

NATIONAL WATER REUSE ACTION PLAN



NATIONAL WATER REUSE ACTION PLAN QUARTERLY UPDATE

July–September 2021

A Message from Sharon Nappier, National Program Leader for Water Reuse

This summer, 99 percent of the Western United States experienced drought, and nearly 60 percent experienced extreme drought, with little relief in sight. Patterns of warmer temperatures and reduced precipitation are only expected to increase with climate change, impacting water quantity and quality and creating challenges for communities to meet local water needs. While reuse is not a quick fix for drought conditions, it can be leveraged along with conservation and efficiency measures as a key tool to counteract climate change and drought impacts—particularly with thoughtful planning and infrastructure investments. EPA is catalyzing investments in water reuse through recent WIFIA loan announcements, supporting projects in [California](#) and [Virginia](#) that create a resilient, local supply of water in communities. As summarized in our new topical highlights [webpage](#), many WRAP actions—including EPA’s contributions to a strengthened National Drought Resilience Partnership Action Plan—are helping to mitigate drought and other climate change-induced impacts. Collectively, we play a critical role in building resilience as we leverage water reuse to ensure a sufficient supply of clean water for all.

The status update table below includes brief updates on all WRAP actions. Acronyms are defined at the end of this document.

Seeking Feedback on Proposed WRAP Actions

Three proposed WRAP actions are summarized below, with more information available in the [WRAP Online Platform](#). We welcome feedback on these proposed actions via waterreuse@epa.gov through November 19, 2021.

We also welcome federal, state, tribal, local, and water sector partners to propose actions to advance water reuse. Ideas for new actions may be sent to waterreuse@epa.gov at any time. For information about how to propose, lead, or collaborate on a WRAP action, visit [this webpage](#).

1. **Policy Coordination: Incorporate Water Quality and Onsite Reuse into Premise Plumbing Codes and Standards** ([Action 2.18](#), led by EPA and NBRC for ONWS)

Decentralized ONWS collect, treat, and reuse alternative water sources at a building, or district scale thereby reducing potable water demand and wastewater and stormwater discharge volume. The EPA Premise Plumbing Workgroup plans to partner with NBRC to convene multiple stakeholders with the goal of incorporating water quality and onsite reuse into premise plumbing codes and standards at a national

IN CASE YOU MISSED IT

Our WRAP monthly update listserv messages feature action highlights and reuse events. Issues from this past quarter are available online:

- [September update](#)
- [August update](#)

Please visit the [Recent and Upcoming Water Reuse Activities](#) page for information about these current reuse opportunities and resources and more:

- **November 15** – Keys to Success: Water Recycling in Small and Disadvantaged Communities training webinar ([registration link](#)).
- **November 17** – Permitting Water Innovation: Improving Permitting Processes to Support New Water Management Technologies and Strategies webinar ([registration link](#)).

level to advance ONWS. This action builds on the work of WRAP Action 3.4 (Develop Research and Tools to Support ONWS) that is developing ONWS risk-based treatment targets.

2. **Science and Specifications: Assess Regulatory Frameworks for Produced Water Applications** ([Action 3.8](#), led by EDF)

As practitioners, regulators, and policymakers consider reusing treated produced water outside of the oilfield, there are complex considerations for identifying and appropriately managing environmental and public health risks. EDF plans to identify and analyze current regulatory frameworks for produced water reuse and discharge in relevant states. EDF also plans to utilize existing knowledge of produced wastewater quality to identify needs for further research and potential state guidance and/or state regulatory development.

3. **Water Information Availability: Reflect Water Use and Reuse in Material Life Cycles and Actions** ([Action 5.6](#), led by EPA)

EPA plans to develop an interactive sustainable materials management dashboard with information on: 1) life cycle impacts of resource and materials management; 2) progress in achieving national goals related to the sustainable use of materials; 3) estimates of the embodied water content in all manufactured goods and services; and 4) an estimated quantification of industrial water use across the U.S. economy. The information should be used to inform EPA programs, policies, and goals; prioritize efforts to reduce water use; and identify opportunities for industrial water reuse.

