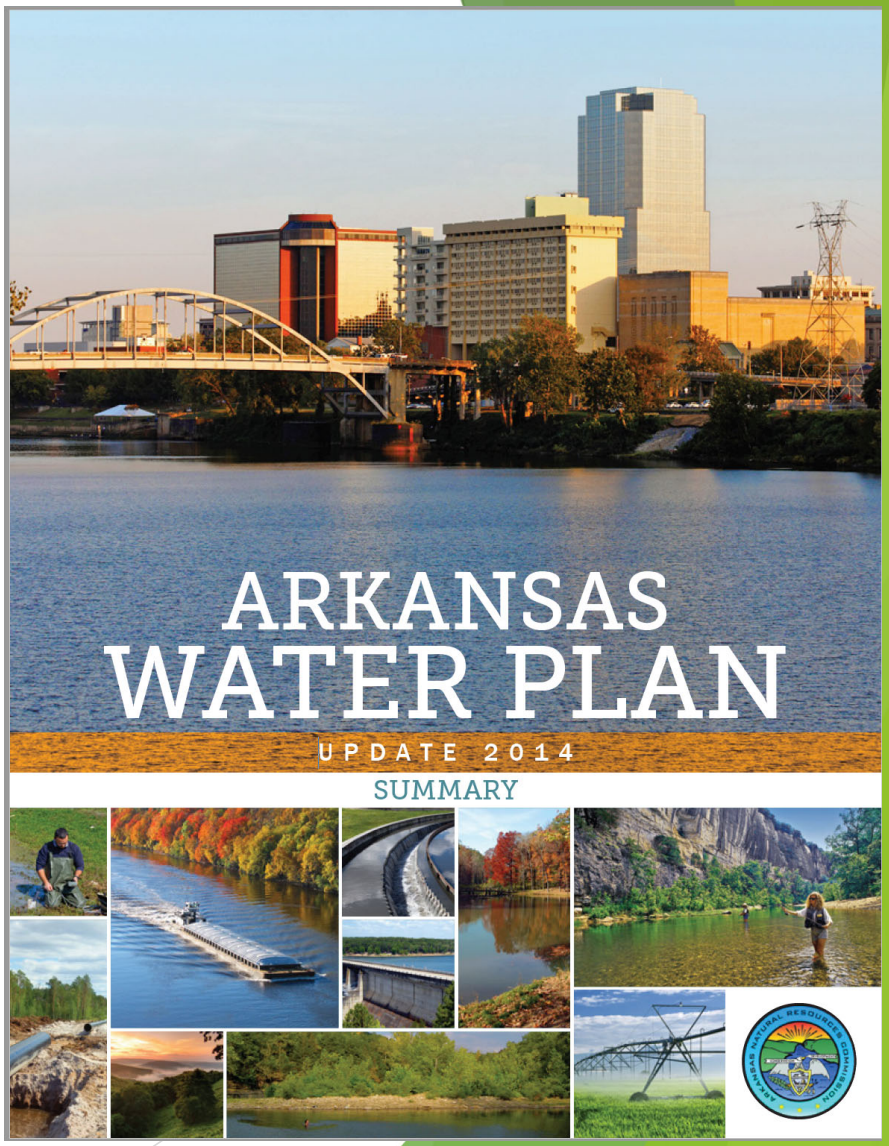
ARKANSAS WATER PLAN UPDATE (2014)

STATUS OF RECOMMENDATIONS

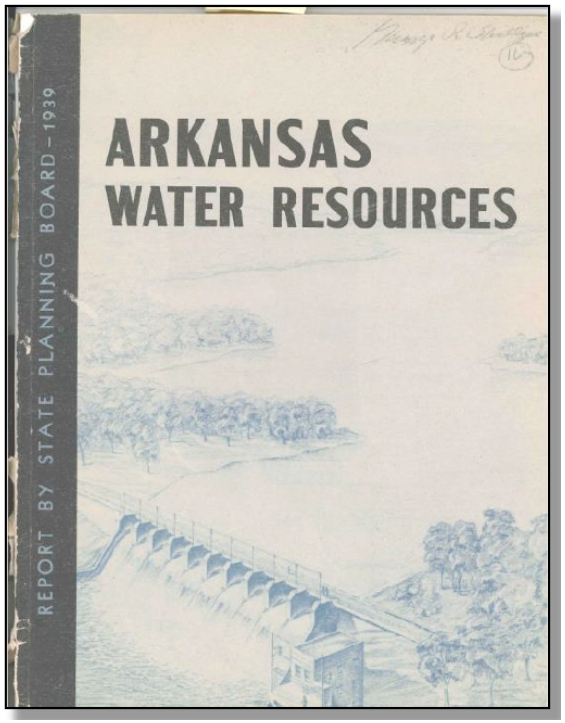
CURRENT PRIORITIES

2014 Water Plan Update

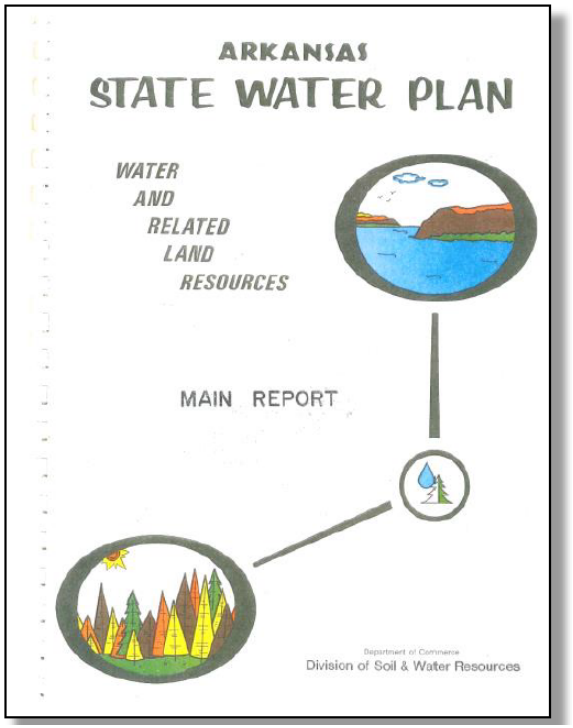
- What is the Arkansas Water Plan
  - "A comprehensive program for the orderly development and management of the state's water and related land resources"
    Arkansas Code § 15-22-503(a)
- Why did we do a comprehensive Water Plan Update
  - To assess quantity and quality of water in Arkansas
  - To be ready for growth, declines, and new challenges
- Structure
  - Background
  - Demands
  - Issues
  - Recommendations



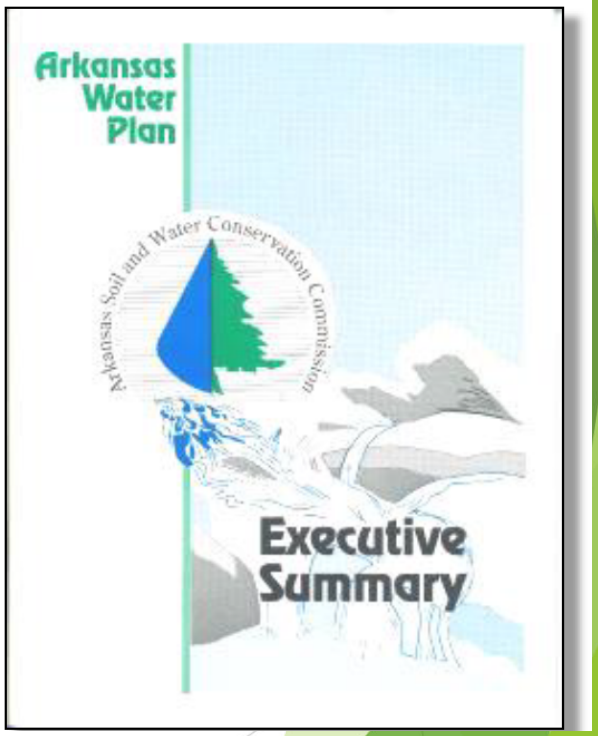
Arkansas Water Planning – 1930s to Present



1939



1975



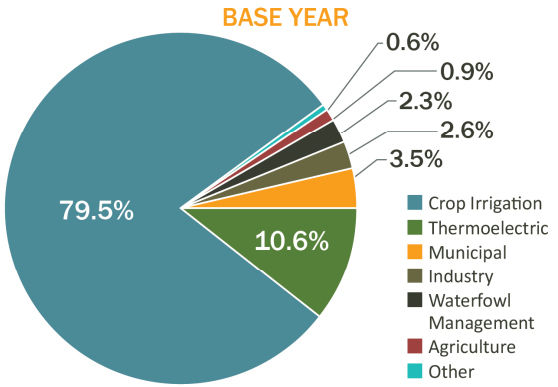
1990

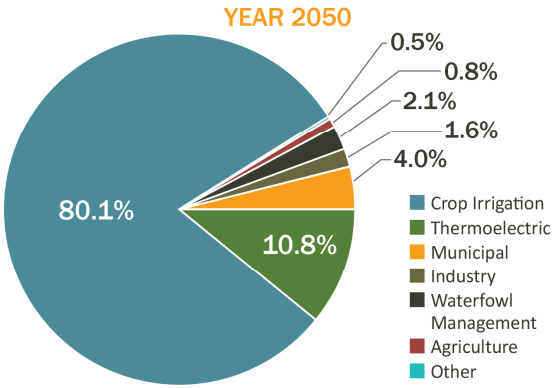
2014 State Water Plan Process

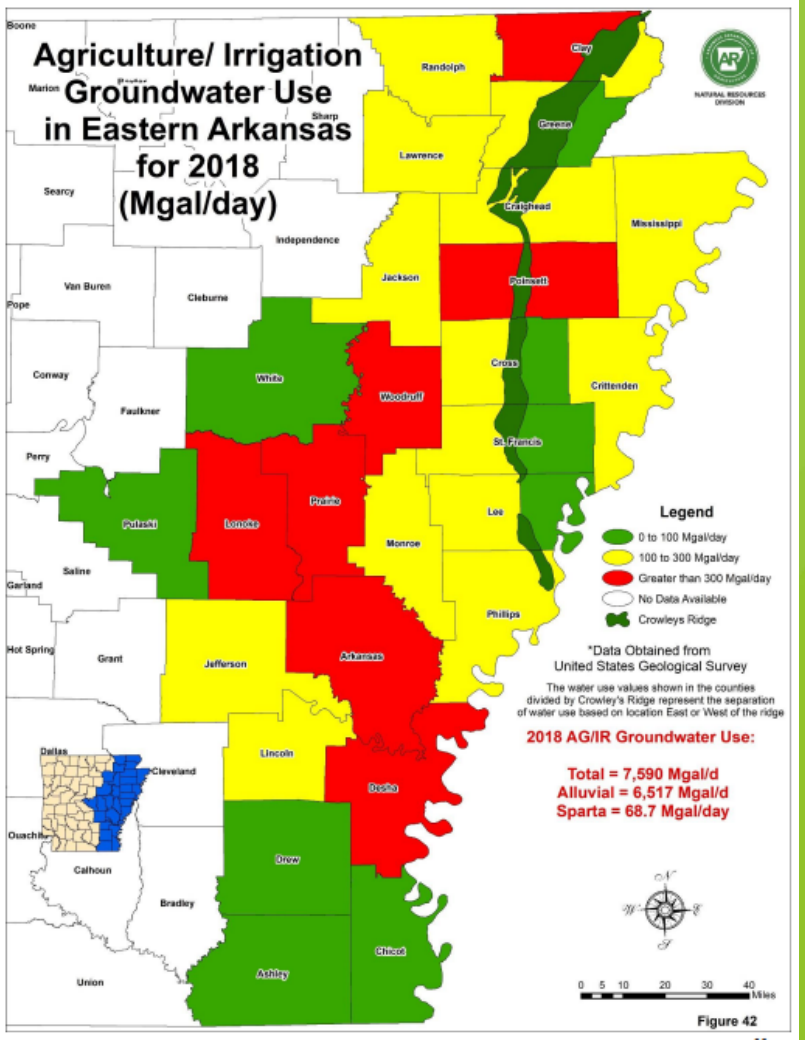
- Public Participation
  - Extensive Public and Agency Participation
  - Volunteer Workgroups Beginning to End
  - Approx. 250 Meetings and Presentations
  - Recommendations Placed in Rule in 2015
- Development Process
  - **Demand** – how much needed, where, and when?
  - **Supply** – how much available, where, and when?
  - **Gaps** – the difference between demand and supply
  - **Issues and Recommendations** – challenges and solutions
- Planning out to Year 2050

Arkansas Demand Projections

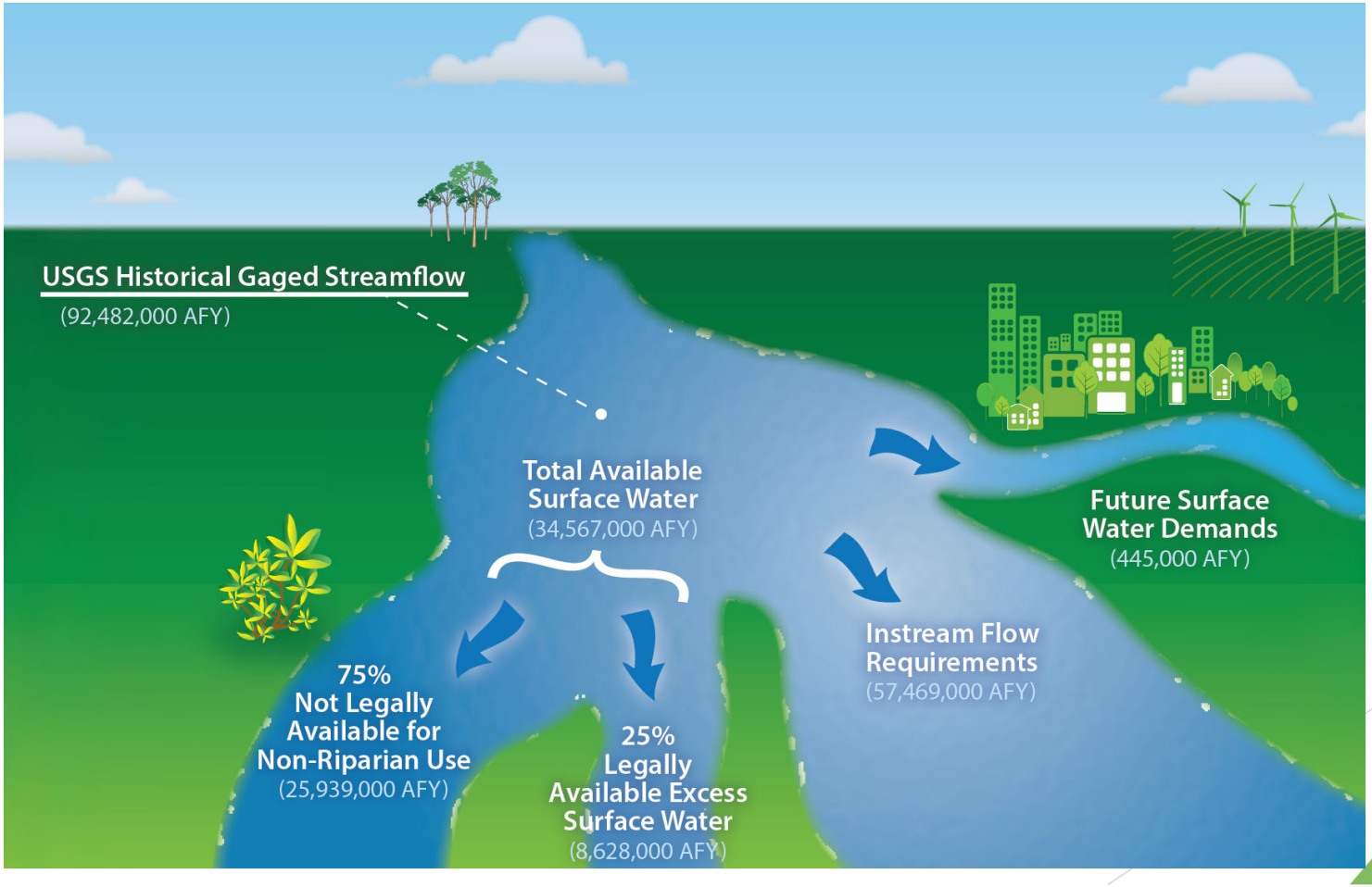
- Current Demand(2014) - 12.4 million AFY
  - 11 Billion gallons per day
- Projected Demand in 2050 – 14 million AFY
  - 12.4 Billion gallons per day





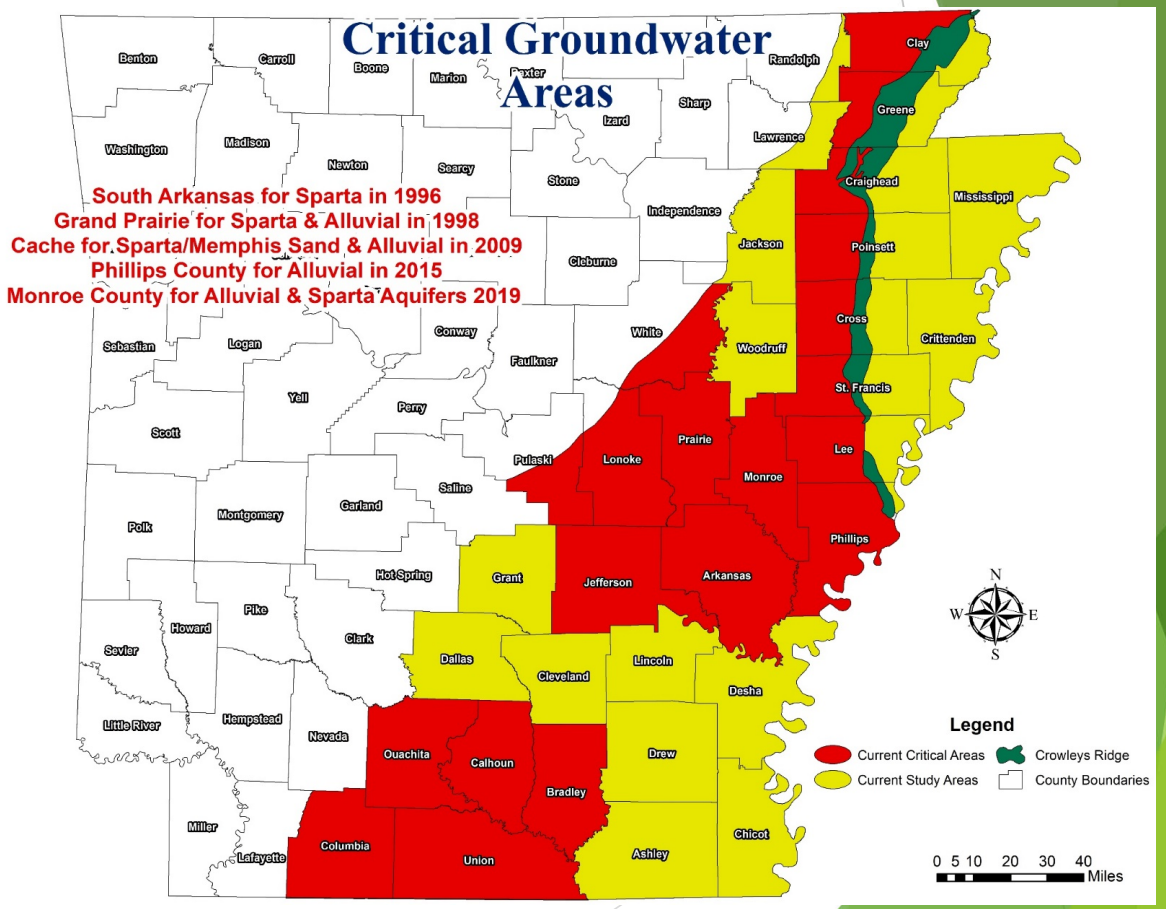


Arkansas Surface Water Availability

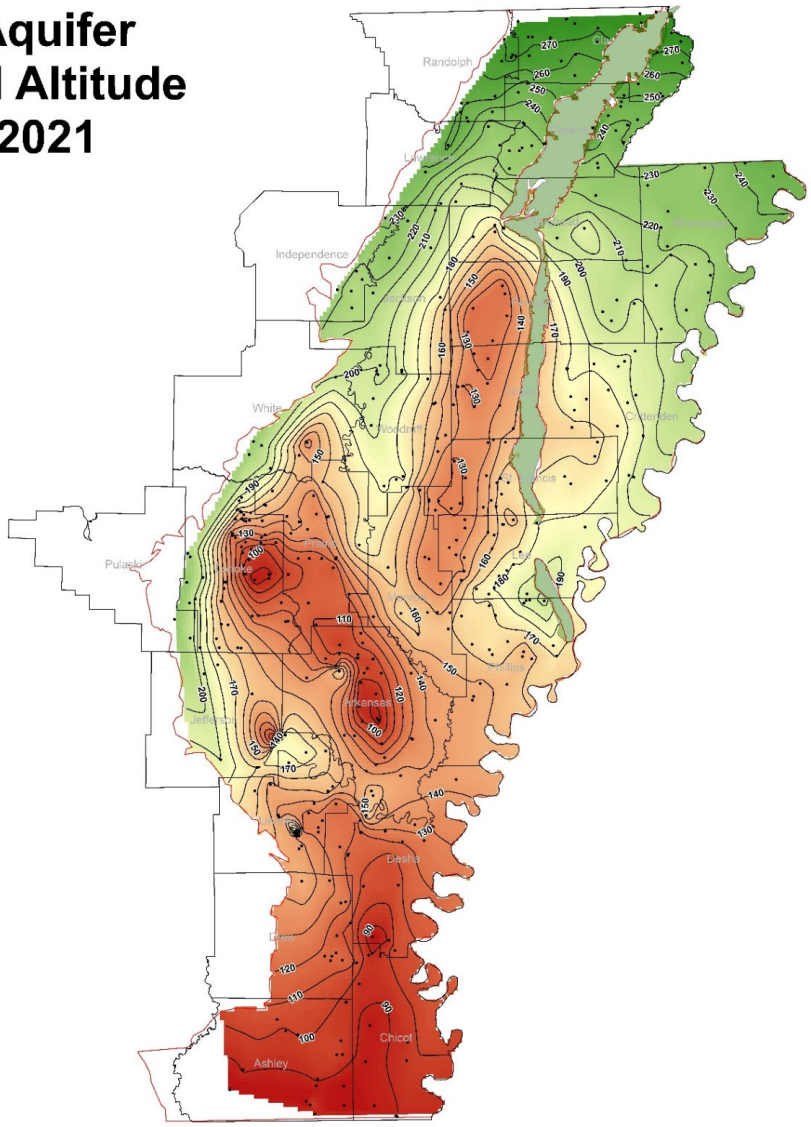


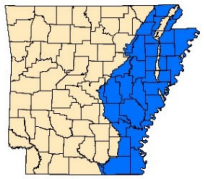
Arkansas Ground Water Demand/Availability

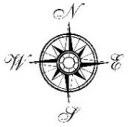
- Groundwater Demand
  - 71% of Use
  - 8.7 Million AFY – 2010
  - 9.9 Million AFY - 2050
- Aquifer Use
  - Mississippi Alluvial 97.5%
  - Sparta – 2%
  - Wilcox - .5%
- Sustainable Yield
  - 1.9 Million AFY



Alluvial Aquifer Water Level Altitude Spring 2021





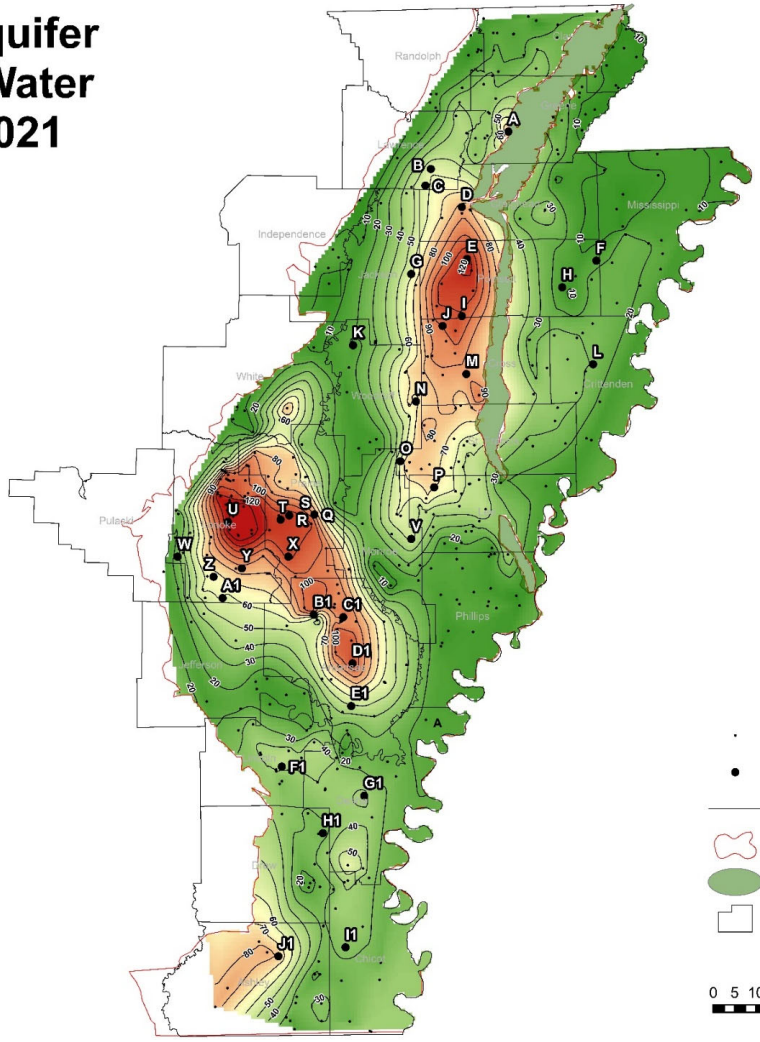


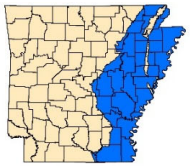
Legend

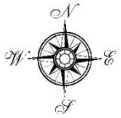
- Data Points
- 10 Foot Contour Lines
- Alluvial Extent
- Crowleys Ridge
- County Boundaries

0 5 10 20 30 40 Miles

Alluvial Aquifer Depth to Water Spring 2021





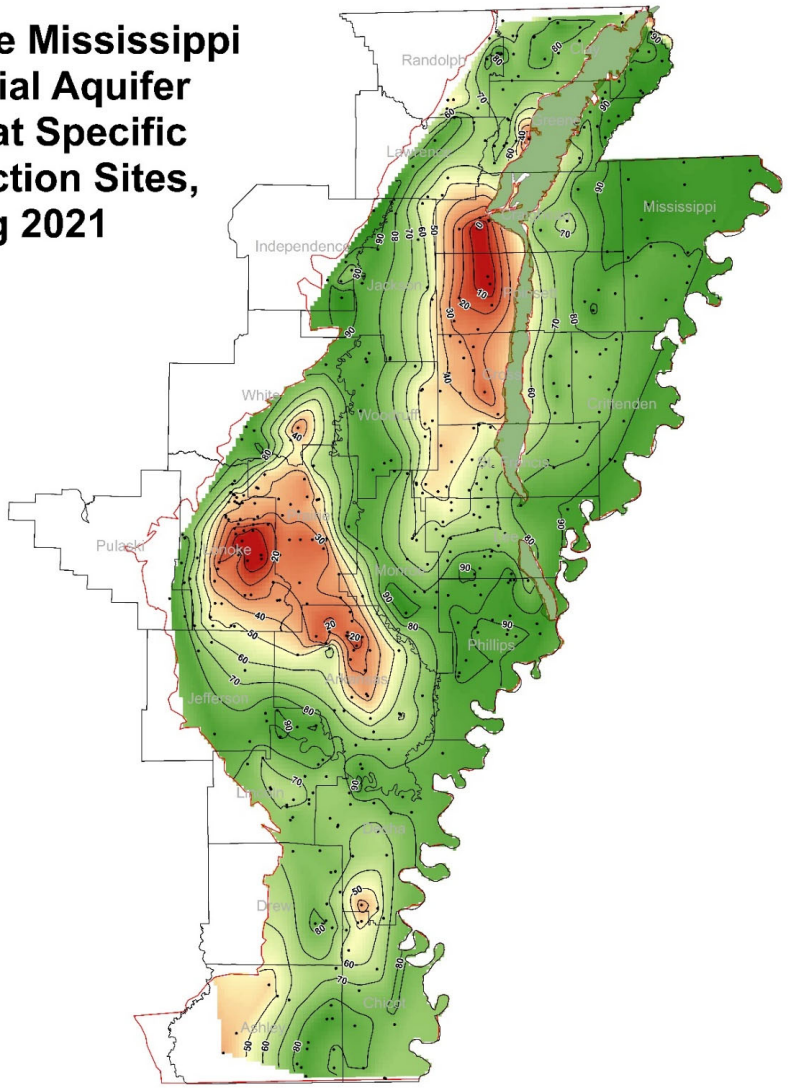


Legend

- Data Points
- Corresponds to Hydrograph in Fig. 13
- 10 Foot Contour Lines
- Alluvial Extent
- Crowleys Ridge
- County Boundaries

0 5 10 20 30 40 Miles

Percent of the Mississippi River Alluvial Aquifer Saturated at Specific Data Collection Sites, Spring 2021



Based on USGS MERAS model aquifer thickness, and Spring 2021 water level measurements.

