

*Strategy and Recommendations  
for  
Modernizing America’s Water Resource  
Management and Water Infrastructure*

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Initial Reports and Recommendations Prepared by the Water Subcabinet  
Pursuant to Executive Order 13956 titled “Modernizing America’s Water Resource  
Management and Water Infrastructure” issued October 13, 2020.

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Submitted by:

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MEMO

January 12, 2021

To: Mary Neumayr, Chairman of the Council on Environmental Quality  
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Subject: Reports and Recommendations prepared pursuant to Executive Order 13956, titled "Modernizing America's Water Resource Management and Water Infrastructure"

Modernizing the management of our Nation's water resources and infrastructure improves the quality of life for every American. For the past three years our agencies have coordinated like never before to help ensure that all Americans have access to safe, reliable water supplies essential for our communities, our economy, and for recreation and the environment.

On October 13, 2020, Executive Order 13956, titled "Modernizing America's Water Resource Management and Water Infrastructure" was issued formally establishes an interagency Water Subcabinet that will streamline the Federal government's approach to managing America's water resources and work to upgrade our Nation's water infrastructure, safeguard public health, and create jobs. The Water Subcabinet includes the U.S. Department of the Interior (DOI), U.S. Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA), the Department of the Army (Civil Works), the U.S. Department of Commerce (DOC) represented by the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Energy (DOE).

Pursuant to Executive Order 13956, the Water Subcabinet is delivering the following items:

- Section 4 "Reducing Inefficiencies and Duplication" – The first assessment of Federal water related task forces, working groups, and other formal cross-agency initiatives (Federal interagency working groups) being considered for coordination, consolidation, or retirement. This assessment, along with recommendations for coordination, consolidation, and retirement, will be updated and provided to CEQ, OSTP, and OMB quarterly, beginning January 2021, per the methodology described in the Section 4 Federal Action Plan.
- Section 5 "Improving Water Resource Management" – The initial report and recommendations, which examine specific National water resources and infrastructure issues.
- Section 7 "Integrated Infrastructure Planning" – The report and recommendations to support integrated planning and coordination among agencies to modernize our Nation's water infrastructure.
- Section 8 "Water Sector Workforce" – The Report on Recommendations to Ensure Maintenance and Sustainability of America's Water Workforce.

**Sec. 4. Reducing Inefficiencies and Duplication.** Currently, hundreds of Federal water related task forces, working groups, and other formal cross-agency initiatives (Federal interagency working groups) exist to address water resource management. Within 90 days of the date of this order, the Water Subcabinet shall, to the extent practicable, identify all such Federal interagency working groups and provide recommendations to the Chairman of the Council on Environmental Quality (CEQ), the Director of the Office of Management and Budget (OMB), and the Director of the Office of Science and Technology Policy (OSTP) on coordinating and consolidating these Federal interagency working groups, as appropriate and consistent with applicable law.

Pursuant to section 4 of Executive Order 13956, the Water Subcabinet submits the following report and recommendations (“Section 4 Action Plan”).

### Reducing Inefficiencies and Duplication

#### Introduction

Within the Federal government and across the Nation, numerous Federal departments, agencies, and bureaus facilitate Federal water related task forces, working groups, and other formal cross-agency initiatives (Federal interagency working groups) that are tasked with similar, if not identical, missions, goals, and objectives across geographic and subject matter areas.

Duplication and redundancy creates inefficiencies and delays policy implementation, resulting in wasteful spending, dilution of dedicated resources, and confusion between participants and decision makers, as well as beneficiaries and external stakeholders. More fundamentally, such duplicative efforts risk of undermining the mission of the working groups themselves.

Through increased coordination and streamlining the Federal interagency working groups, Federal, state, and local participants will achieve:

- Increased productivity and effectiveness in accomplishing the intended mission of the Federal interagency working groups;
- More efficient and focused use of resources for better delivery of services and implementation of activities at the regional, state, and local levels;
- Improved communication and time management;
- Greater transparency and accountability to better capture progress and success, expedite processes, and increase responsiveness in decision making; and
- A clear and up to date vision of the current status, challenges, and accomplishments of these working groups.

#### Methodology

To reduce unnecessary duplication across the Federal government, the Water Subcabinet will undertake quarterly or other regularly scheduled assessments of existing Federal interagency working groups and provide consistent recommendations to coordinate, consolidate, or retire existing Federal interagency working groups.

The Water Subcabinet will initiate the following practices:

- Quarterly Data Call of All Federal Interagency Working Groups
  - Member agencies of the Water Subcabinet will, beginning in January 2021, update quarterly the list of Federal interagency working groups and provide recommendations to the Chairman of CEQ, the Director of OMB, and the Director of OSTP on coordinating, consolidating, or retiring existing and new Federal interagency working groups.
  - To organize and assess associated and related Federal interagency working groups, recommendations will be categorized using either a Geographic (i.e., the Great Lakes region) or Subject Matter (i.e., forecasting) area. Moving forward, additional categories may be established as deemed appropriate.
  
- Designation of One Federal Lead
  - The Department, Agency or Bureau that is designated as the lead entity in an identified Geography or Subject Matter area, will be tasked with ensuring quarterly updates are provided and making recommendations for coordinating, consolidating, or retiring related interagency working groups.
  - Upon adoption by the Executive Office of the President of the recommendations, the lead Department, Agency or Bureau working in close coordination with the Water Subcabinet, shall implement the recommendation to coordinate, consolidate, or retire the existing Federal interagency working groups.
  
- Assessment & Recommendations
  - Working groups within an individual Geographic or Subject Matter area, the Water Subcabinet shall be assessed for coordination, consolidation or retirement based on based on, but not limited to, the following criteria:
    - Mission Accomplished – Has the Federal interagency working group met its specified mandate?
    - Frequency and Relevance – When did the Federal interagency working group last meet? How often does the Federal interagency working group meet?
    - Origin and Authority – How was the Federal interagency working group created (i.e., Legislation, Executive Actions including Executive Orders and Presidential Memorandum, Court Settlement, etc.)? Under what authority does the working group convene? What authority, if any, does the working group administer?

### Recommendation

Recommendations to CEQ, OMB, and OSTP must include the following metrics for consideration:

- Justification – Summary of the data call, categorization, and assessment process;
- Propose New Organizational Alignment for the Federal Interagency Working Groups – As described and supported by the Justification summary; and
- Appropriations Summary – The Water Subcabinet will provide a snapshot analysis of the current appropriations of each Federal interagency working group assessed and briefly describe how the proposed New Organizational Alignment would affect the appropriations process, as appropriate and consistent with existing law.

**Sec. 5. Improving Water Resource Management. Federal agencies engage in a wide range of activities relating to water resource management. Within 120 days of the date of this order, the Water Subcabinet shall submit to the Chairman of the Council on Environmental Quality (CEQ), the Director of the Office of Management and Budget (OMB), and the Director of the Office of Science and Technology Policy (OSTP) a report that recommends actions to address the issues described below, and for each recommendation identifies a lead agency, other relevant agencies, and agency milestones for fiscal years 2021 through 2025:**

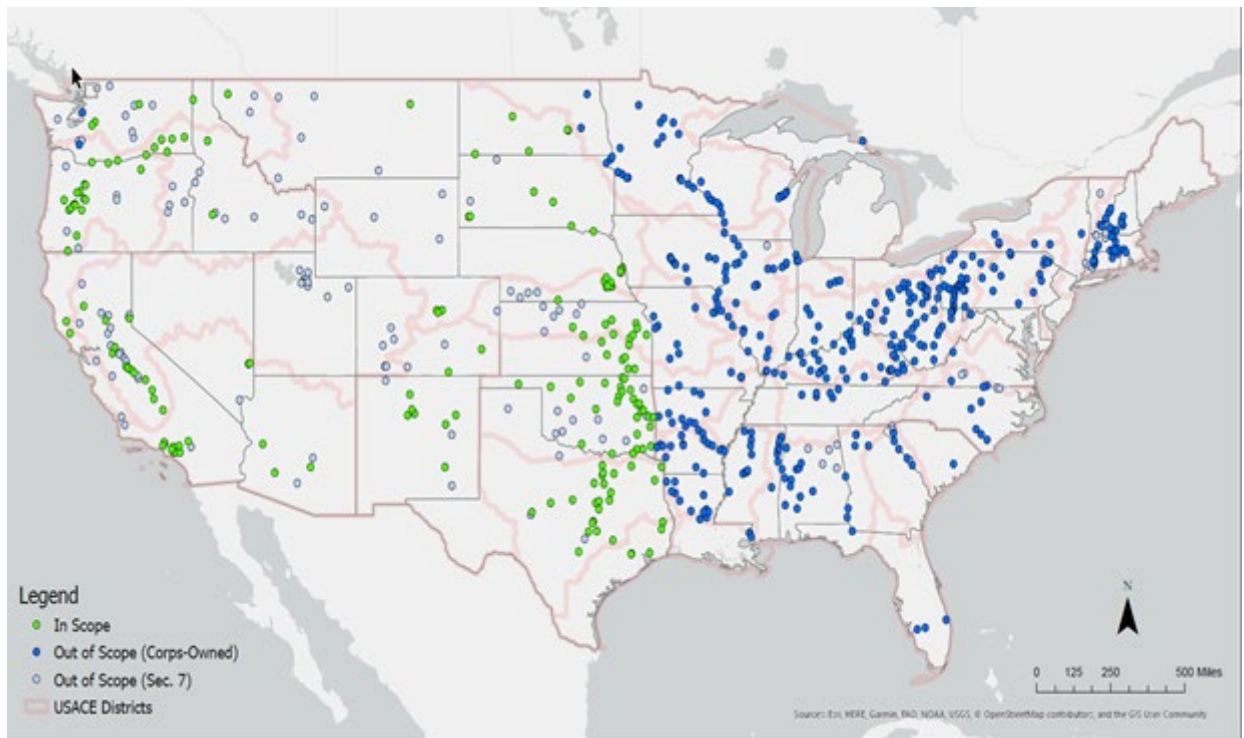
**Pursuant to section 5 of Executive Order 13956, the Water Subcabinet submits the following report and recommendations.**