Newly Active WRAP Actions

This quarter, we're pleased to announce that three actions proposed in the previous quarter are now active and underway. Collectively, WRAP actions seek to advance water reuse planning and implementation across the country. Actions are organized by strategic theme to help focus efforts and inspire future action.



Science and Specifications

Develop Issue Papers on Emerging Public Health Topics in Water Reuse ([Action 3.7](#), led by EPA and FDA)

- ✓ Strategic theme tie-in: Increase understanding of why certain constituents may or may not be a concern for source and use applications of recycled water by illuminating key public health topics and relevant research.



Outreach and Communication

Develop Public Health and Resiliency-Focused Water Reuse Communication Tools ([Action 8.6](#), led by CDC and EPA)

- ✓ Strategic theme tie-in: Bolster public confidence in and acceptance of water reuse as part of community water supply portfolios by engaging medical and public health professionals.



International Collaboration

Develop and Highlight Case Studies Relevant to International Contexts ([Action 11.3](#), led by EPA and The World Bank)

- ✓ Strategic theme tie-in: Support underserved U.S. communities and lower- and middle-income countries around the world by exchanging examples of innovative and successful water reuse solutions that reflect shared experiences.

Status Update on WRAP Actions

* For the implementation progress bar graphs in the table below, the dark blue area indicates the completed milestones, the light blue area indicates milestones that are in progress, and the white area reflects forecasted future milestones.

** Complete actions are those where all supporting milestones are completed, and no additional milestones will be added.

Shortened Action Title and Number	Action Leader(s)	Brief Update	Implementation Progress*
Integrated Watershed Action			
Prepare Case Studies of Successful Water Reuse Applications (Action 1.2)	Aliza Furneaux (WateReuse)	The action team is making final preparations to release a compilation of five case studies that will explore how communities incorporated water reuse into their integrated water management plans. The case studies include recycled water used for on-site reuse, surface water augmentation, and potable reuse.	
Leverage EPA's Water Partnership Programs (Action 1.4)	Bob Benson (EPA)	The water reuse and water resource management inventory was published in April 2021 and will serve as a foundation to leverage strong multi-stakeholder relationships in addressing water scarcity issues and reuse opportunities in communities across the country. A water reuse pilot project in collaboration with River Network and National Park Service, under Milestone 7, is nearing completion in San Antonio and Verde River basins given initial funding. Final deliverables and reports should be available by the end of the fiscal year.	
Develop Case Studies of Low-Input Solutions (Action 1.5)	Layne Piper (ECOS)	ECOS is conducting outreach to obtain more information about select reuse case studies showcasing the integration of low-input solutions across a variety of geographic areas, community sizes, and applications of water reuse.	
Policy Coordination			
Compile Existing State Policies and Approaches to Water Reuse (Action 2.1)	Jake Adler (ACWA), Wendi Wilkes (ASDWA), Sharon Nappier (EPA), Greg Fogel (WateReuse)	Work has begun to compile and organize state policy and regulatory documents.	
Enhance State Collaboration on Water Reuse (Action 2.2)	Jake Adler (ACWA), Wendi Wilkes (ASDWA), Ashley Harper (EPA)	ACWA, ASDWA, ASTHO, ECOS, GWPC, and EPA continue to convene to discuss topics, needs, and logistics for the 2022 State Summit on Water Reuse.	
Enhance Wastewater Source Control Through Local Pretreatment Programs (Action 2.4)	Cynthia Finley (NACWA), Claudio Ternieden (WEF)	NACWA is developing an online resource library for case studies and other relevant documents that characterize how pretreatment pollution prevention programs can be incorporated into a water reuse program.	
Develop Materials on How CWA NPDES Permits Can Facilitate Water Reuse (Action 2.6)	David Smith (EPA), Kevin Weiss (EPA), Sean Rolland (ACWA)	The action workgroup, consisting of EPA, state, permittee, and other stakeholder volunteers, has developed a draft white paper to identify issues and compile case studies addressing key NPDES permitting questions specific to water reuse. The draft white paper is currently under internal review.	