Legend

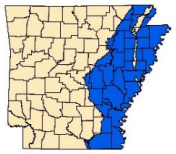
- Data Points
- 10% Contour Lines
- Crowleys Ridge
- Alluvial Extent
- County Boundaries

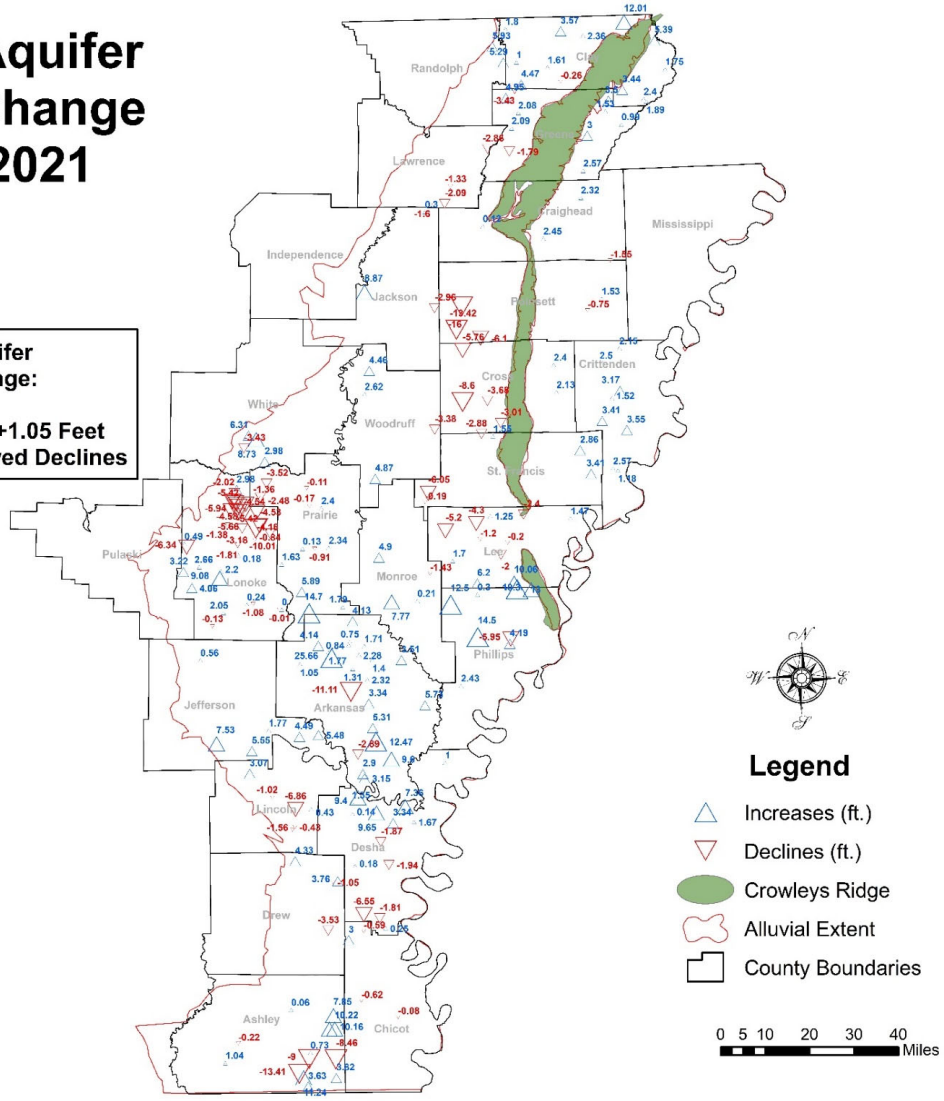
0 5 10 20 30 40 Miles

Alluvial Aquifer
10 Year Change
2011 - 2021

Alluvial Aquifer
10 Year Change:

Average Change: +1.05 Feet
80 of 210 Wells Showed Declines



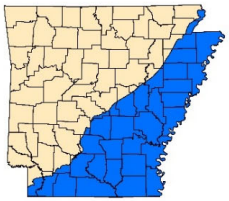


Legend

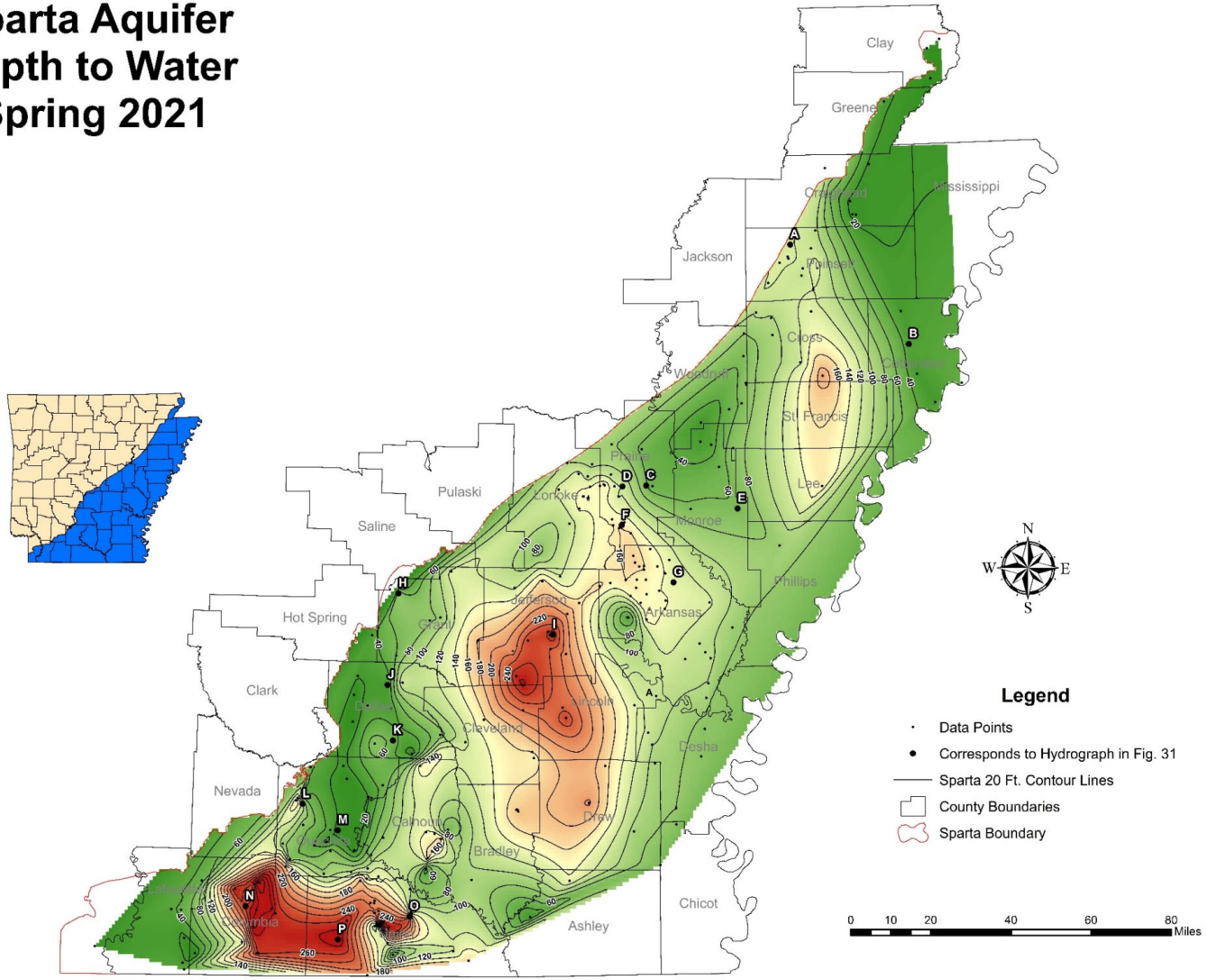
- Increases (ft.)
- Declines (ft.)
- Crowleys Ridge
- Alluvial Extent
- County Boundaries

0 5 10 20 30 40
Miles

Sparta Aquifer
Water Level Altitude
Spring 2021



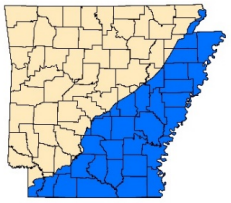
Sparta Aquifer Depth to Water Spring 2021

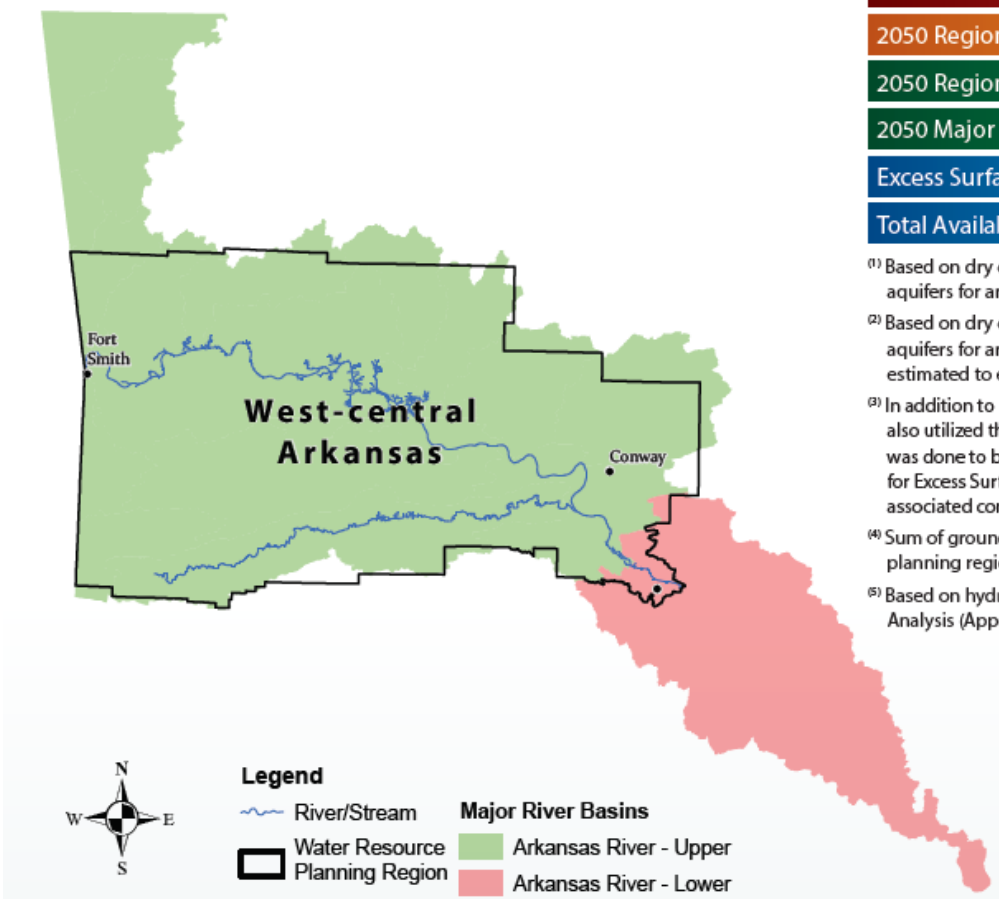


Sparta Aquifer
10 Year Change
2011 - 2021

Sparta Aquifer
10 Year Change

Average Change: +6.59 Feet
51 of 182 Wells Showed Declines





REGIONAL STATISTICS

2050 Total Regional Demand	1,123,360	AFY
2050 Regional GW Availability[1]	9,900	AFY
2050 Regional GW Gap[2, 3]	(56,932)	AFY
2050 Major Basin GW Gap[3, 4]	(757,581)	AFY
Excess Surface Water[5]	3,307,616	AFY
Total Available Surface Water[5]	13,230,466	AFY

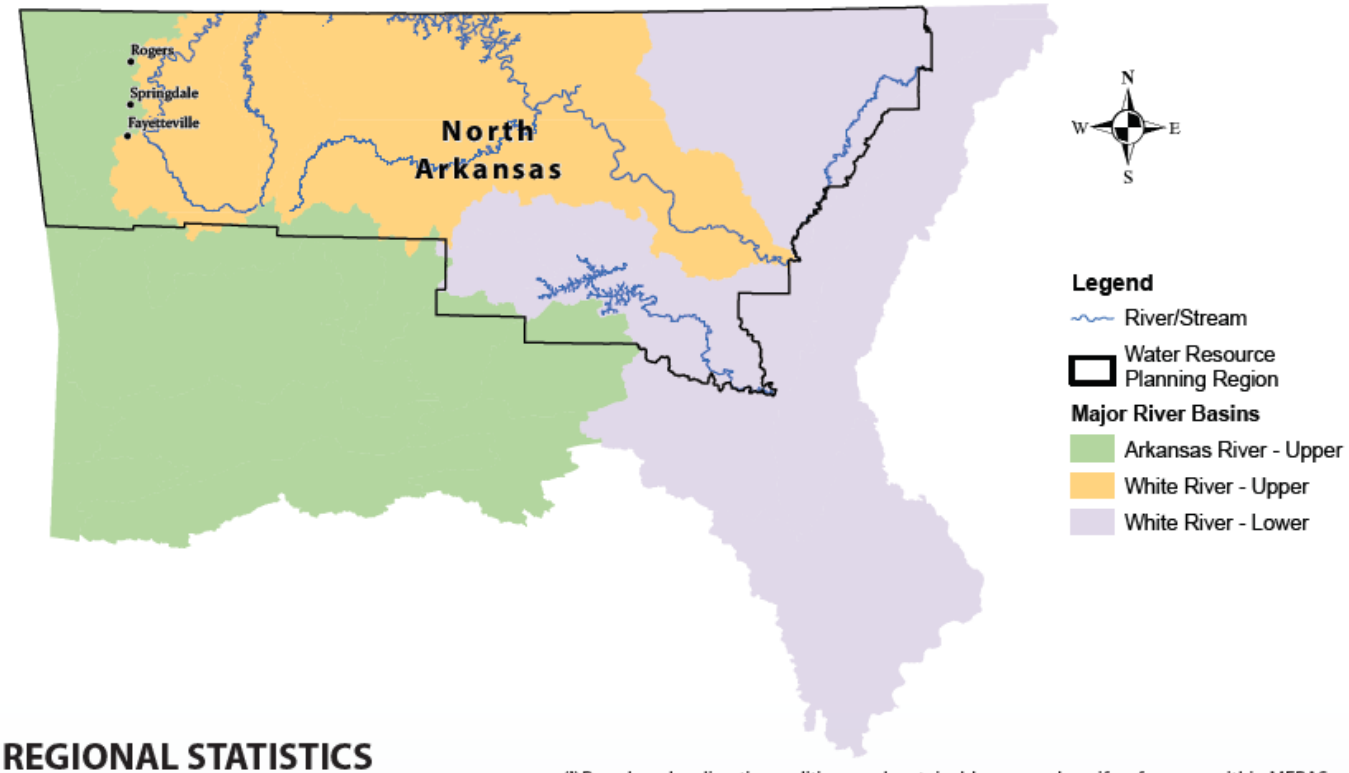
(1) Based on dry climatic conditions and sustainbly pumped aquifers for areas within MERAS model area.

(2) Based on dry climatic conditions and sustainbly pumped aquifers for areas within MERAS model area, otherwise gap was estimated to equal projected growth in groundwater demand.

(3) In addition to regional GW gaps, major basin GW gaps were also utilized that include some areas outside of the region. This was done to be consistent with the hydrologic spatial unit used for Excess Surface Water, Total Available Surface Water, and associated combined source gaps.

(4) Sum of groundwater gaps within major basins that intersect planning region, including areas outside of region.

(5) Based on hydrologic analysis of major basins. See AWP Gap Analysis (Appendix F) for detailed description of methodology.



REGIONAL STATISTICS

2050 Total Regional Demand	1,212,960	AFY
2050 Regional GW Availability[1]	78,782	AFY
2050 Regional GW Gap[2, 3]	(661,869)	AFY
2050 Major Basin GW Gap[3, 4]	(3,774,454)	AFY
Excess Surface Water[5]	5,388,109	AFY
Total Available Surface Water[5]	21,552,437	AFY

(1) Based on dry climatic conditions and sustainably pumped aquifers for areas within MERAS model area.

(2) Based on dry climatic conditions and sustainably pumped aquifers for areas within MERAS model area, otherwise gap was estimated to equal projected growth in groundwater demand.

(3) In addition to regional GW gaps, major basin GW gaps were also utilized that include some areas outside of the region. This was done to be consistent with the hydrologic spatial unit used for Excess Surface Water, Total Available Surface Water, and associated combined source gaps.

(4) Sum of groundwater gaps within major basins that intersect planning region, including areas outside of region.

(5) Based on hydrologic analysis of major basins. See AWP Gap Analysis (Appendix F) for detailed description of methodology.

Legend

- River/Stream
- Water Resource Planning Region

Major River Basins

- Red River

REGIONAL STATISTICS

2050 Total Regional Demand	217,280	AFY
2050 Regional GW Availability[1]	3,642	AFY
2050 Regional GW Gap[2, 3]	(70,219)	AFY
2050 Major Basin GW Gap[3, 4]	(70,115)	AFY
Excess Surface Water[5]	1,221,666	AFY
Total Available Surface Water[5]	4,866,664	AFY

(1) Based on dry climatic conditions and sustainably pumped aquifers for areas within MERAS model area.

(2) Based on dry climatic conditions and sustainably pumped aquifers for areas within MERAS model area, otherwise gap was estimated to equal projected growth in groundwater demand

(3) In addition to regional GW gaps, major basin GW gaps were also utilized that include some areas outside of the region. This was done to be consistent with the hydrologic spatial unit used for Excess Surface Water, Total Available Surface Water, and associated combined source gaps.

(4) Sum of groundwater gaps within major basins that intersect planning region, including areas outside of region.

(5) Based on hydrologic analysis of major basins. See AWP Gap Analysis (Appendix F) for detailed description of methodology.

Issues Identified in 2014 Water Plan Update

- Groundwater Depletion
  - By 2050 Approx. 8.2 million AFY above sustainable yield, if possible
  - Primarily East Arkansas and in the Mississippi Alluvial Aquifer
- Infrastructure Construction, maintenance, and replacement
  - Projected a need to spend $5.74 Billion on Water and $3.76 Billion on wastewater by 2024 to build, maintain and replace required infrastructure.
- Use of excess surface water
  - Sufficient Surface water exists to close GW gap
  - Lack the appropriate infrastructure
- Maintaining and improving surface and groundwater quality
  - 59% of assessed streams supported all uses
  - 64% of assessed lakes supported all uses

Groundwater Depletion Action Items

- Conserve
  - Possible 12% -22 % GW Use Reduction
- Use mostly surface water
  - Large Water Diversion Projects(in progress)
  - Arkansas Tax incentives and Credits(Expanded as Recommended)
- Prepare for drought
  - Develop a drought contingency network(in progress)
- Educate
  - Arkansas Conservation Partnership Groundwater Summit
    - June 21-22, 2022 – Lonoke Arkansas

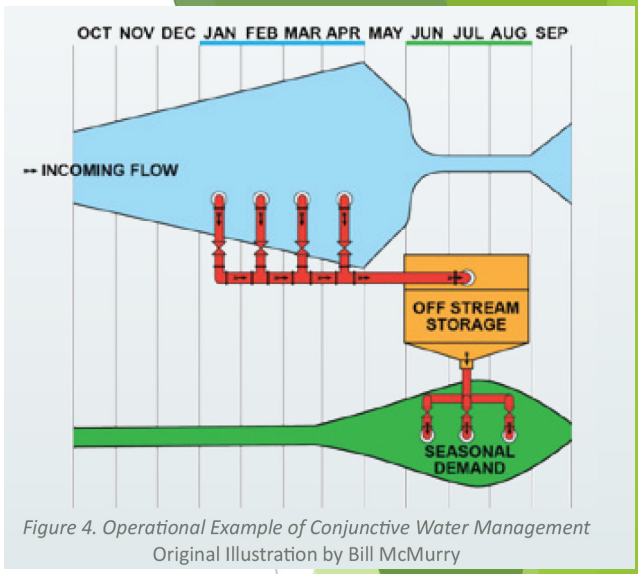


Figure 4. Operational Example of Conjunctive Water Management
Original Illustration by Bill McMurry

Ouachita River Alternative Water Supply Project intake structure in Union County near El Dorado - *Photo courtesy of Union County Water Conservation Board*

Infrastructure Action Items

- Continue State General Obligation Bond Program and request additional authorization.
  - $43 Million in Additional Bonds Sold
  - American Rescue Plan Funding
  - Infrastructure and Jobs Act Funding
- Public entities operating water and wastewater infrastructure or flood control and drainage projects should develop sustainability plans through financial incentives
- Promote Regionalization of Water and Wastewater Systems
- Develop training programs for utility boards of directors
  - Act 605 of 2021 – Retail Water Provider Act

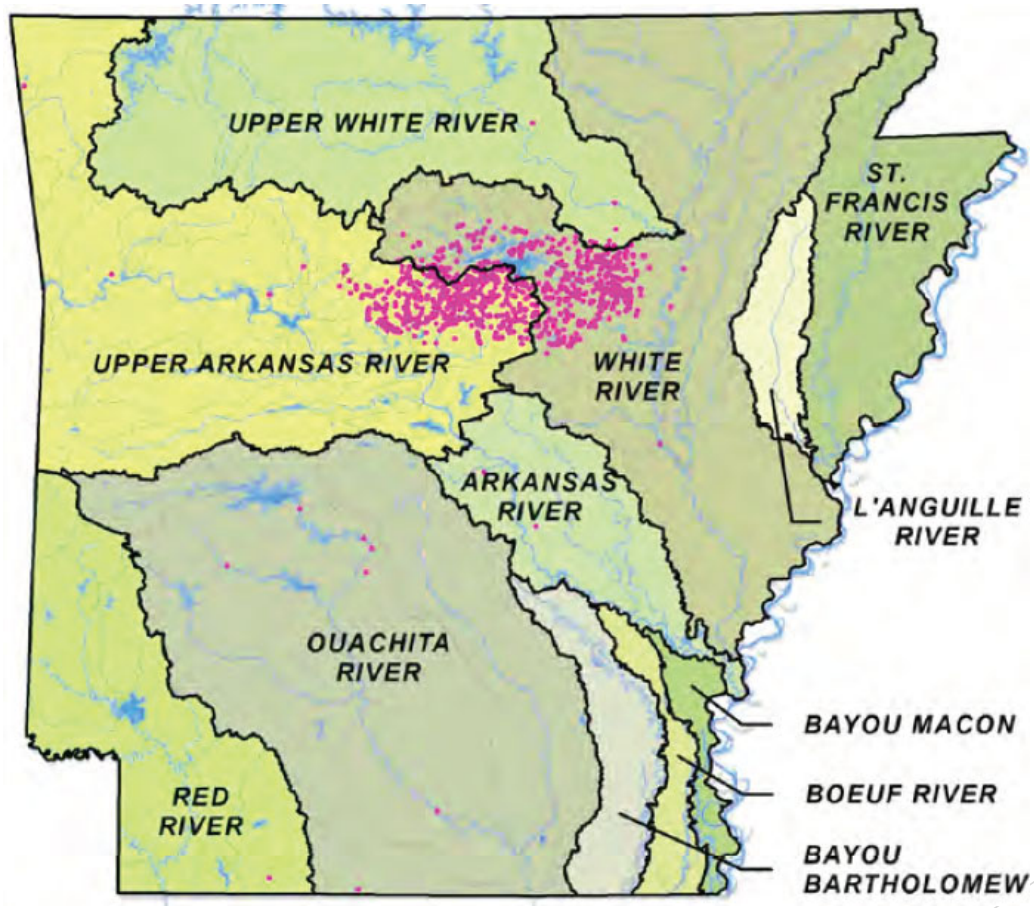
Use of Excess Surface Water Action Items

- Review and recommend modification to 25% restriction on permitting diversions of excess surface water
  - Sustainable Rivers Program (In Progress)
- Large Water Diversion Projects(in progress)
- Improve Water Use Reporting
- Seek Reallocation of water storage in USACE Reservoirs as needed.

