

An aerial photograph of a winding river flowing through a landscape of green agricultural fields. The river is dark blue and curves through the center of the frame. The fields are a vibrant green, and there are some patches of brown earth along the riverbanks. The overall scene is a mix of natural water and human agriculture.

Water Resource Management Strategies

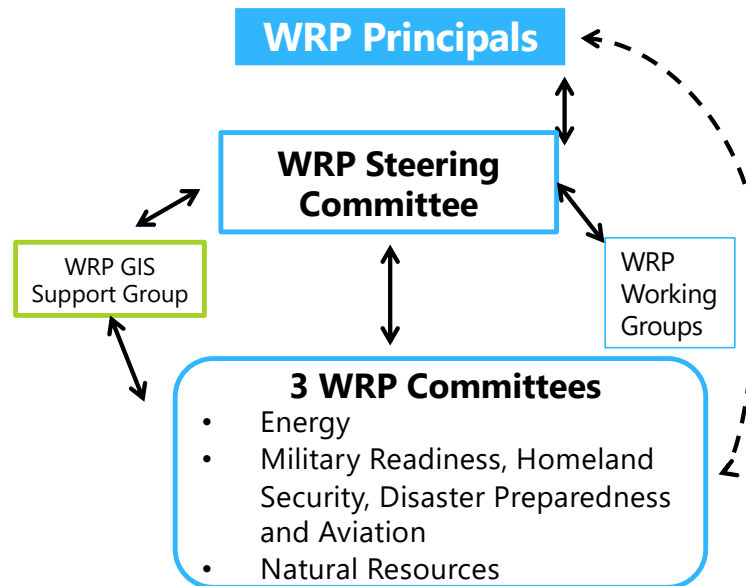
Hosted by the WRP Natural
Resources Committee

February 2021

WRP Mission

WRP provides a proactive and collaborative framework for **senior-policy level Federal, State and Tribal leadership** to identify common goals and emerging issues in the states of **Arizona, California, Colorado, Nevada, New Mexico and Utah** and to develop solutions that support WRP Partners and protect natural and cultural resources, while promoting sustainability, homeland security and military readiness.

WRP Structure



**WRP NATURAL
RESOURCES
COMMITTEE
CO-CHAIRS**

- **Melanie Barnes, Ph.D.**, Deputy State Director, Bureau of Land Management, New Mexico
- **Thomas M. Finnegan**, Colonel (Retired), Arizona Military Affairs Commission
- **Kevin Kinsall**, Natural Resources Intergovernmental Coordinator Arizona Game and Fish Department
- **Priscilla Pavatea**, Interim Director, Department of Natural Resources, The Hopi Tribe
- **Steve Pennix**, Branch Head, Range Sustainability Office, Naval Air Warfare Center, Weapons Division, China Lake Ranges
- **Matt Wunder, Ph.D.**, Chief, Ecological and Environmental Planning Division, New Mexico Department of Game and Fish

WRP Natural Resources Committee GIS Liaison: Mike Dick, Biologist, U.S. Fish and Wildlife Service, Region 2 Regional Office

Brief Background on WRP Water Security Deep-Dive

- Current WRP Priority:
 - *Building Resilience in the West for America's Defense, Energy, Environment and Infrastructure through Enhanced Collaboration among Federal, State and Tribal Entities.*
 - **Explore** tools and resources needed to build resilience to **support** the diverse missions of Federal, State and Tribal entities in the WRP Region
- Phase one: Survey of WRP Leadership identified four deep-dives
 - Resiliency of Airspace in the WRP Region
 - **Water Security**
 - Disaster Mitigation
 - Resilient Energy Infrastructure

Background on WRP Water Security Deep-Dive (continued)

Desired End State:

- Brief overview of water security (what does “water security” mean for the WRP Region)
- Highlights of Water Security Deep-Dive Efforts (info on each “bucket”)
 - Case studies/vignettes to assist efforts
- Identify areas of commonality and recommendations (enforcement; water quality and quantity; financing/funding; resources, areas of potential WRP partner commonality to address water security efforts; recommendations)

Started a collection of water security resources; agency definitions of “water security”; and Case Study Vignettes

WRP Water Security working definition: For the WRP Region, “Water Security” means having a reliable supply of water of suitable quality. Elements that assist in the establishment or recognition of water security include: having adequate data on water availability and infrastructure; appropriate planning, policies, laws and regulations to promote water security; and the identification of best practices and implementation of new technologies to reduce water demand and increase and protect water quality and quantity.

DATA:

Develop understanding of the scientific data to support water availability and infrastructure capacities in the WRP Region and identify gaps and best practices

POLICY PLANNING and IMPLEMENTATION:

How statutes, regulations, policy, and guidance are implemented to promote planning for water security

WATER RESOURCE MANAGEMENT STRATEGIES:

Identify best practices and new technologies for implementing water resource management strategies to reduce water demand, increase supply reliability, improve quality, reduce flood risk, restore ecosystems, and ensure equity

WATER LAWS and REGULATIONS:

Develop understanding of water quality and quantity laws and regulations in the context of water security

Water Security “Buckets”

Each of the buckets are to explore their interdependencies with each other, including enforcement, water quality and quantity as well as financing/funding

Water Resource Management Strategies Webinar Speakers

- Mr. Kamyar Guivetchi, P.E., Manager, Division of Planning, California Department of Water Resources, to highlight the **California Water Plan which includes 30 plus resource management strategies** to diversify regional water portfolios and manage water resources for sustainability and resilience.
- Ms. Amanda Erath, Program Coordinator for Title XVI Water Reclamation and Reuse Program and Basin Studies and Mr. Josh German, WaterSMART Grants Coordinator, will share information on the **WaterSMART program** and efforts to improve water management.
- Dr. Sharon Nappier, EPA Office of Water, National Program Leader for Water Reuse, will detail the **National Water Reuse Action Plan (WRAP)**, which is a coordinated and collaborative effort across the water user community to advance consideration of water reuse to ensure the security, sustainability, and resilience of our nation's water resources.
- Mr. Mike Hightower, Program Director, **New Mexico Produced Water Research Consortium**. Through this consortium, New Mexico will advance scientific and technological solutions related to the treatment and reuse of produced water generated by the oil and gas industry.

Kamyar Guivetchi, P.E.

Manager, Division of Planning
California Department of Water Resources

- Appointed a division manager at the California Department of Water Resources (DWR) in 2008. During 43 years with DWR, worked on technical and planning studies and projects with Division of Planning, Statewide Integrated Water Management, North-Central Region Office, Bay-Delta Office, Environmental Services, and Suisun Marsh Program. Managed staff work and coordinated the collaboration of numerous government agencies, Native American Tribes, stakeholders, and public to prepare California Water Plan Updates 2005, 2009, 2013, and 2018.
- Chairs the 30-member State Agency Steering Committee.
- State Co-chair of the California Biodiversity Council's Executive Committee.
- B.S., Civil Engineering; post graduate work, Environmental Engineering, University of California, Davis; California registered Civil Engineer.





Managing Water Resources for Sustainability & Resilience in California



Water Resource Management Strategies Webinar

Western Regional Partnership Natural Resources Committee

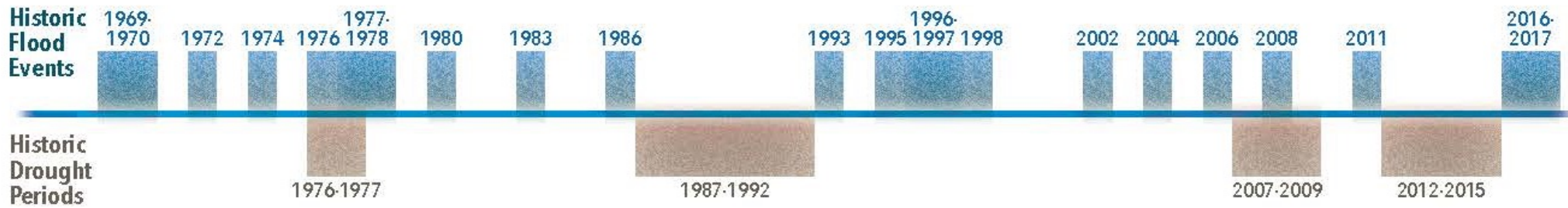
February 4, 2021

California Water A Quilt of Hydrologic Regions



California Water Management

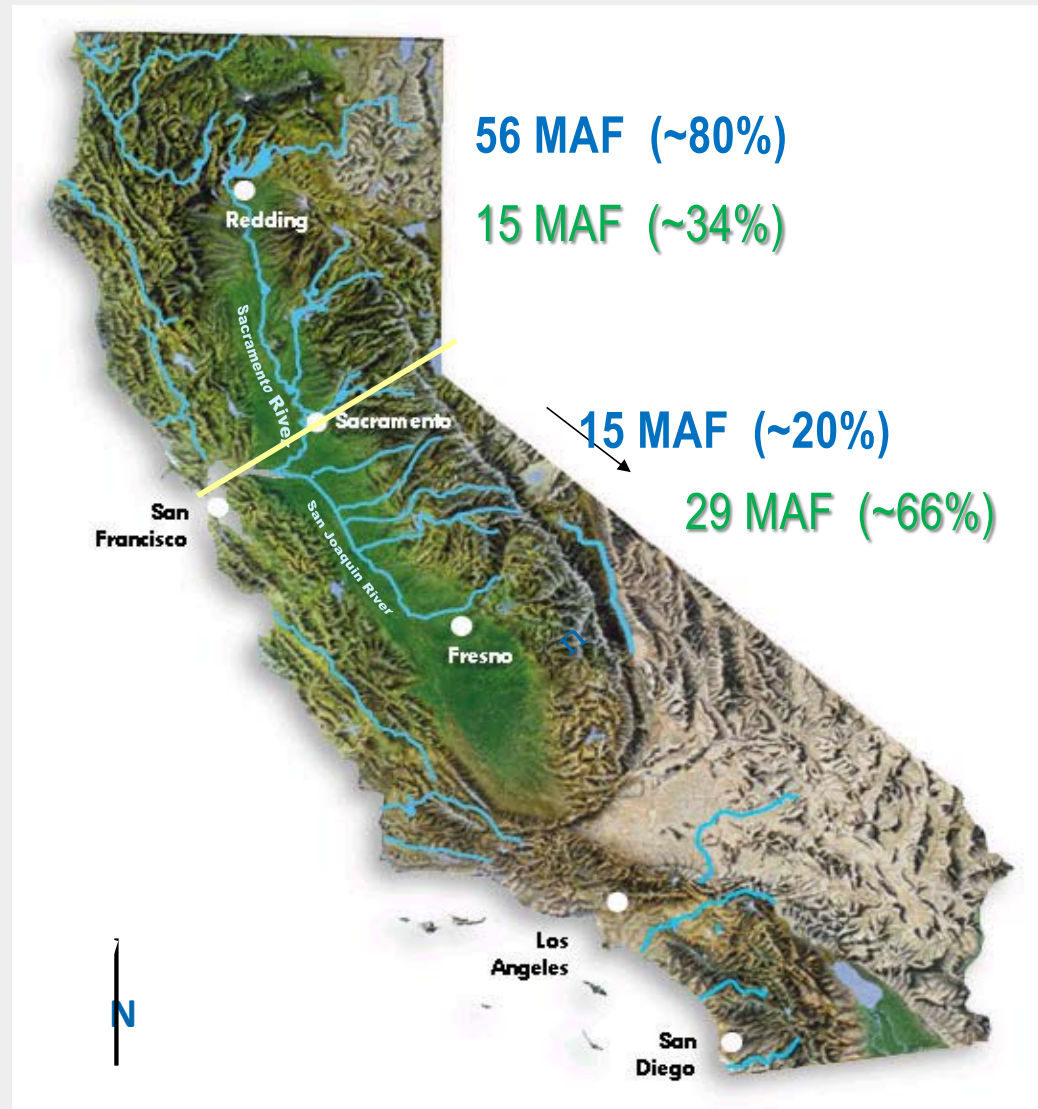
A Tale of Extremes



California's Major River Systems

Distribution of Average Runoff

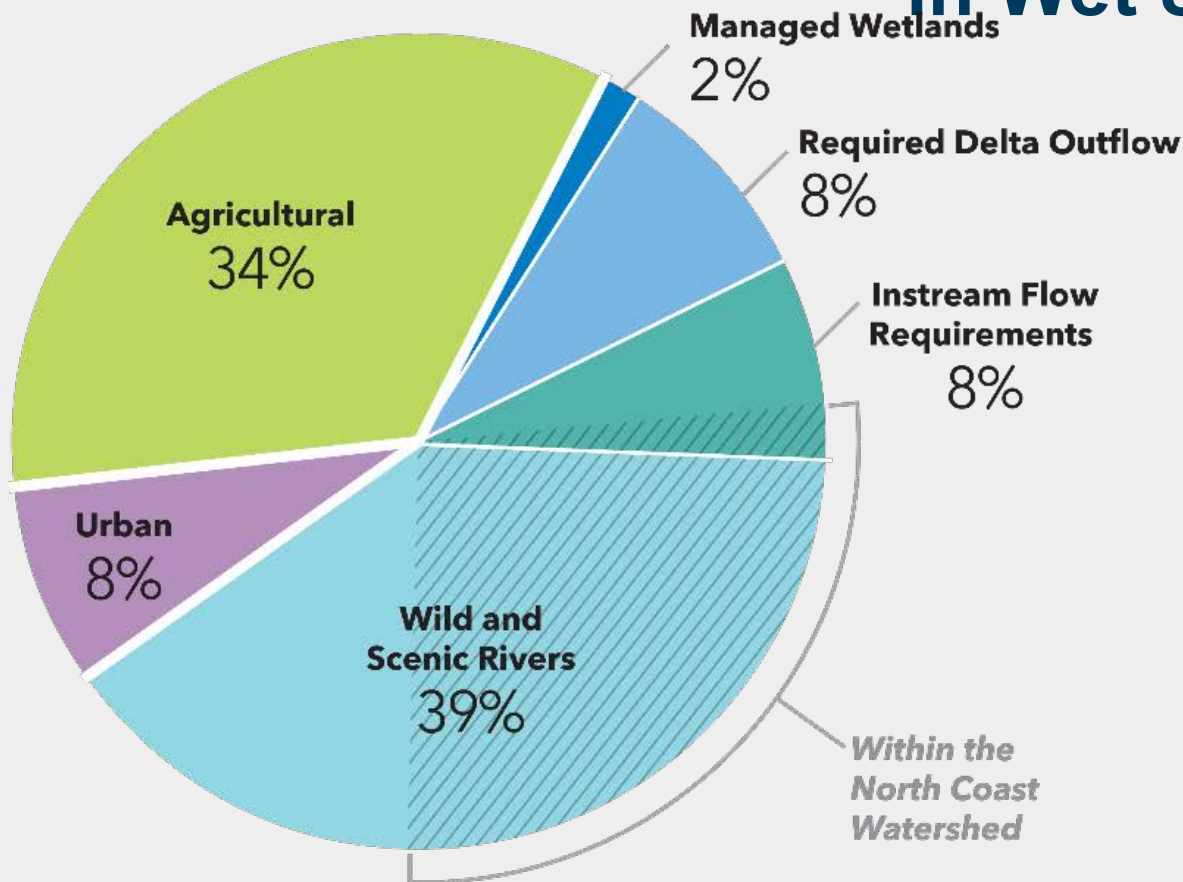
Distribution of Average Agricultural & Urban Water Uses



Variable Statewide Water Uses in Wet & Dry Years

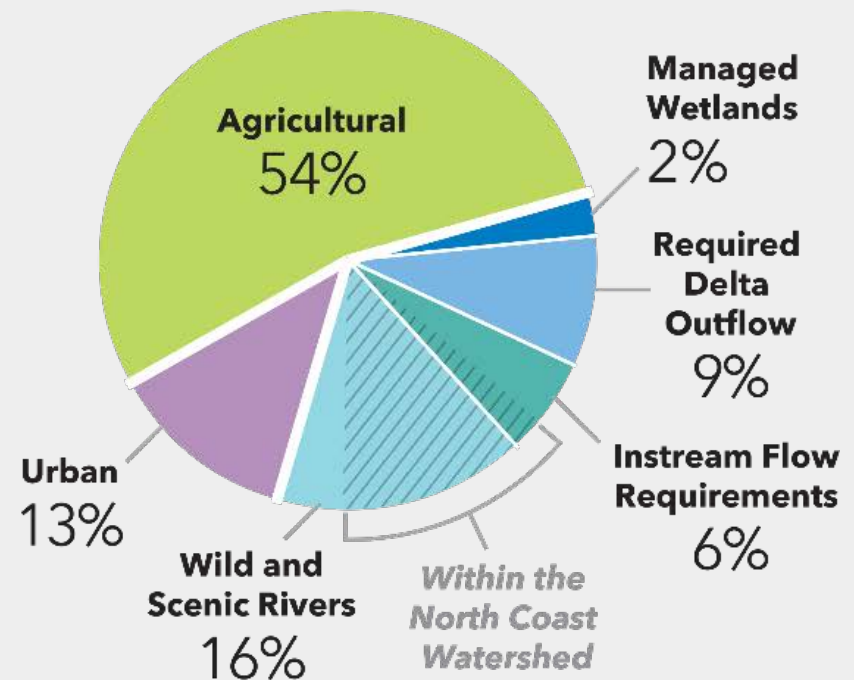
Water Year 2011 (Wet)