**(a) Actions to increase water storage, water supply reliability, and drought resiliency, including through:**

**(i) developing additional storage capacity, including an examination of operational changes and opportunities to update dam water control manuals for existing facilities during routine operations, maintenance, and safety assessments:**

The U.S. Army Corps of Engineers (USACE) develops water control manuals to ensure the projects are operated to achieve authorized purposes and compliance with other laws. In addition to those projects owned by USACE, the USACE is responsible under Section 7 of the Flood Control Act of 1944 and subsequent related legislations, for developing a water control plan for any project managed and operated for flood risk management or navigation, or any project constructing in whole or in part with federal funds. Many U.S. Bureau of Reclamation (Reclamation) projects fall within this category, thus there is a direct linkage to the work of these two agencies for revision of water control manuals. Within the continental United States, there are 419 USACE-owned projects that have water control manuals and another 136 projects owned by others where the USACE has supervisory authority over operations and maintains a water control plan.

USACE is completing an analysis of a subset of these facilities. The report, scheduled for completion in FY21 will provide a prioritized list of water control manuals for projects within states where Reclamation projects also reside, including Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, North Dakota, New Mexico, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. Figure 1 illustrates the 175 projects that are within this scope. Also indicated are the USACE-owned projects outside of this scope as well as projects subject to Section 7 of the Flood Control Act of 1944 or other authority where the USACE has a flood risk management or navigation responsibility, including those projects owned by Reclamation.



**Figure 1-**Map of the Continental United States showing USACE District boundaries and projects in and out of scope.

Of the 166 water control manuals surveyed in this effort, 20 are in the process of being updated. The remaining 146 are either in immediate need of updating or are considered up-to-date and will be due for review ten (10) years after the most recent update. The most pressing challenge with revisions/updates to water control manuals is limited appropriations since the funding allocated for such efforts is entangled with other competing needs within the USACE Operations and Maintenance (O&M) funding. Establishing a priority listing will aid in discerning how best to allocate limited resources.

Water control manuals are prepared to meet initial requirements when storage in the reservoir or water control projects begin. Revisions are periodic and necessary to address changing conditions or requirements, including emerging science, improved data collection techniques and strengthened forecasting skill. Since 2015, a consortium of state entities as well as U.S. Geological Survey (USGS), NOAA, Reclamation, and USACE have worked within a pilot research and development (R&D) program to enhance the predictability of atmospheric rivers and their impacts/importance and influence on the management of reservoir projects. The Forecast Informed Reservoir Operation (FIRO) R&D collaborative effort has greatly strengthened the linkages between weather forecasting and the collective response/action among the agencies to the betterment of water management practices, including for minimizing impacts to protected species such as salmonids. Initial outcomes from the Lake Mendocino pilot study in California are favorable in terms of accounting for/utilizing forecasts for specific operational release decisions at reservoir projects. Fiscal years (FY) 2021-2025 planned work to advance this groundbreaking effort, includes:

- USACE is leading the development of a FIRO Screening Level Assessment Tool. The work will produce a tool to empower more local ownership over the FIRO implementation process to enable FIRO benefits at more reservoir sites. Reclamation is participating on the project steering

committee to assist and ensure applicability to Reclamation facilities. Planned FY21-25 work includes finalization of the Lake Mendocino pilot study and further development of the Prado Dam pilot study and the Yuba-Feather River pilot study. Prado Dam and Yuba-Feather River pilot studies are expected to be complete by FY25.

- NOAA completed work to implement the Hydrologic Ensemble Forecast Service (HEFS) that provides probabilistic streamflow and reservoir inflow forecasts enabling FIRO. This includes Lake Mendocino, as well as expansion to other planned expansions from FY 2021-2025 under the auspices of the Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West.
- Reclamation has several efforts that have been accomplished or are underway that apply FIRO-like concepts. These risk-based operations utilize modern, ensemble streamflow forecasts to enhance operational outcomes such as water supply and hydropower in the Bighorn Basin. Key efforts include:
  - In 2019, Reclamation and USACE completed a new auxiliary spillway at Folsom Dam known as the Joint Federal Project (JFP) including an update of the water control manual that enables additional water storage within available flood control space by leveraging forecasts to better predict and manage run-off during storm events. As a result of the updated water control manual, Reclamation will be able to store up to an additional 200,000 acre-feet during flood season, allowing additional stored water to be put to beneficial use at a later date, rather than being lost to flood spill. This achievement provides a model for USACE and Reclamation to find opportunities to update and improve water management at jointly managed reservoirs. In particular, this is relevant to reservoirs impacted by atmospheric rivers where Reclamation has water storage authorizations and USACE has flood management responsibilities. Continued investments in atmospheric river forecasting research will further enhance and expand such opportunities.
  - In the Bighorn Basin in Wyoming, Reclamation is evaluating the use of modern, ensemble streamflow forecasts to enhance operational outcomes such as water supply and hydropower. This work is conducted in partnership with the National Center for Atmospheric Research (NCAR) and University of Colorado's Center for Advanced Decision Support for Water and Environmental Systems (CADSWES). The study will conclude in FY 2021 and should results be promising, follow-on activities to support implementation operationally are expected in FY 2022 and beyond.
  - The Truckee Basin Water Management Options Pilot in California and Nevada is exploring potential changes to wintertime reservoir flood storage limits, associated flood control rule curves, and downstream flow thresholds as a response to climate-change induced risk in the Truckee Basin. This work is a 50/50 Federal, non-Federal cost share between the WaterSMART Basin Studies program and local water users. The pilot is anticipated to conclude in FY 2022.

Reclamation's WaterSMART program supports actions to improve water supply reliability through a range of financial assistance programs. The programs included in WaterSMART are collaborative in



nature and work is done in partnership and cooperation with non-Federal entities and other Federal agencies to reduce conflict, facilitate solutions to complex water issues, and stretch limited supplies. Priorities for FY 2021-2025 for WaterSMART are to continue supporting investments in existing infrastructure and efforts to identify and address imbalances between water supply and demand to increase water supply reliability by leveraging Federal and non-Federal funding. Funding provided through WaterSMART Grants is prioritized for projects that conserve water such as installing automation and water measurement technologies and lining and piping canals, and WaterSMART Drought Response Program funding is prioritized for improvements that increase flexibility during times of drought, such as lowering intakes and installing interties. Over the last four years (FY 2017-2020), Reclamation has provided more than \$379 million to fund 652 projects across the West through the WaterSMART Program. Reclamation estimated that including non-Federal matches that equates to over \$1.5 billion in projects.

Under the WaterSMART Basin Study Program, Reclamation conducts activities to assess imbalances between water supply and demand, and to identify strategies to address those imbalances, including strategies to optimize reservoir operations. For example, Reclamation conducts Reservoir Operations Pilots to evaluate opportunities to improve reservoir operations using new forecasting and modeling tools and evaluating potential operating alternatives. Reclamation completed the four initial pilots in 2020 (results are available here: <https://www.usbr.gov/watersmart/pilots/index.html>) and plans to initiate a second round of pilots beginning in FY 2021. The Basin Study Program also includes Applied Science Tools funding opportunities to support adoption and use of the latest modeling and forecasting tools by Reclamation and non-Federal stakeholders to improve water operations. Priorities for FY 2021-2025 are to continue assessments of imbalances between supplies and demands, reducing uncertainties associated with projected supplies and demands, and exploring new and innovative adaptation strategies.