TABLE 6-2. CALCULATED EXCESS SURFACE WATER

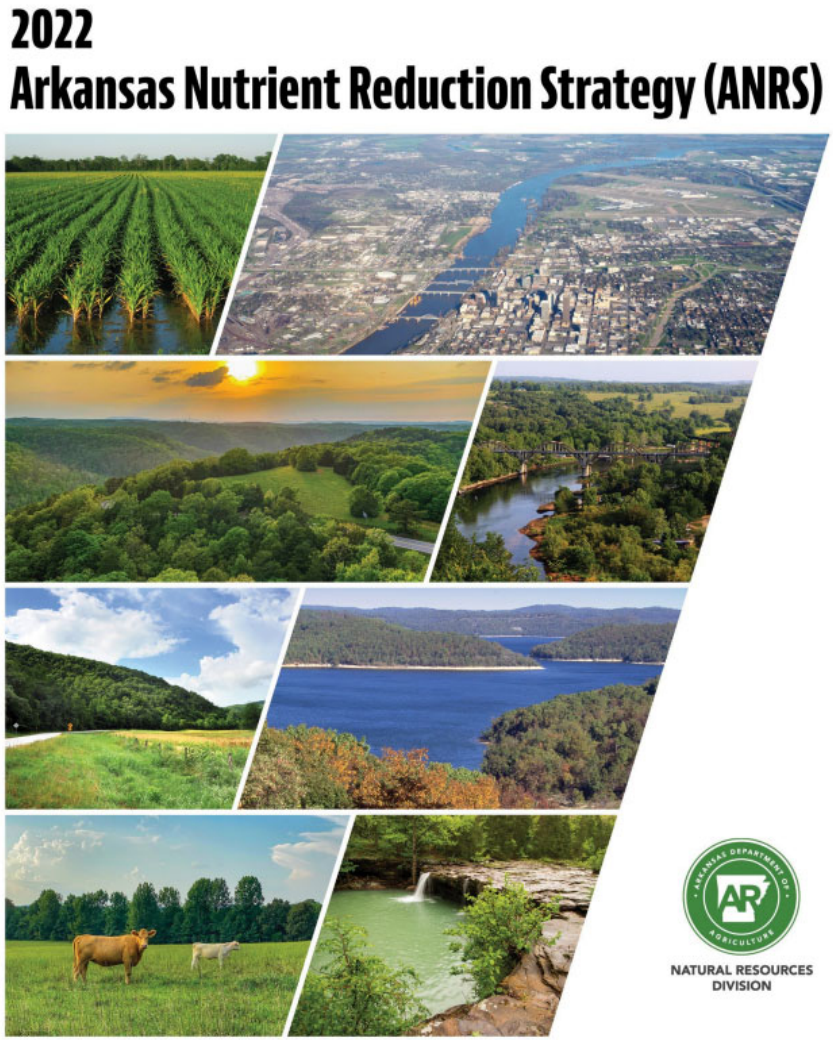
Stream/Watershed	Excess Surface Water (AFY)
St. Francis River	670,500
L'Anguille River	90,800
White River	2,131,300
White River above the Cache River	1,769,100
Upper White River	830,600
Cache River	160,900
Kings River	42,300
Black River	694,500
South Fork of Little Red River	36,900
Middle Fork of Little Red River	36,300
Devil's Fork of Little Red River	24,600
Arkansas River	3,307,600
Arkansas River – Upper (at Murray Dam)	3,256,900
Spavinaw Creek (and tribs)	19,200
Flint Creek	3,200
Illinois River	48,200
Baron Fork	5,800
Lee Creek	23,500
Poteau River	26,700
Poteau River Tributaries	15,600
Mulberry River	42,600
Big Piney Creek	39,100
Illinois Bayou	41,700
Point Remove Creek	41,900
Cadron Creek	82,100
Petit Jean River	81,700
Fourche La Fave River	101,500
Red River[1]	1,221,700
Little River	378,700
Saline River	38,700
Kelly Bayou	4,700
Bodcau Creek	34,600
Bayou Dorcheat	42,600
Mountain Fork	30,500
Ouachita River[1]	1,026,600
Upper Ouachita River	61,900
Saline River	272,200
Ouachita River Tributaries-East	2,900
Ouachita River Tributaries-West	46,200
Bayou Bartholomew[1]	114,500
Bayou Bartholomew Tributaries	25,500
Boeuf River	38,000
Boeuf River Tributaries	9,500
Bayou Macon	27,100

Non-riparian Permits - 2014



Water Quality Action Items

- Dedicated State Nonpoint Source Funding
- Greater Coordination among State and Federal Entities on Water Quality
- Additional Nutrient Management Planning Requirements
- Update and Continue to Implement the Arkansas Nutrient Reduction Strategy developed as part of the Hypoxia Task Force(currently out for review)



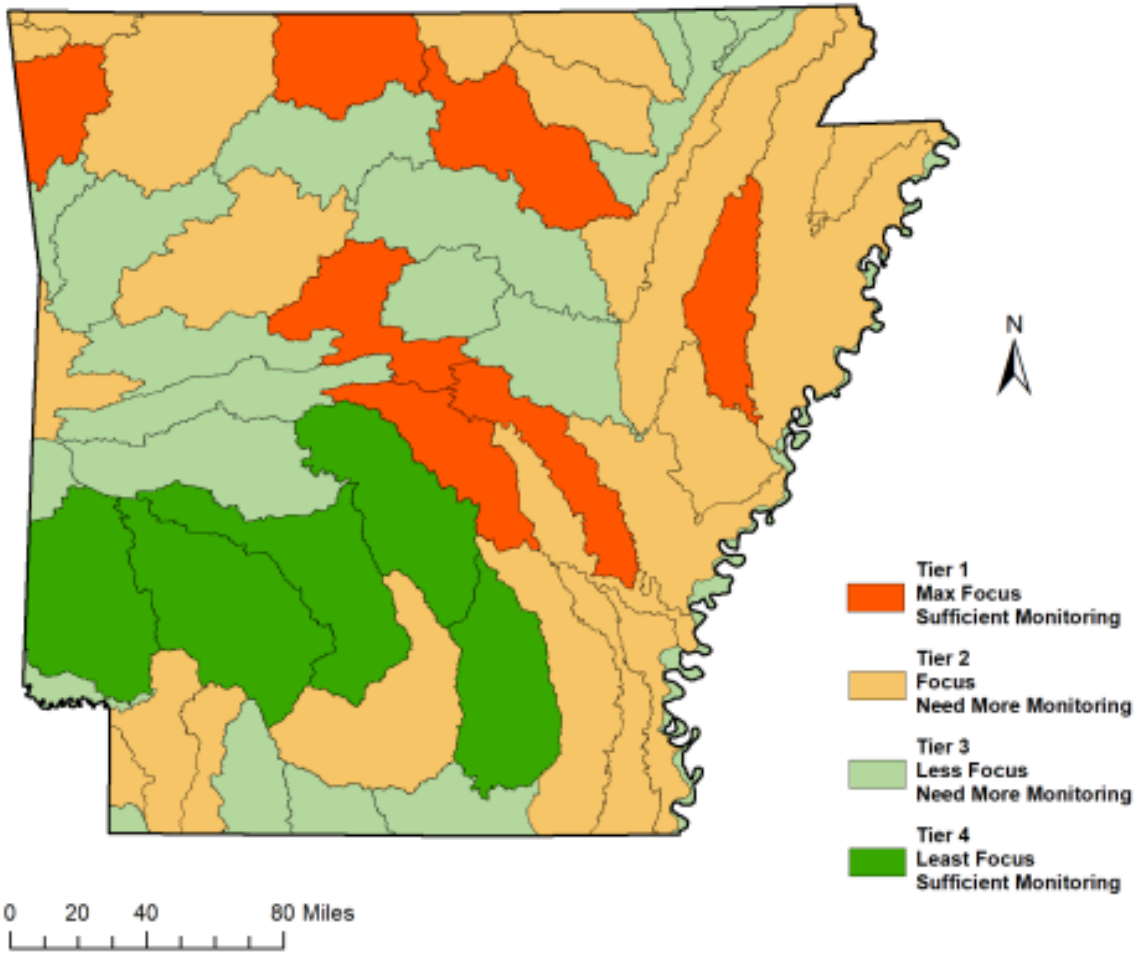


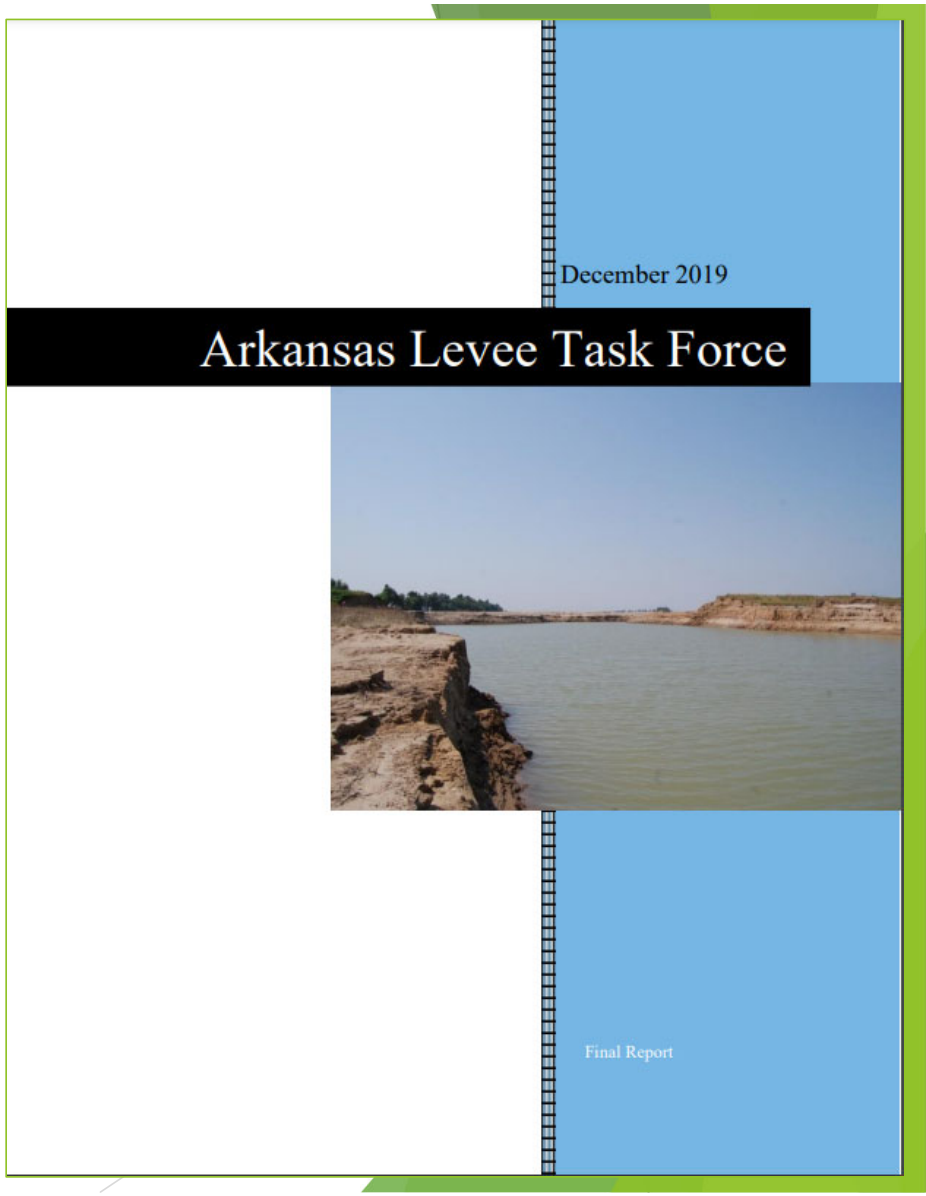
Figure 10. Four Tiers of HUC-8 Watersheds.

High Priority Items Since Water Plan Update

- Arkansas River Levees(And other Levees)
- Northwest Arkansas Drinking Water Use Needs
- Southwest Arkansas Navigation Study
- Northwest Arkansas Stormwater Management

Arkansas River Levees(And Other Levees)

- Arkansas Levee Task Force
- Report Recommendation Areas
  - (A) Analyzing the current conditions of the levees within the State of Arkansas.
  - (B) Identifying sources and requirements needed for funding the construction, repair, and maintenance of levees within the State of Arkansas.
  - (C) Studying the prospective monitoring and reporting of systems for the maintenance of levees within the State of Arkansas. The Task Force recommends
  - (D) Reviewing the adequacy of current laws and the organizational structure of the levee system and levee district boards within the State of Arkansas.



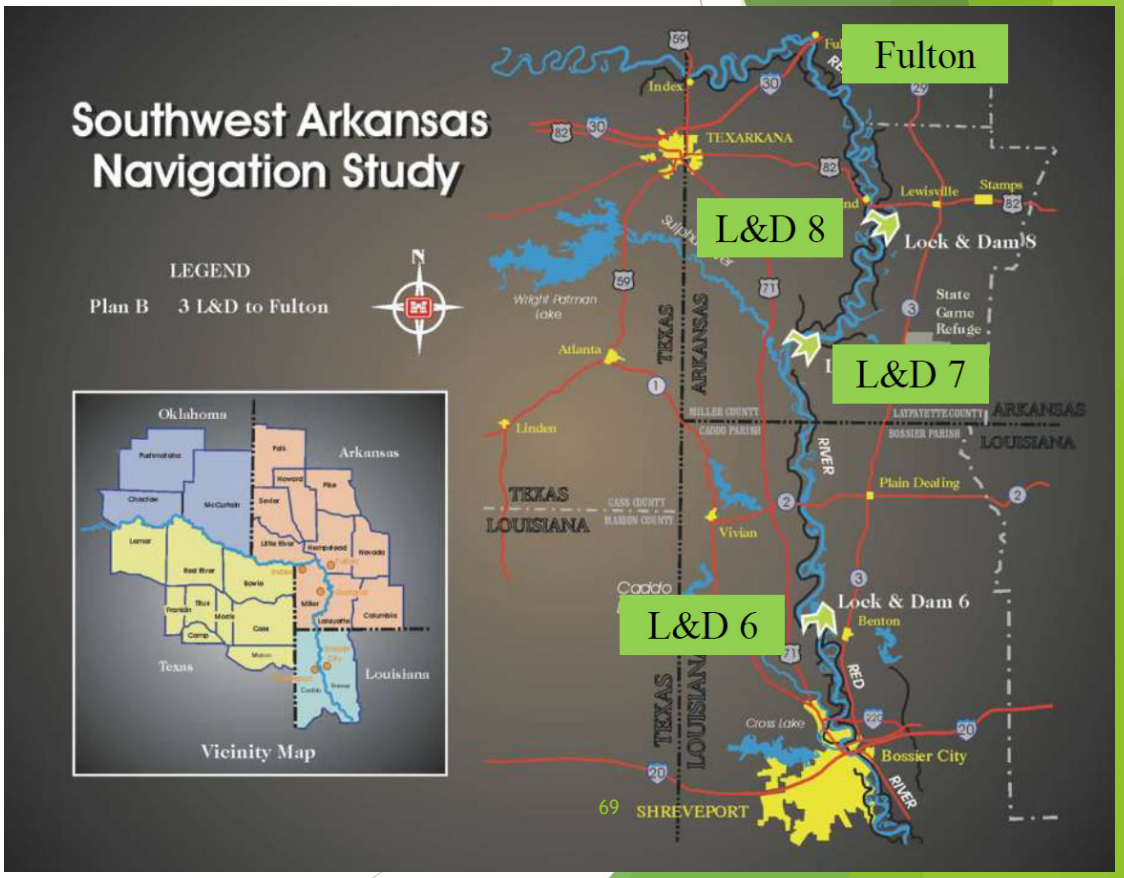
Northwest Arkansas Drinking Water Needs

Projected Future Water Demands

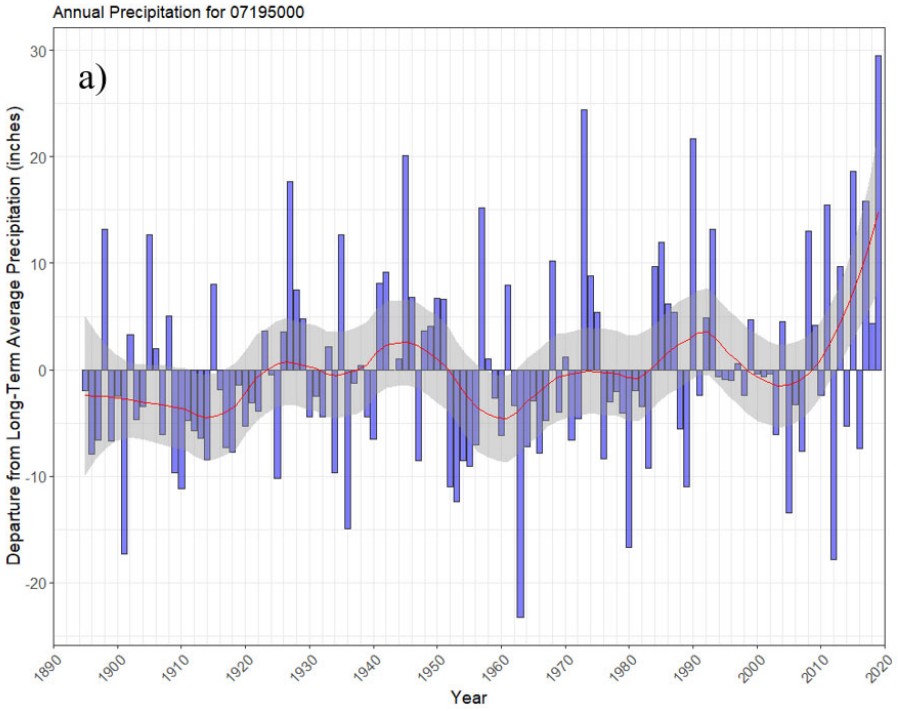
Year	Bentonville		Rogers		Springdale		Fayetteville		Total Demand	
	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)
2019	10.1	19.0	10.4	19.5	18.0	33.9	17.0	32.0	**55.5**	**104.4**
2025	12.1	22.8	12.0	22.6	20.9	39.2	18.9	35.6	**63.9**	**120.2**
2030	14.1	26.5	13.6	25.5	23.5	44.3	20.7	38.8	**71.9**	**135.1**
2035	16.4	30.7	15.3	28.8	26.6	50.0	22.6	42.4	**80.9**	**151.9**
2040	19.0	35.7	17.3	32.4	30.0	56.4	24.7	46.3	**91.0**	**170.8**

Southwest Arkansas Navigation Study

- Benefit to Cost Ratio (BCR) of 1.8 for 2 L&Ds and 1.2 for 3 L&Ds.
- Feasibility study ($3 million) - Section 203 Process
- Funds Committed – Arkansas and Louisiana
- 3 Year Process
- RFQ – Engineer Procurement



Northwest Arkansas Stormwater Management



US Army Corps of Engineers

Planning Assistance to States Scope between

Arkansas Natural Resources Division and

Little Rock District, U.S. Army Corps of Engineers

April 2022

Title: Stormwater runoff analysis of the Illinois River watershed in northwest Arkansas

Background: Stormwater runoff has become an increasing concern for northwest Arkansas, particularly in Benton and Washington Counties (Figure 1). The increase in impervious surfaces, such as paved streets, parking lots, and building rooftops, has potentially led to increased flooding and increased sedimentation and erosion. Furthermore, the increased runoff can negatively impact rivers, streams, and lakes by increasing the amount of nutrients and sediments that are being transported during high flow events.

Figure 1. The Illinois River watershed of Northwest Arkansas within Benton and Washington Counties.

QUESTIONS?


LUNCH 12:30-1:30pm
Stay Tuned for an Icebreaker after lunch!

Day 1 – Wednesday, June 8, 2022
1:30pm-2:30pm

Missouri Presentation

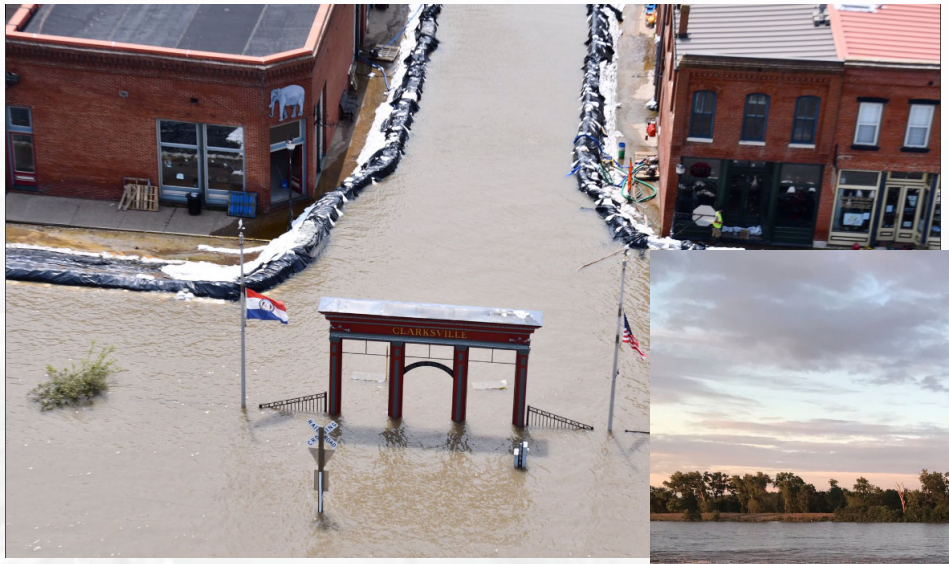
Jennifer Hoggatt, Deputy Director
Missouri Geological Survey

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES
Missouri Geological Survey

US Army Corps
of Engineers.

Jennifer Hoggatt
Deputy Director, Missouri Geological Survey

When Do We Plan For Water?



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When Do We Plan For Water?