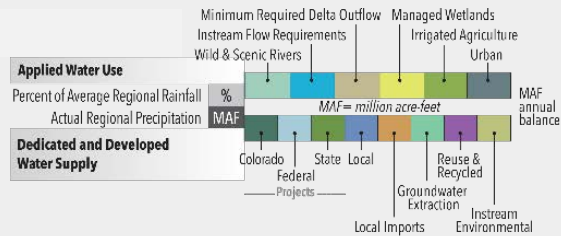
92.7MAF



Water Year 2014 (Critical Dry)

64.7MAF

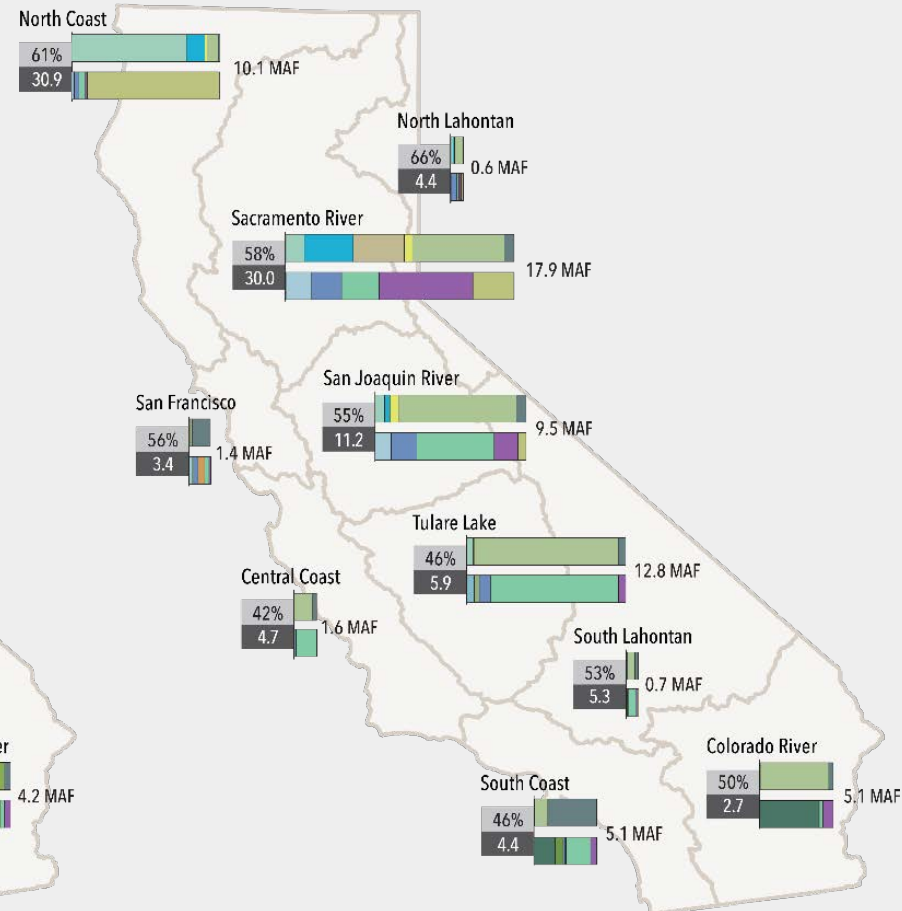
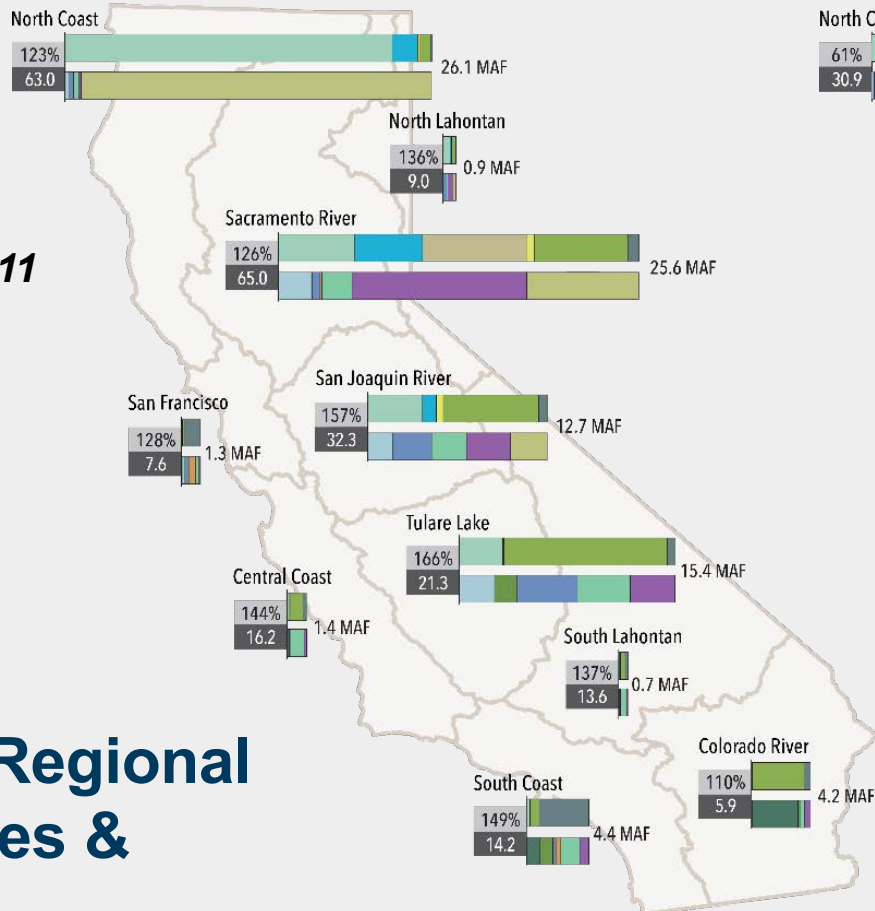




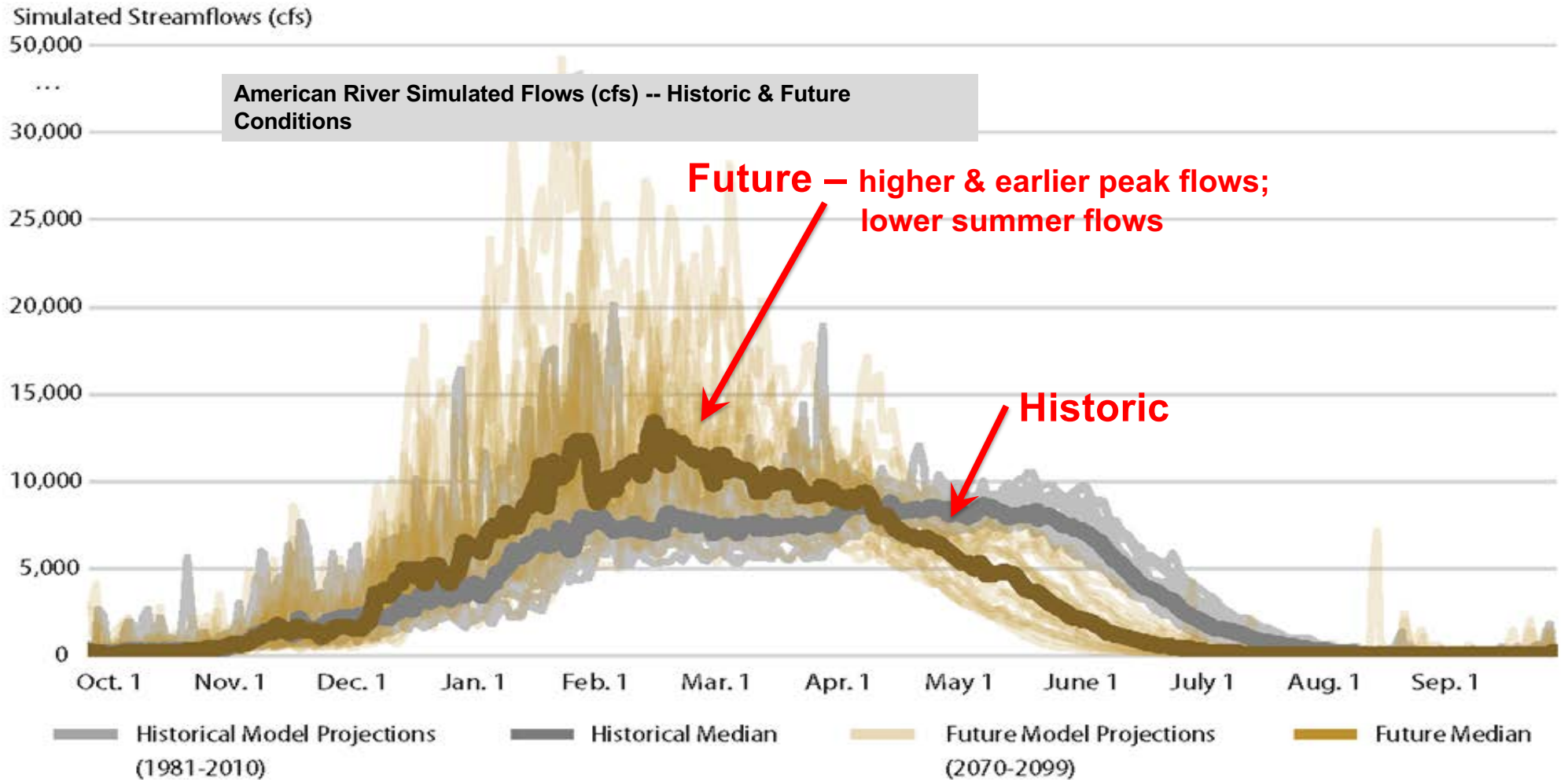
Dry Year - 2014

Wet Year - 2011

Variable Regional Water Uses & Supplies



Effects of Climate Change Necessitate Wholesale System Changes



A System in Crisis

Reduced Prosperity for Future Generations

- Greater Drought Impacts - Unreliable Water Supplies
- **Increasing Flood Risk**
- Groundwater Depletion and Subsidence
- **Degraded Water Quality**
- Declining Environmental Conditions
- **Aging Infrastructure**
- Climate Change Impacts

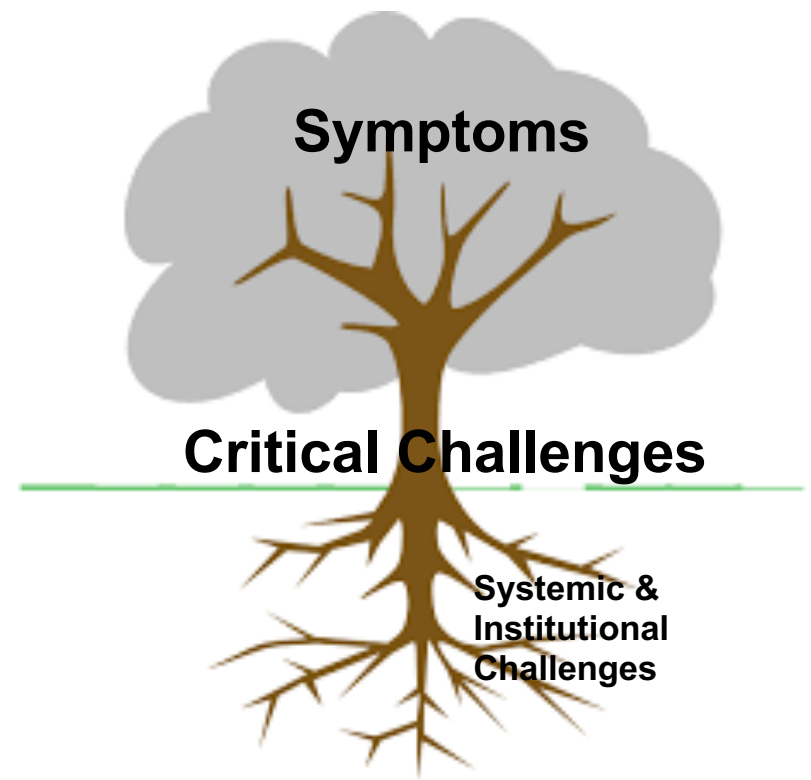


Low water level at Folsom Lake (January 2014)

Systemic & Institutional Challenges

Overcoming them Increases Return on Investment

- ❖ Fragmented and uncoordinated decisions, initiatives & actions
- ❖ Inconsistent, inflexible, & conflicting regulations
- ❖ Insufficient capacity for data-driven decision-making
- ❖ Insufficient & unstable funding
- ❖ Inadequate performance tracking



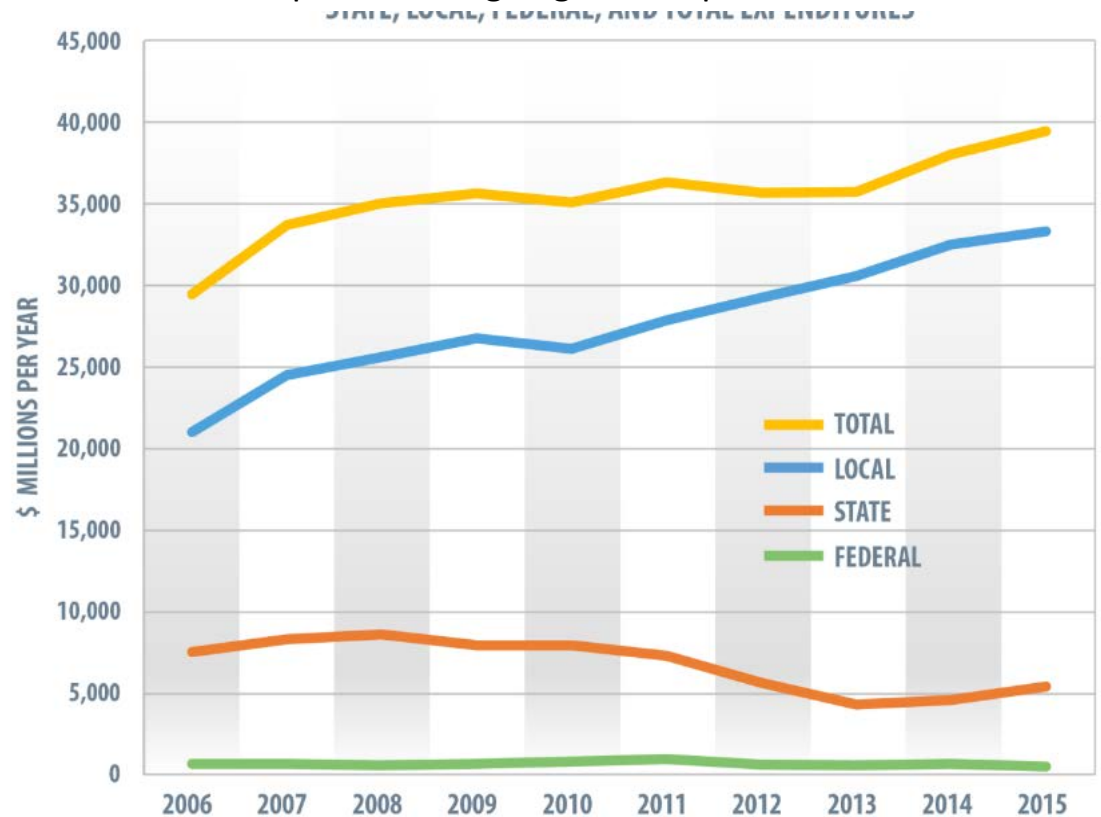
Today's Water Management System Favors Advocacies and Actions



Local, State & Federal Investment in CA Water

- ❖ **80%** of investment from Local/regional entities
- ❖ **75%** for ongoing costs
- ❖ State expends ~ **\$2 Billion/year** on water management
- ❖ State allocates only **2%** of State General Fund for water
- ❖ Investment backlog is *at least* **\$350 Billion** over next 50 years