The U.S. Forest Service (USFS) within the USDA works to fulfill its mission to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. Partnerships with national, state, and local entities and organizations, continue to work together with stakeholders interested in improving the condition and resilience of watersheds on forests and grasslands that are the backbone of the natural infrastructure supplying water to much of the Nation to increase the pace and scale of the work. The USFS continues to focus on improving the condition of watersheds on and around National Forest System lands to make certain that those lands can continue to provide the goods and services the Nation expects, including sustainable clean water, through a number of programs and initiatives. These include the following, with FY 2021-2025 goals:

- Joint Chiefs' Landscape Restoration Partnership with Natural Resources Conservation Service (NRCS) – continue to solicit new cross-boundary landscape-scale partnership projects and support existing projects to completion, with enhanced focus on water resources benefits;
- Collaborative Forest Landscape Restoration Program – continue to solicit new collaborative projects and support existing projects to completion;
- Watershed Condition Framework – continue to focus restoration work on designated priority watersheds, completing restoration plans in at least 10 priority watersheds each year;

- Watershed Investment Partnerships – continue to collaborate with the impact investment community and non-governmental organizations to test investment models on watersheds across the country, identifying at least one new opportunity each year;
- Shared Stewardship – continue to develop agreements with states, tribes, and state-based organizations and work within each agreement to identify shared priorities that improve landscape condition and water resources;
- Hazardous Fuels Reduction Program – continue to identify priority landscapes for fuels reduction treatments, including water supply watersheds, and work to meet annual targets; and
- Research on resiliency and adaptation – continue work to clarify approaches and best practices to improve natural water storage on the landscape, enhance watershed condition and function, and improve resiliency of forests and grasslands to stressors and disturbance.

Also within USDA, the NRCS is involved in a number of activities that assist in increasing water storage, water supply reliability, and drought resiliency, including the following:

- NRCS developed a prototype for the M4 (Multi-method machine learning metasytem) water supply forecasting model and plans to have it operational in NRCS forecasting in the next few years. Numerous benefits exist to have various groups studying improvements to water supply forecasting. NRCS’s M4 also combines multiple forecast model outputs into a single forecast, improving ultimate outcome.
- NRCS plans to collaborate on remote sensing technology to improve snow water equivalent estimates and offer snow telemetry (SNOTEL) data. There is a need to better understand the dependency of other water agencies on NRCS SNOTEL data and instrumentation for understanding drought, flooding, validating weather models, and use in streamflow modeling, which could further support an interagency agreement. In particular, NRCS is seeking to collaborate with other agencies and add instrumentation at SNOTEL sites to support scientific technological advances in water supply modeling, which is another opportunity to create an interagency agreement.

**(ii) coordinating agency reviews when there are multi-agency permitting and other regulatory requirements;**

Principles of One Federal Decision

Section 5(b) of Executive Order 13807, *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects* set forth the “One Federal Decision” policy for major infrastructure projects. The key elements of the One Federal Decision process include designating a single lead Federal agency (One Federal Lead) for qualifying projects that require an environmental impact statement, consolidating all Federal authorizations for a single project into one Record of Decision, and establishing timeframes for the issuance of appropriate permits. Under Executive Order 13807, this process was intended for “major infrastructure projects.” However, it has proven a best management practice for thorough, efficient, and timely multi-agency activities relating to water

infrastructure and water management as well, beyond federal environmental impact statement or National Environmental Policy Act (NEPA) review processes.

For example, the timely and thorough completion of the Columbia River System Operations Record of Decision. Per the instruction of the Presidential Memorandum on Promoting Reliable Supply and Delivery of Water in the West (Oct. 2018), the USACE was designated the “One Federal Lead,” coordinating DOI, DOC, and DOE in developing and keeping to a schedule to complete by 2020 the Columbia River System Operations Environmental Impact Statement and the associated July 2020 National Marine Fisheries Service and US Fish and Wildlife Service’s Endangered Species Act (ESA) section 7 Federal Columbia River Power System Biological Opinions. On September 28, 2020, the three action agencies, including the USACE, Reclamation, and the Bonneville Power Administration, signed a single, joint Record of Decision, consistent with the principles outlined in Executive Order 13807.

Effective application of the One Federal Decision or One Federal Lead as a best management practice consists of the following core principles:

- **Defined Roles & Responsibilities:** Agencies cooperate to complete environmental reviews and make authorization decisions for major infrastructure projects. The One Federal Lead details the permitting timetable milestones, and roles and responsibilities for the lead, cooperating, and participating agencies.
  - **Lead Agency:** Agency or Co-Lead agencies, designated based on capability, jurisdiction, expertise, etc. to facilitate multi-agency activities, meet any reporting requirements, and ensure adherence to the Timetable for timely completion. The One Federal Lead is the Supported agency by the other cooperating/participating agencies.
  - **Cooperating/Participating Agency:** Each agency whose authorization is required or has jurisdiction by law will support the agency designated as the One Federal Lead.
  - **Points of Contact (POC):** Agencies expeditiously identify POCs who will represent the agency and initiate interagency consultation.
- **Cooperation:** Agencies retain all existing authority, budget, and jurisdiction. Designating One Federal Lead does not provide any supplementary powers or authorities, nor do any Cooperating/Participating entities abdicate any authorities or jurisdiction.
- **Timetable:** Agencies develop an agreed upon single Timetable and work schedule; working together to use standard operating procedures for concurrent and synchronized reviews to meet the milestones and completion dates of any reviews or authorization decisions.
- **Communication:** Active, regular, and structured communication provides all agencies with the opportunity to identify concerns, raise potential issues early in the review process, and identify and act on solutions quickly.
- **Concurrence:** Wherever possible and applicable, prepare and issue a single Federal decision or work product to eliminate duplication, promote transparency and consistency, and improve efficient product or service delivery.

The Water Subcabinet recommends the application of the One Federal Decision policy principles as a best management practice in any multiagency activity, where applicable, beyond the Federal environmental review process, including permitting, to ensure consistency across the federal water space, expedite conflict resolution among Departments, bureaus, and agencies, reduce redundancy and streamline processing, and establish accountability across the Federal government for responsive customer service to America's water.

#### Borrowed Categorical Exclusions

In July 2020, CEQ comprehensively updated its NEPA implementing regulations for the first time in over forty years. This update modernizes the NEPA regulations by simplifying and clarifying the requirements, incorporating key elements of the One Federal Decision policy, eliminating delay and redundancy, and promoting transparency and accountability throughout the federal environmental review processes. One provision of the new regulations that is critical to achieving these goals is Categorical Exclusion Borrowing.

When administering a NEPA review process, "an agency may adopt another agency's determination that a categorical exclusion applies to a proposed action if the action covered by the original categorical exclusion determination and the adopting agency's proposed action are substantially the same. The agency shall document the adoption." (40 CFR 1507.3(f)(5))

The Water Subcabinet will initiate a data call to identify and coordinate Categorical Exclusions across all member departments and agencies specific to water infrastructure, water management, and permitting, to implement Categorical Exclusion Borrowing, where applicable, to coordinate and expedite multi-agency reviews.

#### **(iii) increasing engagement with State, local, and tribal partners regarding the ongoing drought along the Colorado River and regarding irrigated agriculture in the Colorado Basin;**

As a fundamental part of its mission, Reclamation works extensively and collaboratively with State, local, and tribal partners, as well as cross-border partners in Mexico, on issues related to ongoing drought and irrigated agriculture in the Colorado Basin. Reclamation prepared an extensive report, referenced as "The Section 7.D Report" and released on December 18, 2020, that reviews the effectiveness of the 2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead. The report is technical and retrospective in nature, and is required by the 2007 Interim Guidelines to help inform discussions on future operational guidelines (post-2026) of Colorado River reservoirs operated by Reclamation.

Reclamation, the seven Basin States, and stakeholders will begin developing a new set of guidelines in coming years. In 2021, Reclamation will position itself to provide modeling and analysis of potential new guidelines. Reclamation will also be prepared to fully consider, analyze, model, and develop updated terms among the Basin States, other agencies, tribes, and other concerned stakeholders.

In 2020, Reclamation prioritized actions and funding in response to continuing and historic drought in the Colorado River Basin. As background, Reclamation led development and adoption of Colorado River Drought Contingency Plans (DCPs) following expedited Congressional consideration and passage. The Colorado River DCPs were implemented on May 20, 2019 and consist of an Upper Basin DCP (Drought Response Operations and Demand Management Storage) and a Lower Basin DCP including Lower Basin Drought Operations. The DCPs are in place through 2026. To reduce the risk of Lake Powell and Lake

Mead reaching critically low elevations (3,490/3,525 feet and 1,020 feet, respectively), harming agricultural sectors and millions of municipal users that rely on the Colorado River, actions under the DCPs are in addition to the 2007 Interim Guidelines.

Key elements of the Lower Basin DCP include required water savings contributions by the Lower Basin states, including Arizona, California, and Nevada, at specified Lake Mead elevations, and additional flexibility for water storage and recovery to incentivize conservation. Calendar year 2020 was the first year that Arizona and Nevada required water savings contributions, contributing 192,000 acre-feet and 8,000 acre-feet, respectively. These same contributions are required in 2021.

The NOAA Physical Sciences Laboratory (PSL) and the National Integrated Drought Information System (NIDIS) (see below) also completed testing and evaluation of the Evaporative Demand Drought Index (EDDI) for the Upper Colorado Basin drought early warning system. EDDI is a drought index that can serve as an indicator of both rapidly evolving “flash” droughts (i.e., droughts that develop over a few weeks) which are critical during periods of peak demands and sustained droughts (i.e., droughts that develop over months but can last up to years).