Lake Elmwood, Milan
Summer 2018

Hamilton City Lake,
Summer 2018

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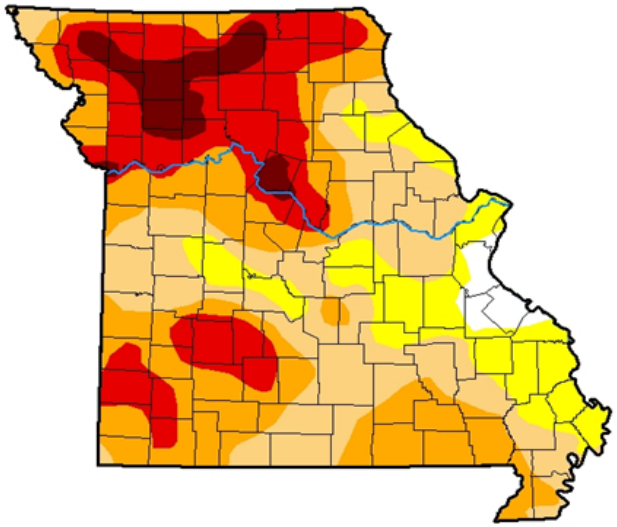
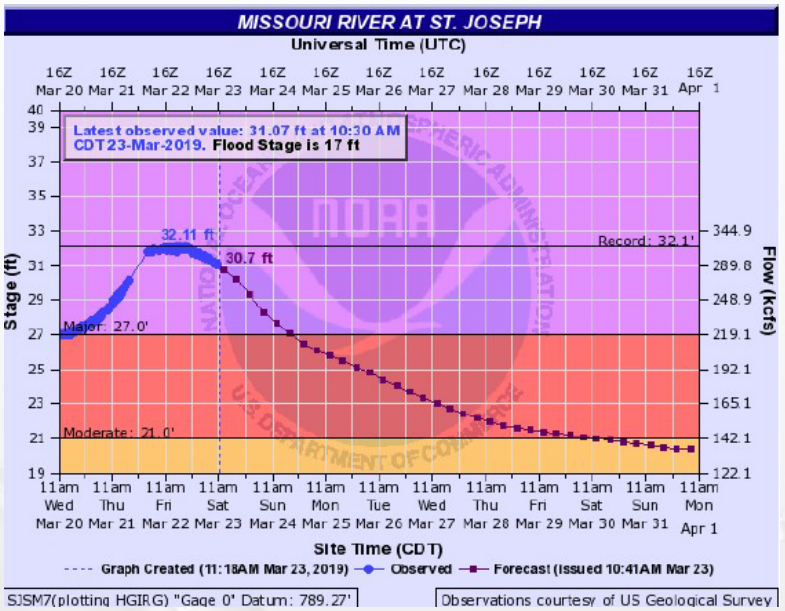
NATURAL RESOURCES

What a Difference Six Months Makes



August 14, 2018



March 23, 2019

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Missouri Water Resources Plan

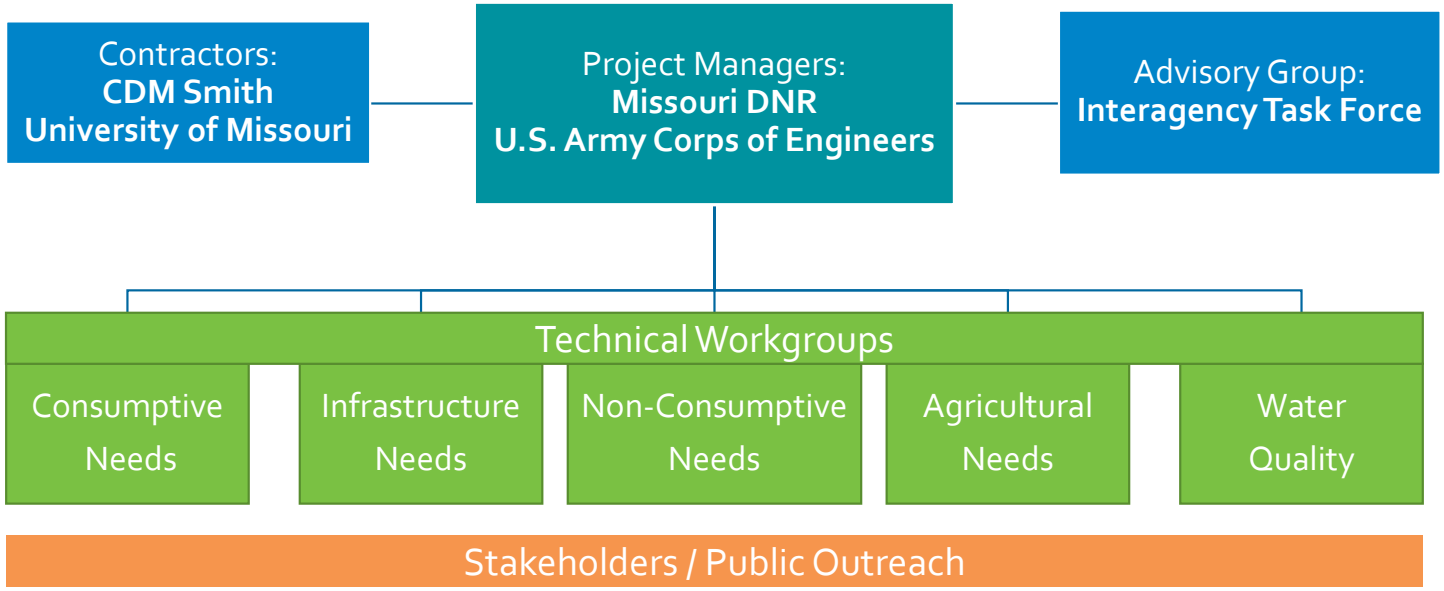
Statutory Responsibility (640.415 RSMo):

"The department shall develop, maintain and periodically update a state water plan for a long-range, comprehensive statewide program for the use of surface water and groundwater resources of the state, including existing and future need for drinking water supplies, agriculture, industry, recreation, environmental protection and related needs."

Elements of the 2020 Water Plan

- Estimated water needs for all sectors of water use
- Assessed water supplies
- Assessed water quality as it affects water use availability
- Identified infrastructure needs, costs and financing
- Gathered public and stakeholder input

Missouri Water Resources Plan Team for the 2020 Update



MISSOURI
WATER RESOURCES PLAN

Water Plan Elements: Demands

WATER DEMAND SECTORS

Consumptive Demand

- Municipally-Provided Public Supply
- Self-Supplied Nonresidential
- Self-Supplied Domestic
- Livestock
- Agriculture Irrigation

Non-Consumptive Demand

- Hydroelectric Power Generation
- Commercial Navigation
- Fisheries and Wetlands
- Water-Based Outdoor Recreation
- Thermoelectric Power Generation (small portion consumed)

Consumptive demand refers to water that is withdrawn from the source and consumed in a way that makes its use all or partially unavailable for other purposes or uses

MISSOURI WATER RESOURCES PLAN

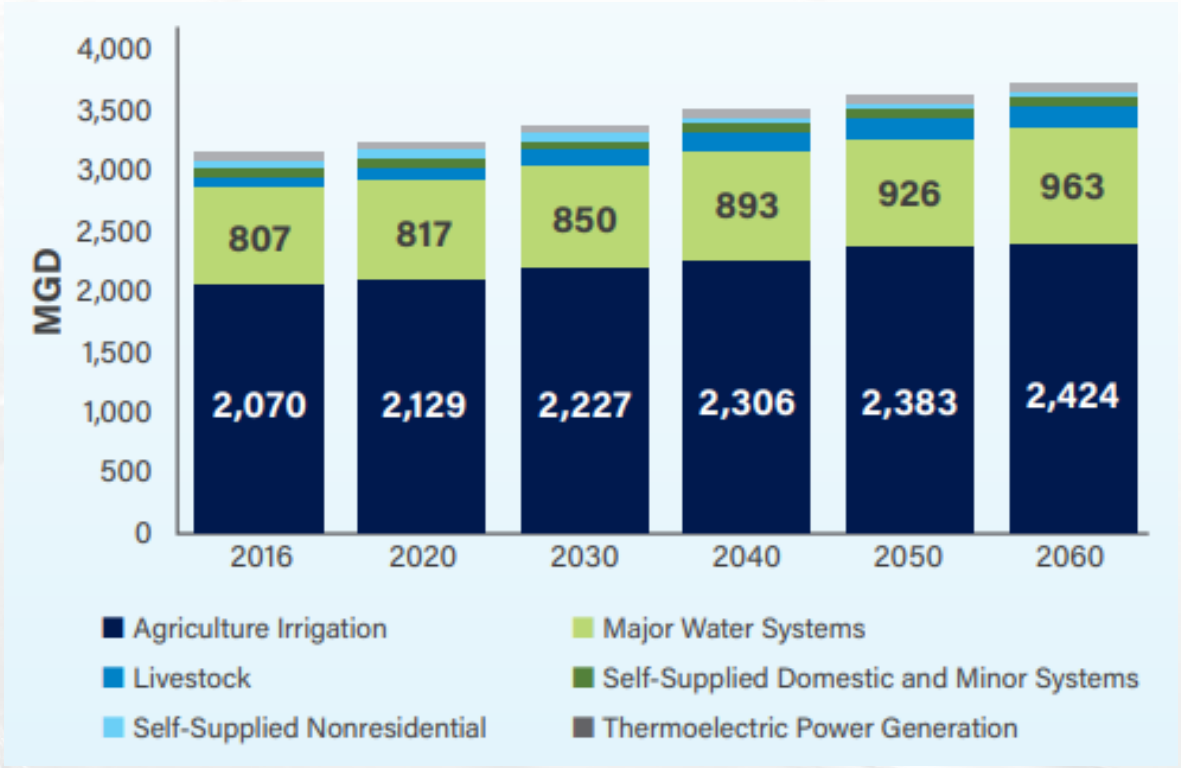
Determining Agriculture Needs

University of Missouri Led the Assessment

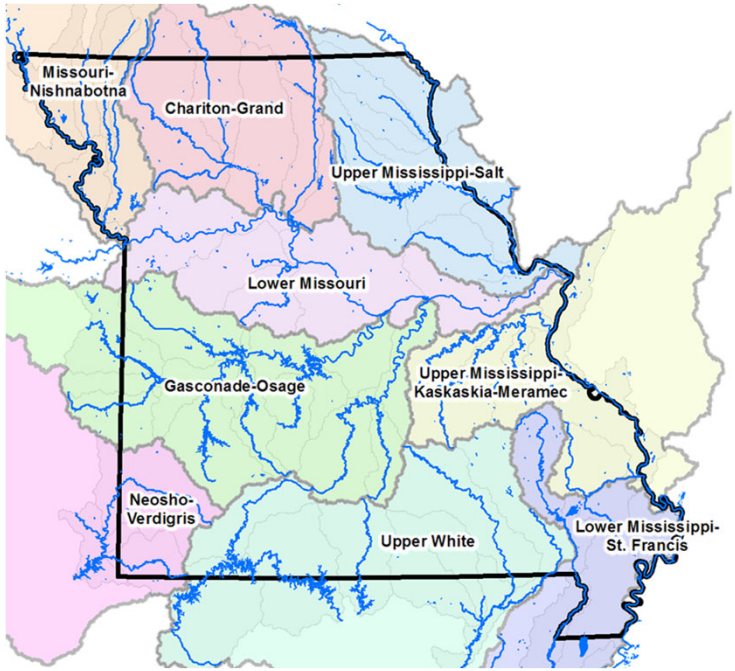
Overall Objectives:

- Evaluate historical monthly water use of livestock and irrigated crops by county in the State of Missouri
- Project the monthly volume of water needed for irrigation and livestock for each county to 2060

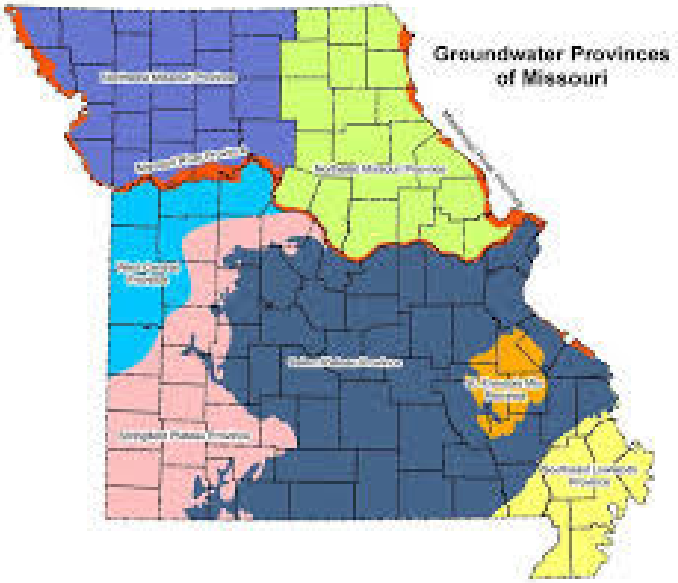
Demands & Projections



Water Plan Elements: Supply



Surface Water Basins of Missouri



MISSOURI
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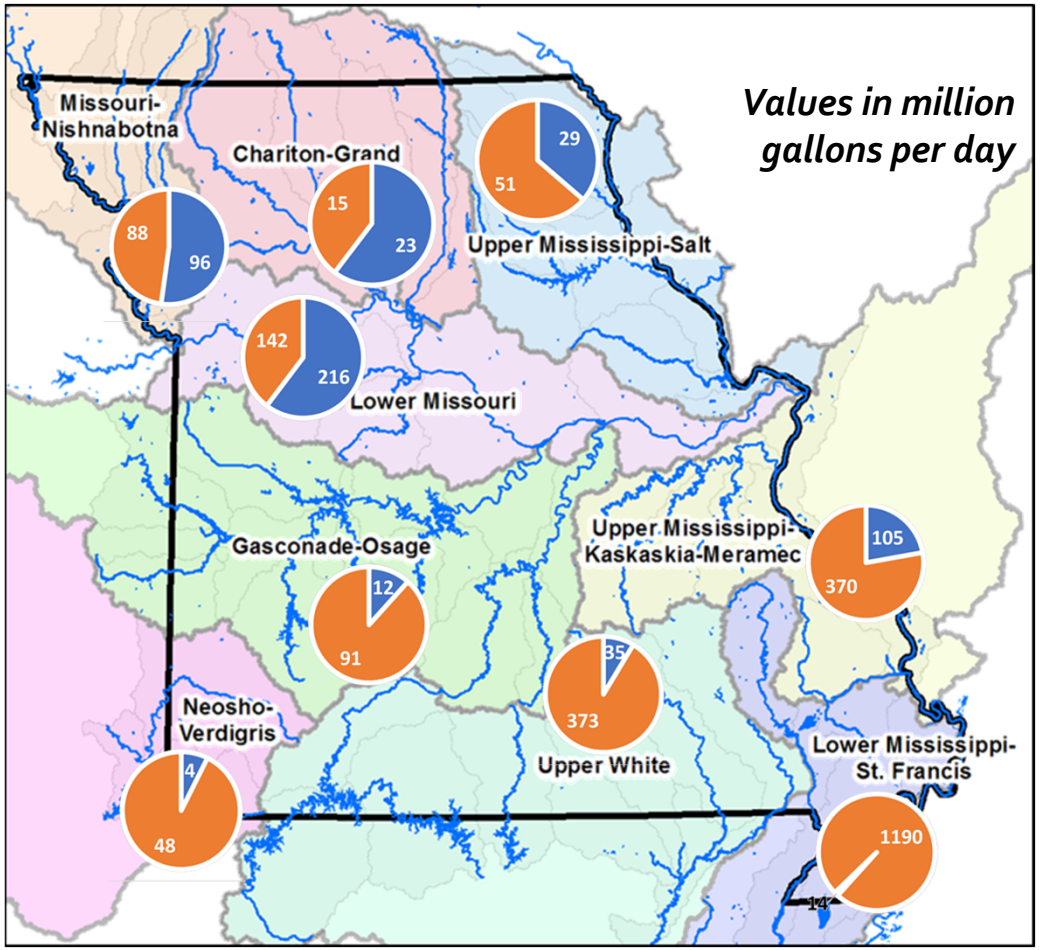
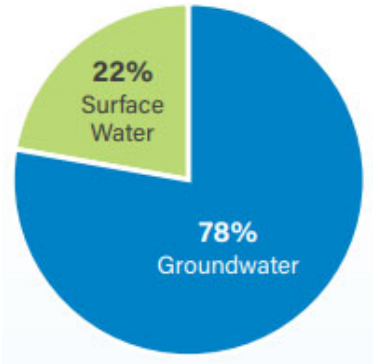
Water Plan Elements: Supply



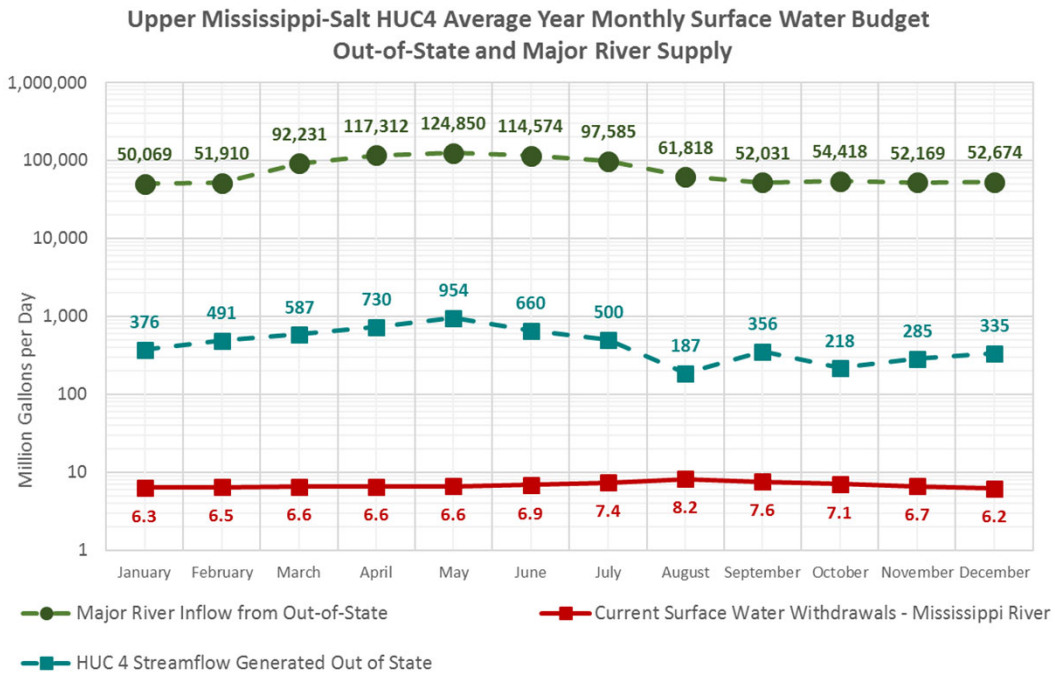


Overall Distribution of Demand by Source

MISSOURI WATER RESOURCES PLAN

Determining Challenges in Supply: Analysis at the HUC4

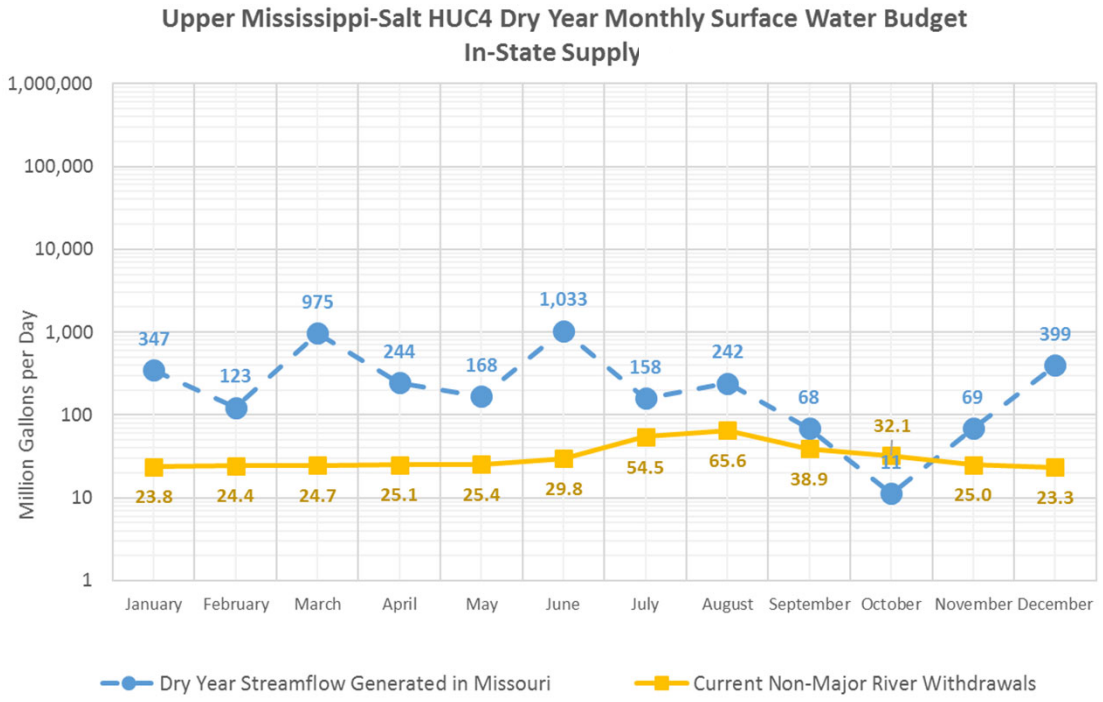
Out-of-State and Major River Supply Average Year



MISSOURI WATER RESOURCES PLAN

Determining Challenges in Supply: Analysis at the HUC4

In-State Supply
Dry Year



MISSOURI
WATER RESOURCES PLAN

Water Plan Elements: Infrastructure

Wastewater and drinking water infrastructure needs in Missouri, over the next twenty years, are estimated to exceed $9.6 billion and $8.9 billion, respectively.

(EPA Analysis 2016, 2018)

- Infrastructure Analysis
  - EPA 2011 Drinking Water Infrastructure Needs Survey and Assessment (DWINSA)
  - Drinking Water State Revolving Funds (SRF)
  - EPA 2012 Clean Watersheds Needs Survey (CWNS)
  - Missouri Clean Water Information System Database (CWIS)
- Regional Water Supply Studies

MISSOURI
WATER RESOURCES PLAN

Putting It All Together: Scenario Planning

Demands

Supply

Infrastructure

- Identify major uncertainties that can impact the future
- Select most important uncertainties as "drivers" of scenarios
- Combine uncertainty drivers into scenarios that represent a different possible futures
- Measure impacts of scenarios and assess strategies to address impacts
- Use an adaptive management framework for continuous re-assessment and implementation of strategies

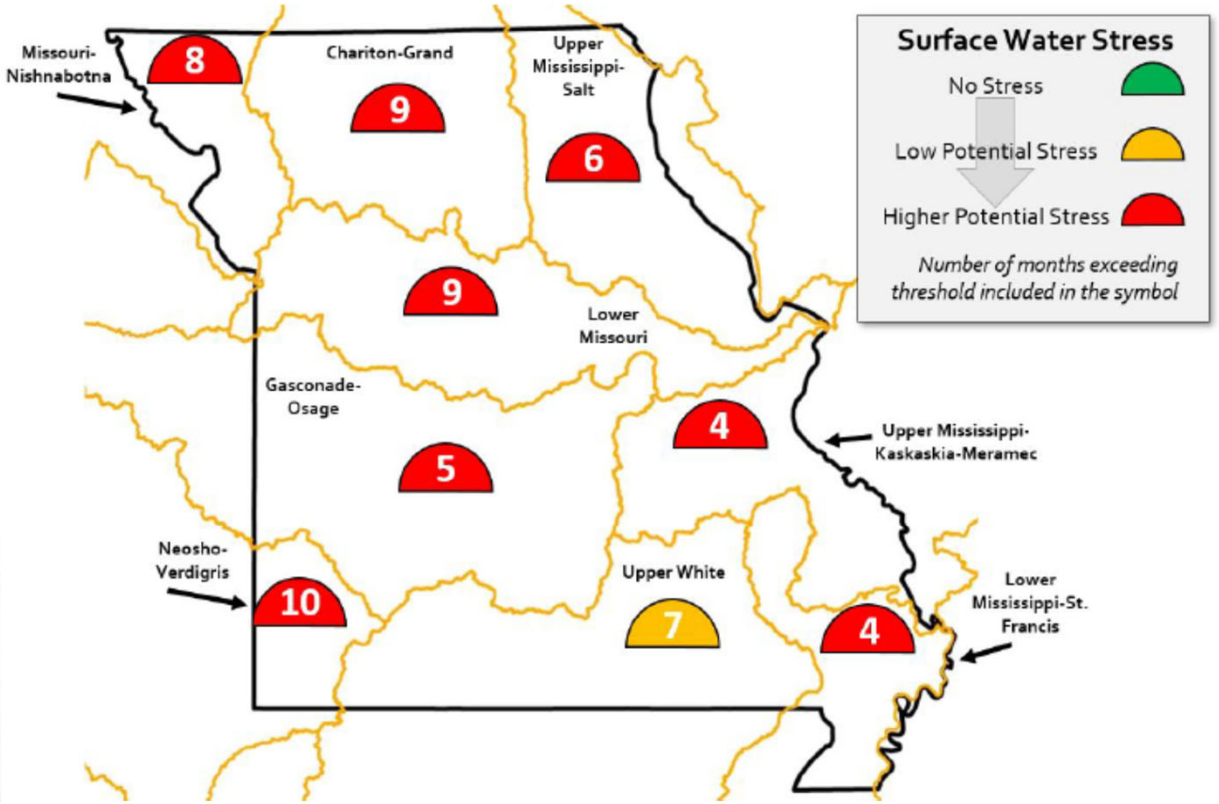
MISSOURI WATER RESOURCES PLAN

Major Uncertainties & Drivers

MISSOURI
WATER RESOURCES PLAN

Scenario Result Example

Business-As-Usual Scenario Results for Drought of Record Conditions



MISSOURI WATER RESOURCES PLAN

MISSOURI WATER RESOURCES PLAN

What Does the Future Hold?