Shortened Action Title and Number	Action Leader(s)	Brief Update	Implementation Progress*
Utilize Existing Working Groups to Coordinate Federal Engagement (Action 2.7)	Sharon Nappier (EPA)	The Inter-Sustainability Working Group, Interagency Water Working Group, and National Drought Resilience Workgroup continue to convene with their partners. NDRP is working on publishing a strengthened action plan.	
Align Tools to Promote Best Management of Unused/Expired Pharmaceuticals (Action 2.9)	Sharon Green (LACSD)	The action team meets regularly to explore opportunities to align messaging related to pharmaceutical disposal and its potential to impact water reuse opportunities. Work to develop outreach materials regarding EPA's Hazardous Waste Pharmaceutical Rule, identify outreach and communication needs of water and wastewater utilities regarding pharmaceuticals in recycled water, and prepare a white paper regarding existing messaging about pharmaceutical disposal alternatives and options for aligning that messaging are expected to be completed in late 2021.	
Leverage Existing USDA Programs for Consideration of Agricultural Water Reuse (Action 2.12)	Alan Gillespie (USDA)	NRCS will evaluate the effectiveness of two interim practice standards, Managed Aquifer Recharge and Groundwater Recharge Basin, in California as part of their fiscal year 2022 program delivery.	
Support Local and Regional Reuse Projects (Action 2.16)	Eric Rosenblum, Greg Fogel (WateReuse), David Smith (EPA)	The action team completed research and interviews with key water practitioners and received input from a peer-review panel on a report summarizing institutional challenges, innovative governance structures and models, and critical factors in selecting interagency collaboration models. The report is under internal review and completion is planned for fall 2021.	
Propose Nationwide Permit Addressing Reuse (Action 2.17)	Jennifer Moyer (USACE)	USACE's proposed nationwide permit E is being considered for finalization in the coming months.	
Science and Specifications			
Compile Existing Fit-for-Purpose Specifications (Action 3.1)	Sharon Nappier (EPA)	EPA and contractors convene weekly and have ongoing meetings with action partners. The team is currently developing the web tool for an initial launch in early 2022.	
Convene Experts on Urban Stormwater Capture and Use (Action 3.3)	David Smith (EPA), Chris Kloss (EPA), Danielle Johnson (JFW), Seth Brown (NMSA), Richard Luthy (ReNUWIt), Greg Fogel (WateReuse), Claudio Ternieden (WEF)	EPA, in partnership with the ReNUWIt research consortium, NMSA, WateReuse, WEF, and JFW, convened a group of national, regional, and local leaders from September 13 to 15 to explore the varied drivers and interests that motivate investment in SCU and develop strategies and priorities for enhancing state and local capacity to pursue SCU.	