NIDIS is continuing its drought early warning activities in the Colorado Basin as part of the Colorado Basin Drought Assessment. The Colorado Climate Center in collaboration with NIDIS, National Weather Service, NRCS, Reclamation, and USGS, holds ongoing regular drought briefings for the regional and basin-wide stakeholders. Briefings are being conducted via webinar on a monthly or bi-weekly basis depending on the season.

Section 3(b) of the Lower Basin DCP provides that, subject to applicable law, including the availability of appropriations, “The Secretary will take affirmative actions to implement Lower Basin programs designated to create or conserve 100,000 acre-feet per annum or more of Colorado River System water to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs in the Lower Basin.” Reclamation’s Lower Colorado Basin Region has conducted outreach with its partners to discuss ongoing and potential projects and is currently developing a prioritized list of likely projects and studies to help meet this goal (including requests for funding). Reclamation’s strategy focuses on recurring projects that will generate water savings over a longer period, with the recognition that these projects will take time to develop. Therefore, Reclamation is also looking to develop one-time system conservation agreements that generate system water for the next 2 to 3 years to bridge the gap until longer-term projects can come on-line. Consistent with commitments memorialized in prior system conservation funding agreements, Reclamation anticipates working closely with Federal partners at the NRCS to identify opportunities for enhanced long-term water conservation opportunities. The goal of this collaboration is to assess whether, during periods of temporary fallowing and other water conservation actions pursuant to system conservation pilot projects, there may be federal funding opportunities to implement longer-term actions that would reduce reliance on the limited waters of the Colorado River.

Under Minute 323, an agreement between the United States and Mexico, the Binational Water Scarcity Contingency Plan also requires water savings contributions by Mexico at the same specified Lake Mead elevations. In calendar year 2020, Mexico was required to contribute 41,000 acre-feet of water savings. This same contribution is required in 2021.

**(iv) implementing the “Priority Actions Supporting Long-Term Drought Resilience” document issued on July 31, 2019, by the National Drought Resilience Partnership;**

The National Drought Resilience Partnership (NDRP), formalized in 2016, is an interagency Task Force responsible for coordinating Federal drought resilience policies and provides the Federal government with a platform that enables locally and regionally driven priorities and needs to guide coordinated Federal activities. The NDRP also complements the work performed by NOAA’s NIDIS. Authorized by Congress in 2006 (Public Law 109-430), the National Integrated Drought Information System Reauthorization Act of 2018 was signed into law on January 7, 2019, which reauthorized the NIDIS program through FY 2023. NIDIS has an interagency mandate to coordinate and integrate drought research, building upon existing Federal, tribal, state, and local partnerships in support of creating a national drought early warning information system. NIDIS was established to improve the Nation’s capacity to manage drought-related risks by providing the best available information and tools to assess the potential impacts of drought, and to prepare for and mitigate the effects of drought, ultimately enhancing drought resilience.

Among those Federal activities are items identified in the "Priority Actions Supporting Long-Term Drought Resilience" issued on July 31, 2019 at the National Drought Forum, jointly held by NIDIS and the NDRP. The document highlights actions that the NDRP member-agencies committed to accomplish.

Recently, the NDRP examined how its member-agencies utilize and contribute to the United States Drought Monitor (USDM). The USDM is produced jointly by NOAA, USDA, and the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln. This is consistent with objectives outlined in the “Federal Action Plan for Improving Forecasts of Water Availability” prepared pursuant to Section 3 of the Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West issued October 19, 2018. The goal of this effort is to improve trust through transparency with the customers and users of the USDM. By increasing the accuracy, consistency, and integrity of the USDM, this will also increase accountability and integrity for the numerous federal programs and federal dollars that depend on the USDM.

**(v) improving coordination among State, local, tribal, and territorial governments and rural communities, including farmers, ranchers, and landowners, to develop voluntary, market based water and land management practices and programs that improve conservation efforts, economic viability, and water supply, sustainability, and security;**

To fully address the water resource needs of the Nation, whether for water quality, water supply, or flood control, substantial public and private investments will be needed independently and working in partnership. Environmental markets remain an underutilized tool in water resource management and can be used to harness the power of public-private partnerships. In fact, leveraging private financing will be critical to promoting environmental markets. For example, several private companies are currently investing in carbon mitigation or sequestration efforts to showcase corporate environmental stewardship, but these efforts also typically have co-benefits that positively affect water quality and habitat, among others. The Water Subcabinet agencies should evaluate existing regulations and policies that may hinder the development of multi-use environmental markets, seeking to maximize investment in projects that promote diversified ecosystem services, such as wetland mitigation, species conservation, water storage, nutrient cycling, and carbon sequestration. To facilitate that evaluation, the Water Subcabinet should consider hosting a series of listening sessions and coordinated outreach events to connect various stakeholder groups that can help identify impediments and engage with

experts on how to promote markets. Maintaining a strong relationship between EPA and USDA and growing our collaboration and with the Farm Water Coalition will help the agencies bring stakeholders together to maximize the environmental return on these private investments and promote new environmental investments by landowners and conservationists (including farmers).

The agencies should also prioritize revising the Compensatory Mitigation Rule to further promote market-based programs and support credit stacking and multi-use mitigation banks. Credit stacking and multi-use mitigation banks have the potential to promote more holistic resource improvements, including habitat and wetland restoration and protection of endangered and threatened species on a local, watershed, or landscape scale. The ability to generate multiple types of credits may create additional financial incentives for landowners, conservationists, and innovators to participate in market-based environmental improvement projects and may promote portfolio diversification and increased financial opportunity for existing and future credit providers. Water Subcabinet member-agencies that have equities in wildlife and habitat conservation, restoration and development, like the U.S. Fish and Wildlife Service (FWS), NOAA and its National Marine Fisheries Service, should work to align their policies with EPA, USDA, and the USACE's policies to further promote self-sustaining environmental markets that support their agency missions.

The agencies should also prioritize the improvement of technical models and methods to quantify water quality improvements that occur due to conservation practices and other watershed activities. Improved modeling capabilities will help create certainty that financial investments in those activities can provide quantifiable value to an environmental market, while reducing the demand for third party certification and prescriptive monitoring programs that often chill investment and participation in those markets.

**(b) Actions to improve water quality, source water protection, and nutrient management; to promote restoration activities; and to examine water quality challenges facing our Nation's minority and low-income communities, including through:**

**(i) implementing the "Great Lakes Restoration Initiative (GLRI) Action Plan III" issued on October 22, 2019, by the EPA for the GLRI Interagency Task Force and Regional Working Group, established pursuant to the Water Infrastructure Improvements for the Nation Act (Public Law 114-322);**

In October 2019, EPA unveiled an updated and aggressive action plan under the Great Lakes Restoration Initiative (GLRI) to guide the actions of Federal agencies and their many partners over the next 5 years to protect and restore the Great Lakes — fueling local and regional economies and community revitalization efforts across the basin. Pursuant to GLRI Action Plan III and identified Administrative priorities, the Water Subcabinet will continue to identify and implement the programs and projects that will best advance progress toward achieving long-term Great Lakes goals in partnership with states, tribes, and other non-Federal stakeholders.

The Water Subcabinet will work to evaluate the most effective way to utilize resources to strategically target the biggest threats to the Great Lakes ecosystem and associated human health issues. In an effort to ensure that targeted work and necessary associated funding occurs, the Water Subcabinet recommends a regular audit and review of the GLRI program, including the appropriation of funding provided under the GLRI. Regular audits of will help ensure that the money is being spent appropriately and pursuant to an outcome-based approach, with a specific focus on Administrative priorities as well as those priorities established in GLRI Action Plan III.

**(ii) enhancing coordination among the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force partners to support State implementation of nutrient reduction strategies;**

Several important enhancements to the Hypoxia Task Force (HTF) over the last several years have reenergized HTF state and Federal agency partners. It is critical that these enhancements continue so the HTF can take advantage of the recent positive engagement and momentum. For example, HTF members have committed to improving their communication strategies with the public to ensure that interested stakeholders understand the level of commitment and investment happening throughout the Mississippi River Basin. Given the scale of work and timeframe needed to meaningfully reduce the size of the Gulf of Mexico hypoxic zone, understanding annual progress made on the subwatershed scale will continue to drive public and private investment and engagement throughout the entire Basin. Continuing to promote greater public education and stakeholder engagement through improved communication tools will be central to supporting state progress on the HTF water quality improvement goals.

The HTF also recently established seven new workgroups that focus on issues that were identified as priorities by HTF state members. Institutionalizing these workgroups through continued state and Federal agency participation and the development of substantive deliverables will help ensure steady work continues year-round and that progress is made on those priority issues. One such priority is to promote information sharing between USDA and USGS in a way that is protective of sensitive agricultural information. Information sharing is needed so HTF states can better quantify water quality improvements that occur due to conservation practices and other watershed activities. The combination of information sharing, quantifying water quality improvements, and improved communication tools will assist the HTF states in demonstrating progress in the watershed based on their significant financial and resource investments. Another priority is to ensure better and more timely integration of the research and investment needed to promote localized conservation practices in priority watersheds to accelerate landscape-scale water quality improvements. Continued and enhanced coordination with the HTF partner research institutions and universities is needed to supplement Federal and state research efforts.