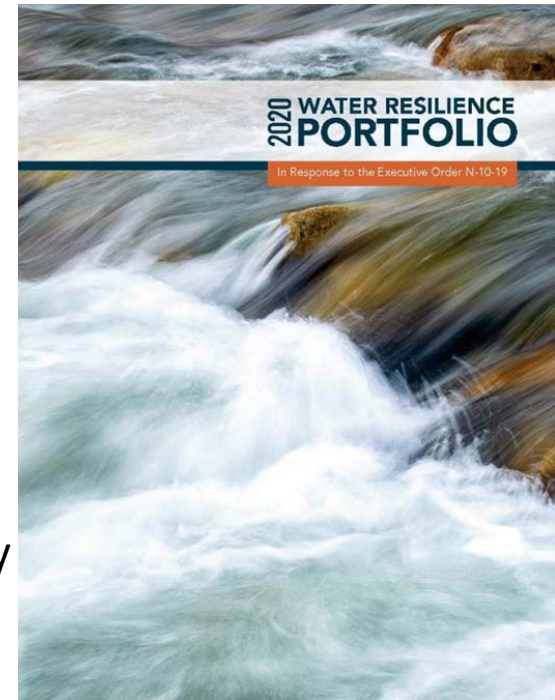
Total Capital and Ongoing IWM Expenditures



Multi-State Agency Water Resilience Portfolio (June 2020)

Advancing Regional Networks With State Support

- ❖ **Maintain & Diversify Water Supplies**
 - ✓ Diversify regional supplies to strengthen water security
- ❖ **Protect & Enhance Natural Systems**
 - ✓ Restore environmental health to sustain fish & wildlife
 - ✓ More adaptive & holistic environmental management
- ❖ **Build Connections**
 - ✓ Improve physical infrastructure to store, move & share water
 - ✓ Integrate water management with shared science, data & technology
- ❖ **Be Prepared**
 - ✓ Respond to flashier floods, deeper droughts & hotter temperatures





Principles for Preparing Water Resilience Portfolio

- ❖ **Prioritize** - *multi-benefit approaches* that meet multiple needs at once
- ❖ **Utilize** - *natural infrastructure* such as forests and floodplains
- ❖ **Embrace** - *innovation and new technologies*
- ❖ **Encourage** - *regional approaches* in watersheds
- ❖ **Incorporate** - *successful approaches* from other parts of the world
- ❖ **Integrate** - *investments, policies and programs* across state government
- ❖ **Strengthen Partnerships** - with *local, federal and tribal* governments, *water agencies and irrigation districts, and other stakeholders*

California Water Plan Update 2018

Messages from CNRA Secretary Crowfoot & DWR Director Nemeth



- ❖ Recent extreme events causing volatility & uncertainty in CA hydrology
- ❖ New climate reality -- requires innovative solutions & local partnerships in everything we do
- ❖ CA water management a grand exercise in partnerships -- Update 2018 key tool to strengthen partnerships
- ❖ State prioritizes “thinking long” on water solutions & investments to strengthen water systems with multi-benefit projects
- ❖ Update 2018 has important role to inform Water Resilience Portfolio





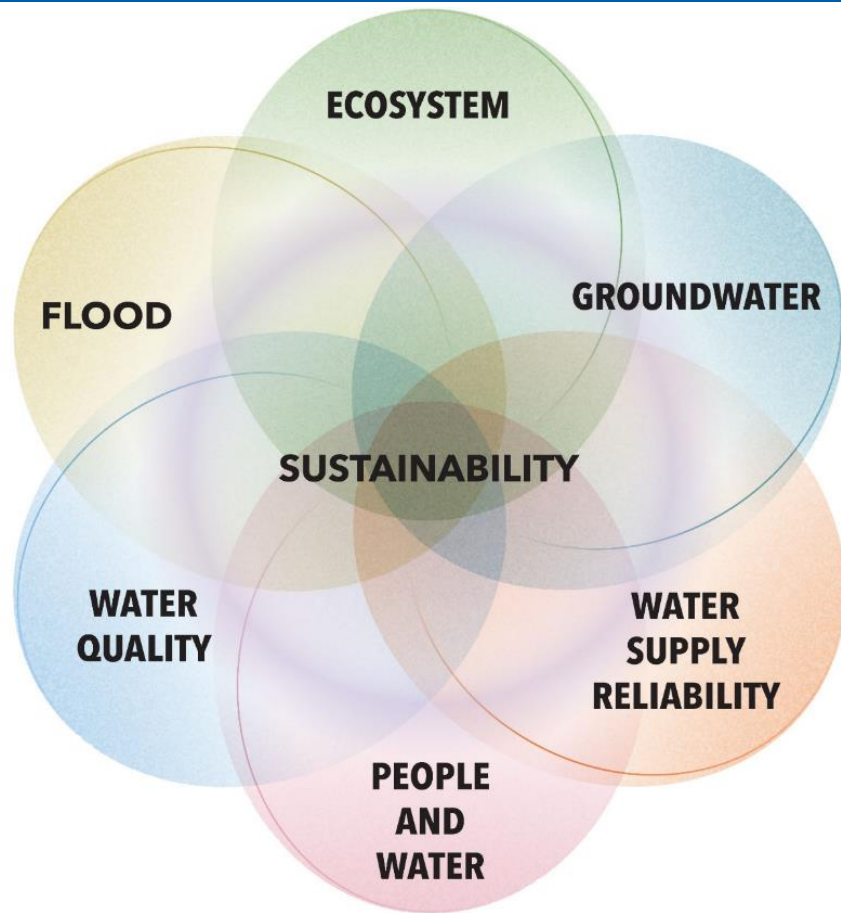
6 Sustainability Goals & 19 Rec'd Actions To Overcome Critical & Systemic Challenges

- 1. Improve Integrated Watershed Management**
2. Strengthen Infrastructure Resiliency & Operational Flexibility
3. Restore Critical Ecosystem Functions
4. Empower Under-Represented & Vulnerable Communities
5. Improve Agency Alignment &
Address Persistent Regulatory Challenges
6. Support Decision-making, Adaptive Management
& Long-term Planning

Sustainability Requires Shared Intent & Outcomes



Sustainability Requires Big Collaboration, Agency Alignment & Sector Co-Management



Integrated Watershed Management

Multi-Sector Collaboration

Multi-Discipline Planning

Multi-Benefit Projects

Multi-Fund Investments

30+ Resource Management Strategies

Tools for Diversifying Regional Water Portfolios

Introduction to RMS

Reduce Water Demand

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency

Improve Operational Efficiency & Transfers

- Conveyance – Delta
- Conveyance – Regional / Local
- System Reoperation
- Water Transfers

Increase Water Supply

- Conjunctive Management & Groundwater Storage
- Desalination – Brackish & Seawater
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – CALFED
- Surface Storage – Regional / Local

Improve Flood Management

- Flood Management

Improve Water Quality

- Drinking Water Treatment & Distribution
- Groundwater / Aquifer Remediation
- Matching Quality to Use
- Pollution Prevention
- Salt & Salinity Management
- Urban Stormwater Runoff Management

Practice Resource Stewardship

- Agricultural Lands Stewardship
- Ecosystem Restoration
- Forest Management
- Land Use Planning & Management
- Recharge Areas Protection
- Sediment Management
- Watershed Management

People & Culture

- Economic Incentives (Loans, Grants & Water Pricing)
- Outreach & Engagement
- Water & Culture
- Water-Dependent Recreation

Anatomy of a Resource Management Strategy

Online Articles @ [Water Resource Management Strategies \(water.ca.gov\)](http://WaterResourceManagementStrategies.water.ca.gov)

- Definition
- Level of implementation
- Benefits & implementation potential by 2030
- Implementation cost estimate
- Implementation challenges
- Recommendations to remove challenges





Flood Managed Aquifer Recharge

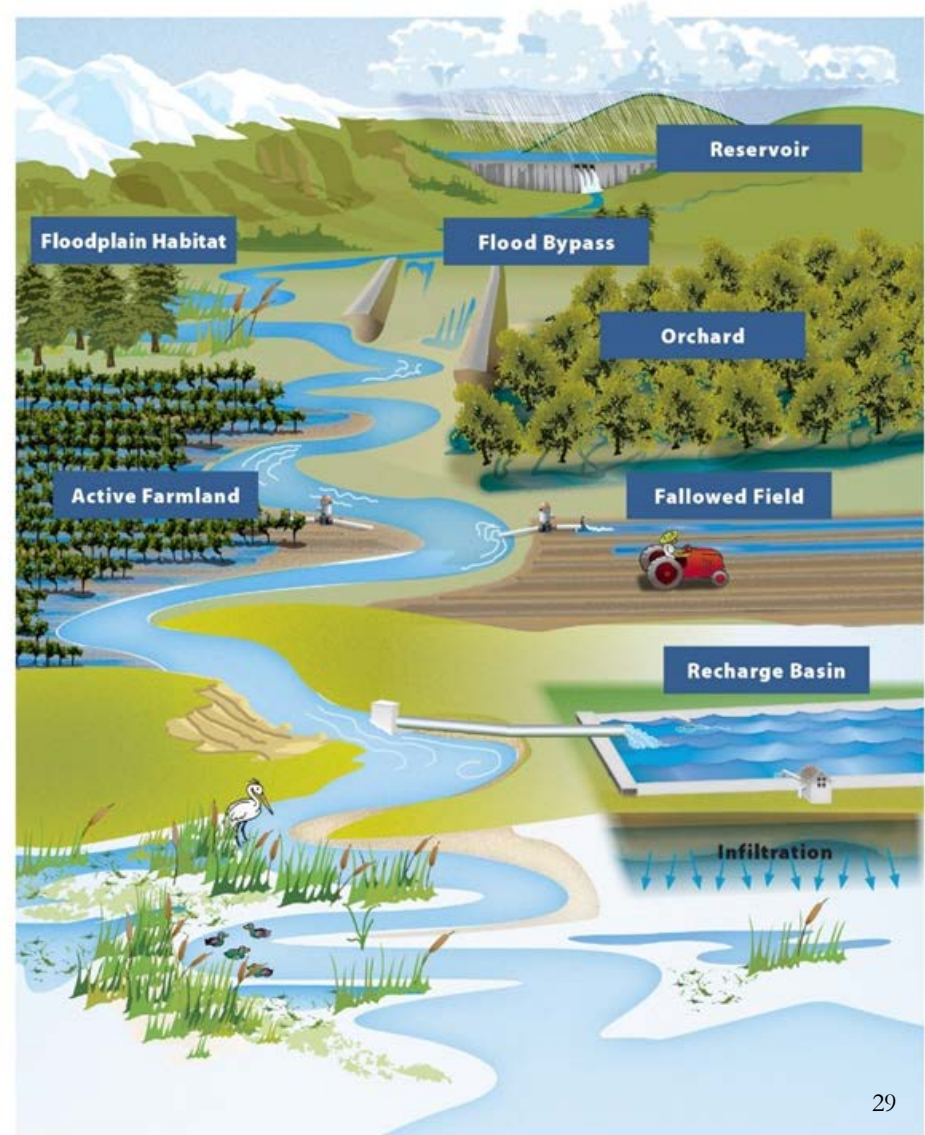
Using Floodwater for Managed Aquifer Recharge

Flood-MAR Epitomizes Integrated Watershed Mgmt

An integrated strategy to manage water resources for sustainability & climate resiliency ...

... using high flows from (or in anticipation of) rainfall or snowmelt for managed aquifer recharge ...

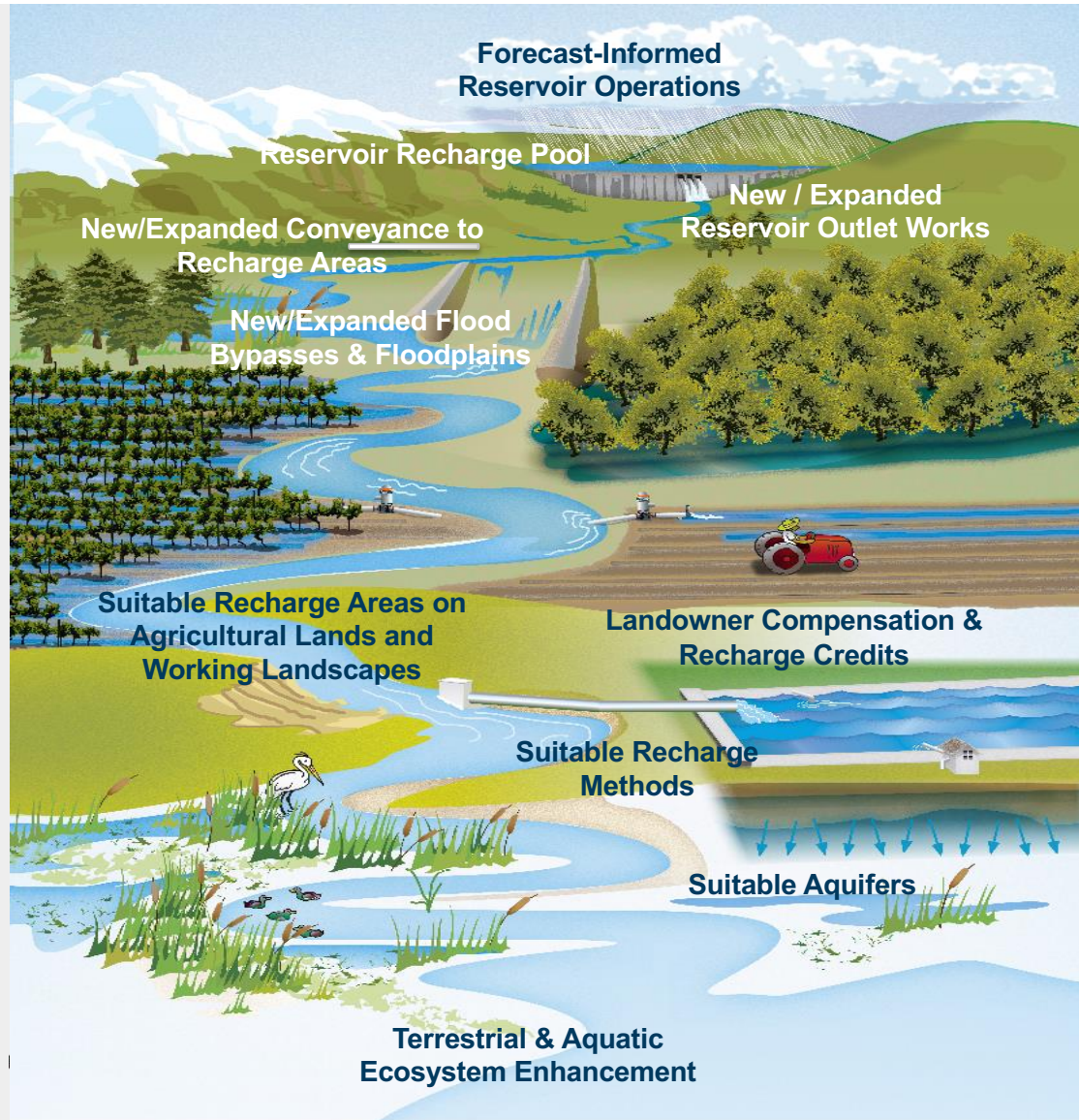
... on agricultural lands, working landscapes, and natural managed lands



Flood-MAR is ...

- ... **voluntary** (public-private partnerships among private landowners, public agencies, and governments)
- ... **multi-sector** (co-management of flood, surface & groundwater, ecosystem & quality)
- ... **scalable** (on-farm, GSA, basin, region, watershed)
- ... **multi-faceted** (reoperation, conveyance, storage, recharge, banking, transfers, cultivation, restoration, etc.)
- ... **untapped** part of California's water portfolio





A Headwater to Groundwater Strategy



Example Flood-MAR Projects & Activities

Ways to Access Water Plan Information

❖ Visit the Water Plan Web Portal

❖ Subscribe to Water Plan eNews

The screenshot shows the California Department of Water Resources website. The header includes the department name and navigation links: Water Basics, What We Do, Programs, Work with Us, News, Library, and Search. The main content area features a large image of a wetland and a sidebar with navigation options: Home, Programs, and California Water Plan. The main heading is "California Water Plan". Below it, a paragraph states: "The California Water Plan is the State's strategic plan for sustainably managing and developing water resources for current and future generations. Required by Water Code Section 10005(a), it presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios." A sub-section titled "The plan:" lists key features:

- Is updated every 5 years
- Provides a way for various groups to collaborate on findings and recommendations and make informed decisions regarding California's water future
 - Elected officials
 - Government agencies
 - Tribes
 - Water and resource managers
 - Businesses
 - Academia
 - Stakeholders
 - General public
- Can't mandate actions or authorize spending for specific actions

 A sidebar on the right contains a "California Water Plan" menu with links to Water Plan Participation, Water Plan Updates, Water Portfolios, and Water Resource Management Strategies. At the bottom, there is a "Contact Us" section with an "Email Us" button and an "Upcoming Meetings" section.