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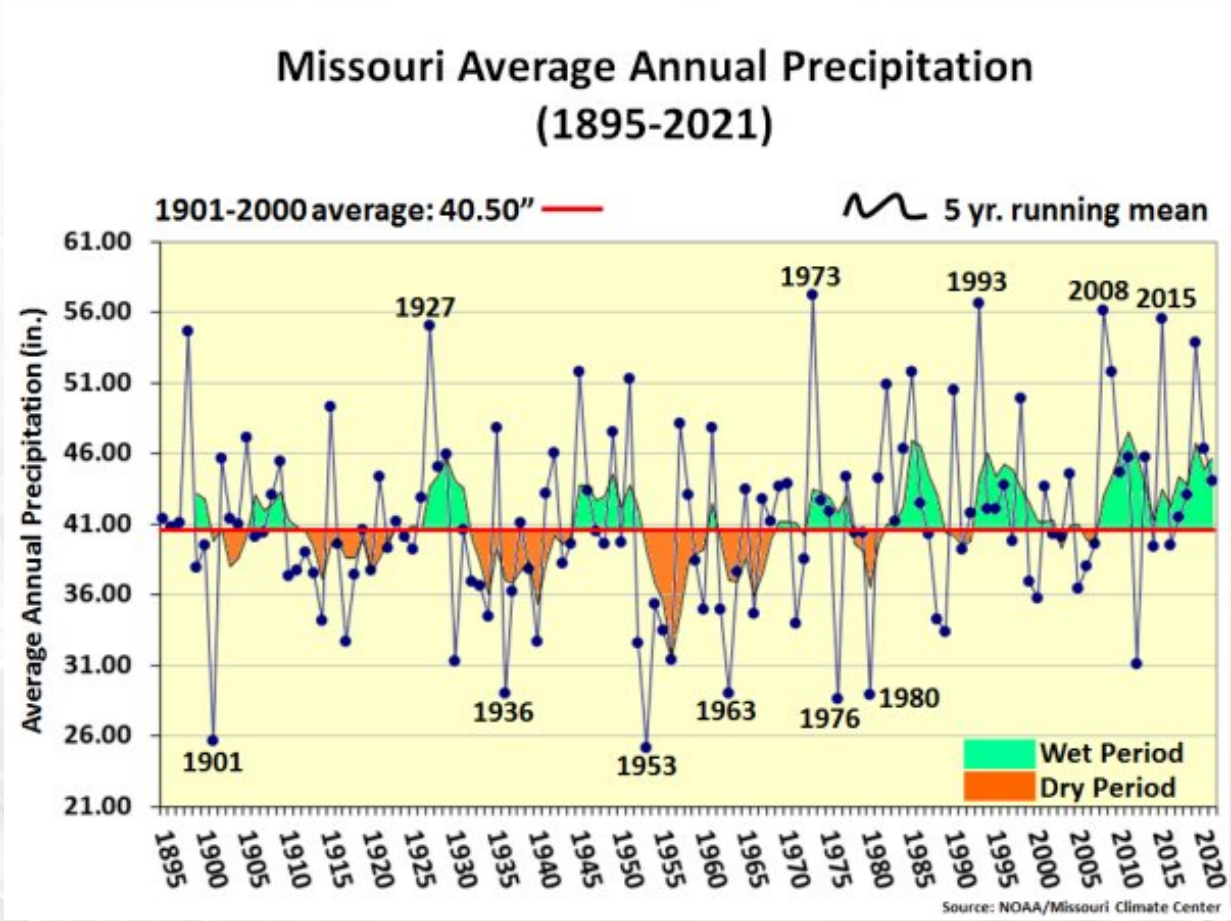
NATURAL RESOURCES

Historical Record



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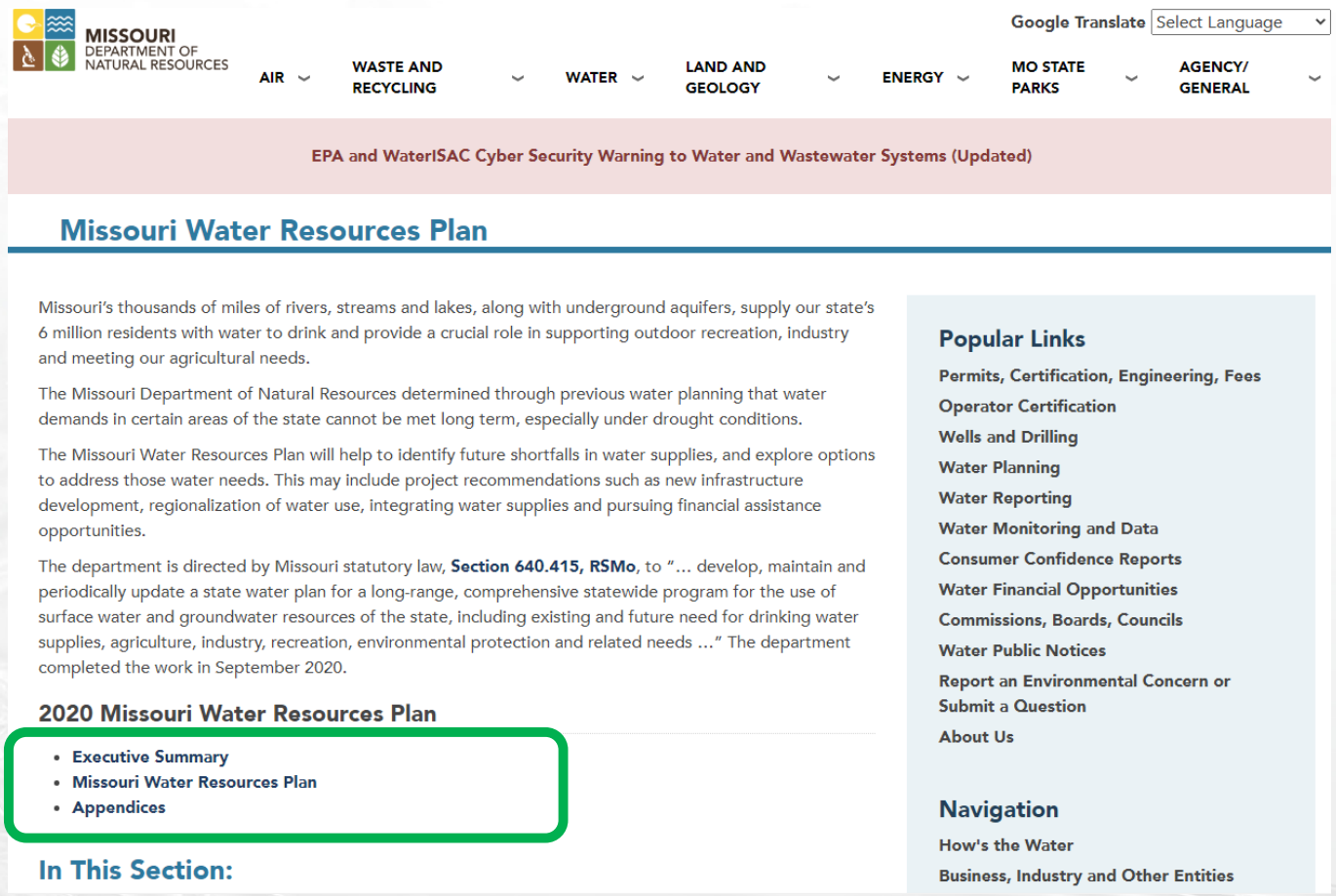
Where to Read the Plan



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NATURAL RESOURCES

dnr.mo.gov/mowaterplan/

Thank You

Jennifer Hoggatt
(573) 751-1403
jennifer.hoggatt@dnr.mo.gov

Day 1 – Wednesday, June 8, 2022
2:30-3:30pm

Oklahoma Presentation

Owen Mills, Director of Water Planning
Oklahoma Water Resources Board

Oklahoma Comprehensive Water Plan

U.S. Army Corps of Engineers Southwestern Division Civil Works Strategic Plan Workshop

Owen Mills Director of Water Planning | OWRB

OKLAHOMA Water Resources Board

Dallas, TX // June 8, 2022

- Background – Comprehensive Water Plan (OCWP)
- How OCWP Was Developed
- What the OCWP Covers
- After OCWP Submittal (*Next Steps*)

Background
OK Comprehensive Water Plans & 2012 Water Plan (OCWP)

- Identifies tasks, studies, or programs where USACE/PAS played a substantial role

// What is State Water Planning in Oklahoma?

OWRB has authority:

- Water Rights Permitting – GW *(private)* & SW *(public)*
- Monitor streams, lakes, and groundwater *Quantity & Quality*
- Enforce NPDES / WQS (DEQ)
- Quantify/Model & provide data on GW & SW basins
- License and enforce well drillers
- License and enforce dam construction and maintenance
- Negotiate interstate compacts
- Project state-level supply and demand *and some other stuff…*

// What is State Water Planning in Oklahoma?

OWRB does NOT have the authority to:

- Require regional plans
- Meter water use* *(use reporting is honor system, except municipal)*
- Fund projects** e.g. build infrastructure, move water
- Enforce on interference*
- Consider environmental flows in a permit*
- Deny a permit* *(if requirements are met)*

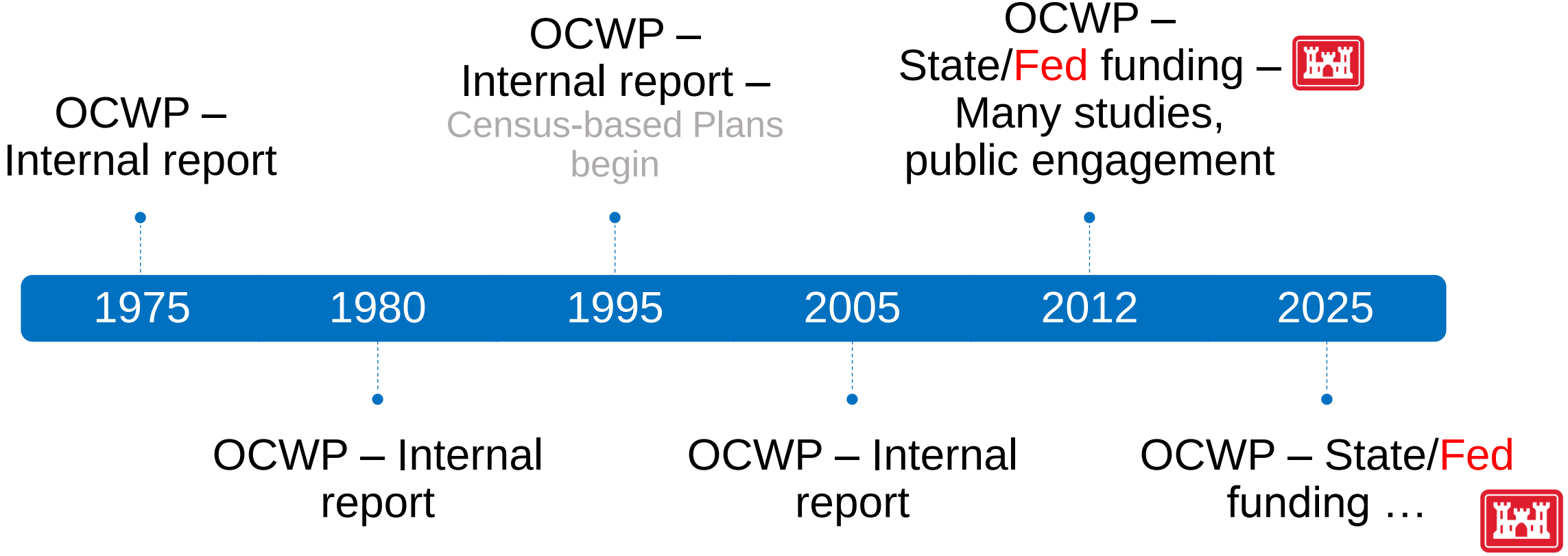
** There are exceptions*

*** OWRB does finance projects (CWSRF/DWSRF/State SRF)*

// What is the Role of our State Plan?

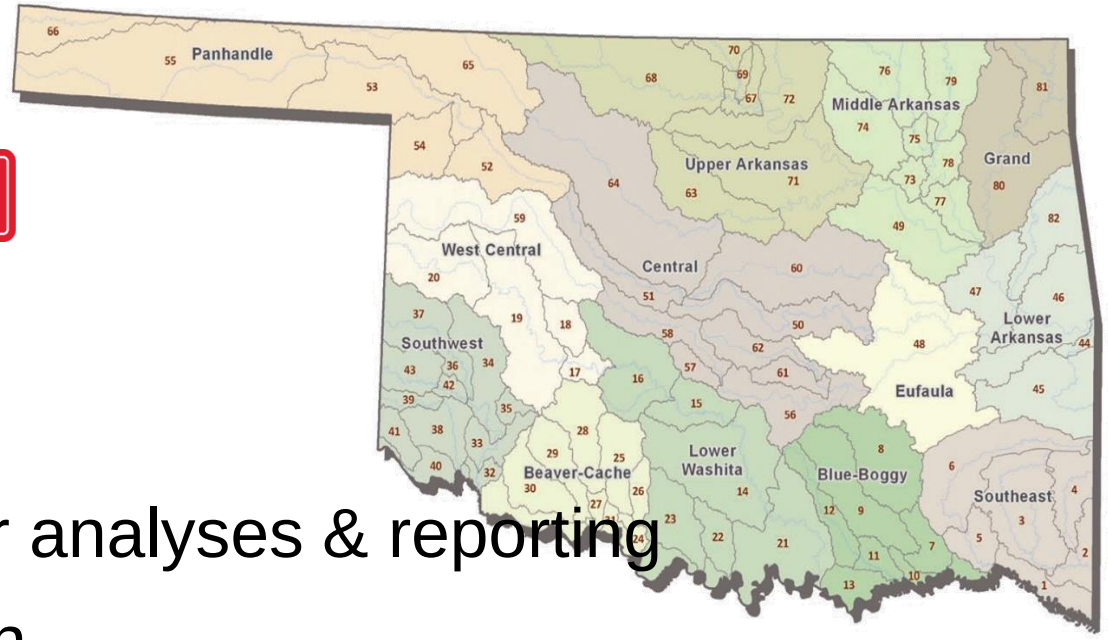
1. **Data – reliable, consistent, statewide info for planners, users, and decision-makers**
   - 50-year supply and demand projections (required)
   - Infrastructure needs assessment
   - Permit availability & physical availability
   - Basin data summaries, concerns, and supply options
   - Many more…
2. **Engagement – discover new priorities and validate existing ones, increase awareness**
3. **Develop recommendations, supporting policy initiatives, and technical strategies**

// Background of Oklahoma Comprehensive Water Plan



2012 OCWP Recap

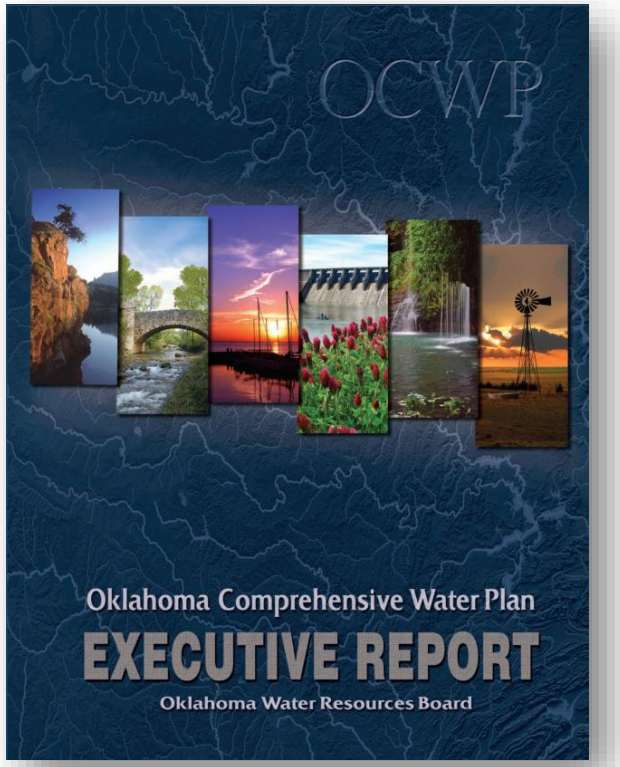
// 2012 Oklahoma Comprehensive Water Plan

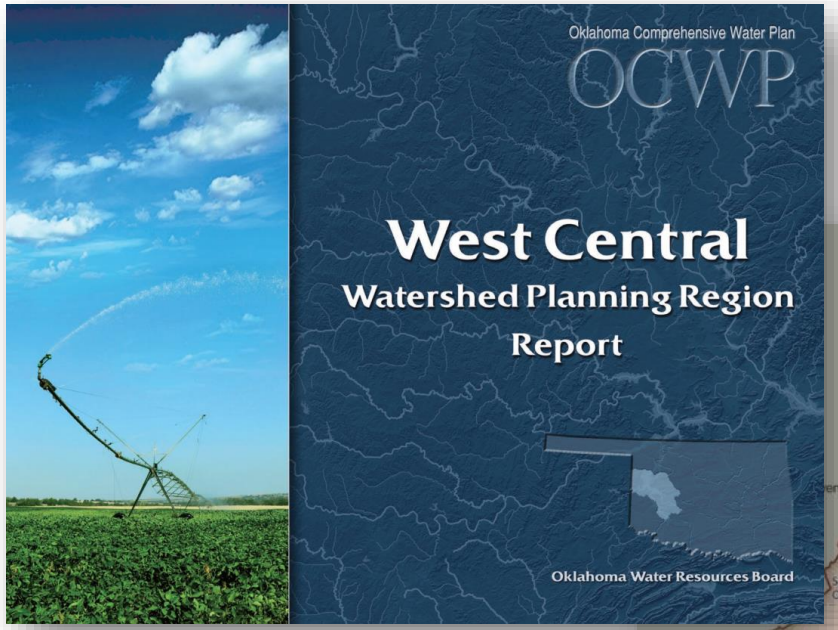


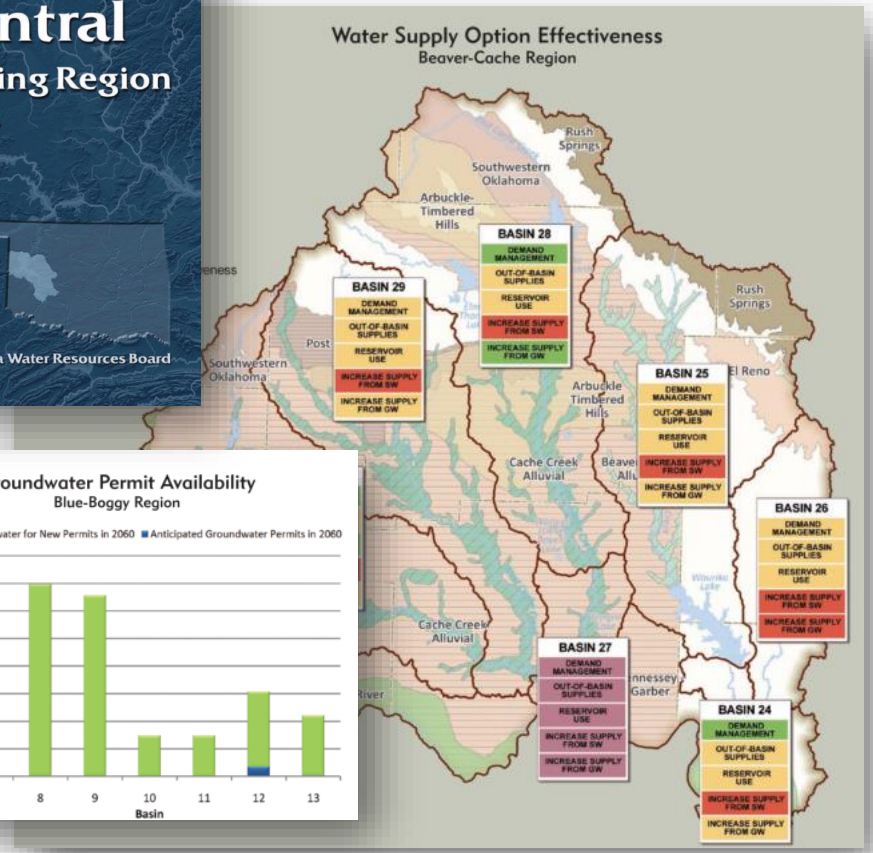
- 50-year water resource assessment
- Developed Basins (82) & Regions (13) for analyses & reporting
- Source options identified for every basin
- 5-year process with numerous stakeholders and technical partners
  - State Water Policy Recommendations
  - Robust technical data and topic-specific studies and workgroups
  - Assessment of future water shortages, water quality challenges, and solutions

Overarching goal: Provide options for safe, reliable water supplies to meet Oklahoma's diverse future resource needed for water security, economic prosperity, and quality of life

// 2012 OCWP: Example Outputs







OKLAHOMA Water Resources Board

// Key outcomes of the 2012 OCWP

Supply / demand vulnerabilities quantified by basin

Projected 50-year water and wastewater infrastructure needs

Secured Funding for applied studies/monitoring

Supplemental reports & studies on current issues

Publicly supported recommendations

Spin-off Water for 2060 Act

// Key Legislation of the 2012 OCWP

Legislation and Funding

- Funding approval: Groundwater Monitoring Network
- Funding approval: Groundwater Studies (yield and recharge)
- HB 3055 Water for 2060 Act (a state goal, not a mandate)
- SQ 764 – Water Infrastructure Credit Enhancement Reserve Fund
- SB 1043 ODEQ Reuse Framework

// 2012 OCWP Priority Policy Recommendations

- Infrastructure Financing
- Conservation, Efficiency, Reuse
- Water Monitoring
- Supply Reliability
- Fish & Recreation Flows
- Excess/Surplus
- State/Tribal Resolution
- Regional Planning

// 2012 OCWP Supporting Recommendations

Nonpoint Source Pollution	Water Quality Management	Maximizing and Developing Reservoir Storage	Water Management and Administration
Dam Safety and Floodplain Management	Navigation	Interstate Water Issues	Source Water Protection
Water Emergency/Drought Planning	Water Supply Augmentation	Agricultural & Other Water Research	Climate and Water Impacts on Water Management

// Resulting Legislation and Collaborative Studies

- Phase II Arbuckle-Simpson
- Water Bank Development Strategy
- Water Settlement Planning and Blue River ISF Economic Study
- Upper Red and Upper Washita Studies
- Illinois River Phosphorus WQ Standards Rulemaking
- Soil Health Economic Value Study
- Master Irrigators Program
- Produced Water Chemical Characterization
- GRDA Grand River Water Study and Operations Analyses
- HB3405 Use of brackish or marginal groundwater
- SB1219 Aquifer storage framework
- SB1043 Water Reuse Framework
- SB1294 Gradual implementation of groundwater limits
- HB2263 Irrigation District Act
- SB1875 Oil and Gas Produced Water Recycling Act

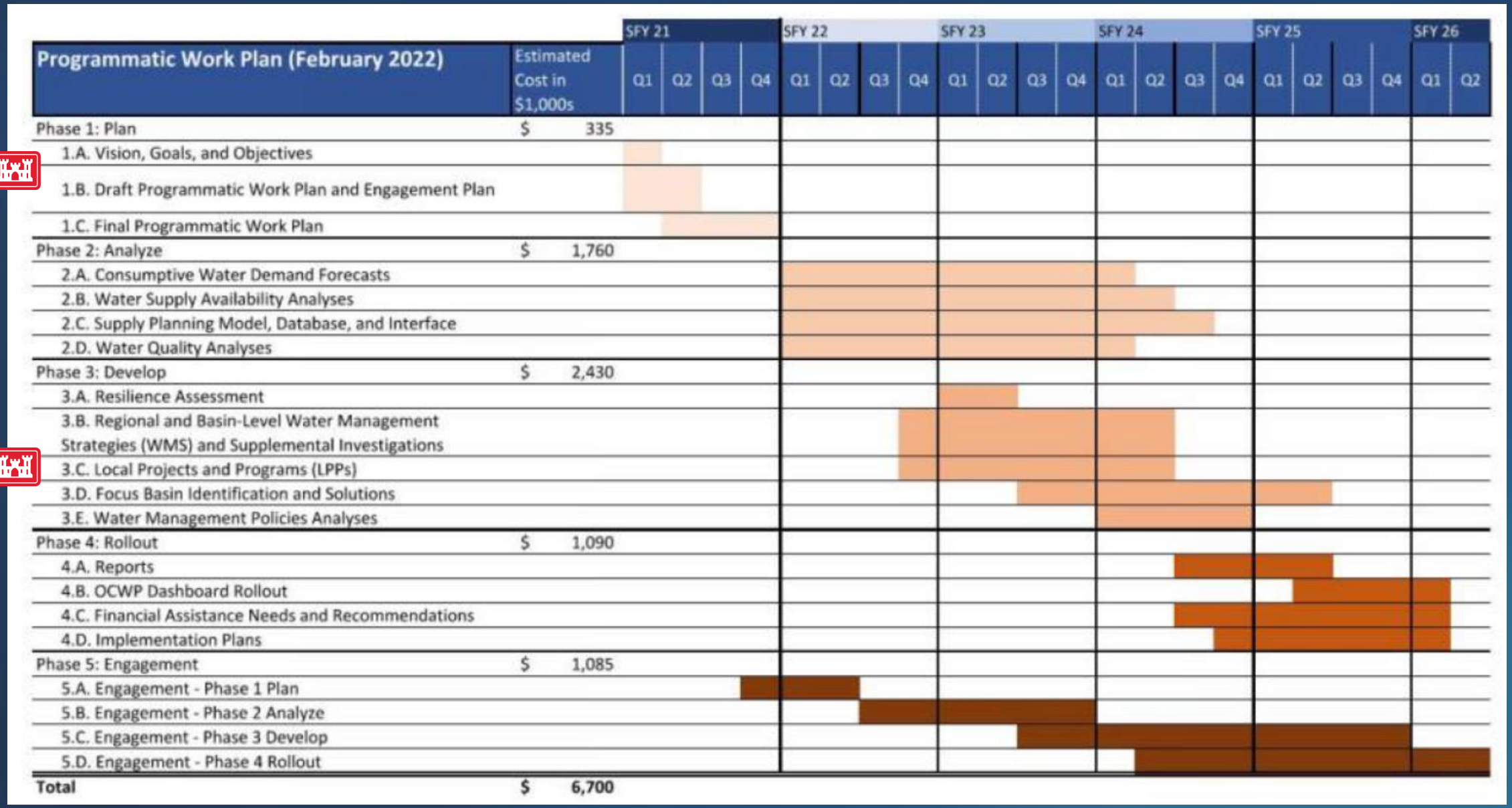
2025 OCWP
Oklahoma Comprehensive Water Plan

How was it developed?

2025 Update to the Oklahoma Comprehensive Water Plan

// How was 2025 OCWP PWP developed?