The Federal partners must also continue to align research funding, grant and loan programs, and other targeted financial assistance to support HTF state members in implementing their nutrient reduction strategies. Continued edge-of-field monitoring, fate and transport, and legacy nutrient research is needed to support state-financed efforts, while Federal grant and loan programs can support nutrient reduction strategy planning and implementation, pilot studies, wetland and stream restoration projects, and new infrastructure investments.

**(iii) increasing coordination between agencies and members of the South Florida Ecosystem Restoration Task Force, established pursuant to the Water Resources Development Act of 1996 (Public Law 104-303), and implementing and completing the activities included in the Comprehensive Everglades Restoration Plan, established pursuant to the Water Resources Development Act of 2000 (Public Law 106-541)**

The South Florida Ecosystem, known as America's Everglades, is both nationally significant and unique in the world. A healthy and resilient Everglades directly supports the economy and sustainability of a region in south Florida that is home to over 9 million people. The South Florida Ecosystem Restoration (SFER) Program will restore, protect, and preserve this natural resource treasure. The SFER Program



receives strong support from the SFER Task Force, established pursuant to the Water Resources Development Act of 1996 (Public Law 104-303). Restoring the Everglades is a complex undertaking, which requires constant coordination, communication, and issue resolution amongst the SFER Task Force and the primary non-Federal sponsor, the South Florida Water Management District (SFWMD). Equally important is dialogue between the OMB, USACE, and other Federal, state, and local agencies and stakeholders.

Through coordinated efforts between agencies and members of the SFER Task Force, by 2024, four foundation projects will be complete, six Comprehensive Everglades Restoration Plan projects will be constructed, and seven more Comprehensive Everglades Restoration Plan projects will be simultaneously under design and construction. Additionally, the Consolidated Appropriations Act, 2021 included three additional authorizations or modifications – the Loxahatchee River Watershed Restoration Project at Martin and Palm Beach Counties, the Caloosahatchee River West Storage Basin Reservoir (C-43), and the Canal 111 South Dade Project.

The 2020 sequencing strategy for advancing Everglades restoration projects estimates a total SFER Construction need of approximately \$7.4 billion from 2020 to 2030. This equates to combined state and federal funding commitments between \$750 million and \$1.2 billion per year from FY 2022-2025. The \$235 million FY 2020 USACE funds allocation represented a significant increase over previous allocations, and the FY 2021 President’s Budget identified \$250 million, which will continue to allow for the acceleration of project completion. In order to maintain the planned implementation, additional yearly funding is required by the USACE, with some fiscal years requiring upwards of \$1 billion. The USACE SFER yearly budget requirement exceeds the Nation’s yearly total Aquatic Ecosystem Restoration Business Line (\$314 million in FY 2021). Thus, key budgetary and policy decisions, including use of the continuing contract clause and maintaining a significant portion of the USACE Aquatic Ecosystem Restoration budget to SFER, will enable accelerated and cost-effective project delivery.

Relatedly, frequent flood events are impacting the communities to the north and east of Everglades National Park. In particular, these events harm tribal resources and wildlife habitat. To relieve these areas from flooding and to supplement the work of SFER, additional infrastructure should be considered in other areas of the federal budget.

**(iv) continuing implementation of the EPA’s memorandum entitled “Updating the Environmental Protection Agency’s Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality” issued on February 6, 2019;**

Continued implementation of EPA’s February 6, 2019 memorandum (2019 Memo) will help drive the next era of holistic environmental improvements in this country. The most efficient way to ensure implementation is to continue developing content around each of the six market-based principles identified in the 2019 Memo. For example, EPA recently issued a technical memorandum to provide guidance to policy makers for how to establish the appropriate geographic area and watershed size for a market-based program. This technical memorandum describes factors that policy makers can consider that will help inform the size and scale of a market-based program. To provide state and tribal policy makers with additional flexibility in implementing baseline concepts in a market-based program, it is recommended that EPA update its definition of “baseline.” Implementing market-based programs on a watershed scale and encouraging flexibility in baseline concepts are two principles from the 2019 Memo that can create significant new drivers and interest in market-based environmental programs.

Going forward, the Water Subcabinet member-agencies should enter into a Memorandum of Understanding to memorialize the Federal government's support for the ability of a single project to generate credits for multiple markets, which is another principle from the 2019 Memo. This practice, often called credit stacking or multi-use banks, can promote more holistic resource improvements, including habitat and wetland restoration and protection of endangered species on a local, watershed, or landscape scale.

One principle from the 2019 Memo that could use additional support and content is that water quality credits and offsets may be banked for future use. Allowing banking and future use of water quality credits encourages early adoption of pollutant reduction practices, reduces risks associated with conservation practice failures, and will likely broaden and strengthen the marketplace for buyers and sellers, resulting in larger scale resource improvements over time. Market-based programs that address other media, including air emissions and habitat conservation, allow credits and offsets to be banked for future use, and there is no practical or compelling policy reason why water quality-based programs should not also benefit from the flexibility and market security that banking credits and offsets could provide. The Water Subcabinet recommends the Federal agencies memorialize support for banking credits and offsets for future use, either through an interagency agreement or, to provide the most regulatory certainty, through a formal rulemaking process.

Finally, EPA should adopt targeted modifications to its National Pollutant Discharge Elimination System permitting program to explicitly authorize the use of pollutant trading as a means of achieving water quality standards throughout watersheds. EPA and state permitting agencies have authorized the use of pollutant trading for decades, but program participation has not proliferated, in part due to the lack of regulatory certainty in EPA's permitting program. To effectively promote, modernize and expand the use of water quality trading, EPA should undertake a targeted rulemaking to provide much-needed regulatory certainty for program participants.

**(c) Actions to improve water systems, including for drinking water, desalination, water reuse, wastewater, and flood control, including through:**

**(i) finalizing and implementing, as appropriate and consistent with applicable law, the proposed rule entitled "National Primary Drinking Water Regulations: Proposed Lead and Copper Rule Revisions," 84 Fed. Reg. 61684 (Nov. 13, 2019);**

On December 21, 2020, EPA finalized the first major update to the Lead and Copper Rule (LCR) in nearly 30 years. This historic action strengthens every aspect of the LCR and accelerates actions that reduce lead in drinking water to better protect children from lead exposure. EPA's final rule incorporates best practices, including using science-based testing protocols, closes loopholes, will accelerate the real world pace of lead service line replacement, and ensure that lead pipes will be replaced in their entirety.

**(ii) implementing the "National Water Reuse Action Plan" issued on February 27, 2020, by the EPA;**

The National Water Reuse Action Plan (WRAP) is a collaborative and dynamic initiative coordinated across the Federal, state, tribal, and local levels to enhance and strengthen the security, sustainability, and resilience of our nation's water resources. Currently, the WRAP represents the collective efforts of 30 unique action leaders and more than 90 partnering organizations and is anticipated to include additional leaders and partners as the effort evolves in years to come. On February 27, 2020, EPA and its Federal partners released Action Plan (Version 1), featuring 37 specific actions and over 270

implementation milestones to be taken by a spectrum of partners in the water sector to advance consideration of water reuse. Since the WRAP's inception, over 40 new milestones have been added as well as four new actions, with the opportunity to introduce new actions each quarter. As of the end of December 2020, more than 139 implementation milestones have been completed. Implementation progress, outputs, and outcomes for all actions are highlighted through the dynamic WRAP Online Platform, while WRAP quarterly updates showcase meaningful advancements made by action leaders and partners.

Some key accomplishments thus far include: Federal agency partners issuing a policy statement supporting the consideration of water reuse; water associations hosting an interactive State Summit on Water Reuse attended by 150 regulators across 35 states; and EPA announcing \$6.2 million for reuse research under its Science to Achieve Results (STAR) program. Additionally, EPA has funded over \$1 billion in water reuse investments through its Water Infrastructure and Finance Innovation Act (WIFIA) program. The USDA's Water and Environmental Programs (WEP) are also able to provide financing, through low interest loans or grants, to assist communities in developing water reuse projects and currently has 54 reuse projects ongoing in 10 different states, ranging from completed to operational in current status. Further, WEP's Technical Assistance Partners for the WRAP are providing assistance to promote water reuse in their work with rural and wastewater systems.

Implementation progress, outputs, and outcomes for all actions are highlighted through the dynamic WRAP Online Platform, while WRAP quarterly updates showcase meaningful advancements made by action leaders and partners. EPA is actively seeking input from stakeholders to help inform the next release of the WRAP slated for Spring 2021, as well as ideas for new actions, which are introduced as frequently as once a quarter. Enhanced Federal coordination, in partnership with state and local entities, is essential to driving progress on actions that will diversify our nation's water supplies to help meet future demand. This includes ensuring continued close collaboration with the DOE to ensure the successful long-term implementation of the Water Security Grand Challenge (WSGC) and the National Association for Water Innovation's (NAWI) Energy-Water Desalination Hub; working with the USACE to facilitate finalization and implementation of a new Clean Water Act nationwide general permit for water reuse and recharge projects; and coordinating with USDA, NOAA, and DOI on aligning water reuse strategies in priority watersheds with water security concerns. Going forward, EPA remains committed to facilitating action implementation among the broad group of leaders and partners, recognizing that this endeavor represents a new level of integrated action across the spectrum of water interests.