The screenshot shows the "CALIFORNIA WATER PLAN eNEWS Special Edition" newsletter dated July 16, 2019. The header features a circular diagram with five segments: FLOOD, SUSTAINABILITY, WATER QUALITY, PEOPLE AND WATER, and WATER SUPPLY RELIABILITY. The main headline is "DWR Releases CA Water Plan Update 2018". Below this, a paragraph explains that the update is the latest in a series of plans for sustainably managing water resources and systems. It provides recommended actions, funding scenarios, and an investment strategy to overcome California's most pressing water resource challenges. A sidebar on the left offers options to "COMMENT / SUGGESTIONS", "SUBSCRIBE / UNSUBSCRIBE", and social media links for Facebook and Twitter. A "Supporting Documents" section lists:

- News release
- CAWA Secretary's Message — DWR Director's Message
- Executive Summary
- Digitally accessible version

 A "Featured Companion State Plans" section mentions that the Update 2018 webpage provides links to more than 40 companion state plans. A "Update 2018 webinar set for July 29" section states that the webinar will discuss the elements of Update 2018 and its relationship to Governor Newsom's water portfolio initiative. At the bottom, there is a section for "CALIFORNIA WATER PLAN SPLASH" which includes links to various sections of the update.

Questions & Comments



Kamyar Guivetchi

Manager, Division of Planning
CA Department Water Resources

Amanda Erath

Program Coordinator for Title XVI Water Reclamation and Reuse Program and Basin Studies

- Worked in the Water Resources and Planning Office in Reclamation's Denver office for 10 years.
- Leads multiple Reclamation-wide teams and manages the Title XVI Water Reclamation and Reuse Program, WIIN Desalination construction project funding, and the Basin Studies program.
- B.A., San Diego State University; J.D., University of Denver.



Josh German
Program Analyst
U.S. Bureau of Reclamation

- Worked in Water Resources and Planning Office in Reclamation's Denver Office for over 10 years.
- Coordinates WaterSMART Grants.
- B.A., Colby College; J.D.; Villanova University.





— BUREAU OF —
RECLAMATION

WaterSMART Program

Amanda Erath and Josh German
Water Resources and Planning Office
February 4, 2021

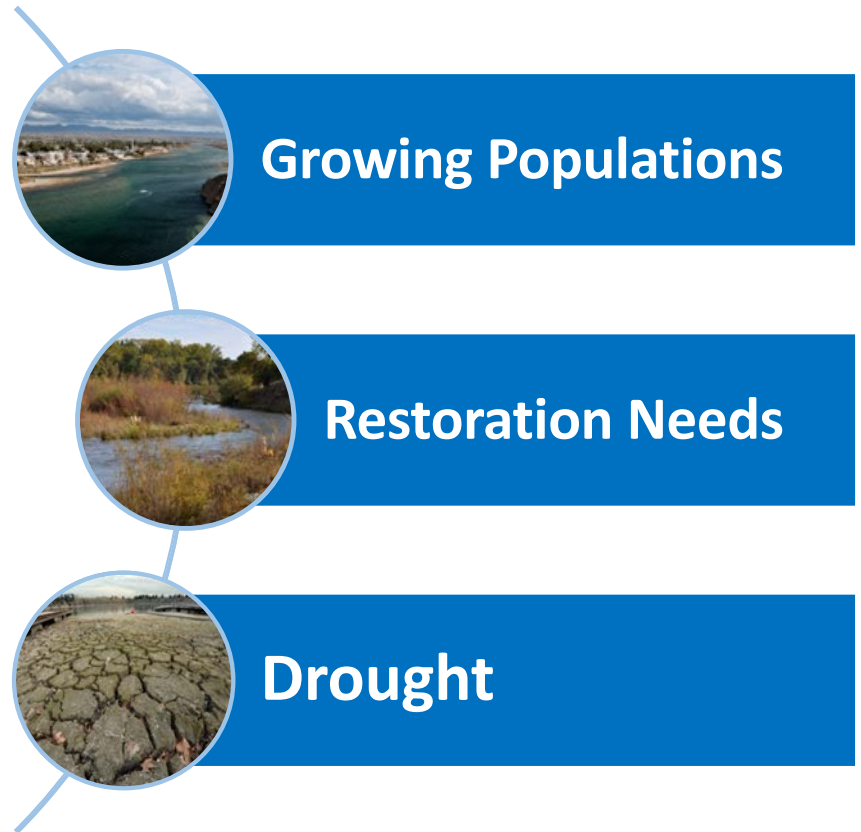
WaterSMART Program



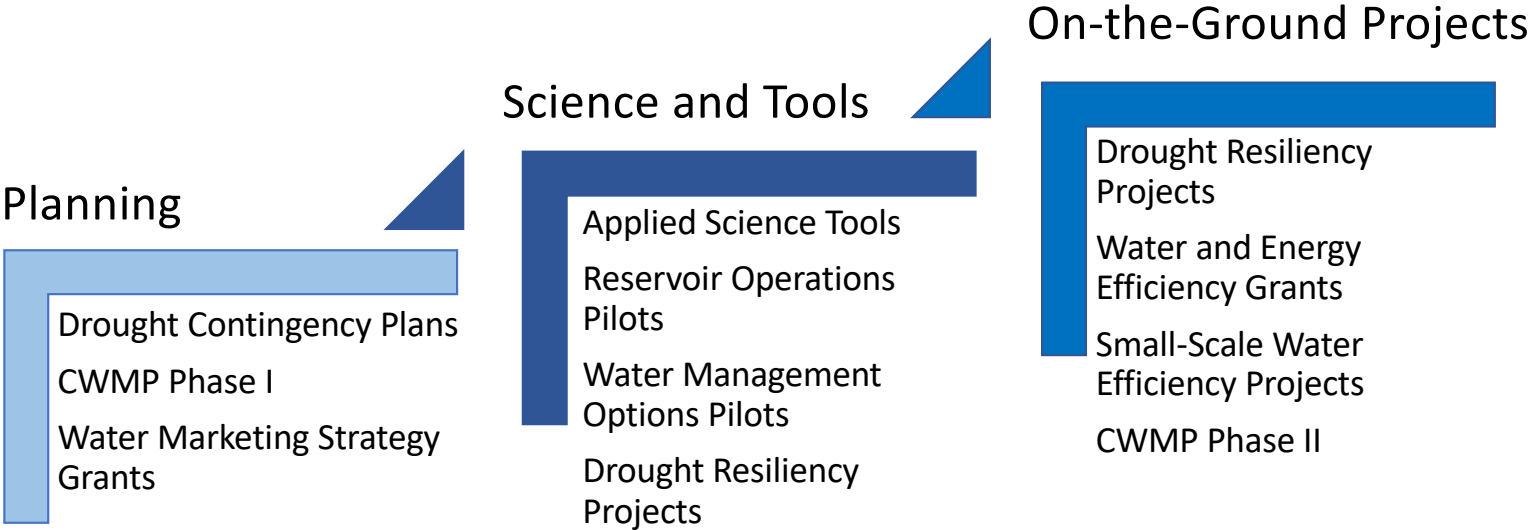
Provides a framework for Interior to support water supply reliability for multiple water users.

WaterSMART Program Overview

- Increases water supply reliability through investments and attention to local water conflicts
- Supports water conservation and water management improvements to help meet competing demands for water
- Leverages Federal and non-Federal funding
- Relies on collaboration with stakeholders to develop local solutions to water supply issues



Build a Foundation Through WaterSMART



WaterSMART Program Basics

- ➔ **Most WaterSMART activities are grant programs**
- ➔ **Generally a 50% non-Federal cost share is required for grants under WaterSMART**
- ➔ **Applicants include entities such as states, tribes, cities, water districts, irrigation districts, watershed groups, non-profits, and flood control districts within the 17 Western United States and territories (and in some cases AK and HI)**
- ➔ **Funding is allocated through annual competitive processes**



Title XVI

Water Reclamation and Reuse Projects

- Eligible Project Types
 - Projects that reclaim and reuse municipal, industrial, and agricultural wastewater; or impaired ground and surface waters
 - Projects must either have a specific congressional authorization or be eligible under section 4007(c) of the Water Infrastructure Improvements for the Nation (WIIN) Act amendments
- Funding
 - 75% non-Federal cost share required
 - Up to \$20 million in Federal funding per project, unless otherwise specified by Congress
- In 2019, water reuse projects funded through the Title XVI Program delivered over 411,143 acre-feet of recycled water

**Authorized by Title XVI of P.L. 102-575, Wastewater and Groundwater Study and Facilities Act, as amended*



WIIN Act Desalination Projects

- Eligible Project Types
 - Ocean or brackish water desalination projects that meet the requirements of Section 4007(a) of the WIIN Act amendments to the Desalination Act
- Funding
 - 75% non-Federal cost share required
 - Up to \$20 million in Federal funding per project

**Authorized by P.L. 104-298, Water Desalination Act of 1996, as amended*



Basin Study Program

- Basin Studies
- Water Management Options Pilots
- Applied Science Grants
- Baseline Assessments

*SECURE Report

<https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREREport.pdf>

**Authorized by Section 9504 of P.L. 111-11, SECURE Water Act*

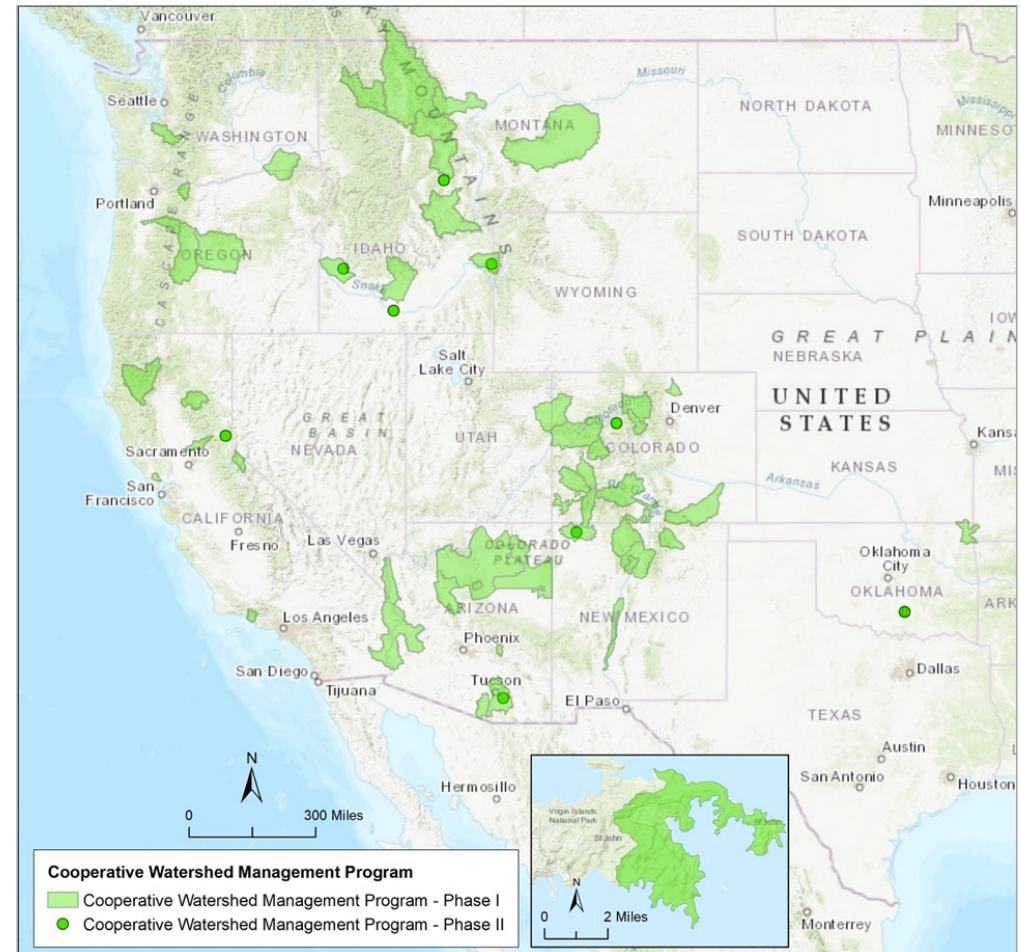


Cooperative Watershed Management Program

2 sub-activities

- Phase I: Form a watershed group, develop a restoration plan and do project design
- Phase II: Implement on-the-ground watershed management projects

**Authorized by Section 6002 of the Cooperative Watershed Management Act, Subtitle A of Title VI of the Omnibus Public Land Management Act of 2009, P.L. 111-11*



Drought Response Program

3 sub-activities

- Drought Contingency Planning
 - Drought Resiliency Projects
 - Emergency Response Actions
- Since 2015, the program has provided over \$41 million in competitively-awarded funding for drought planning and drought resiliency.

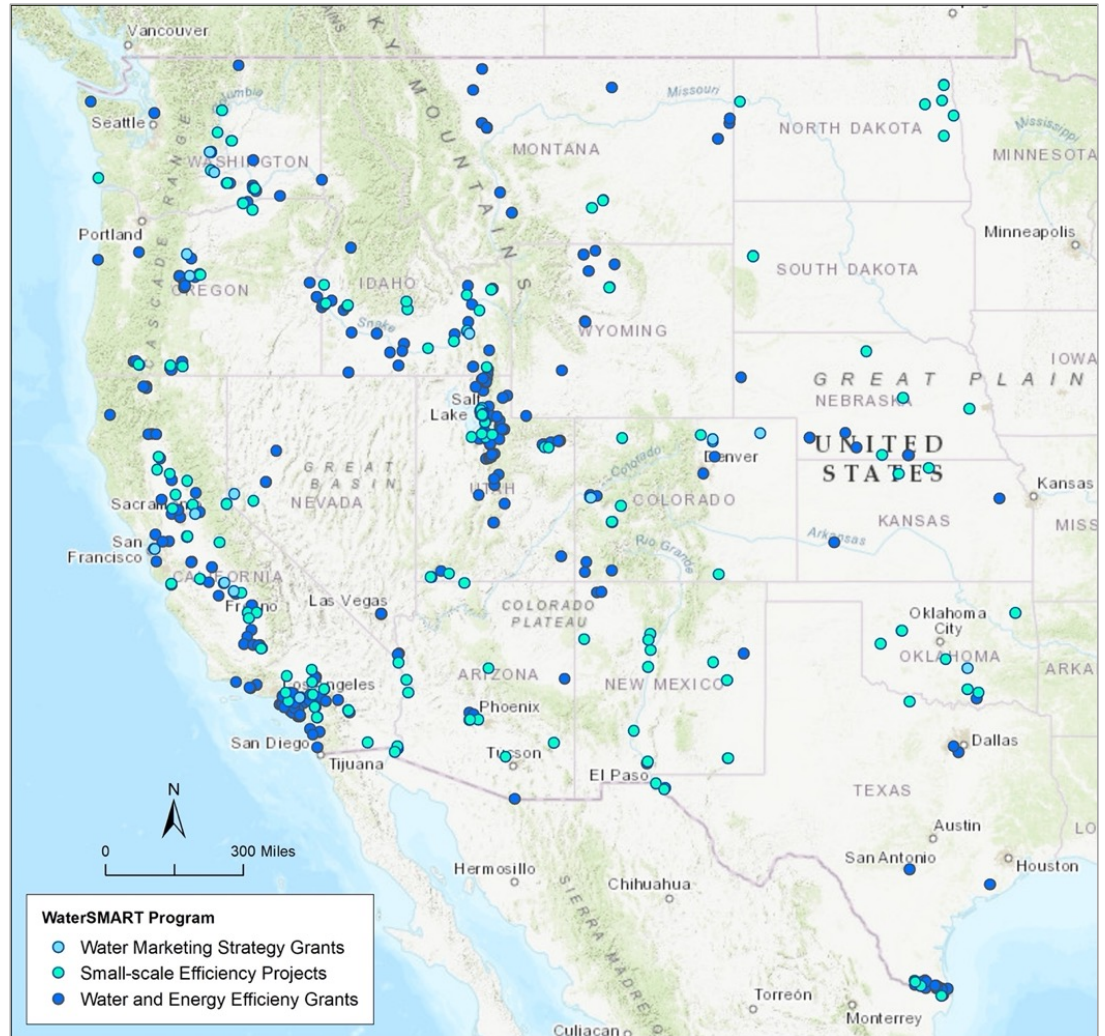


WaterSMART Grants

3 sub-activities

- Water and Energy Efficiency Grants (WEEG)
- Small-Scale Efficiency Projects (SWEP)
- Water Marketing Strategy Grants (WMSG)

**Authorized by Section 9504 of P.L. 111-11, SECURE Water Act*



WaterSMART Funding

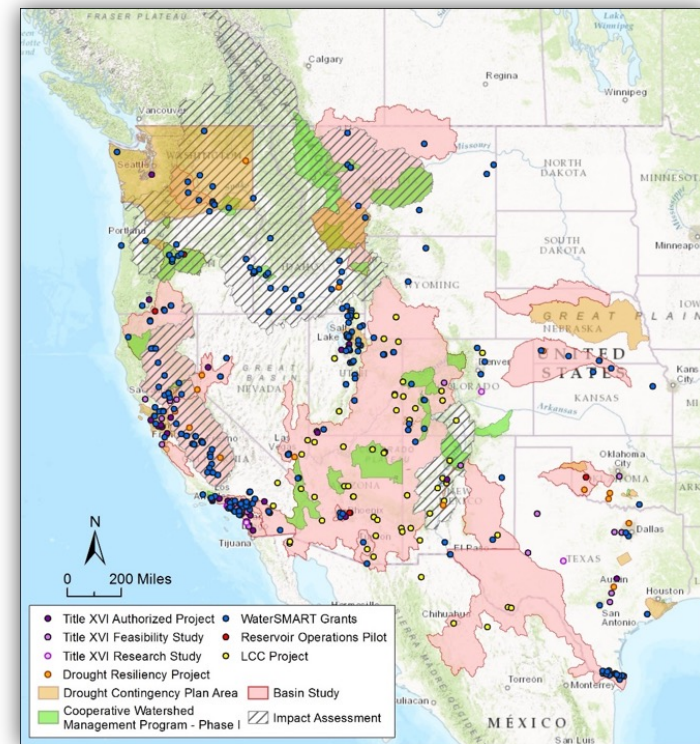
Program	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Enacted
WaterSMART Grants	\$34 million	\$55 million	\$55 million
Cooperative Watershed Management Program	\$2.25 million	\$2.25 million	\$4.2 million
Basin Study Program	\$5.2 million	\$5.2 million	\$2.4 million
Title XVI Program	\$58.6 million	\$63.6 million	\$63.6 million
Drought Response Program	\$9 million	\$8 million	\$4 million
WIIN Act Desalination Projects	\$12 million	\$12 million	\$12 million
Water Conservation Field Services	\$4.2 million	\$4.2 million	\$2.14 million
Total	\$125.25 million	\$150.25 million	\$143.4 million

WaterSMART Data Visualization Tool

- Data Visualization Tool is an interactive website with program information including:

- Interactive maps
- Featured project tours
- Program growth over time

<https://www.usbr.gov/watersmart/>





— BUREAU OF —
RECLAMATION

Thank you! Questions?