- **Drafted Programmatic Work Plan (PWP) based on:**
  - Review of 2012 OCWP comments and recommendations
  - Review of other state plans
  - Knowledge of perceived priority Oklahoma water challenges
- **Held focused engagement meetings with key organizations and interests from across the state:**
  - Agencies, municipalities, tribal nations, operators, NGO's, academia, finance, etc.
  - Commented on draft Work Plan
  - Shared their own OCWP "wish lists"
- **Updated PWP with new or updated tasks and sub-tasks.**



Programmatic Work Plan (February 2022)	Estimated Cost in $1,000s	SFY 21 Q1	SFY 21 Q2	SFY 21 Q3	SFY 21 Q4	SFY 22 Q1	SFY 22 Q2	SFY 22 Q3	SFY 22 Q4	SFY 23 Q1	SFY 23 Q2	SFY 23 Q3	SFY 23 Q4	SFY 24 Q1	SFY 24 Q2	SFY 24 Q3	SFY 24 Q4	SFY 25 Q1	SFY 25 Q2	SFY 25 Q3	SFY 25 Q4	SFY 26 Q1	SFY 26 Q2
Phase 1: Plan	$ 335																						
1.A. Vision, Goals, and Objectives																							
1.B. Draft Programmatic Work Plan and Engagement Plan																							
1.C. Final Programmatic Work Plan																							
Phase 2: Analyze	$ 1,760																						
2.A. Consumptive Water Demand Forecasts																							
2.B. Water Supply Availability Analyses																							
2.C. Supply Planning Model, Database, and Interface																							
2.D. Water Quality Analyses																							
Phase 3: Develop	$ 2,430																						
3.A. Resilience Assessment																							
3.B. Regional and Basin-Level Water Management Strategies (WMS) and Supplemental Investigations																							
3.C. Local Projects and Programs (LPPs)																							
3.D. Focus Basin Identification and Solutions																							
3.E. Water Management Policies Analyses																							
Phase 4: Rollout	$ 1,090																						
4.A. Reports																							
4.B. OCWP Dashboard Rollout																							
4.C. Financial Assistance Needs and Recommendations																							
4.D. Implementation Plans																							
Phase 5: Engagement	$ 1,085																						
5.A. Engagement - Phase 1 Plan																							
5.B. Engagement - Phase 2 Analyze																							
5.C. Engagement - Phase 3 Develop																							
5.D. Engagement - Phase 4 Rollout																							
Total	**$ 6,700**																						

Programmatic Work Plan

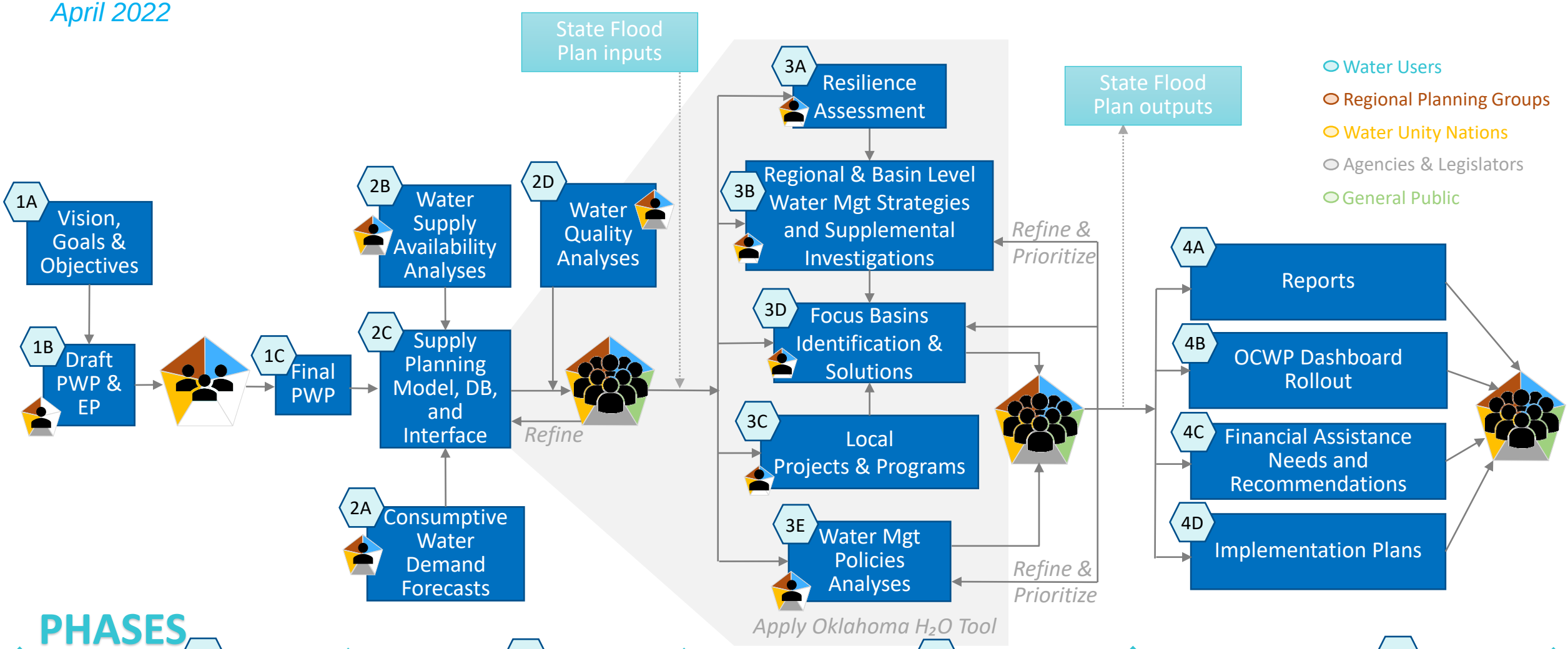
Programmatic Work Plan (February 2022)		Brief description
1	**Phase 1: Plan**	
1.A.	Vision, Goals, and Objectives	Define OCWP initial goals, objectives, and vision.
1.B.	Draft Programmatic Work Plan and Engagement Plan	Develop initial framework for the Programmatic Work Plan (PWP) and Engagement Plan (EP).
1.C.	Final Programmatic Work Plan	Refine PWP workflow and planned OCWP products based on feedback from 5A engagement meetings.
1.D.	Project Coordination and Collaboration	Project coordination and collaboration for Phase 1 work.
1.E.	Quality Management	QA/QC for Phase 1 work.
2	**Phase 2: Analyze**	
2.A.	Consumptive Water Demand Forecasts	
2A 100	Data Collection and Analysis	Aggregate and compile the avail information base of population (areas, categorical growth and us connections, per capita use, wat estimated historical water use fc municipal uses and geographic r determine historical trends.
110	Water Demand - Data Collection and Analysis	Aggregate and compile the avail information base of population (areas, categorical growth and us connections, per capita use, wat estimated historical water use fc municipal uses and geographic r determine historical trends.
120	Water Demand - incorporate 2020 census and/or 2020 USGS	Gather and review data
2A 200	Develop Demand Forecasts by Decade to 2075 (Including Existing, Planned, and Passive Conservation)	Establish assumptions and perfo analyses towards development c projections by use category at th conservation, goals, and estimat efficiency will be developed and
210	Develop Demand Model and Forecast for All Water Use Sectors	Statistically analyze each water u categorical characteristics of hist past water use.

Programmatic Work Plan (February 2022)		Brief description
6D0	Other studies	Other studies as identified by OWRB or water users, subject to funding availability.
6Z0	... Reserved	
3B 700	... Reserved	
3B 900	Regional and Basin-Level Water Management Strategies Report	Document Task 3B methods and findings, excluding Supplemental Investigations that may have their own dedicated reports.
3.C.	Local Projects and Programs (LPPs)	
3C 100	Establish Eligibility Criteria for Inclusion in OCWP / Financial Assistance Eligibility	Develop criteria for projects to be included in OCWP LPP database. Compile eligibility criteria for existing or potential future financial programs and recommend changes to be considered. Results from this work may be incorporated into water management policies work (3E).
3C 200	Inventory Potential LPPs	
210	Water Supply and Infrastructure Needs Survey (WSINS)	Solicit LPP information from additional water providers, possibly through use of a survey or other outreach mechanisms.
220	Wastewater collection and treatment infrastructure needs (CWNS)	Solicit LPP information from additional water providers, possibly through use of a survey or other outreach mechanisms.
230	Coordinate survey with other OCWP elements	
3C 300	Screen LPPs Using Eligibility Criteria	Using criteria developed in 3C100, screen LPP list and identify which projects are eligible for existing or potential future financial programs.
3C 400	Populate Interactive Portal from 3C with LPP Content	Populate LPPs into geospatial coverages in the interactive OCWP Portal.
3C 500	... Reserved	
3C 900	LPPs Report	Summarize findings from analyses into report. Report will include documentation of LPP screening criteria and weighting criteria (if appropriate for funding).
3.D.	Focus Basin Identification and Solutions	
3D 100	Identify Focus Basins (FBs)	Develop criteria and scoring method to assess all 82 basins relative to physical water availability, legal water availability, and water quality. Identify FBs based on this process.

Programmatic Work Plan and Engagement Plan

// OCWP PWP and Engagement Framework

April 2022



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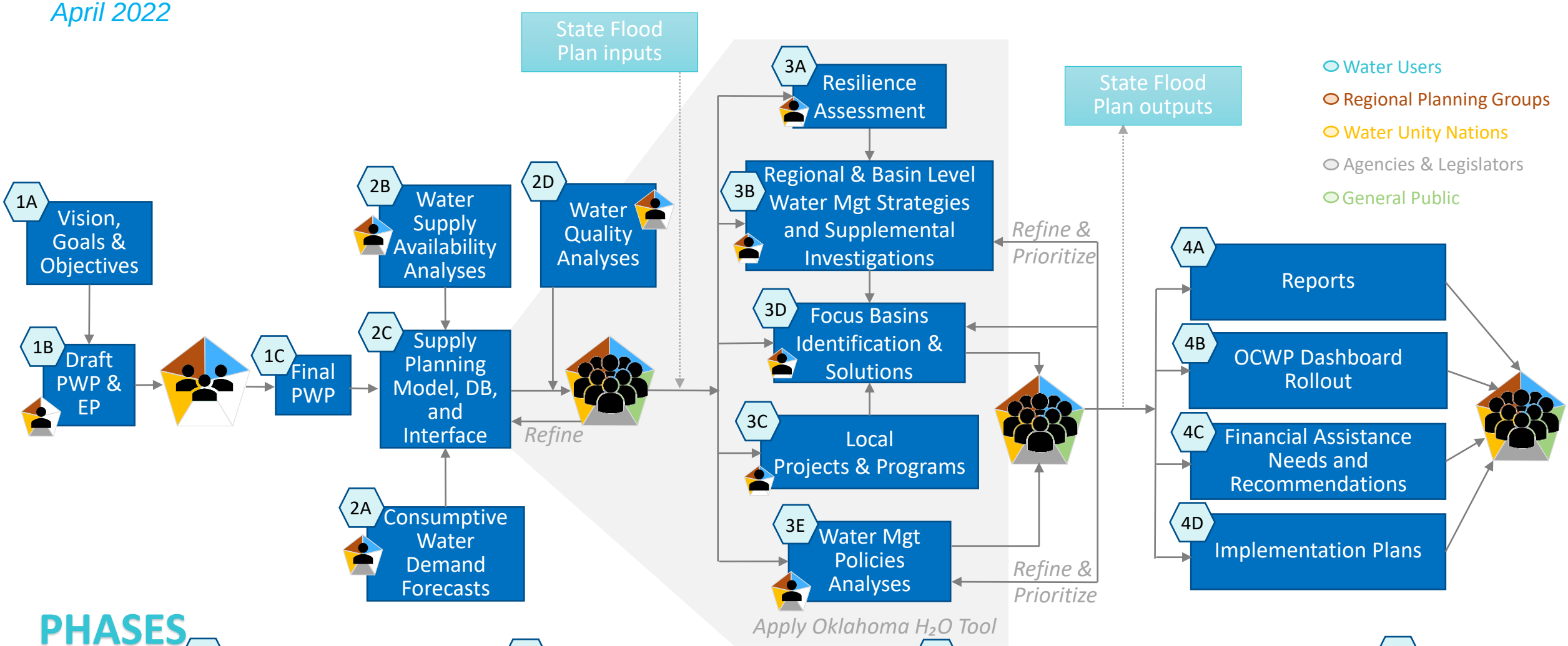
// OCWP PWP and Engagement Framework

April 2022



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2025 OCWP
Oklahoma Comprehensive Water Plan

What does it cover?

Key Activities of the 2025 OCWP

// Key activities for 2025 OCWP

2025 OCWP
Oklahoma Comprehensive Water Plan

Supply/Demand vulnerabilities quantified by basin

Project 50-year infrastructure needs

Focus Basin studies & OK Flood Plan*

Funding* to address water supply and quality challenges; infrastructure needs

Publicly supported recommendations

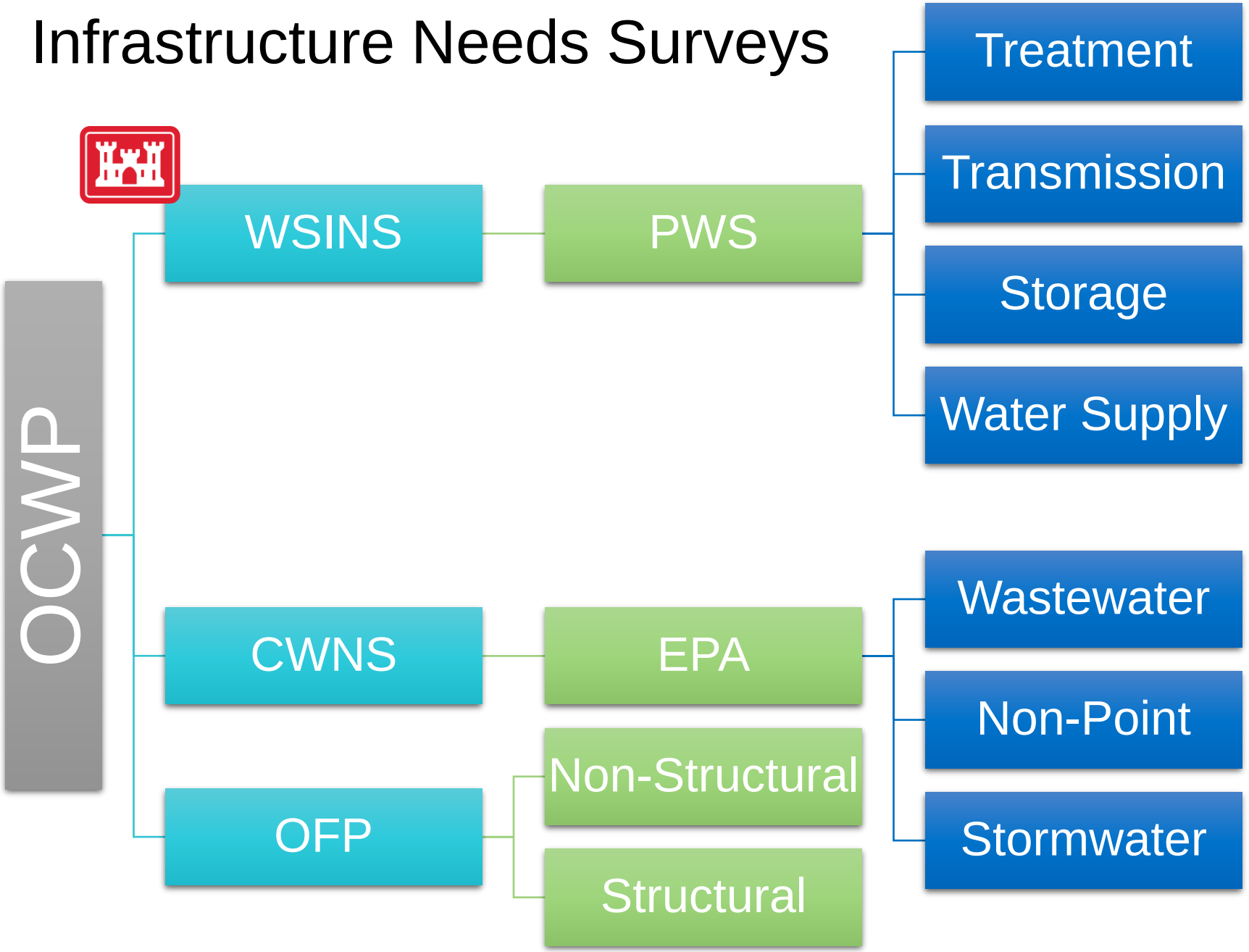
Focus groups*

Supplemental reports & studies on current issues & WQ Trends*

Water for 2060 Act Conservation activities, studies, regulatory develop*

* New or reformatted from 2012 OCWP effort

Infrastructure Needs Surveys



Data

- current demands gcpd.
- Short/med/long term infrastructure needs & costs.
- Capacity.
- Supply sources.
- Permitting needs.
- Goals/expectations.
- Conservation efforts
- Challenges.
- CIP.
- many others.

// Results and recommendations baked into the OCWP from today's hot topics and key challenges

Regional planning

Infrastructure needs

Irrigation Exploratory Workgroup

Nonconsumptive flow management

Water Reuse Action Plan

Workforce development

Source water protection

Others

These groups will elevate the issues, move the ball down-field, and perhaps bring ONE VOICE to bear on the needs for a focus on water management in Oklahoma

// What does the 2025 OCWP cover? *(will refine this)*

Data and technical studies

- Spatial Analyses: Supply Availability, Demand, Quality Trends.
- Forecasts: Database Model, decadal forecasting scenarios.
- Resilience Assessment.
- Regional & Basin Level water management strategies.
- Identification of focus basins and development of solution strategies.
- Local projects needs database.
- Financial needs and assistance recommendations state, regional, local.

Policy issues

- Collaborative workgroups:
  - OK Water Reuse Action Plan.
  - Source Water Protection Action Plan and Collaborative.
  - Workforce Action Plan.
  - Irrigation Workgroups.
  - Other workgroups:
    - Water Coalition.
    - Soil Health or other agriculture.
    - Others TBD.
- Legislative recommendations based on focus groups and public input.

Engagement

- On-going meetings, email, and informal conversations with stakeholder groups and interested parties.
- Living/updateable OCWP data/info dashboard with custom queries.

2025 OCWP
Oklahoma Comprehensive Water Plan

What is Planned Next?
Implementation of the 2025 OCWP

// Schedule for OCWP

State Flood Plan

2020

- Initial Vision and Goal setting.

2021-2022

- Draft Workplan.
- Initial Engagement.
- Supply/demand projections.
- Water Quality Analysis.
- Technical Studies.
- Online tool Development Begin.

2022-2023

- Resilience Assessment.
- Regional & Basin Level Water Mgt Strategies.
- Focus Basins.
- Local Infrastructure Projects.
- Develop Water Management Policies.
- Technical Studies.

2024-2025

- Technical Studies
- Policy. Recommendations.
- Online tool/data.
- OCWP final recommendation.

Stakeholder Engagement

// What's Planned Next (2025 OCWP Implementation)

- With One Water/IWRM in mind, Prioritize, fund, and pursue any OCWP recommended studies
- Assist all OK water sectors to use OCWP data/info/findings to actualize local solutions
- Continue basin yield studies and implement findings
- Where appropriate, carry on OCWP workgroups and assist to further group objectives such as the OK Water Reuse Action Plan
- Where appropriate, assist with legislative actions on policy recommendations
- Implement OCWP water management strategies where there is local interest
- Elevate water needs via one voice among water interests
- More to come

// Discussion With Other States

- Who are the primary users/audiences for your state plan? How do you know that? What feedback do you hear from them regarding the plan's contents? What do they want more of? Less of? How do they access the information?
- How does your state account for interstate Compact requirements in your planning – both in term of inflows to, and outflows from, your state? What are your key assumptions about Compacts when you're looking ahead several decades?
- Does your state have processes for managing groundwater pumping? If yes, are the processes voluntary or regulatory in nature? For critical aquifers that cross state boundaries, should states work collaboratively to better align management actions?

// Discussion With Other States

Figure 5-6 - Maximum Annual Surface Water Gap for 1950 through 2007 Historical Hydrology and 2060 Demands

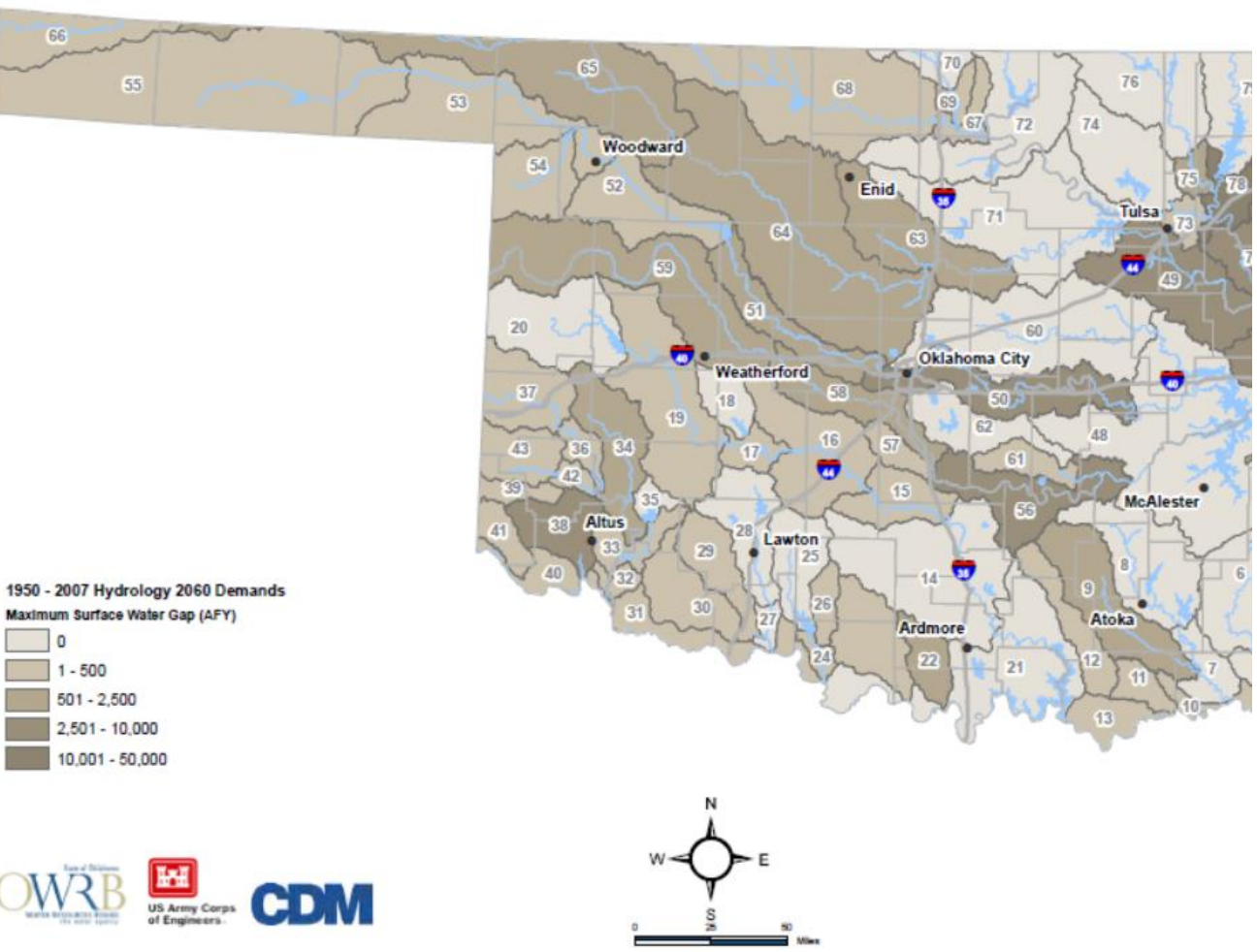
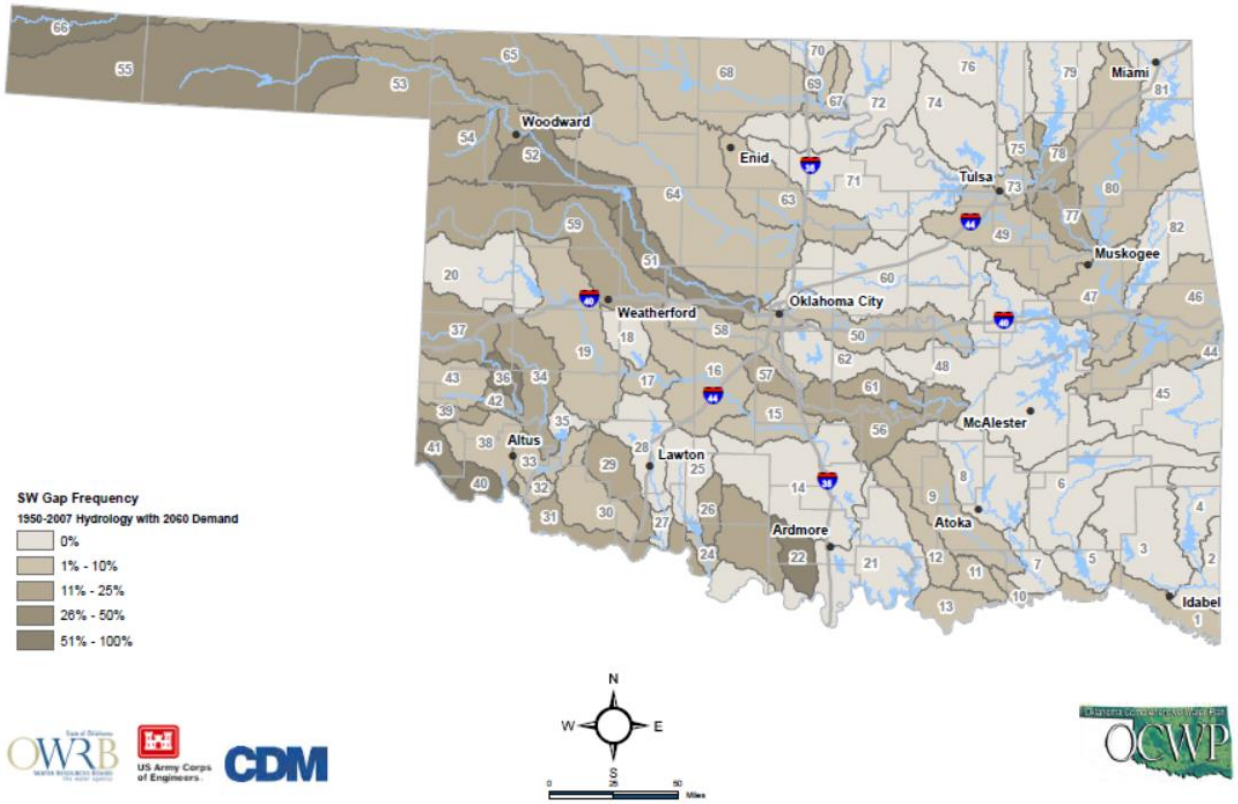


Figure 5-8 - Frequency of Annual Surface Water Supply Gaps for 2060 Demands



2025 OCWP
Oklahoma Comprehensive Water Plan

THANK YOU!