**(iii) coordinating with the Federal Interagency Floodplain Management Task Force, established pursuant to the National Flood Insurance Act of 1968 (Public Law 90-448), on Federal flood risk management policies and programs to better support community needs;**

Responsibility for flood risk management in the United States is a shared responsibility between multiple Federal, state, and local government agencies with a complex set of programs and authorities. Within the Federal portion alone, there are dozens of programs administered by multiple agencies that play a role in the flood risk management lifecycle — in preparation, response, recovery, and mitigation of flood risk. Continued coordination amongst the Water Subcabinet officials is crucial to ensure consistency, leverage resources, and minimize duplication of efforts.

The Federal Interagency Floodplain Management Task Force (FIFM-TF) was authorized and established by Congress in 1975. The purpose of the Task Force was to carry out the responsibility of the President to prepare for the Congress proposals necessary for a Unified National Program for Floodplain

Management. FIFM-TF delivered on its task in 1994 when it submitted the program, which called for the formulation of a more “comprehensive, coordinated approach to protecting and managing human and natural systems.”

Having fulfilled its mandate, and pursuant to Section 4 of the Executive Order on Modernizing America’s Water Resource Management and Water Infrastructure to reduce inefficiencies and consolidate water resource working groups, it is recommended that the FIFM-TF be discontinued. The Water Subcabinet will use the products produced by the FIFM-TF to reduce the loss of life and property by protecting the economic, environmental and societal value of floodplains.

**(iv) continuing coordination among agencies concerning the Department of Energy’s Water Security Grand Challenge to advance transformational technology and innovation to provide safe, secure, and affordable water;**

The WSGC is a White-House-initiated, DOE-led effort to advance transformational technology and innovation to meet the national and global need for safe, affordable, and reliable water. The WSGC works closely with the Water Subcabinet to improve coordination, achieve WSGC goals, and remove duplicative efforts in the water security and infrastructure.

The WSCG uses a coordinated suite of prizes, competitions, early-stage R&D to pursue the following goals for the United States by 2030:

1. Launch desalination technologies that deliver cost-competitive clean water.
2. Transform the energy sector’s produced water from a waste to a resource.
3. Achieve near-zero water impact for new thermoelectric power plants, and significantly lower freshwater use intensity within the existing fleet.
4. Double resource recovery from municipal wastewater.
5. Develop small, modular energy-water systems for urban, rural, tribal, national security and disaster response scenarios.

Currently, the WSGC has three active prize competitions: the Waves to Water Prize, the Solar Desalination Prize, and the Water Resource Recovery Prize.

The Waves to Water Prize is a 5-Stage, \$3.3 million contest to accelerate technology innovation in wave energy powered desalination systems. These technologies hold the potential to deliver clean water to communities for disaster relief purposes and to remote communities throughout the globe.

The Solar Desalination Prize is a four-stage, \$9 million prize competition, providing an additional \$1 million in support, designed to accelerate the development of low-cost desalination systems that use solar-thermal power to produce potable water from salt water.

Through the Water Resource Recovery Prize competition, DOE is seeking novel, systems-based solutions from multidisciplinary teams to implement resource recovery at small- to medium-sized water resource recovery facilities (WRRFs). By presenting cost-effective and innovative facility engineering solutions,

WRRFs can progress toward the goal of doubling resource recovery and accelerate the transition from conventional wastewater treatment to a model of resource recovery from municipal wastewater across the United States.

#### Energy-Water Desalination Hub

Through the WSGC, DOE invested \$100 million in the Energy-Water Desalination Hub, led by NAWI. NAWI is a public-private partnership with more than 35 members and over 180 organizations within the alliance, which is led by DOE's Lawrence Berkeley National Laboratory (LBNL) in collaboration with National Energy Technology Laboratory, National Renewable Energy Laboratory (NREL), and Oak Ridge National Laboratory (ORNL).

The Energy-Water Desalination Hub is focusing on research and development of cost competitive desalination technologies for "non-traditional" water sources—such as seawater, brackish water, and produced water—so the desalinated water can be used instead of freshwater for municipal, industrial, agricultural, utility, oil and gas, and other water supply needs. NAWI's goal is to enable the manufacturing of energy-efficient desalination technologies in the United States at a lower cost with the same (or higher) quality and reduced environmental impact for 90 percent of non-traditional water sources within the next 10 years.

#### Other R&D Investments

DOE is supporting the U.S.-Israel Center of Excellence in Energy, Engineering and Water Technology. Water-Energy is one of three elements of the larger Center, specifically desalination, nutrient and energy recovery, and energy and cost performance analysis.

DOE is competing a \$20 million funding opportunity announcement (FOA) entitled *Research and Development of Advanced Water Resource Recovery Systems*. The main objective of this FOA is to drive manufacturing innovation and spur economic competitiveness through development of technologies that significantly improve energy efficiency for water and wastewater treatment across the energy water nexus.

#### Future of Water Infrastructure and Innovation Summit

On October 27 and 28, 2020, the DOE's WSGC hosted a virtual summit in coordination with the White House and other U.S. Federal agencies and offices. The summit focused on the future of water infrastructure and innovation in the United States, and the role of DOE and other Federal agencies in supporting R&D to achieve a more water secure future.

The summit featured plenary talks from the Water Subcabinet, other Federal agency leadership, and industry visionaries, and interactive breakout rooms for participants. During the breakout sessions—led by program managers and other leaders from academia, industry, and government—attendees had the opportunity to:

1. Discuss the roles of the Federal agencies in water security, innovation, and investment related to water infrastructure.
2. Provide vision and input related to water infrastructure and innovation directly to Federal agencies.

3. Learn about opportunities for water research and innovation at different scales (e.g. facility, city, regional) and how those opportunities may change over time.

Information gathered from the summit will inform the next wave of prizes and R&D investments related to water security and helped to stimulate stronger connections among attendees—including researchers, innovative companies, multiple agencies of the Federal government, and state and local utilities. A completed report of findings from the summit is anticipated in early January 2021.

**(d) Actions to improve water data management, research, modeling, and forecasting, including through:**

**(i) aligning efforts and developing research plans among the Secretary of the Interior, the Secretary of Agriculture, the Administrator of the National Oceanic and Atmospheric Administration, and the Secretary of the Army, through the Assistant Secretary of the Army (Civil Works), to ensure that America remains a global leader for water-related science and technology capabilities;**

The Water Subcabinet agencies are actively advancing water-related science and technology capabilities through progressive coordination and collaboration. Over the last several years, alignment of related agency-specific research and modelling efforts measurably strengthened the nation’s water science and forecasting capabilities. However, much work remains to be improved. Targeted actions that will further advance water-related science and technology capabilities over FY 2021-2025 include:

- **Renew Integrated Water Resources Science and Services Consortium MOU (2021)**  
([https://www.nohrsc.noaa.gov/~cline/IWRSS/IWRSS\\_ROADMAP\\_v1.0.pdf](https://www.nohrsc.noaa.gov/~cline/IWRSS/IWRSS_ROADMAP_v1.0.pdf))  
The Integrated Water Resources Science and Services Consortium (IWRSS) has successfully leveraged agency capabilities to eliminate duplication of effort and promote a more effective use of resources. The overarching goal is to enable and demonstrate a broad, integrative national water resources information system to serve as a reliable and authoritative means for adaptive water-related planning, preparedness and response activities. IWRSS goals include collaboratively advancing interoperability standards for data and product outputs, water resources prediction, integrating service and service delivery, and providing new “summit-to-sea” high-resolution water resources information within each agency’s complimentary mission space. The MOU that established IWRSS expires in May 2021 and it is recommended that an updated MOU that broadens member agencies to include EPA, USDA, and DOE, as well as elevating signatory from USGS to DOI in order to include Reclamation and FWS. IWRSS activities would be executed on a priority basis to continue to advance collaborative efforts.
- **Centers for the Advancement of Water Prediction**  
The National Water Center (NWC) in Tuscaloosa, Alabama serves as a center of excellence and catalyst for interagency coordination and collaboration on research and operations activities. In FY 2023, completion of the new USGS Hydrologic Instrumentation Facility (HIF) in close proximity to the NWC will provide innovations in sensor technology and data monitoring operations for optimal water prediction capabilities and serve as multi-center hub for model development and prediction analysis, as well as a training center for current and future water resources research. Recommendations to further accelerate advances in water prediction in FY 2021-2025 include re-architecting the National Water Model (NWM) to enable collaborative development among broad water resources community, coupling the NWM with coastal-

estuary models to routinely generate forecasts of total water in the coastal zone, and the national implementation of real-time flood forecast inundation mapping.

- **Reclamation Information Sharing Environment (RISE)**

In 2019, Reclamation launched a new Reclamation-wide system for viewing, accessing, and downloading Reclamation's data via a centralized data portal. RISE enables access to a range of data types (geospatial, time series, and other) that span Reclamation's mission (e.g. water, hydropower, biological, water quality, and infrastructure/assets). Over FY 2021-2025 RISE will continue to expand its data catalog and functionality, including adding user accounts with features to save searches and customize data alerts. Additionally, data visualizations combining data feeds from RISE and other agencies will be pursued to support resource management decision-making.