Amanda Erath

303-445-2766

aerath@usbr.gov

Josh German

303-445-2839

jgerman@usbr.gov

Sharon Nappier, Ph.D.

EPA Office of Water, National Program Leader
for Water Reuse

- Specializes in environmental health microbiology and quantitative microbial risk assessment
- Helped develop the National Water Reuse Action Plan (WRAP), which was released on February 27, 2020
- B.S., Biology and Environmental Science, George Washington University; M.S.P.H., Environmental Sciences and Engineering, University of North Carolina at Chapel Hill; Ph.D., Johns Hopkins Bloomberg School of Public Health in Environmental Health Engineering.



National Water Reuse Action Plan

Improving the Security, Sustainability, and Resilience of
Our Nation's Water Resources

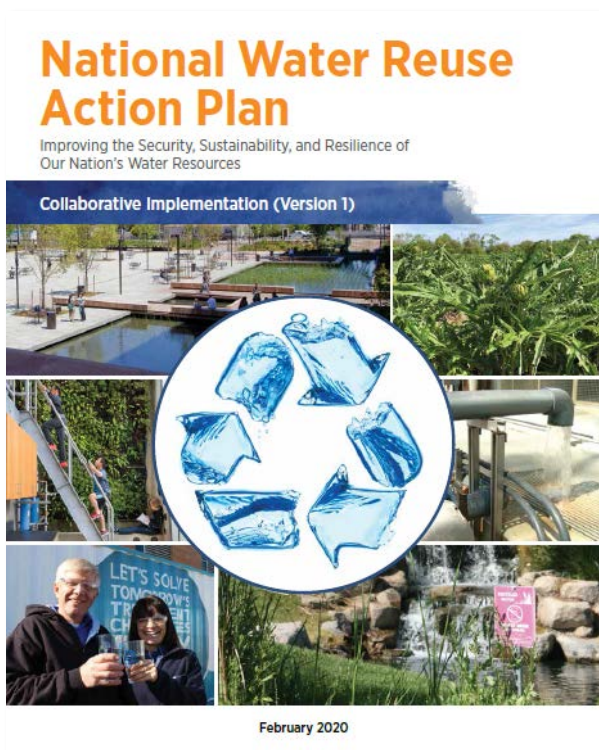
Western Regional Partnership Webinar

February 4, 2021

waterreuse@epa.gov



Session Overview



- Water Reuse Background
- WRAP Overview
- WRAP Online Platform
- Action Highlights
- Communicating Progress
- Looking Ahead
- Getting Involved

Water Reuse Background

- Pressures threaten the availability of clean and sustainable water supplies
 - Increased demand for clean water
 - Climate change
 - Aging infrastructure
 - Population growth
- Water reuse can provide alternatives to existing water supplies
 - Agriculture and irrigation
 - Potable supply augmentation
 - Groundwater replenishment
 - Industrial processes
 - Environmental restoration



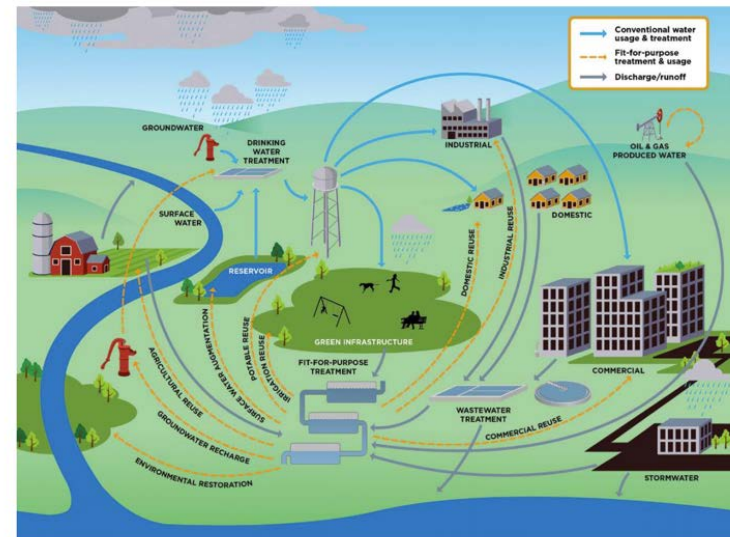
Denver Water contractors install a purple pipe used to deliver recycled water in northeast Denver, Colorado

Sources of Waters and Potential for Reuse

Clear potential to reclaim more of the nation's water

- Nearly 350 BGD from various sources of water discharged
- Over 280 BGD potentially available for reuse

* Estimates from draft Action Plan, page 6



Examples of water sources and use applications.

The Vision

Engage with over 100 partners across the water sector to build technical, financial, scientific, and organizational capability to spur implementation of reuse, thereby helping ensure a clean, sustainable water supply that is resilient to pressures such as climate change and aging infrastructure.

"The actions contained within the WRAP aim to lay the groundwork for greater adoption of water reuse as a tool for building resilience, protecting water quality, and meeting other water resource management goals."

- Water Association Letter to Biden Administration



National Water Reuse Action Plan

- Developed with federal, state, tribal, local, and private sector partners
- Addresses challenges to advance water reuse
- Builds state and local capacity
- Encourages integrated solutions to water resources management
- Fosters collaboration



Release of the Water Reuse Action Plan at EPA Headquarters in February 2020

National Water Reuse Action Plan

WRAP by the Numbers

11 Strategic Themes

41 Actions

30 Unique Action Leaders

90+ Action Partners

330 Implementation Milestones

- Development and implementation that can adjust to changing policy and science landscape
- Continues to grow with new actions, leaders, and partners
- Anticipated impact
 - Help prepare for a safe and resilient water future
 - Promote environmental justice
 - Facilitate financial support related to reuse
 - Encourage collaboration across the water sector

WRAP Guiding Principles

- **Protect public health.**
- Protect the environment and ecosystem health.
- **Promote action based on leadership, partnership, and collaboration.**
- Build on past experiences.
- **Identify the most impactful actions.**
- Recognize distinct challenges posed by water reuse.
- **Consider water reuse in an integrated water resources management framework.**
- Defer to state and local issues and considerations.
- **Commit to implementation through transparency and shared accountability.**
- Communicate effectively.
- **Apply adaptive management and governance.**



Source: www.epa.gov/sites/production/files/2019-09/documents/water-reuse-action-plan-draft-2019.pdf

WRAP Online Platform

- Repository for all active actions
- Provides background and opportunities to be gained
- Identifies leaders, partners, interested collaborators
- Captures milestones and progress
- Helps form the pipeline of new actions and collaboration

National Water Reuse Action Plan: Online Platform

Instructions: Click on an action in the table to display detailed information.

Strategic Theme Area:

Show 10 entries

Strategic Theme Area	Action
Integrated Watershed Action	Develop a Federal Policy State Consideration of Water Reuse
Integrated Watershed Action	Prepare Case Studies of Successful Integrated Water Resources Management
Integrated Action	Incorporate Water Reuse and Planning Efforts at the Local Level
Integrated Watershed Action	Leverage EPA's Water Partners in the Context of Integrated Watershed Scale
Policy Coordination	Compile Existing State Policies
Policy Coordination	Enhance State Collaboration on Water Reuse
Policy Coordination	Complete the EPA Study of Drinking Water Management
Policy Coordination	Enhance Wastewater Source Control Programs to Support Water Reuse
Policy Coordination	Compile and Develop Protection Waters for Potential Reuse
Policy Coordination	Develop Informational Materials to Facilitate Water Reuse

Showing 1 to 10 of 58 entries

Enhance State Collaboration on Water Reuse

Enhance State Collaboration on Water Reuse (Action 2.2.2)

Action Milestones | Action Tools | Implementation Milestones | Subjects and Resources

Action Attributes

Status: Developed

Action Leaders and Key Contact:
U.S. Environmental Protection Agency (EPA)
Jeff Lane
jeff.lane@epa.gov

Association of Clean Water Administrators (ACWA)
Jake Adler
jadler@acwa-us.org

Association of State Drinking Water Administrators (ASDWA)
Wendi Wilkes
wwilkes@asdwa.org

Description: Provide forums and opportunities for states to discuss water reuse. Some states, particularly in the west, have well-established opportunities to exchange ideas, experiences, successes, and challenges opportunities to learn from each other; (2) identify common needs to of water reuse.

Background: The Annual WaterReuse Pacific Northwest Conference, organized by the coordinated state focused forum to encourage states to come together in September 2015, ACWA and ASDWA co-organized and facilitated the representatives from 25 state water programs participated in this over engagement of additional state associations to engage in future state

Opportunities:

- Increase state collaboration on water reuse across the spectrum.
- Share experiences across state organizations.
- Enable water reuse discussions and networking opportunities.

Implementation Milestones

1. Convene the 25 state summit on water reuse at the 24th Annual WaterReuse Symposium in San Diego, CA.
Lead(s): ACWA (Julia Anandak, julianandak@acwa-us.org), ASDWA (Wendi Wilkes, wwilkes@asdwa.org)

Partners: EPA, WaterReuse

Target Completion Date: September 2023

Actual Completion Date: September 2023

Milestone Complete: Yes

Status/Updates: Completed (26 representatives from 25 states attended)

- Secure meeting facilitation and logistical support for the 2nd state summit on water reuse.
- Conduct water reuse focused discussions at a session at the ACWA Member Meeting.
- Conduct water reuse focused discussions at a session at the ASDWA Member Meeting.
- Initiate planning for next annual state summit on water reuse.
- Complete a list of state water reuse contacts and roles and post in an accessible location online.
- Convene the 2nd state summit on water reuse at the 25th WaterReuse Symposium in Denver, CO.
- Prepare state summit on water reuse meeting summary for state representatives.
- Additional milestones to be determined.

Use the arrows to navigate between actions.

Previous Action | Next Action

<https://www.epa.gov/waterreuse/national-water-reuse-action-plan-online-platform>

Water Reuse Collaborative Action Implementation

The WRAP features 11 strategic themes:

1. Integrated Watershed Action
- ➔ 2. Policy Coordination
- ➔ 3. Science and Specifications
- ➔ 4. Technology Development and Validation
5. Water Information Availability
6. Finance Support
7. Integrated Research
8. Outreach and Communications
9. Workforce Development
10. Metrics for Success
11. International Collaboration



Public landscapes throughout Northern California's City of Roseville are irrigated with recycled water.

Strategic Theme in Focus: Policy Coordination



As part of the “Don’t Rush to Flush” campaign, pills are collected in a pharmaceutical drop box and properly disposed instead of entering the wastewater system.

Coordinate federal, state, tribal, and local programs and policies to encourage consideration of water reuse.

“Exploring why resources, policies, and approaches vary (for example, across states or between federal programs), or how differences in seemingly-similar scenarios came to be (for example, what are the scientific bases of different fit for purpose specifications among similar types of reuse?), provide important contexts for end-users.”

–ASDWA and ACWA

Enhance State Collaboration on Water Reuse (Action 2.2.2)

- Some states have well-established water reuse guidelines and programs, while others are only beginning to explore reuse
- State-focused forums can:
 - Provide opportunities for states to learn from each other
 - Identify common needs
 - Determine priority actions to facilitate broader application and acceptance of reuse
- The 2nd State Summit on Water Reuse
 - Occurred at the 2020 WaterReuse Symposium
 - Attended by 150 regulators across 25 states
 - Meeting notes available

Action leaders

- Association of Clean Water Administrators (ACWA)
- Association of State Drinking Water Administrators (ASDWA)
- EPA

Partners

- Association of State and Territorial Health Officials (ASTHO)
- The Environmental Council of the States (ECOS)
- Ground Water Protection Council (GWPC)
- WaterReuse Association (WaterReuse)

Conduct Outreach and Training with Tribes to Build Water Reuse Capacity (Action 2.2.15)

- Many tribes face critical water supply challenges (e.g., drought, increasing demand)
- Foster understanding of opportunities and capabilities necessary to ensure safe and reliable water reuse
- Conduct outreach with federally recognized tribes, national and regional tribal organizations, and tribal utilities
- Develop and deliver training tailored for tribes to build capacity
- *Keys to Success: Water Recycling in Tribal Communities* webinar

Action leader

- EPA

Partners

- National Tribal Caucus (NTC)
- National Drought Resilience Partnership (NDRP)
- National Tribal Water Council (NTWC)
- Regional Tribal Operations Committees (TROCs)

Strategic Theme in Focus: **Science and Specifications**

Compile and describe science-based specifications for potential end uses of recycled water to better understand and consider source waters and use applications.

“ Governments at all levels and non-governmental organizations should draw on the sound science and long history of water reuse in different parts of the country that can provide the basis for greater acceptance of this water management approach. ”

–National Groundwater Association



The San Francisco Public Utilities Commission building irrigates exterior vegetation using onsite water reuse.

Compile Fit-for-Purpose Specifications (Action 2.3.1)

- Technologies and treatment methods are available to address pathogens and/or chemical residues
- Level of treatment required varies by source water and end-use application
- Many states lack resources to perform site-specific assessments of their unique source waters for different end-use applications
- Assemble federal, state, and international fit-for-purpose specifications for water reuse and information on their underlying scientific and technical basis
- Aim to launch an online portal in 2021

Action leader

- EPA

Partners

- Association of Clean Water Administrators (ACWA)
- Association of Metropolitan Water Agencies (AMWA)
- Association of State Drinking Water Administrators (ASDWA)
- Association of State and Territorial Health Officials (ASTHO)
- Colorado Department of Public Health and Environment (CDPHE)
- Water Research Foundation (WRF)
- WaterReuse Association (WaterReuse)
- Wyoming Department of Environmental Quality

Strategic Theme in Focus: **Technology Development and Validation**

Accelerate water reuse opportunities through advances in treatment technologies and make technology performance information consistent and accessible.

“Technology validation processes can be complicated and variable between individual states; this issue presents an opportunity for EPA to assist in streamlining and standardizing technology validation processes to enable faster adoption of new technologies.”

—Denver Water



GlaxoSmithKline (Upper Providence, Pennsylvania) air handler condensate is reused by their cooling towers, resulting in 9 million gallons water savings in 2019, equivalent to \$140,000 in cost savings and a 14.3 percent reduction in water use.

Implement and Manage the NAWI Energy-Water Desalination Hub (Action 2.4.6)

- The NAWI Energy-Water Desalination Hub was launched in January 2020
- Conduct early-stage research on desalination and reuse associated water treatment technologies
- Develop new water sources that are cost-competitive with existing water sources and end uses
- Integrate data into an open-source and customizable analytical framework
- The Hub supports the Water Security Grand Challenge (Action 2.4.3)

Action leader

- U.S. Department of Energy (DOE)
- National Alliance for Water Innovation (NAWI)

Partners

- Oak Ridge National Laboratory (ORNL)
- National Renewable Energy Laboratory (NREL)
- Industry partners
- U.S. research universities

Outreach and Engagement

- Quarterly updates
 - Highlight new proposed actions
 - Share action progress
- Action leader meetings
 - Convene every 6 weeks
 - Discuss action progress, cross-action collaborations, and new action ideas
- Activities and Highlights webpage
 - **Feb 3:** Stormwater Capture Drivers, Impediments, and Future Visions webinar (Action 2.3.3)
 - **Feb. 9:** Understanding of Current Aquifer Storage and Recovery Practices webinar (Action 2.7.4)
- Ongoing discussions with federal, state, tribal, and local stakeholders
 - Over 4,100 external stakeholders engaged so far



WRAP Action Leader panelists at the 2020 WateReuse Symposium.