Shortened Action Title and Number	Action Leader(s)	Brief Update	Implementation Progress*
Develop Research and Tools to Support ONWS (Action 3.4)	Paula Kehoe (NBRC for ONWS)	EPA ORD published three papers on the NEWR calculator , graywater and wastewater log₁₀ reduction targets , and bacteria in graywater . Additionally, NBRC for ONWS continued to advance the development of an operator certificate exam and training for onsite systems. In partnership with WEF and Association of Boards of Certification, the group began recruitment of Subject Matter Experts to refine the basis of knowledge and skills that will be tested in the exam.	
Assess Specifications of Wastewater in Food Animal Protein Processing Facilities (Action 3.5)	Jay Garland (EPA)	EPA resumed sampling work in March 2021, which is scheduled to be completed in 2022.	
Viral Pathogen and Surrogate Approaches for Assessing Treatment Performance (Action 3.6)	Sarah Ludwig-Monty (EPA)	EPA ORD plans to announce awards in the fall.	
Develop Papers on Emerging Public Health Topics in Reuse (New Action 3.7)	Ashley Harper (EPA), Kruti Ravaliya (FDA)	EPA and FDA developed the Action Implementation Plan.	
Technology Development and Validation			
Implement New Mexico Produced Water Research Consortium (Action 4.2)	Rebecca Roose (NMED), Lynette Guevara (NMED)	The NM PWRC Directors and project review teams continue to work with pilot project proponents. The NM PWRC collaborated with GWPC to develop a beta version of the New Mexico Produced Water Data Portal. Sandia National Laboratory and the NM PWRC acquired funding from DOE to develop an alpha version of a socio-economic model; the beta version is expected to be complete in November 2021. The NM PWRC plans to demonstrate the modeling efforts and data portal, as well as provide updates on other Consortium activities, at upcoming Public Education and Outreach meetings in November 2021.	
Support Water Reuse Through DOE's Water Security Grand Challenge (Action 4.3)	Diana Bauer (DOE)	DOE's Wave to Water prize challenge announced five winners in the CREATE stage and can be viewed here . The DESIGN phase, stage 5, opened on September 9, 2021.	
Support Air-Cooling Condensate Water Reuse in Large Buildings (Action 4.5)	Thomas Lawrence (ASHRAE), Bob Boulware (Design Aire), Pete DeMarco (IAPMO), Greg Eades (EPA), John Wammes (WW), Fred Betz (ASHRAE), Jay Garland (EPA), Gaby Schubert (WTA), Michael Jahne (EPA)	The action team added three new milestones to reflect an EPA study of condensate water quality promoting study collaboration from partner universities and utilities.	

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Implement and Manage the NAWI Energy-Water Desalination Hub (Action 4.6)	Melissa Klembara (DOE), Peter Fiske (NAWI), Meagan Mauter (NAWI)	In August 2021, NAWI published their master technology roadmap, which details the results of the 2020 road-mapping initiative that focused on technical challenges across five end-use sectors.	
Evaluate Low-Input Methods to Remove Pharmaceutical Residues (Action 4.7)	Clinton Williams (USDA)	Action partners at Penn State University are conducting ongoing research.	
Water Information Availability			
Foster USDA Watershed-Scale Pilot Projects to Share Water Information (Action 5.1)	Alan Gillespie (USDA)	USDA NRCS's CIG program opened May 18, 2021, and accepted applications through July 19, 2021. This year's CIG includes a priority area of "Water Resources and Increased Resilience: Climate-Smart Strategies," and is seeking proposals for technologies that address water quality/quantity issues through climate-smart strategies, such as improving groundwater recharge.	
Identify Monitoring Practices for Reuse Applications (Action 5.2)	Erin Partlan (WRF)	Research teams are beginning research on two projects: (1) developing standard operating procedures for the collection, storage, and extraction of aqueous samples for <i>in vitro</i> bioanalytical tool screening and (2) assessing water quality monitoring needs, tools, gaps, and opportunities for potable water reuse.	
Develop National Integrated Water Availability Assessments (Action 5.4)	Brian Clark (USGS)	USGS developed project plans; work is underway to identify gaps and compile information needed to initiate simulations for suitable use estimates.	
Quantify the National Volumes of Water Potentially Available for Reuse (Action 5.5)	Ashley Harper (EPA), Patrick Dube (WEF), Greg Fogel (WaterReuse)	The action team has chosen to prioritize stormwater as the additional source of water for quantifying reuse potential. This action builds on the 2018 WEF ReNEW Water Project to quantify the current amount of municipal wastewater reuse and potential volumes available for reuse. Data collection has begun via survey, and WEF is currently working with members to develop a plan to expand the 2018 report.	
Finance Support			
Compile Federal Funding Sources and Develop Interagency Decision Tool (Action 6.1)	Sonia Brubaker (EPA), Stephanie Santell (EPA), David Smith (EPA)	The action team has completed work on determining the user requirements and framing the user interface for the tool to be developed. Work will begin later in the year to engage stakeholders on the design of the tool, as well as to develop the final online product.	
Communicate Eligibility of Water Reuse in SRF Programs (Action 6.2A)	Justin Mattingly (EPA), Kiri Anderer (EPA)	The Council of Infrastructure Financing Authorities' newsletter, released in May 2021, provided updates on the availability of \$1 billion in funding through WIFIA for state infrastructure financing authorities and EPA's release of the report Integrating Water Reuse into the Clean Water State Revolving Fund .	