**(ii) implementing common methods of water forecasting, including the use of snow monitoring tools, on a national and basin scale, supported by weather forecasting on all scales;**

- **Integrated Hydro-Terrestrial Modeling collaboration (IHTM Report)**

In 2019, an interagency workshop on "Integrated Hydro-Terrestrial Modeling (IHTM): Development of a National Capability" provided a venue to bring together representatives of water-related agencies and their scientific partners (including university researchers) to solidify the vision for national IHTM and data infrastructure and to advance ideas that would promote that vision's development. The workshop addressed three critical foci to advance the development of a national IHTM capability, including priority water challenges, technical and methodological obstacles related to data and modeling, and barriers that impede integration of capabilities across the Federal and research landscapes. Coordination of complementary and synergistic capabilities across multiple agencies and academia directed at challenge areas stands to significantly benefit the Nation's water prediction capabilities. In order to advance the IHTM collaboration, in FY 2021-2025, it is recommended that continued collaboration via a series of interagency workshops, as well as pathfinder activities such as the proposed Next Generation Water Observing System (NGWOS) and NextGen Water Resources Modeling Framework be continued.

- **Next Generation Water Observing Systems (NGWOS) for Improved Water Prediction**

The NGWOS is designed to provide high-fidelity, real-time data on water quantity, quality and use necessary to support more accurate National modern water prediction and decision support systems and rapid and informed hazards response. The USGS plans to develop dense networks of stream gages and other monitoring stations utilizing innovative technologies in medium-sized watersheds (each approximately 15,000 square miles) representative of larger water-resource regions. When fully implemented, the NGWOS would provide quantitative information on streamflow, snowpack, evapotranspiration, soil moisture, water quality, groundwater, and water usage at higher spatial and temporal scales. In order to advance the NGWOS work in FY 2021-2025, it is recommended that USGS continue its planned annual implementation of one new NGWOS watershed each year.

- **NextGen Water Resources Modeling Capability as a Pathfinder Activity**

Adhering to the guiding principles and objectives established as part of the interagency Integrated Hydro-Terrestrial Modeling (IHTM) effort, in October 2020, the NWC hosted an

interagency meeting to define requirements for the collaborative and accelerated development of a next Generation Water Resources Modeling Framework. This framework will enable multi-model scientific evaluation and promote model interoperability, using the open source software development paradigm to meet agency mission specific needs and those of the academic and research communities. Through the development and use of this new framework, the water resources community will be able to leverage agency and partner investments in water resources observation and prediction, to more efficiently and effectively meet growing stakeholder needs for actionable water intelligence. Initial deployment of this new framework is targeted for FY 2024. It is vital that planned work in FY 2021-2023 includes completing requirements documentation, project planning, and collaborative agile development and testing.

- **Innovator’s Program and Summer Institute at the National Water Center**

The Innovators Program and associated Summer Institute (NWC-SI), graduate students (fellows), senior academic faculty and Federal scientists work closely alongside NWC staff and other senior scientists to create and complete scientific projects geared toward improving U.S. water resources modeling, science, and services. Since its inception, the Innovator’s Program and specifically the Summer Institute has benefited from guest lecturers, mentors, and participation by scientists from the USACE, USGS, and other offices within NOAA such as the National Ocean Service. It is recommended this invaluable work continue over FY 2021-2025 and leverage opportunities to establish an endowed fellowship program.

- **Sub-Seasonal Climate Forecast Rodeos**

Using prize competitions to spur innovation on sub-seasonal prediction of temperature and precipitation in the Western United States, Reclamation has run two year-long forecasting competitions. In these competitions, participants were required to submit sub-seasonal forecasts every two weeks for a year, competing against benchmark, state of practice forecasts. NOAA’s Climate Prediction Center (CPC) and NIDIS were partners in this effort. Winning solutions from these competitions are being further evaluated and advanced via a partnership with Scripps Institution of Oceanography’s (SIO) Center for Western Weather and Water Extremes (CW3E), in partnership with NOAA’s operational forecasters (NOAA CPC) and NOAA’s PSL, starting January 2021. This effort will span FY 2021-2023. As part of the project, water managers from Reclamation, NOAA PSL, and NOAA CPC will review progress and provide feedback. This aims to foster collaboration for moving research to operations, emphasizing the forecast needs of water managers.

- **Streamflow Forecast Rodeo**

This effort seeks to improve 10-day streamflow forecasts via an evaluation of existing methods coupled with a prize competition. Through the hydro-power industry group CEATI (Centre for Energy Advancement through Technological Innovation), Reclamation partnered with DOE, the Tennessee Valley Authority (TVA), Southern Company, and Hydro-Quebec to conduct a year-long (water year 2021) evaluation of forecasting technologies at locations across North America, including 11 relevant to Reclamation projects. Reclamation is complementing this effort by sponsoring a prize competition focused on the Reclamation locations, aiming to leverage data science communities and Artificial Intelligence (AI)/Machine Learning (ML) methods toward enhancing streamflow forecasts. Participants in this competition develop and submit daily forecasts, evaluated in real-time alongside the existing methods, which serve as “benchmarks” to judge the potential of competitors’ methods. The competition will conclude in FY 2022, at



which point, collaborators will review outcomes. Should promising new methods be identified, appropriate follow-on activities will be pursued.

- **PyForecast**

Pyforecast leverages computing advancements, enabling operators to analyze thousands of forecasts in minutes using modern statistical techniques and provides a robust characterization of forecast uncertainty. PyForecast is being used operationally by Reclamation's Missouri-Basin Region and the Columbia Pacific Northwest Region. PyForecast will continue to be refined and enhanced over FY 2021-2025. In particular, using sub-seasonal temperature and precipitation forecasts in PyForecast has been identified as an area for future development and is recommended to be pursued.

- **Applied Science Tools**

Reclamation initiated a new Applied Science Tools program in FY 2019 that includes funding for projects to develop improved modeling, forecasting and data related tools to improve water management. The Applied Science Tools program includes external and internal components, providing funding on a competitive basis for projects submitted by non-Federal stakeholders, and separately, for projects submitted by Reclamation staff. The Applied Science Tools program plans to offer additional internal and external funding opportunities in FY 2021-2025. In addition, Reclamation will incorporate specific applied science needs shared in the Reservoir Operations Workshops and from other engagement with Reclamation staff and external stakeholders to ensure that the funding opportunities for this program are structured to meet the most urgent needs of the water management community.

- **Coastal Coupling Community of Practice**

In 2018, the Coastal Coupling Community of Practice (CC CoP) was established to enhance collaboration that advances total water forecasting. The CC CoP was necessary to strengthen the partnership between America's freshwater and saltwater scientific communities, bringing them together for the first time in a joint effort to understand the unique challenges in coastal transition zones and to develop and deploy common next generation modeling systems. Since its inception, community membership has grown to over 100 members from seven Federal agencies - including the USACE, NOAA, USGS, and the DOE - 25 different universities, and representatives from the private sector. Community members have collaborated on American Geophysical Union (AGU) technical sessions and Town Halls, co-authored papers, and supported the development of a regional-scale total water forecast model prototype demonstrated in September 2020. Over FY 2021-2025, it is recommended the following actions be taken to advance the collaboration:

- Enable the coupling of models across the coastal zone, starting with hydrologic and hydrodynamic models, to better simulate and analyze earth system processes and provide physical parameters such as water levels, flows, water quality, sediment, and geomorphic changes.
- Provide actionable information on these parameters to stakeholders in accessible and user-friendly formats such as data-services.

- Accelerated national coverage of integrated water prediction capabilities through the adoption of community research and models that acknowledge stakeholder-driven requirements.

**(iii) developing state-of-the-art geospatial data tools, including maps, through Federal, State, tribal, and territorial partnerships to depict the scope of waters regulated under the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500);**

There are currently no comprehensive maps or datasets through which the EPA and the Department of the Army (Army) can depict the universe of federally regulated waters under the Clean Water Act (CWA). To address this need, in December 2018, EPA and the Army launched a workgroup to begin investigating research needs and available resources to map CWA jurisdictional waters, also known as “waters of the United States.” Subsequently, the two agencies began engaging with other Federal agencies to discuss using existing geospatial datasets to map the nation’s aquatic resources. To align the agencies’ waters of the United States mapping interests with the DOI established aquatic resource mapping efforts, including the National Hydrography Dataset (NHD), National Wetlands Inventory (NWI), and other datasets, EPA and the Army have engaged the USGS, the FWS, and the NOAA and established a technical workgroup to develop strategies to address CWA mapping needs.

The interagency workgroup held a research scoping meeting in February 2020 to discuss how DOI capabilities may be able to support EPA’s and the Army’s aquatic resource mapping efforts in the near and long-term and to begin to develop the interagency aquatic resources mapping work plan. EPA and the Army believe the most efficient way to address their CWA regulatory needs is to better align their efforts with DOI’s existing products and national mapping capabilities. In addition, the Army has engaged to provide technical support with respect to its expertise in determining jurisdiction under the CWA, and NOAA will provide technical expertise with respect to hydrologic modeling and coastal and estuary mapping.