Quarterly Action Onboarding



New Proposed Actions

- **ECOS:** Develop Case Studies of Successful Integration of Low-Input Solutions to Meet Local Water Needs (Action 2.1.5)
- **USDA:** Evaluate and Optimize Low-Input Treatment Methods to Remove Pharmaceutical Residues from Treated Wastewater Used for Irrigation (Action 2.4.7)
- **EPA, WEF, WaterReuse:** Identify Methodologies to Quantify the Current Practice of Water Reuse (Action 2.5.5)
- Feedback on these actions is accepted until **February 5** and can be sent through waterreuse@epa.gov

What's Next for the WRAP: Looking Forward

● Spring 2021

- Participate in virtual WaterReuse Symposium (March 15-25)

● Spring/Summer 2021

- *National Water Reuse Action Plan: Update on Collaborative Progress*
- Highlight progress across the active actions
- Demonstrate collective impact
- Showcase new actions



Breakout session at one of the WaterReuse stakeholder convenings on water reuse during development of the draft Action Plan.

Get Involved!

- **Propose or provide input on a new proposed action**
 - Share your idea with EPA's Water Reuse Team
 - Quarterly action onboarding
- **Support an existing action**
 - Reach out to action leader(s) about possible roles
- **Stay in the loop**
 - Follow action implementation progress in the WRAP Online Platform:
<https://www.epa.gov/waterreuse/national-water-reuse-action-plan-online-platform>
 - Email waterreuse@epa.gov to join our listserv for periodic updates





Thank You!

Sharon Nappier, National Program Leader for Water Reuse

EPA Office of Water

Nappier.Sharon@epa.gov

<https://www.epa.gov/waterreuse/water-reuse-action-plan>

waterreuse@epa.gov

Together, we can ensure the sustainability, security, and resilience of our nation's water resources.

Mike Hightower, PE

Program Director, New Mexico Produced Water Research Consortium
Board of Directors, New Mexico Desalination Association

- The Consortium is a joint effort by the NM Environment Department and New Mexico State University
- Also a technical consultant to Sandia National Laboratories in the areas of water treatment, desalination, and energy and infrastructure resiliency research
- Has focused on the development of innovative distributed energy and water technologies to improve critical infrastructure and natural resource security, resiliency, and sustainability.
- Technical experience in aerospace, weapons, energy, and natural resources research, analysis, and engineering.
- Bachelor's and Master's degrees, civil and environmental engineering, New Mexico State University.





Produced Water Treatment and Reuse for Water, Energy, and Environmental Security and Resiliency

**Western Regional Partnership
Water Resource Management Strategies Webinar
February 4, 2021**

**Mike Hightower, Program Director
NM Produced Water Research Consortium**



BE BOLD. Shape the Future.

NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM

Western Regional Partnership Goals

- Building Resilience in the West for America's Defense, Energy, Environment and Infrastructure through Enhanced Collaboration among Federal, State and Tribal Entities.
- Explore tools and resources needed to build resilience to support the diverse missions of Federal, State and Tribal entities in the WRP Region
 - Resilient Energy Infrastructure
 - Resiliency of Airspace in the WRP Region
 - Disaster Mitigation
 - Water Security

WATER RESOURCE MANAGEMENT STRATEGIES Webinar:

- Identify best practices and new technologies for implementing water resource management strategies to:
 - reduce water demand, increase supply reliability, improve quality, reduce flood risk, restore ecosystems, and ensure equity.
- Identified gaps are water management practices and technologies that can support water security, resilience, and sustainability.

System-level Natural Resource Management Plan

Performance Characteristic	Definition and Metrics
Safe	Safely supplies resources to end user
Secure	Protection of supply infrastructure from intentional disruptions
Reliable	Provides services when and where needed in spite of small disruptions
Sustainable	Can be maintained indefinitely with minimal impact on natural resources (<u>air</u> , land, water, energy, environment, ecology)
Cost Effective	Provided at affordable cost (\$ are a limited resource for many)
Resilient	Ability to prepare for and adapt to changing conditions and withstand and recover rapidly from natural disruptions

Integrated systems-level resources management for assured and sustainable socio-economic, ecological, and environmental performance

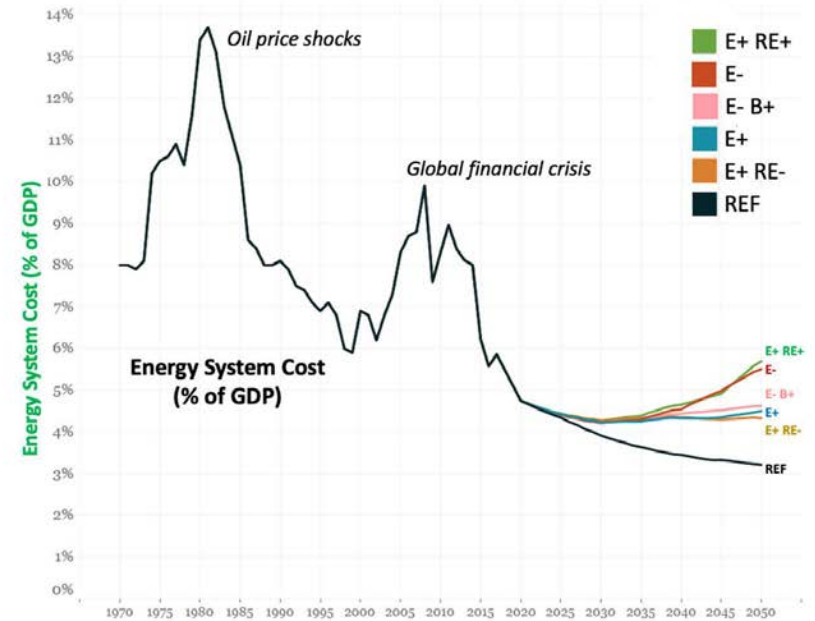
Recent Evaluation of 100% Renewable Energy by 2050

	REF ~AEO 2019	E+ high electrification	E- less-high electrification	E- B+ high biomass	E+ RE- renewable constrained	E+ RE+ 100% renewable
CO ₂ emissions target				- 0.17 GtCO ₂ in 2050		
Electrification	Low	High	Less high	Less high	High	High
Wind/solar annual build	n/a	10%/y growth limit	10%/y growth limit	10%/y growth limit	Recent GW/y limit	10%/y growth limit
Existing nuclear	50% → 80-y life	50% → 80-y life	50% → 80-y life	50% → 80-y life	50% → 80-y life	Retire @ 60 years
New nuclear	Disallow in CA	Disallow in CA	Disallow in CA	Disallow in CA	Disallow in CA	Disallowed
Fossil fuel use	Allow	Allow	Allow	Allow	Allow	None by 2050
Maximum CO ₂ storage	n/a	1.8 Gt/y in 2050	1.8 Gt/y in 2050	1.8 Gt/y in 2050	3 Gt/y in 2050	Not allowed
Biomass supply limit	n/a	13 EJ/y by 2050 (0.7 Gt/y biomass) [No new land converted to bioenergy]		23 EJ/y by 2050 (1.3 Gt/y biomass)	13 EJ/y by 2050 (0.7 Gt/y biomass) [No new land converted to bioenergy]	

PRINCETON UNIVERSITY

Included – air, CO₂ storage, land for biofuels, energy mix, more transmission and batteries, cost

Not included – water, security, resiliency, socio-economic impacts, other CO₂ sources



PRINCETON UNIVERSITY

Water-related Economic Concerns by 2030

Today one in five people live in areas of water stress.

This is expected to rise to two in three.

Demand for water is set to outstrip supply by 40%.

Business as usual water management will put at risk \$63trillion or 1.5 times today's entire global economy.

Water will have more rapid and unavoidable consequences for some businesses than carbon

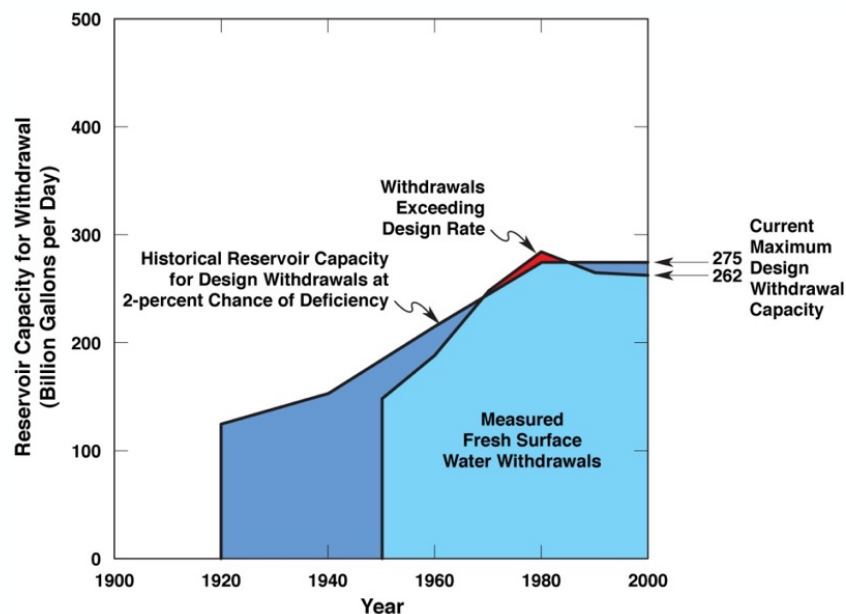
Goldman Sachs

“ Investors know how damaging inaction, inappropriate action or delaying interventions on water-related issues can be... The global economy will favor business that take a pro-active approach to water stewardship.”

- Eurizon Capital



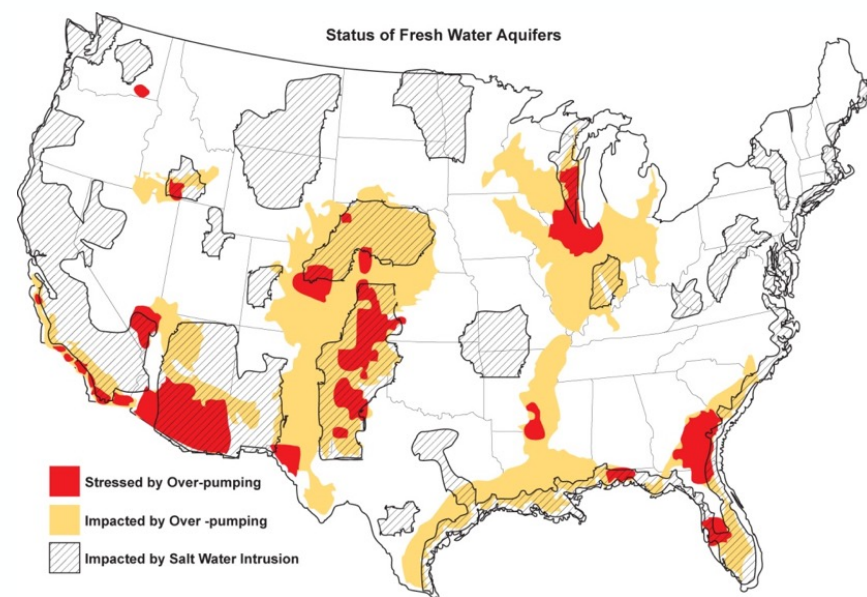
Fresh Water Availability Issues Driving Non-traditional Water Reuse



(Based on USGS WSP-2250 1984 and Alley 2007)

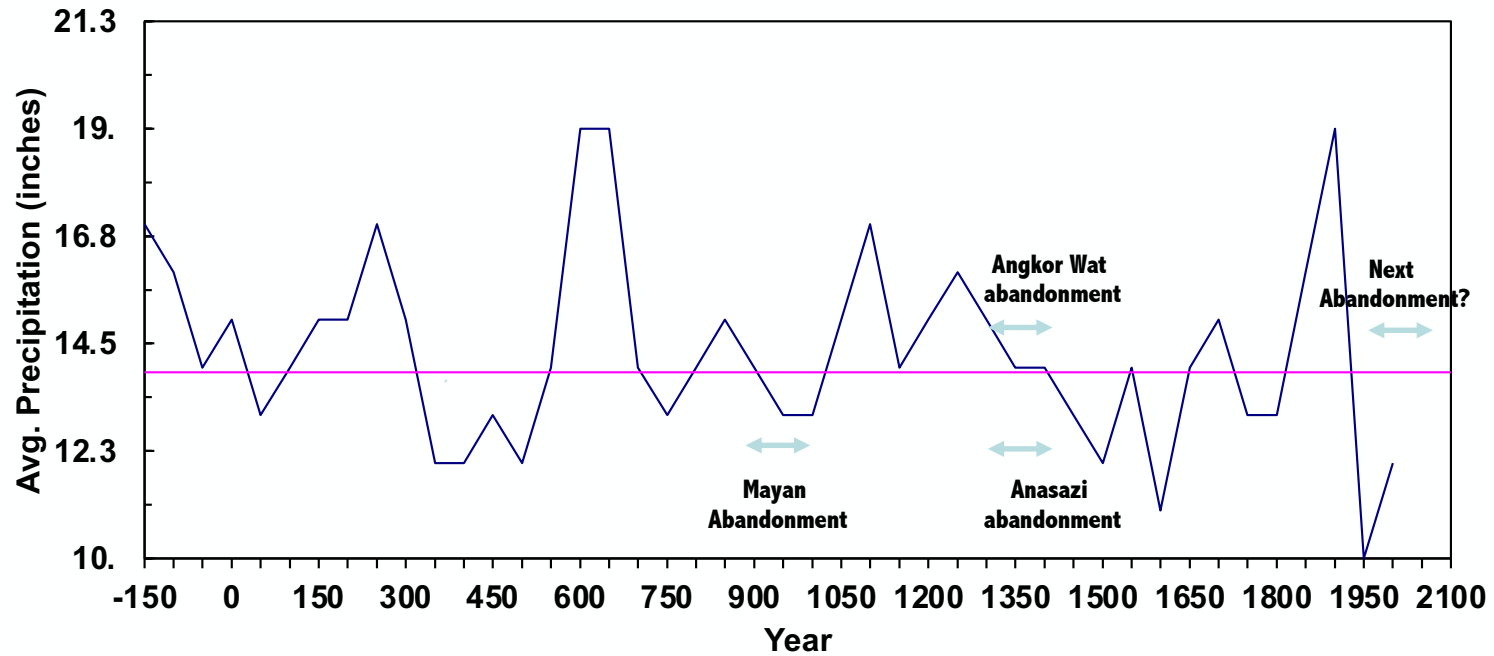
- No new surface water storage capacity since 1980

- All major groundwater aquifers overstressed



(Shannon 2007)

Southwest Climate History from Tree Ring Data



Univ. of Arizona – Tree Ring Lab – 50 year averages

The southern U.S. and the mid-latitudes are in the 130th year of a 300 year arid cycle - not a drought

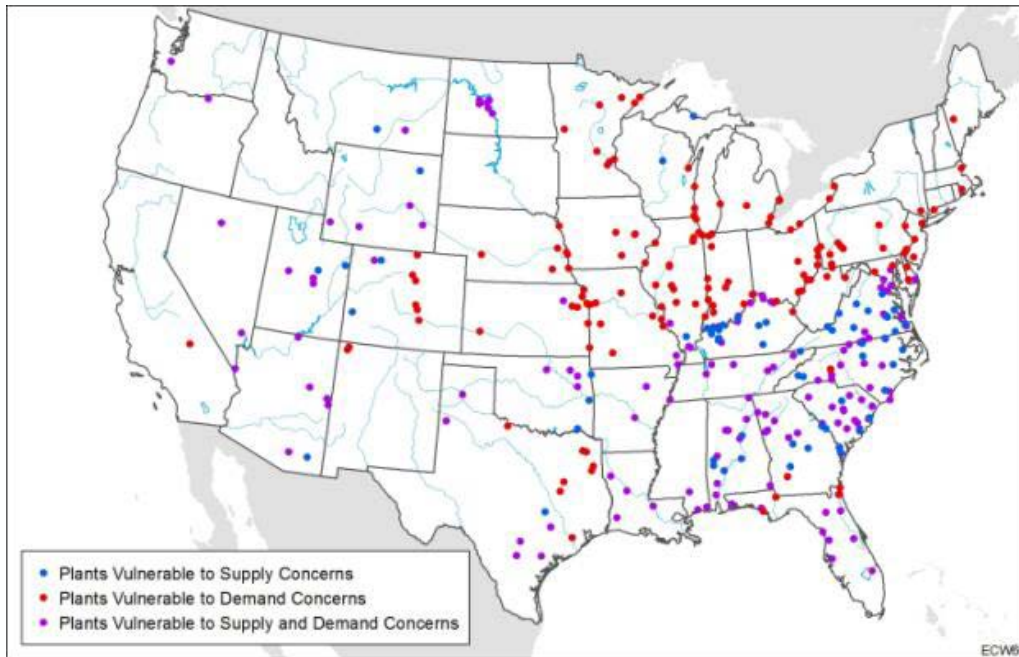
System Performance Optimized 2050 Energy Portfolio