Shortened Action Title and Number	Action Leader(s)	Brief Update	Implementation Progress*
Compile and Promote Existing USDA Resources for Rural Communities (Action 6.4)	Steve Polacek (USDA)	USDA's two funding programs (Water and Waste Disposal Loan and Grant and Water and Waste Disposal Technical Assistance and Training Grant) will be renewed for fiscal year 2021.	
Integrated Research			
Develop a Coordinated National Research Strategy (Action 7.2)	Julie Minton (WRF)	WRF completed a survey on research needs for stormwater harvesting practices at local, regional, and state levels through project 4841 . The results of this survey have been incorporated into Action 3.3.	
Increase Understanding of Current Aquifer Storage and Recovery Practices (Action 7.4)	Mike Paque (GWPC), Justin Mattingly (EPA), Kara Goodwin (EPA)	EPA finalized and published a final report, Enhanced Aquifer Recharge of Stormwater in the United States: State of the Science Review . This report is a summary and synthesis of scientific and technical literature on enhanced aquifer recharge using stormwater.	
Coordinate and Promote Water Reuse Technology in Federal SBIR Programs (Action 7.5)	April Richards (EPA)	EPA closed the 2021–2022 SBIR Phase I Solicitation, which included two water reuse topics, in August. Team members are reviewing submissions. These projects are anticipated to be funded in December 2021.	
Develop USBR's Advanced Water Treatment Research Roadmap (Action 7.6)	Yuliana Porras-Mendoza (USBR)	USBR's roadmap was sent to agencies in the Federal Water Treatment Working Group for review.	
Life-Cycle Analysis to Support Cost-Effective Enhanced Aquifer Recharge (Action 7.7)	Jacquelyn Bell (EPA)	EPA's request for applications is scheduled to be released this fall.	
Outreach and Communications			
Compile and Develop Outreach and Communication Materials (Action 8.1)	Pat Sinicropi (WateReuse), Greg Fogel (WateReuse)	WateReuse anticipates adding new communication materials focused on climate change, affordability, and agricultural reuse to the Online Platform in November 2021.	
Establish a Water Reuse Champion Award Program (Action 8.4)	Shana Rappaport (GreenBiz), Greg Fogel (WateReuse), Jon Freedman (Suez)	WateReuse and Suez met with an additional action partner and anticipates an announcement on the Water Reuse Champion award in spring 2022.	
Engagement with Disadvantaged and Rural Communities on Water Reuse (Action 8.5)	David Smith (EPA)	In June 2021, EPA held two webinars focusing on advancing water reuse in small and disadvantaged communities. The outreach and listening sessions focused on introducing water recycling opportunities and hearing communities' interests in water recycling and needs for support to pursue recycling programs.	