Owen Mills, *primary contact for OCWP*
Director of Water Planning
Owen.Mills@owrb.ok.gov

Yohanes Sugeng, PE, *primary contact for OFP*
Engineering and Planning Division Chief
Yohanes.Sugeng@owrb.ok.gov

Oklahoma Water Resources Board
405-530-8800

www.owrb.ok.gov/ocwp/2025OCWP.php

Break

3:30-3:45pm

Day 1 – Wednesday, June 8, 2022
3:45-4:45pm

Kansas Presentation

Matt Unruh, Assistant Director, Kansas Water Office

WATER PLANNING IN KANSAS

USACE SWD
Civil Works Strategic Plan (CWSP) Workshop

June 8, 2022

Kansas Water Office

Kansas Water Office

- Established in 1981 as the water planning, policy, coordination and marketing agency for the state.
- Coordinates with the Kansas Water Authority (KWA) on review of water laws and makes recommendations to Governor and Legislature for needed legislation to ensure water policies and programs address the needs of all Kansans.
- Primary statutory function is development and implementation of the Kansas Water Plan (K.S.A. 82a-903)

Kansas Statutes

74-2613 Kansas Water Office established
74-2608 Water Policy Development, Water Planning, and Agency Coordination
74-2622 Kansas Water Authority established
82a-220 Grant of streambank easement for navigable waters
82a-733 Water conservation plans
82a-901 ***et seq.*** State Water Resources Planning Act
82a-1101 ***et seq.*** Coordination of streambank projects
82a-1301 ***et seq.*** State Water Plan Storage Act
82a-1330 ***et seq.*** Water Assurance Program Act
82a-1401 ***et seq.*** Weather Modification Act
82a-1501a Water Transfer Act
82a-1604 ***et seq.*** Multipurpose Small Lakes Act
8sa-1801 ***et seq.*** Water Litigation Act and fund
82a-2101 Clean Drinking Water Fee
82a-2301 ***et seq.*** Lower Smoky Hill Supply Access Program
82a-2401 ***et seq.*** Reservoir Improvement District Act

Kansas Water Office

Kansas Water Office

Agency Mission:

Provide Kansans with the framework, policy and tools, developed in concert with agency partners and stakeholders, to manage, secure and protect a reliable, safe, long term statewide water supply.

Agency Purpose:

- Development of comprehensive State Water Plan
- Coordinate the water resource operations of agencies at all levels of government
- Ensure adequate quantities of good quality water to meet future needs
- Efficiently operate state owned storage in federal reservoirs

Kansas Water Office

Agency Overview

*Kansas Water Office

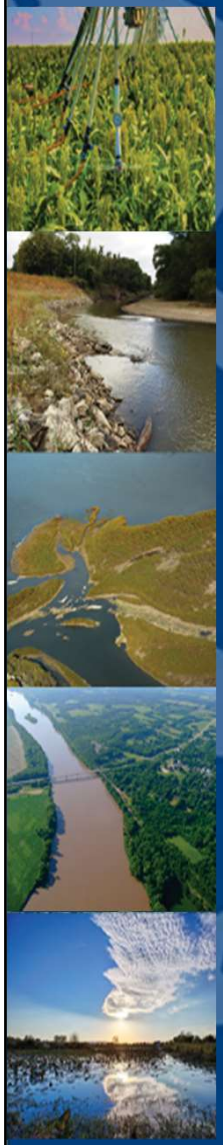
Water Planning & Implementation

- Kansas Water Authority
- Water Planning
  - State Water Plan Development & Implementation
- Drought Monitoring
  - Drought Response Team
  - Water Conservation Planning

Public Water Supply

- Public Water Supply Programs
  - Reservoir Operations
  - Water Marketing Program
  - Water Assurance Program
  - Access District Program

**KWO Director Appointed by Governor*



Water Planning

State Water Plan Development & Implementation

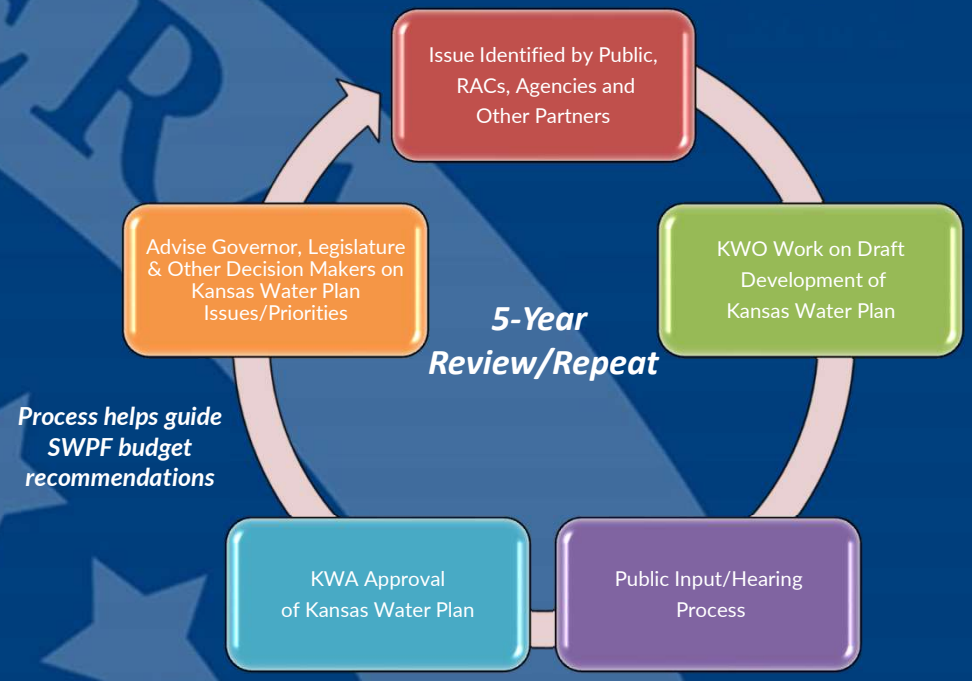
- Address state's current water resource issues and plan for future needs
  - Groundwater declines
  - Reservoir sedimentation
  - Water quality issues
- Public Input and Stakeholder Involvement
  - Regional Advisory Committees (RACs)

State Water Plan Fund

- Coordinate with KWA, RACs and agency partners to develop annual SWPF budget recommendations to implement State Water Plan

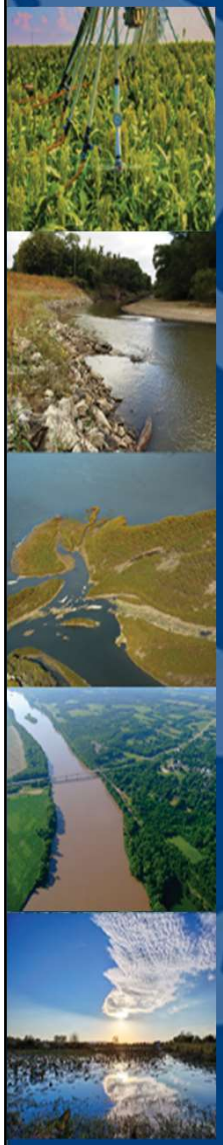
Kansas Water Office

The State Water Planning Process



Process helps guide SWPF budget recommendations

Kansas Water Office



Kansas Water Plan Development & Implementation Coordination

Ongoing Kansas Water Plan (KWP) Update

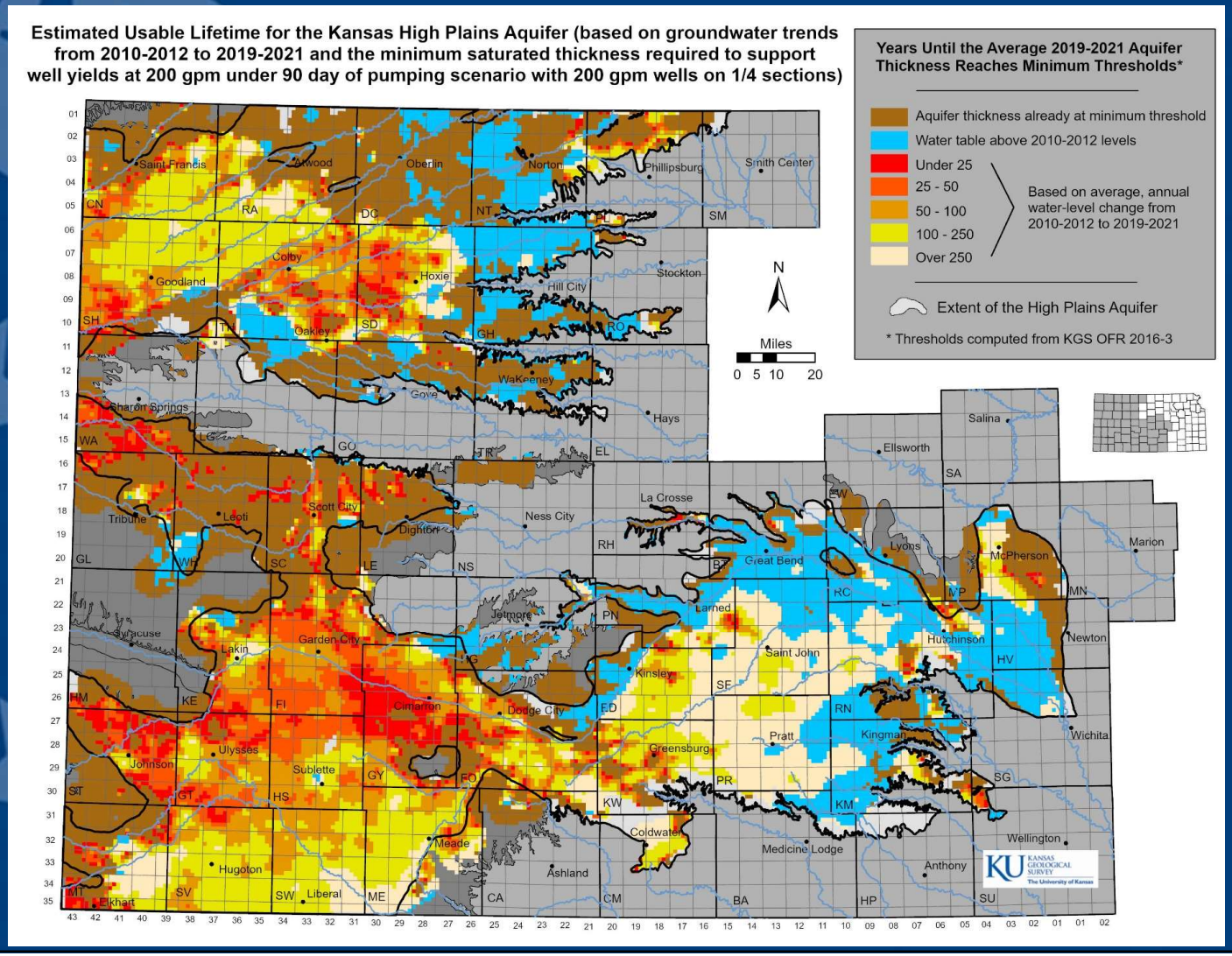
- Incorporation of Vision into updated KWP

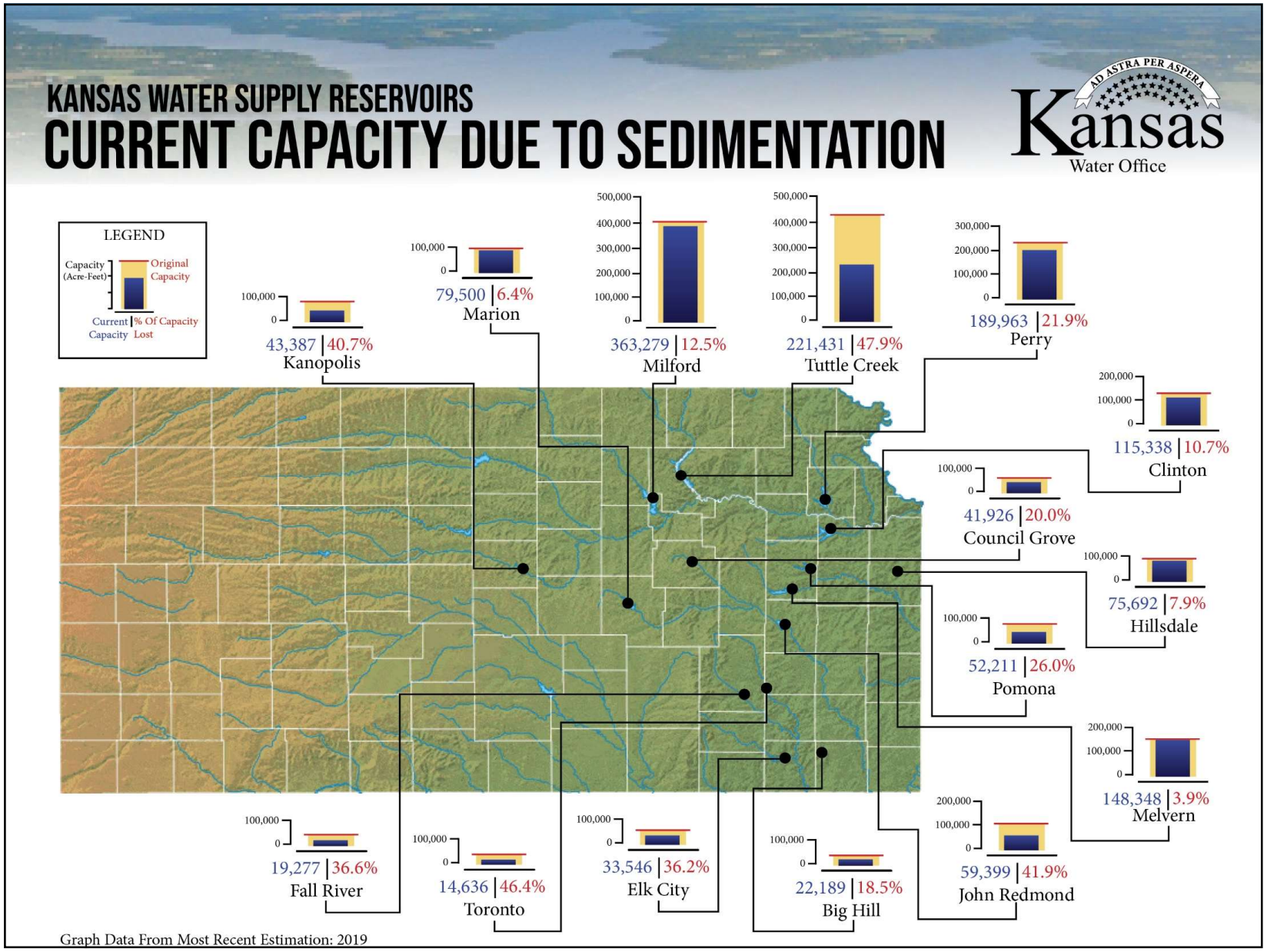
Guiding Principles and Priorities

- Conserve and Extend the High Plains Aquifer
- Secure, Protect and Restore Kansas Reservoirs
- Improve State's Water Quality
- Reduce Vulnerability to Extreme Events
- Increase Awareness of Kansas Water Resources

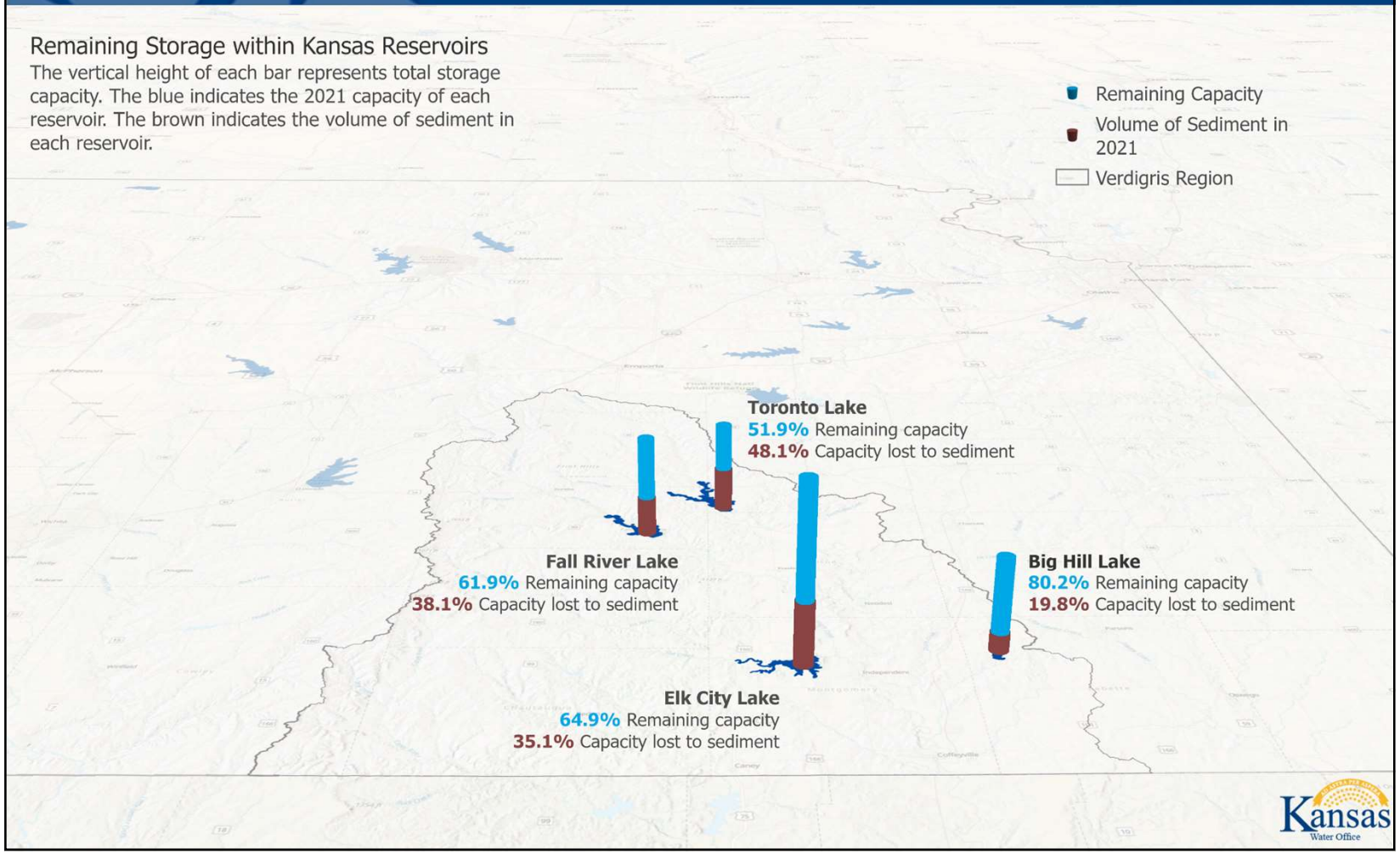
Kansas Water Office

High Plains Aquifer Declines

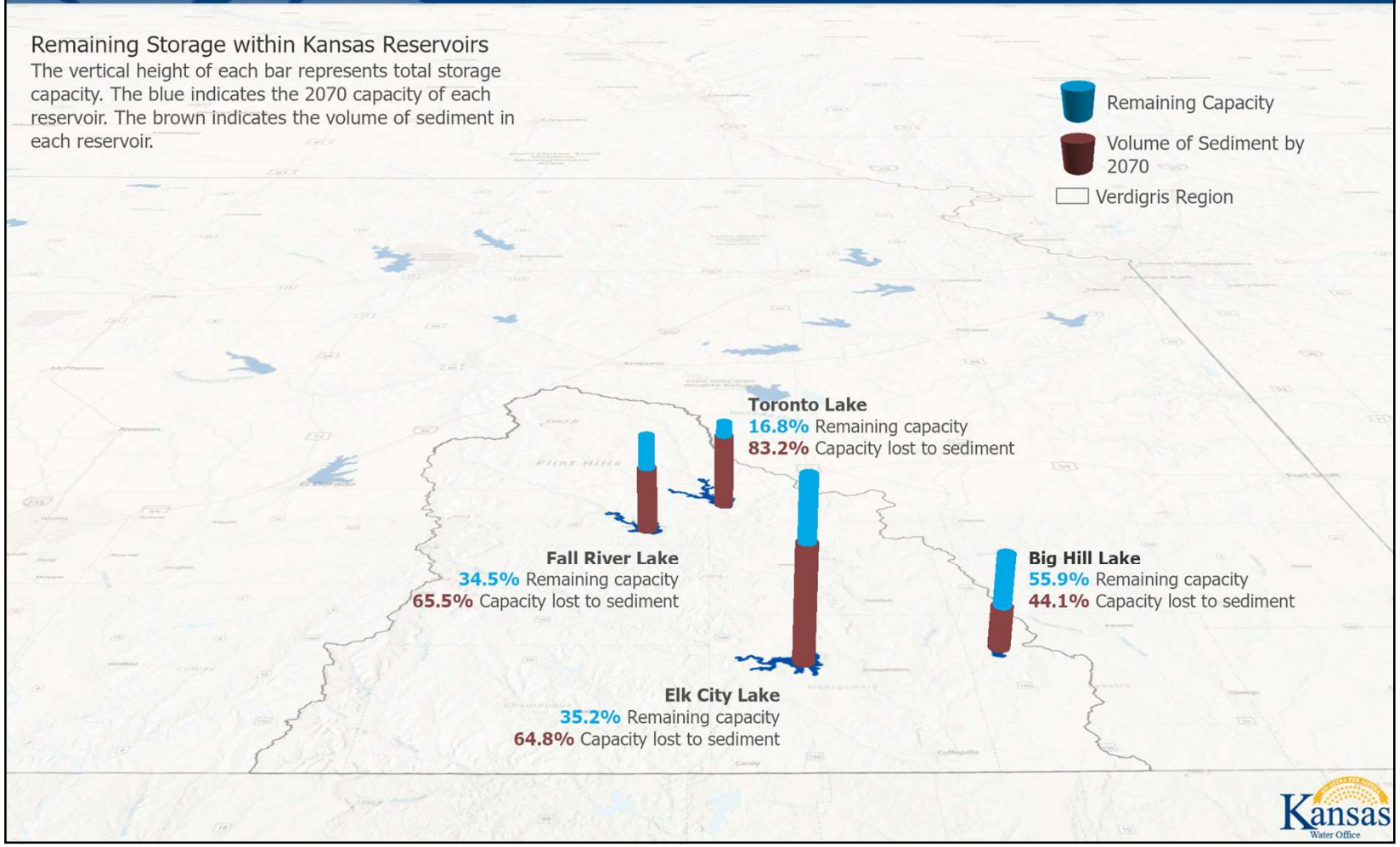



KANSAS WATER SUPPLY RESERVOIRS
CURRENT CAPACITY DUE TO SEDIMENTATION
Kansas
Water Office
LEGEND
Capacity (Acre-Feet)
Original Capacity
Current Capacity
% Of Capacity Lost
43,387 | 40.7%
Kanopolis
79,500 | 6.4%
Marion
363,279 | 12.5%
Milford
221,431 | 47.9%
Tuttle Creek
189,963 | 21.9%
Perry
115,338 | 10.7%
Clinton
41,926 | 20.0%
Council Grove
75,692 | 7.9%
Hillsdale
52,211 | 26.0%
Pomona
148,348 | 3.9%
Melvern
59,399 | 41.9%
John Redmond
22,189 | 18.5%
Big Hill
33,546 | 36.2%
Elk City
14,636 | 46.4%
Toronto
19,277 | 36.6%
Fall River
Graph Data From Most Recent Estimation: 2019