- Collectively, EEI's member companies are on a path to reduce their carbon emissions at least 80% by 2050, compared with 2005 levels.
 - The switch from coal to natural gas and renewable energy has been the single most effective tool over the past decade for reducing carbon emissions
 - all of this has been done while keeping rates steady and while ensuring that electricity remains affordable and reliable.
- It is important to us that we lead on clean energy in a way that gives us all the options, including making sure that we maintain existing nuclear and that we are still able to use natural gas to help achieve our clean energy targets.
- To eliminate the last 10% to 20% of emissions. we need advanced renewables, long-duration energy storage and demand efficiency, advanced nuclear, hydrogen, carbon-capture, use, and storage, ... and getting critical transmission and energy grid infrastructure built more quickly. *Tom Kuhn, president of the Edison Electric Institute, the association of U.S. investor-owned electric companies. Jan. 26, 2021*

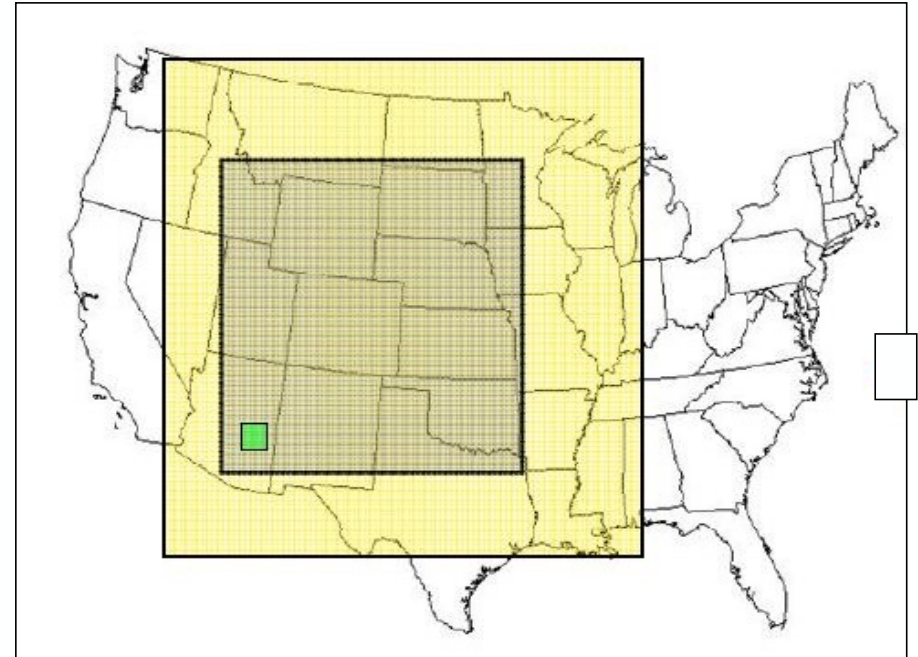
2050 Electric Power Targets
Based on
System Performance
Optimization

- 10% Coal
- 30% Natural gas
- 10% Nuclear
- 50% Renewables
(Wind, Solar, Hydro, Biomass)

Thermoelectric Power Plants with Water Supply and Demand Concerns



Land Needed for Biofuel to Replace 50% of Current Petroleum/Diesel using: Corn, Soybean, Algae



Water Use and Consumption for Electric Power Generation

Plant-type	Cooling Process	Water Use Intensity (gal/MWh _e)		
		Steam Condensing		Other Uses
		Withdrawal	Consumption	Consumption
Fossil/ biomass steam turbine	Open-loop	20,000–50,000	~200-300	~30
	Closed-loop	300–600	300–480	
Nuclear steam turbine	Open-loop	25,000–60,000	~400	~30
	Closed-loop	500–1,100	400–720	
Natural Gas Combined-Cycle	Open-loop	7,500–20,000	100	7–10
	Closed-loop	230	180	
Integrated Gasification Combined-Cycle	Closed-loop	200	180	150
Carbon sequestration for fossil energy generation	~80% increase in water withdrawal and consumption			
Geothermal Steam	Closed-loop	2000	1350	50
Concentrating Solar	Closed-loop	750	740	10
Wind and Solar Photovoltaic	N/A	0	0	1-2

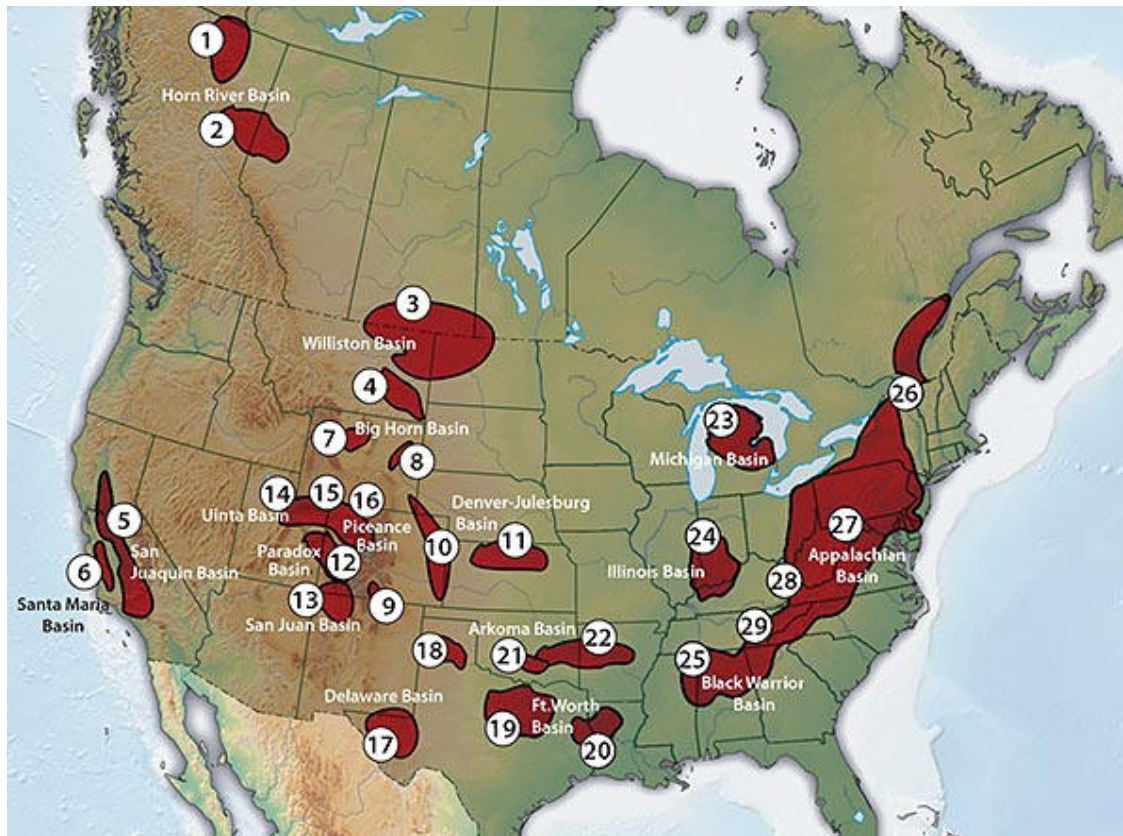
Green Technologies

Lowest Levelized Cost
NGCC, and Wind

Blue Technologies

Dry/hybrid cooling an option in some areas of the west in fall, winter and spring, especially effective with NGCC

Oil and gas shale produced water management is an area of national impact and interest

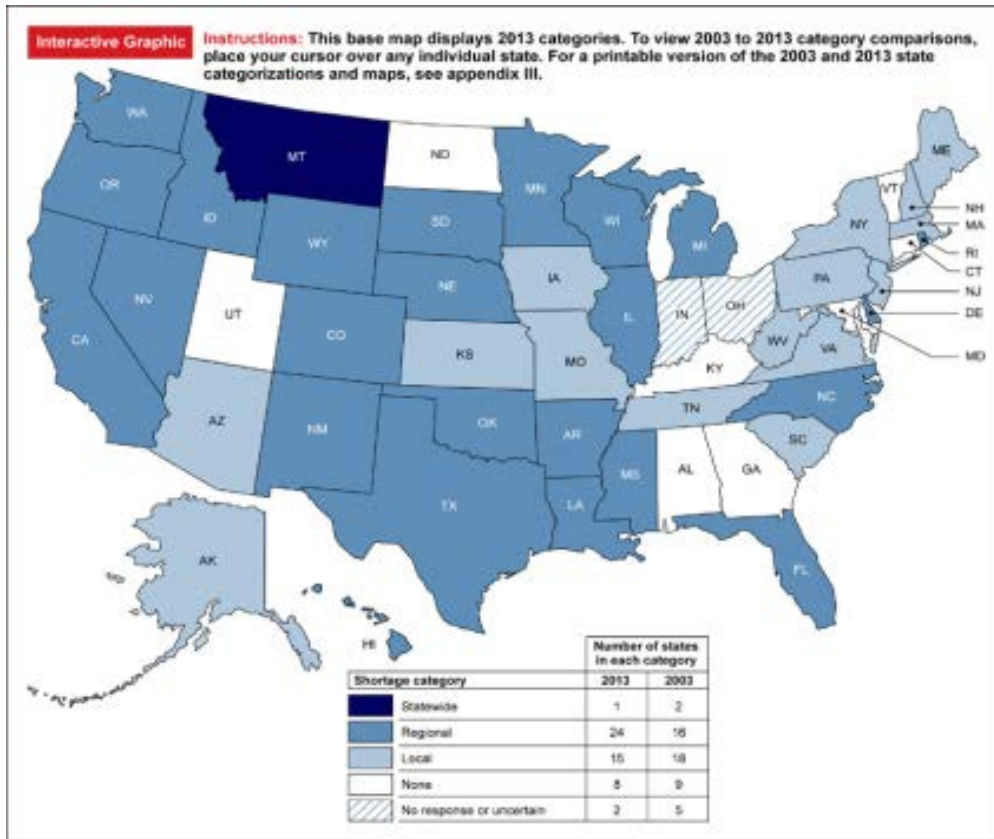


Global Annual CO2 Emissions By Country

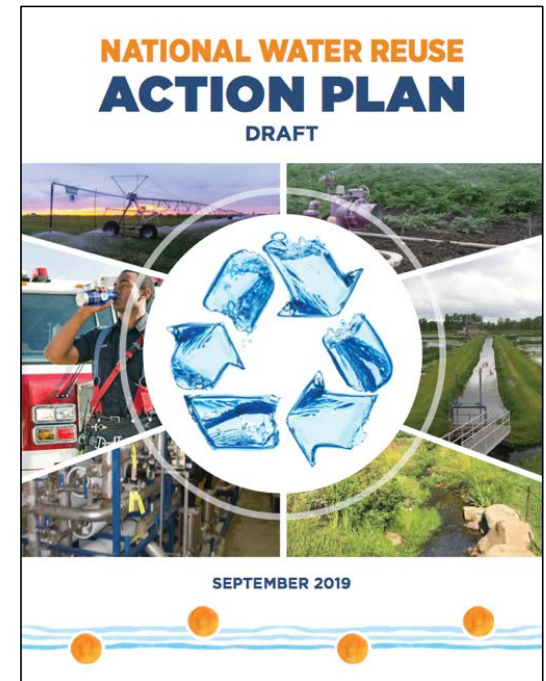
China (28%). <u>10 billion tons</u>	6 tons /cap	
Rest of the World (23%). 9 billion tons		
United States (15%). <u>5 billion tons</u>	14 tons/cap	80% reduction = 2.5 tons/cap
India (7%). 2.5 billion tons	1.66 tons/cap	
Russia (5%) - 2 billion tons	20 tons/cap	
Japan (3%) 1 billion tons	5 tons/cap	
Germany (2%) .66 billion tons	7.3 tons/cap	
Iran (2%)		
South Korea (2%)	13.2 tons/cap	
Saudi Arabia (2%)		
Indonesia (2%)		
Canada (2%) .66 billion tons	16.5 tons/cap	
Mexico (1%) .33 billion tons	2.8 tons/cap	
South Africa (1%)		
Brazil (1%)		
Turkey (1%)		
Australia (1%) .33 billion tons	9.4 tons/cap	
United Kingdom (1%) .33 billion tons	2.2 tons/cap	
Poland (1%)		

EPA National Initiative on Non-traditional Water Reuse

GAO 2003 and 2013

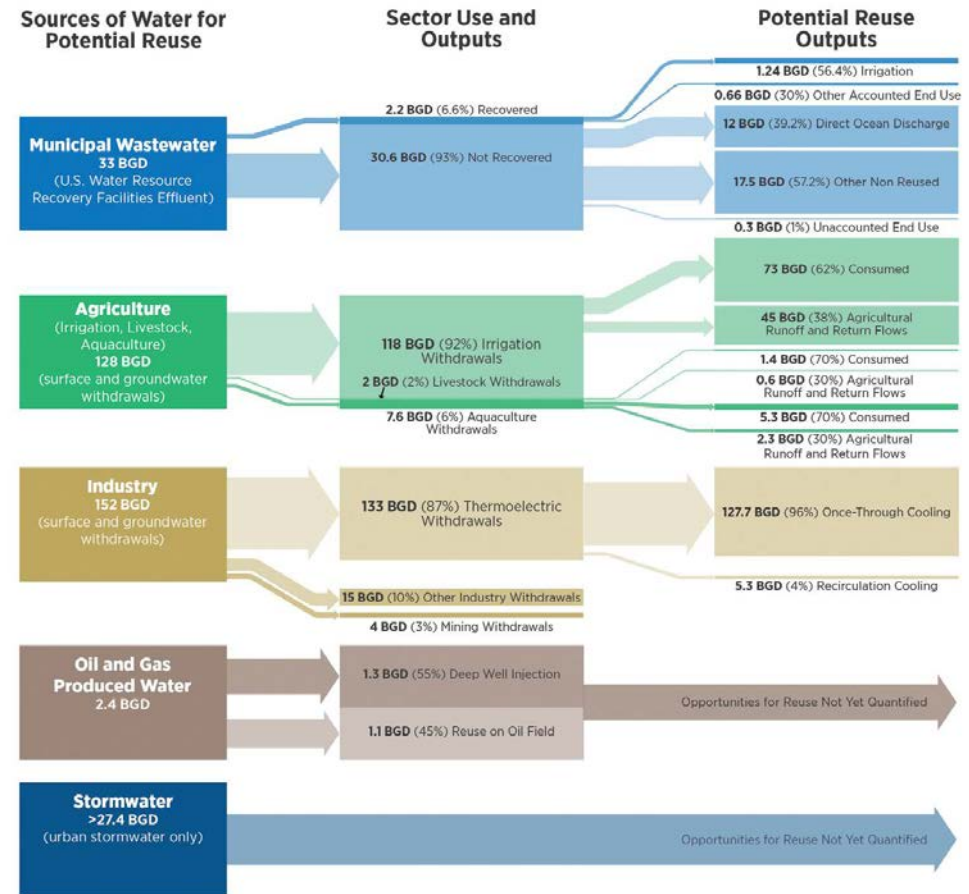


EPA 2019

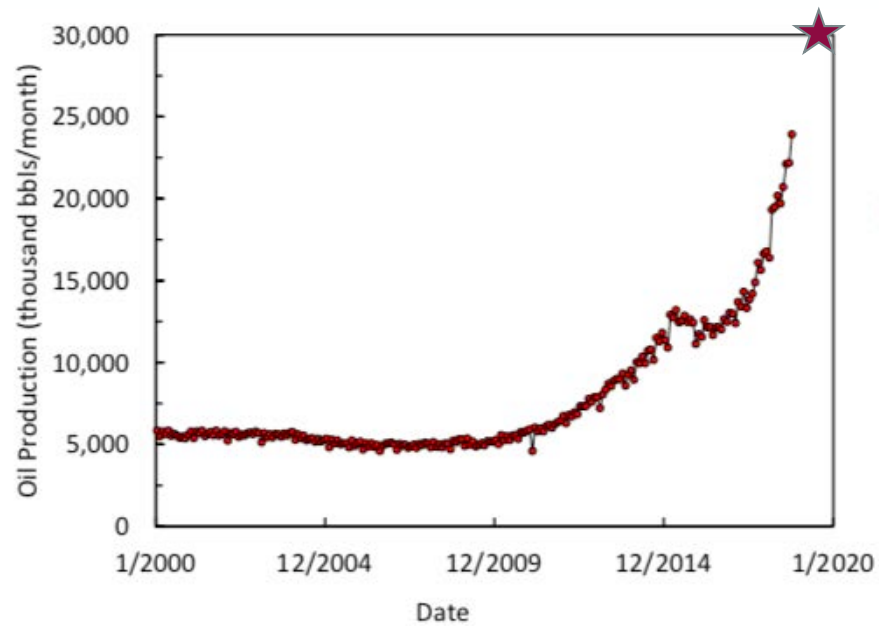
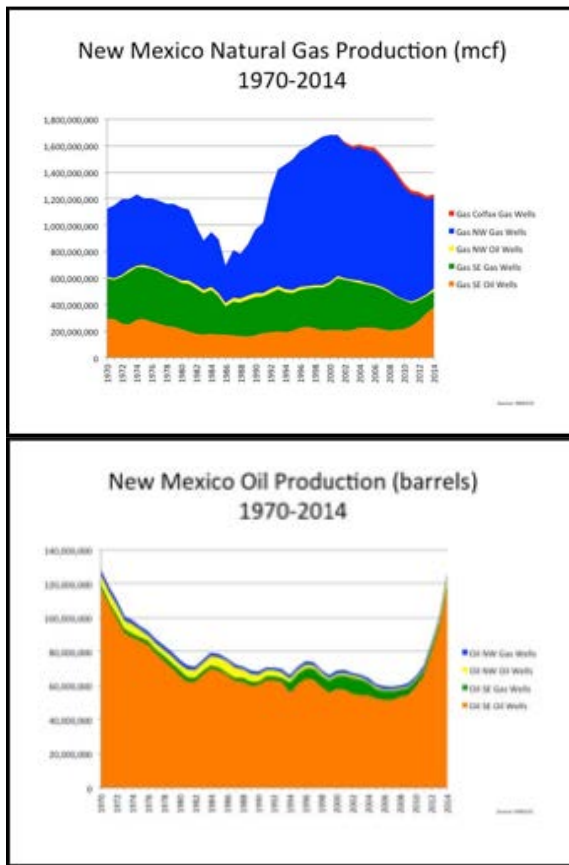