Shortened Action Title and Number	Action Leader(s)	Brief Update	Implementation Progress*
Develop Public Health Communication Tools for Reuse (New Action 8.6)	Jonathan Yoder (CDC), Mia Mattioli (CDC), Ashley Harper (EPA), Rabia Chaudhry (EPA)	CDC and EPA developed an Action Implementation Plan and meet biweekly. CDC developed a draft communications plan outlining planned action activities.	
Workforce Development			
Support and Promote Opportunities for Creating a Skilled Workforce (Action 9.2)	Jim Horne (EPA), Greg Fogel (WaterReuse), Barb Martin (AWWA), Claudio Ternieden (WEF)	AWWA is currently collecting information on existing water reuse training materials to support state-level efforts to develop advanced water treatment operations and water reuse training programs. Once the compilation is complete, AWWA will develop recommendations to expand operator training to support water reuse and other advanced water treatment operations nationwide.	
Metrics for Success			
Facilitate Implementation of the National Water Reuse Action Plan (Action 10.3)	Sharon Nappier (EPA)	The RFA for the funding opportunity titled National Priorities: Water Innovation, Science, And Engagement to Advance Water Reuse Request for Applications was released on July 20, 2021, and remained open for applications through September 29, 2021. Awards are expected in 2022.	
International Collaboration			
Facilitate U.S.-Israel Collaboration on Water Reuse (Action 11.1)	Sharon Nappier (EPA), Adam Schalimtzek (MoEP), Omer Bab (MoEI)	The action team will soon begin planning for an in-person delegation mission to Israel in spring 2022 and is considering other opportunities for collaboration, including webinars and conference participation.	
Raise Global Water Reuse Awareness and Preparedness (Action 11.2)	Allie Davis (DOS)	DOS continues to identify opportunities to highlight water reuse efforts globally through collaboration, including participating in meetings with EPA and the World Bank to frame proposed Action 11.3.	
Develop and Highlight Case Studies Relevant to International Contexts (New Action 11.3)	Rabia Chaudhry (EPA), Clémentine Marie Stip (The World Bank)	EPA and World Bank developed an Action Implementation Plan and meet biweekly. The team is currently compiling examples of water reuse into a database and finalizing a case study template.	
Complete Actions**			
Inclusive of the following completed actions: <ul style="list-style-type: none"> • Develop Federal Policy Statement to Support Consideration of Water Reuse (Action 1.1) • Complete the EPA Study of Oil and Gas Extraction Wastewater Management (Action 2.3) • Conduct Outreach and Training with Tribes to Build Water Reuse Capacity (Action 2.15) • Support and Communicate WIFIA Funding (Action 6.2B) 			
44 Active Actions 4 Complete Actions	35 Unique Action Leaders		224 Milestones Completed

Abbreviations Used in This Document

ACWA	Association of Clean Water Administrators	JFW	Johnson Foundation at Wingspread	ORD	Office of Research and Development
ASDWA	Association of State Drinking Water Administrators	LACSD	Sanitation Districts of Los Angeles County	PWRC	Produced Water Research Consortium
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers	MoEI	Ministry of Economy and Industry (Israel)	ReNUWit	Reinventing the Nation's Urban Water Infrastructure
ASTHO	Association of State and Territorial Health Officials	MoEP	Ministry of Environmental Protection (Israel)	RFA	Request for Applications
AWWA	American Water Works Association	NACWA	National Association of Clean Water Agencies	SBIR	Small Business Innovation Research
CDC	Centers for Disease Control and Prevention	NAWI	National Alliance for Water Innovation	SCU	Stormwater capture and use
CIG	Conservation Innovation Grant	NBRC	National Blue Ribbon Commission	USACE	U.S. Army Corps of Engineers
DOE	U.S. Department of Energy	NEWR	Non-potable Environmental and Economic Water Reuse	USBR	U.S. Bureau of Reclamation
DOS	U.S. Department of State	NDRP	National Drought Resilience Partnership	USDA	U.S. Department of Agriculture
ECOS	Environmental Council of the States	NMED	New Mexico Environment Department	USGS	U.S. Geological Survey
EDF	Environmental Defense Fund	NMSA	National Municipal Stormwater Alliance	WEF	Water Environment Federation
EPA	U.S. Environmental Protection Agency	NPDES	National Pollutant Discharge Elimination System	WIFIA	Water Infrastructure and Finance Innovation Act
FDA	U.S. Food and Drug Administration	NRCS	Natural Resources Conservation Service	WRF	Water Research Foundation
GWPC	Groundwater Protection Council	ONWS	Onsite Non-potable Water Reuse System	WTA	Water Tech Alliance
IAPMO	International Association of Plumbing and Mechanical Officials			WW	Water Works, Inc.