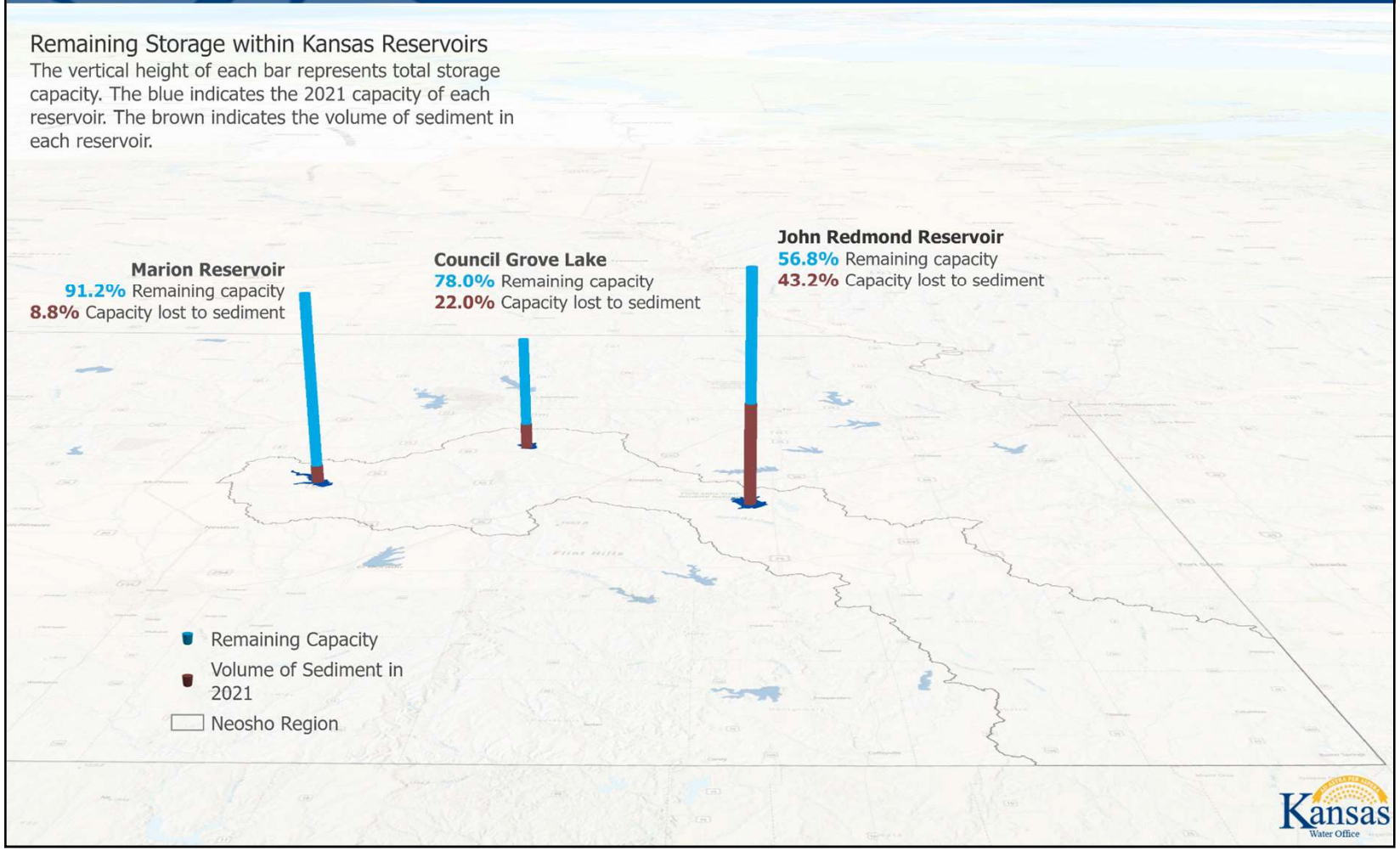
Recent Reservoir Capacity Verdigris River Basin



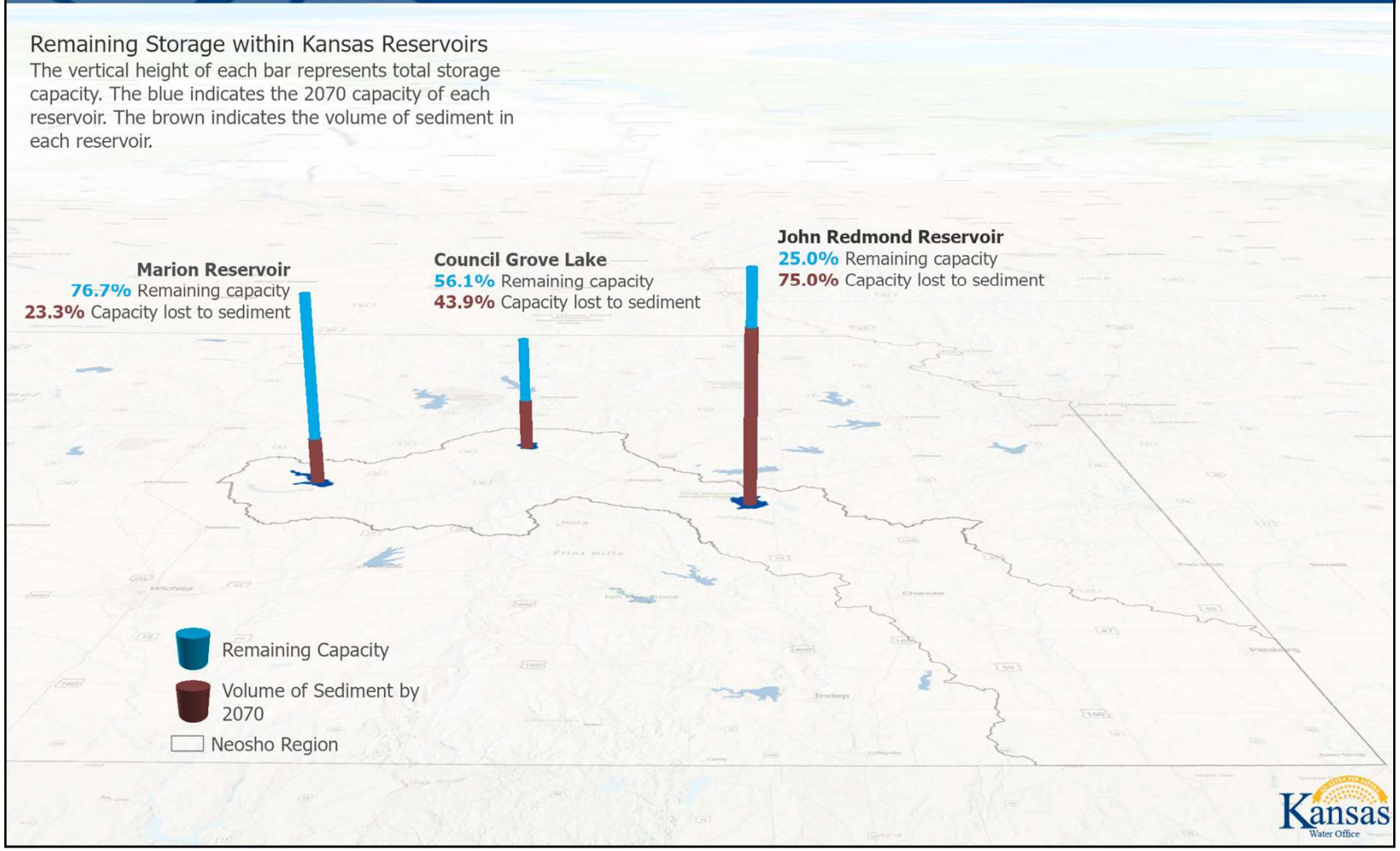
2070 Estimated Reservoir Capacity Verdigris River Basin



Recent Reservoir Capacity
Neosho River Basin

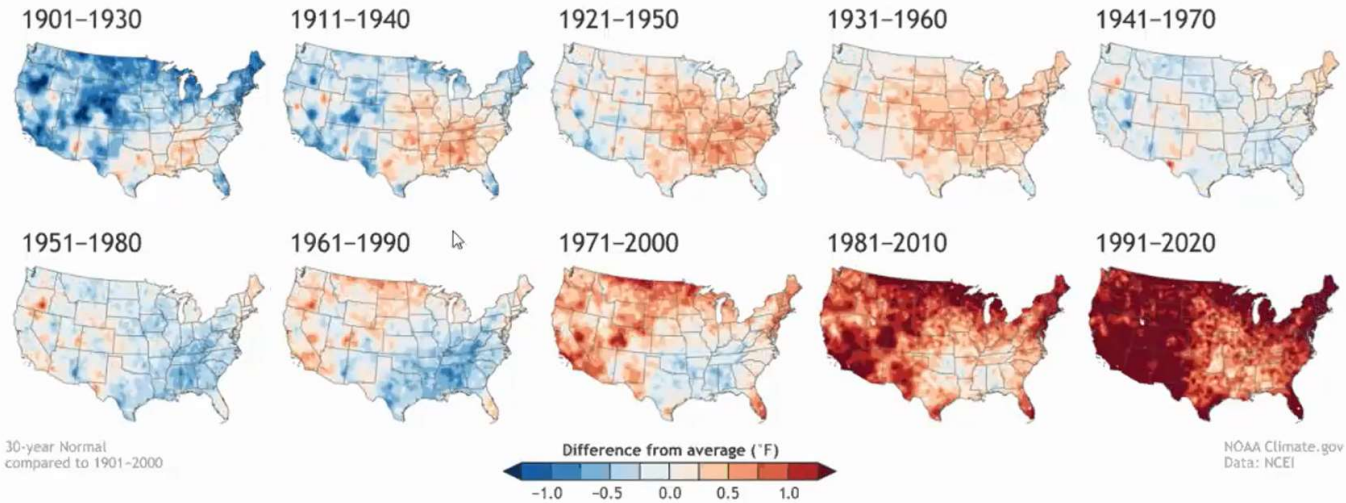


2070 Estimated Reservoir Capacity Neosho River Basin



Vulnerability to Extreme Events

Annual Temperature Normals since 1901 Compared to the 20th Century Average

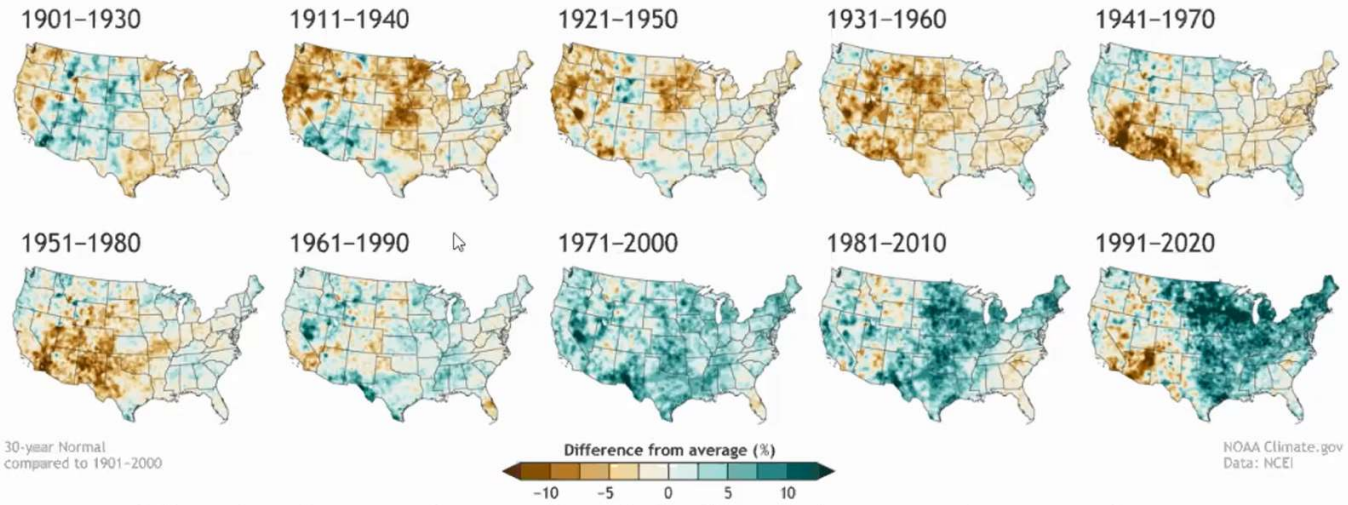


https://www.climate.gov/news-features/understanding-climate/climate-change-and-1991-2020-us-climate-normals

Doug Kluck Presentation: 2021 Governor's Water Conference

Vulnerability to Extreme Events

Annual Precipitation Normals since 1901 compared to the 20th Century Average

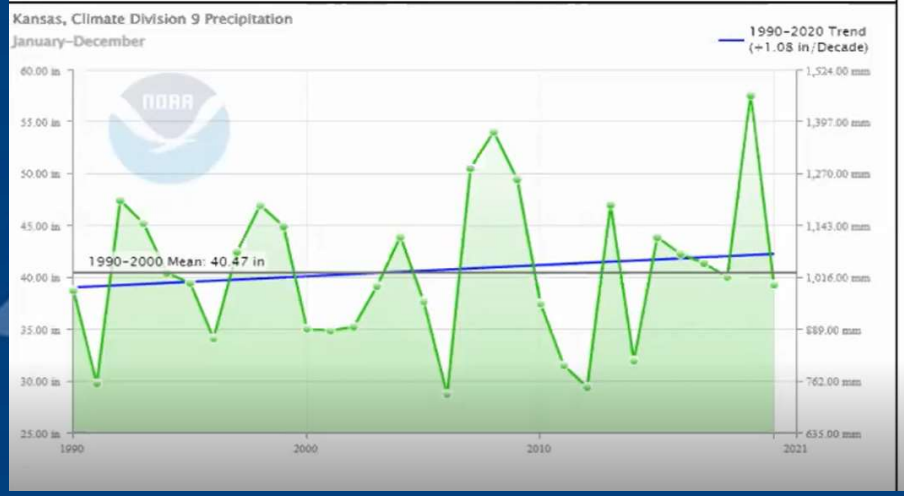


- Climate change is coming into focus in recent normals.

Doug Kluck Presentation: 2021 Governor's Water Conference

Vulnerability to Extreme Events

Precip Trends Last 30 years



Northwest KS -0.62”/decade

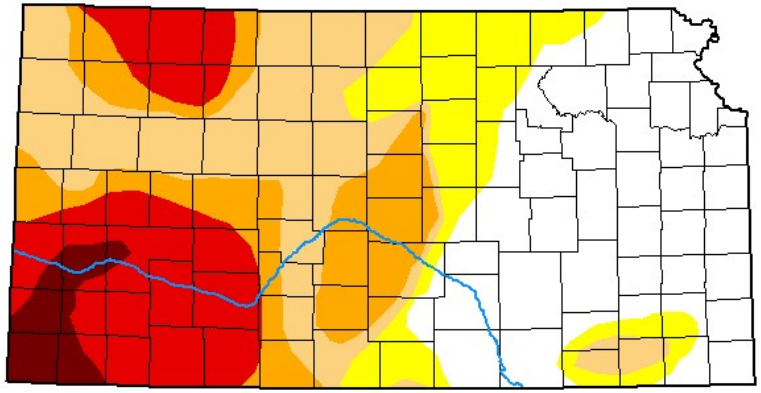
Southeast KS +1.08”/decade

Doug Kluck Presentation: 2021 Governor’s Water Conference

Vulnerability to Extreme Events

U.S. Drought Monitor

Kansas



May 31, 2022

(Released Thursday, Jun. 2, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	33.06	66.94	54.71	33.63	19.67	3.44
Last Week *05-24-2022*	28.98	71.02	65.27	44.41	25.80	4.09
3 Months Ago *03-01-2022*	0.00	100.00	72.87	44.07	5.92	0.02
Start of Calendar Year *01-04-2022*	25.19	74.81	52.34	14.06	2.45	0.00
Start of Water Year *09-28-2021*	51.22	48.78	15.04	4.14	0.00	0.00
One Year Ago *06-01-2021*	96.93	3.07	0.00	0.00	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

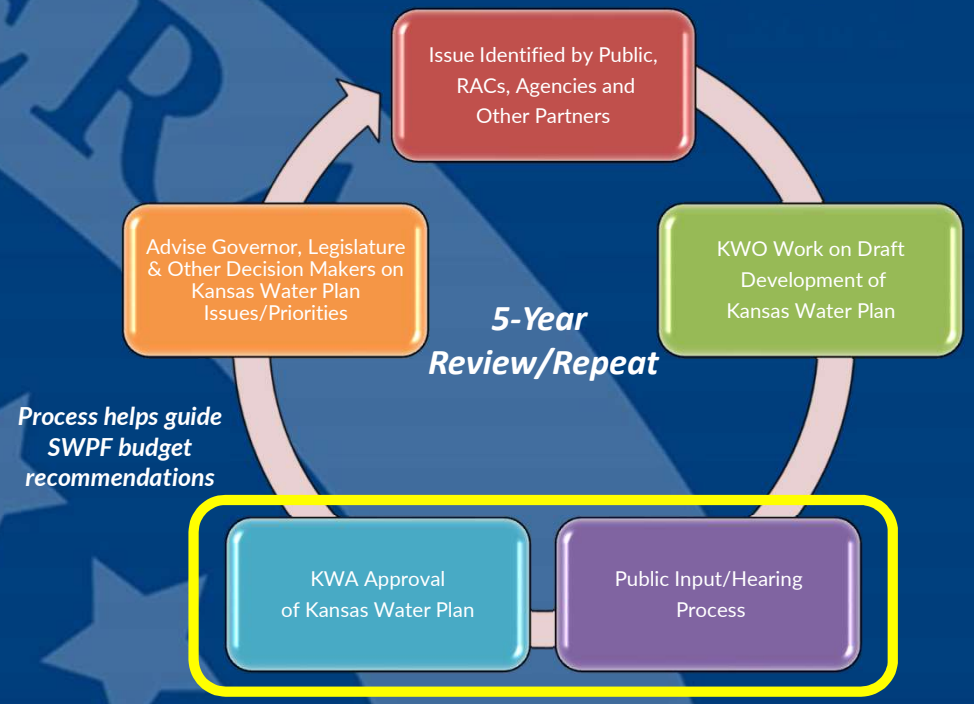
Author:

Curtis Riganti

National Drought Mitigation Center

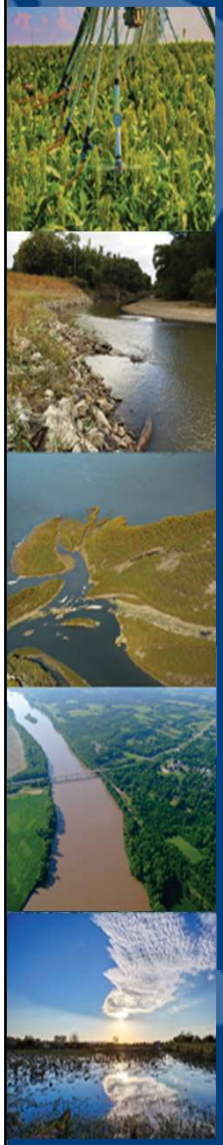
droughtmonitor.unl.edu

The State Water Planning Process



Process helps guide SWPF budget recommendations

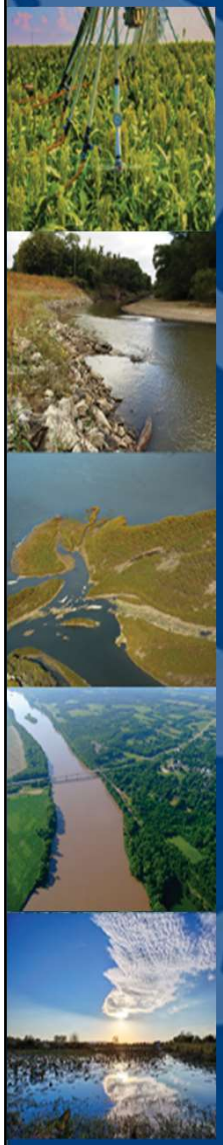
Kansas Water Office



Potential Opportunities for Collaboration Kansas Water Plan Implementation

- Identify opportunities for collaboration on studies, research, planning, demonstration and implementation to help Kansas work towards enhance extreme event resiliency of Kansas and response as well as reservoir sedimentation
  - In-lake reservoir sediment management
  - Flexible reservoir management strategies
  - Identify data gaps and develop strategies to improve river forecasting and understanding of sediment transport
  - Improved flood resiliency
  - Improved drought resiliency
  - *"Advance Notice & Navigation Support"*

Kansas Water Office



Questions?

Website: www.kwo.ks.gov

Phone: 785-296-3185

Office Email: kwo-info@kwo.ks.go

Matt Unruh
Assistant Director
Kansas Water Office

Matt.Unruh@kwo.ks.gov

Kansas Water Office

Day 1 – Wednesday, June 8, 2022
4:45pm

Closing Remarks

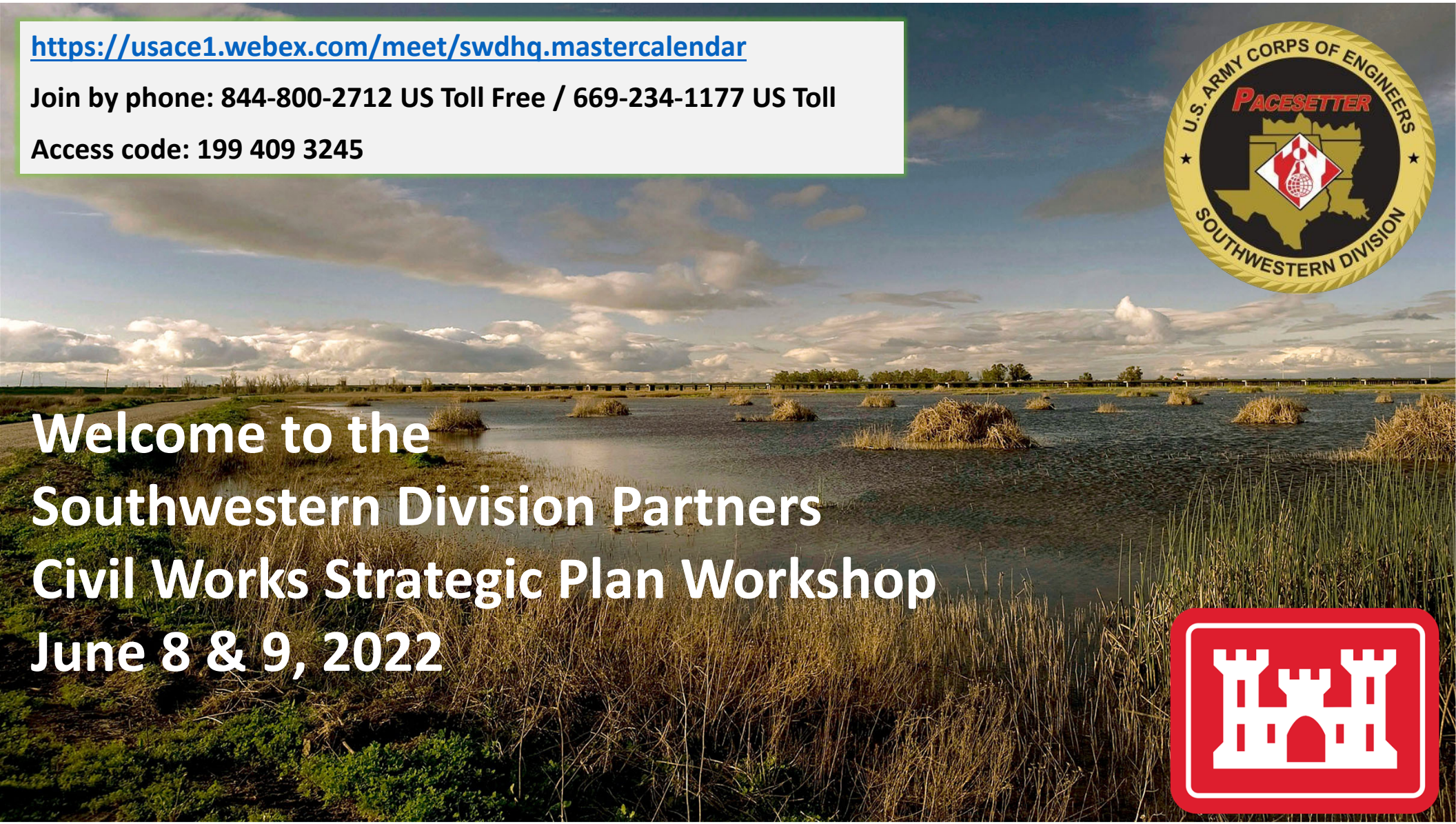
THANK YOU!

Please join us for Day 2 tomorrow at 9:00am

(…or earlier, for an informal "Commanders' Coffee" at 8:30!)

Day 2 – Thursday, June 9, 2022
8:30-9:00am

Informal “Commanders’ Coffee” and Optional Virtual Networking



https://usace1.webex.com/meet/swdhq.mastercalendar

Join by phone: 844-800-2712 US Toll Free / 669-234-1177 US Toll

Access code: 199 409 3245

Welcome to the Southwestern Division Partners Civil Works Strategic Plan Workshop June 8 & 9, 2022

Day 2 – Thursday, June 9, 2022
9:00-9:30am

Recap of Day 1
&
Icebreakers

Breakout Group Session “Icebreakers”

There will be six (6) Breakout Rooms, each with its own WebEx log-in.

Breakout Sessions will last 90 minutes.

Here are some “icebreaker” questions to get started:

- What is your name, agency, and time in service?
- What is your experience in Water Management?
- Which presentation(s) from Day 1 sparked interest for you?
- What is the next big challenge in front of you?

Day 2 – Thursday, June 9, 2022
9:30-9:45am

Ground Rules, Etiquette, Logistics for Breakout Sessions

BREAKOUT SESSION #1

9:45-11:15am

If you have any difficulty with finding a room or engaging with the group virtually, please come back here (the "Main Room") and let us know how we can help you!

Breakout Focus: How do/should we share knowledge and what are our knowledge gaps?

Will focus on:

- Sustainable POCs for geographic regions and risk areas
- How do we share knowledge – where, format, content?
- What are the biggest gaps in knowledge?

- **TAKE NOTES AND SHARE INFO!**

BREAKOUT SESSION #1
11:15am-12:45pm

PLENARY RECAP

15 minutes for each group


LUNCH 12:45-1:45pm

BREAKOUT SESSION #2

1:45-3:15pm

If you have any difficulty with finding a room or engaging with the group virtually, please come back here (the "Main Room") and let us know how we can help you!

Breakout Focus: Risk Drivers

- What is the greatest challenge for this risk driver in the next 15-20 years?
- What are the resources (information, funding, authority) your agency or group can provide to affect change on a driver?
- Identify gap areas?
- Discussion on closing identified gaps
- Discuss methods for increased information sharing
- What are the barriers for achieving Integrated Water Resource Management?

BREAKOUT SESSION #2
3:15-4:45pm

PLENARY RECAP

15 minutes for each group

Day 2 – Thursday, June 9, 2022
4:45-5:00pm

Closing Thoughts, Next Steps

THANK YOU

for attending the 2022 SWD CWSP Workshop!

We hope to see you at future events!

Please send feedback to the organizers on what you would like to see at our next gathering!