EPA National Water Reuse Action Plan Focus Areas

- Clear potential to reclaim more waste waters for beneficial use
- Sources of water for priority reuse:
 - 33 BGD - Municipal wastewater
 - 128 BGD - Agriculture
 - 152 BGD - Industry
 - 2.4 BGD - Oil and gas produced water
 - >27.4 BGD – Storm water
- Focus on treatment for beneficial reuse
- Leads selected for each area - GWPC and NMPWRC selected to lead produced water efforts



Quantify Produced Water Available for Reuse



**Average 4-5 bbls of produced water/ barrel of oil
~4 million bbls produced water/day (3 ABQ's)**

Local Produced Water Treatment Challenges

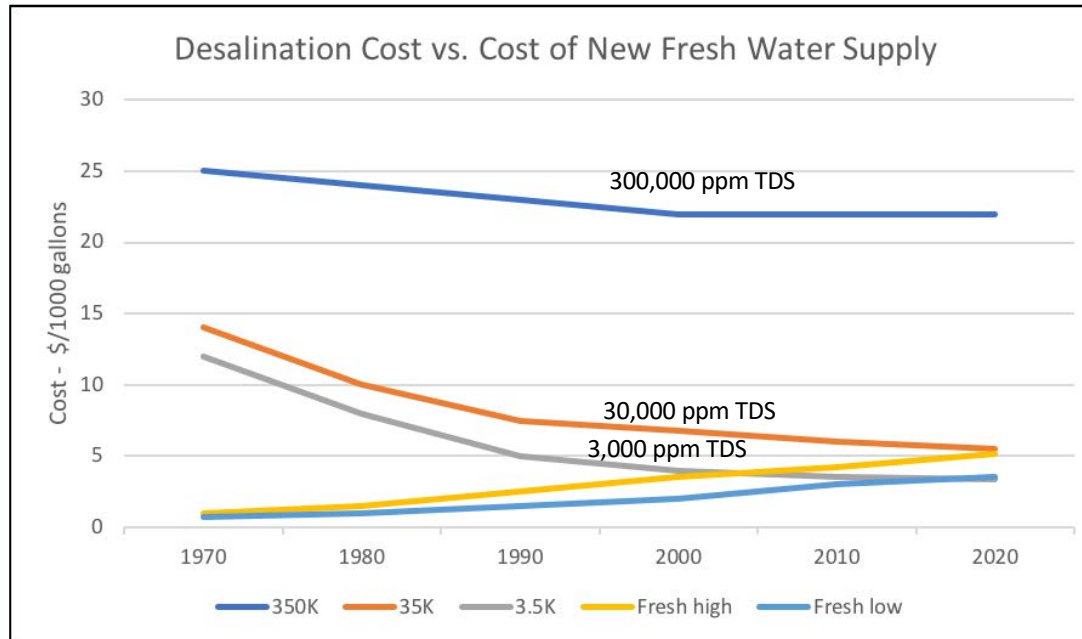
- Produced water quality varies by depth, location (10,000 mg/L to > 300,000 mg/L)
- Often Na, Ca, Cl, CO₃, and SO₄, high scaling
- Can contain hazardous constituents such as: Ra, Ba, Sr, U, heavy metals, organics,
- Fracking chemicals –
 - Water and sand –99% to 99.5% by volume
 - Friction reducer, Biocide, Surfactants, Thickeners, Scale and corrosion inhibitors, and other trace chemicals
- Surface storage
- Concentrate management and disposal issues and costs – solid, hazardous, radioactive, or mixed waste
- Potentially 100-150 MGD of excess produced water available

Requires safe transport, handling, treatment, storage, and residuals management and disposal



Decreasing Treatment/Increasing Fresh Water Costs

(EWRI Hightower 2018)



**2000 Permian Basin
Avg. Produced Water
Disposal costs \$2/1000 gal**

**2020 Permian Basin
Avg. Produced Water
Disposal costs \$20-50/1000 gal**

Water Quality Requirements for Various Reuse Applications

Produced Water Quality (ppm) TDS	Application	Common Water Quality Requirements (ppm) TDS	Typical Treatment Process
Conventional 10K to 50K 50%<35K 50%>35K	Drinking	500-600	Chemical/membrane/thermal
	Aquifer Storage & Recovery	300-5,000	Chemical/membrane/thermal
	Agriculture and livestock	Class 1 <700, <60% Na, B<0.5 Class 2 2000, 60-75% Na, B<2.0 Class 3 >2000, 75% Na, B~2	Chemical/membrane/thermal
	Rangeland	4,000 – 10,000	Chemical/membrane/thermal
Unconventional 60K to 300K 25%<100K	Surface Flow	600-2000	Chemical/membrane/thermal
	Mineral Recovery	>100K (no discharge)	Chemical/thermal
	Road Constr.	Up to 100,000	Chemical/membrane/thermal

Summary Data on Oil and Gas Operation Impacts on Public and Environmental Health and Safety



< 0.25 miles from oil and gas operations

- Highest level of acute public health impacts and concerns
- Highest occurrence of environmental impacts - noise, air, land, and water pollution and contamination



0.25 - 0.50 miles from oil and gas operations

- Significantly reduced public health impacts
- Significantly reduced environmental impacts or damage from operations or accidents



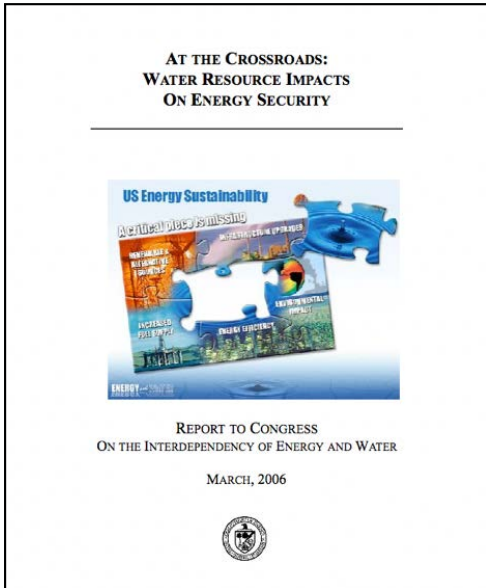
> 0.50 miles from oil and gas operations

- Little observed acute or chronic public health and safety or environmental impacts
- Especially in open, flat, and non-wooded operational areas

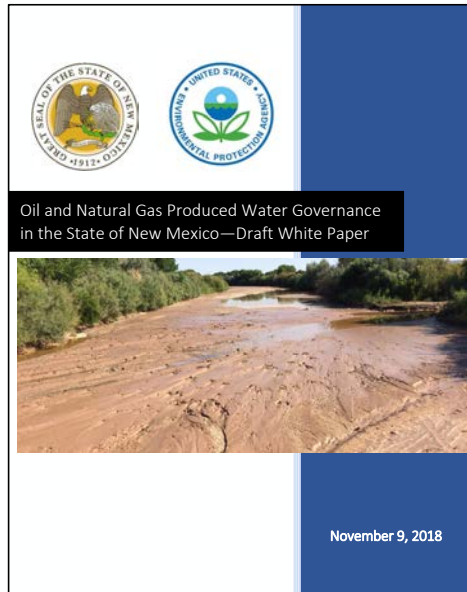
- Highest impacts in populated areas, especially in wooded, rolling terrain
- Highest impacts to permanent residents on small private land parcels in closely aggregated operations
- NM DOH has no record of fracking damaging a personal water supply

Physicians for Social Responsibility-Colorado Symposium - Health Effects of Oil and Gas Development, December 4, 2020.

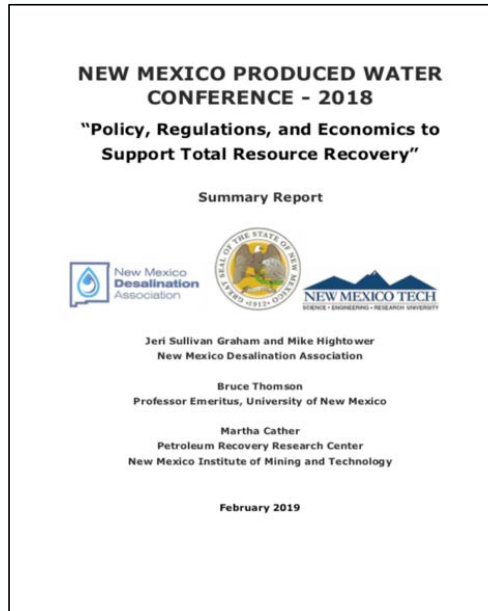
Recent New Mexico Efforts on Produced Water Treatment and Reuse



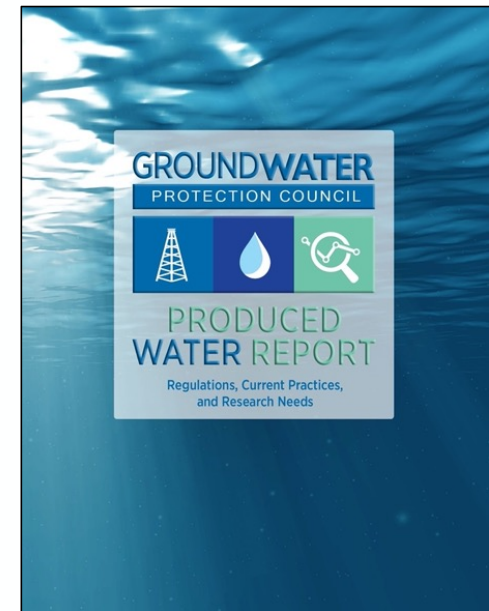
Sandia, Los Alamos, DOE
2004



NMED, OSE, EPA 2017-18



NMED, OSE, EMNRD
2017-19



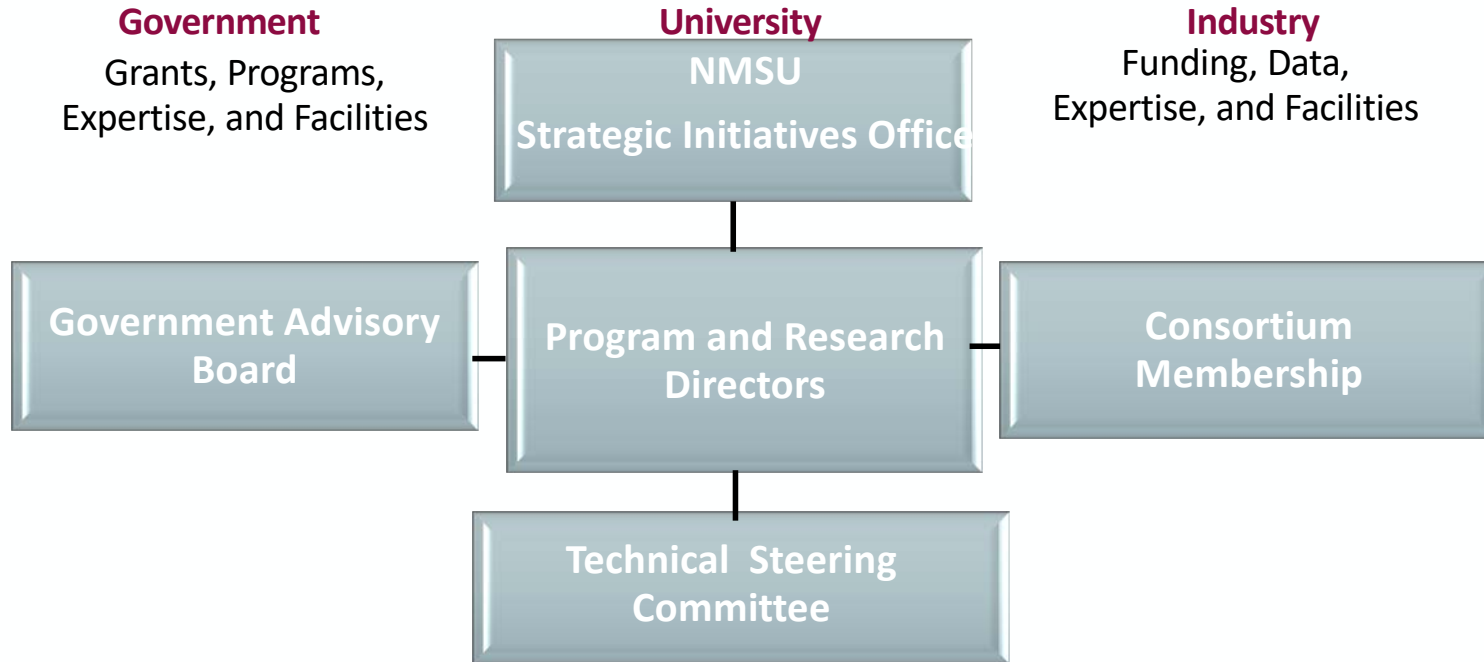
EMNRD 2016-19

NM 2019 Produced Water Act, HB 546

- Through the Act, statutory and regulatory authority for the reuse of produced water was modified:
 - Reuse inside oil and gas sector remains under the Oil Conservation Division (OCD) of the NM EMNRD,
 - **Reuse outside the oil and gas sector, was designated to the NM Environment Department (NMED).**
- The Act encourages produced water reuse outside oil and gas to:
 - enhance fresh water sustainability,
 - reduce or eliminate fresh water use in the oil and gas sector,
 - support new economic development opportunities,
 - maintain public and environmental health and safety.

This regulatory transition is an emerging trend in the oil and gas sector – OK, TX, CA

NMPWR Consortium Organization



Modeled after DOE Innovative Treatment Remediation Demonstration Program and EPA Environmental Technology Verification (ETV) and EPA SITE Program

Consortium Project Efforts



2020	Dark Maroon	Light Maroon	Light Maroon	Light Maroon	Light Maroon	White
2021	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon
2022	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon	Dark Maroon
2023	Light Maroon	Light Maroon	Light Maroon	Dark Maroon	Dark Maroon	Dark Maroon

More extensive research, demonstration and testing efforts are shaded –
 Large focus on field-scale cost and performance testing and evaluation

Consortium Research Focus for 2021

- Current research priorities are on:
 - Technical risks
 - Bench and pilot-scale treatment technology cost and performance,
 - Sampling, monitoring, and chemical analysis improvements,
 - Produced water quality and quantity data portal,
 - Socioeconomic, environmental, ecological cost-benefit risk analyses of reuse
 - Environmental, ecological, and public health and safety risks
 - Quantitative toxicology evaluations, analyses, and assessments using WET and greenhouse-based bioaccumulation studies
 - Treated produced water relative risk analysis – NPDES+ or NPDES- vs other treated waste waters
 - Public education and outreach on relative risks

<https://nmpwrc.nmsu.edu>



Western Regional Partnership

*Reliable Outcomes for America's Defense, Energy, Environment and
Infrastructure in the West*

wrpinfo.org