The agencies have developed an interagency work plan and are coordinating to document requirements, map and model surface waters in four case study watersheds, and begin efforts to more fully scope-out the aquatic resources mapping effort. The interagency workgroup plans to deliver documentation of requirements, options for meeting the requirements, and resources needed in a draft report to the Water Subcabinet in early January 2021. EPA’s Office of Research and Development (ORD) has also been working on the Aquatic Resource Mapping research area of its Strategic Research Action Plan, including a stream and wetland mapping methods review product planned for FY 2021 and has begun aquatic resource mapping in selected case study areas with products planned for FY 2022. ORD’s research will help inform the interagency workgroup mapping initiative.

EPA, Army, DOI, and NOAA intend to formally establish the interagency workgroup, including its purpose and agency specific roles, in a forthcoming memorandum of understanding.

**(iv) implementing actions identified in the “Federal Action Plan for Improving Forecasts of Water Availability” issued on October 18, 2019, by the Department of the Interior and the Department of Commerce pursuant to section 3 of the Presidential Memorandum of October 19, 2018 (Promoting the Reliable Supply and Delivery of Water in the West).**

The Federal Action Plan for Improving Forecasts of Water Availability<sup>1</sup> was released by DOC and DOI in October 2019 pursuant to Section 3 of the October 19, 2018 Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West. Since its publication, the following milestones have been achieved:

- **Section 2.II - Enhanced atmospheric forecasts to inform run-off forecasts:** NOAA implemented the initial operational model configuration of the Finite Volume Cubed Sphere (FV3) Dynamical Core in the Global Forecast System (GFS) in June 2019, and implemented the Global Ensemble Forecast System (GEFS) version 12 in September 2020.
- **Section 3.I - Improved forecast integration in water management decision-making:** NOAA implemented two (Scoggins Dam and Hungry Horse Dam) new HEFS forecast locations in the domain of the Northwest River Forecast Center. In collaboration with Reclamation, the Office of Water Prediction developed the required 30 year reforecast of HEFS and provided that to Reclamation evaluation. Reclamation presented their initial findings on July 28, 2020.
- **Section 3.II - Improve continental scale hydrologic modeling:** NOAA implemented the NWM version 2.0 in June of 2020, providing first-ever hydrologic forecasts for Hawaii, and completed the development and testing of NWM version 2.1 in September 2020, for operational implementation in January 2021 with forecast domain expansion to full Great Lakes Drainage Basin, Puerto Rico, and the US Virgin Islands.
  - Also Under Section 3.II, NOAA PSL completed their investigation of soil moisture performance within the NWM and presented this to stakeholders, including Reclamation and the NIDIS community, in September of 2020.
- **Section 3.III - Continue refinement of the Next-Generation Water Observation System (NGWOS):** USGS completed implementation of new and enhanced instrumentation in the Delaware River Basin and identified two additional watersheds, the Upper Colorado (Colorado River above Cisco, Utah) and the Illinois River Basin, as part of their plan to implement advanced observational capabilities in several other Integrated Water Science Basins across the Nation.
- **Section 4 - Improved regional collaboration:** Reclamation completed Section 7 ESA consultation with NOAA in October 2019 which included a refined water temperature operation for protecting ESA listed salmon in California's Central Valley. Throughout 2020, Reclamation coordinated with NMFS and the other State and Federal fishery agencies to refine the tools and decision-making processes for operating starting in 2020.

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<sup>1</sup> U.S. Department of Commerce and U.S. Department of the Interior. (2019). *Federal Action Plan for Improving Forecasts of Water Availability*.  
<https://www.noaa.gov/sites/default/files/atoms/files/Federal%20Action%20Plan%20for%20Improving%20Forecasts%20of%20Water%20Availability.pdf>

- Finally, while not explicitly called out in the Action Plan, USGS and Reclamation joined USACE Engineering and Research Development Center's Coastal and Hydraulic Lab on an initial requirements conversation for a next generation water resources modeling framework. Such a framework is envisioned to increase collaboration and efficiency and accelerate the development and implementation of a common and more skillful continental scale water modeling and forecasting system.

**Sec. 7. Integrated Infrastructure Planning.** Agencies oversee a number of programs to enhance coordination of cross agency water infrastructure planning and to protect taxpayer investments. Within 150 days of the date of this order, the Water Subcabinet shall identify and recommend actions and priorities to the Director of OMB, the Chairman of CEQ, and the Assistant to the President for Economic Policy to support integrated planning and coordination among agencies to maintain and modernize our Nation’s water infrastructure, including for drinking water, desalination, water reuse, wastewater, irrigation, flood control, transportation on our rivers and inland waterways, and water storage and conveyance. The recommendations shall consider water infrastructure programs that are funded by the Department of Defense through the Army Corps of Engineers, and by the Department of the Interior, the Department of Agriculture, the Department of Energy, the EPA, the Federal Emergency Management Agency, the Economic Development Administration, and other agencies, as appropriate. Such programs include the EPA’s Water Infrastructure Finance and Innovation Act program, established pursuant to the Water Resources Reform and Development Act of 2014 (Public Law 113 121) and amended by the America’s Water Infrastructure Act of 2018 (Public Law 115-270), which modernizes the aging water infrastructure of the United States, improves public health protections, and creates jobs; the Department of Agriculture’s rural development programs, which make and support investments in water infrastructure; and the Department of Agriculture’s Natural Resources Conservation Service programs, which promote source water protection, improve water quality, and assist with developing new water infrastructure projects.

**Pursuant to section 7 of Executive Order 13956, the Water Subcabinet submits the following initial report and recommendations.**

#### Integrated Infrastructure Planning

Recognizing the continued importance of integrated planning, Section 7 of the Executive Order titled, “Integrated Infrastructure Planning,” directs the Water Subcabinet to recommend actions to support integrated planning and coordination among the agencies to “modernize our Nation’s water infrastructure.” The Water Subcabinet’s goal is to broaden integrated planning engagement with federal, state, and local partners, to create alignment, consistency, and opportunity in infrastructure financing and infrastructure planning across all water uses – on the farm, in rural and underserved communities, in major cities – to modernize the Nation’s water infrastructure.

**EPA’s Green Infrastructure Collaborative Network (<https://www.epa.gov/green-infrastructure/green-infrastructure-collaborative>).**

EPA’s Green Infrastructure Collaborative, created in 2014, is a network-based alliance, including seven Federal agencies, to help communities more easily implement green infrastructure, which is a critical element of integrated planning recognized in the Water Infrastructure Improvements Act (WIIA), signed into law on January 14, 2019. The Water Subcabinet will work with EPA to seek additional cooperating federal agencies, including the Army Corps of Engineers (USACE), the Federal Emergency Management Agency, the Economic Development Administration, and other agencies as appropriate, to join the network and work collectively to enhance financing opportunities, investments, and project planning to further support integrated planning in communities and modernize our Nation’s water infrastructure.

The goal will be to broaden the conversation about integrated planning beyond wastewater and stormwater management to more holistically align financing and infrastructure planning to include drinking water, water supply, flood control and hazard mitigation, and other water resource management activities on a basin or watershed scale.

### **USDA’s Rural Development’s Water and Environmental Programs (WEP)**

USDA Rural Development’s Water and Environmental Program and Community Facilities Program promote source water protection, improve water quality, and assist with developing new water infrastructure. For example, an ongoing partnership between USDA Rural Development’s WEP and EPA has promoted the pooling of resources to maximize the benefit to rural water and waste systems. Specifically, WEP is working to promote sustainable rural water and wastewater systems; to help finance efforts to reduce lead in drinking water and childcare centers; to expand the Decentralized Water System Program, which now includes individual homeowner septic systems in addition to wells; and to support the Federal Interagency Tribal Infrastructure Task Force. The Water Subcabinet will encourage its Member Agencies to look for opportunities to collaborate with USDA Rural Development’s WEP and other similar USDA programs.

### **EPA's Water Infrastructure Finance and Innovation Act (WIFIA) Program**

EPA's WIFIA program, as amended by the America's Water Infrastructure Act of 2018, signed into law on October 23, 2018, helps modernize the aging water infrastructure of the United States, improve public health protections, and create jobs. The Water Subcabinet will continue to coordinate with EPA to promote the WIFIA program with the Member Agencies’ individual stakeholders.

### **USACE’s Corps Water Infrastructure Financing Program (CWIFP)**

As part of the Water Resources Reform and Development Act of 2014, Congress also directed the USACE to establish a Federal credit program to accelerate non-Federal investments in water resources infrastructure. On December 27, 2020, the Consolidated Appropriations Act, 2021 was signed into law. Recognizing that the WIFIA program “can play an important role in improving the nation’s infrastructure”, the Consolidated Appropriations Act, 2021, once again, directed the USACE to “complete the administrative actions necessary to stand up the WIFIA program the “Corps Water Infrastructure Financing Program” and provided funds for the USACE for that purpose. The Water Subcabinet looks forward to working with and offering technical assistance to the USACE as they stand up their CWIFP.

### **DOE’s Innovative Loan Guarantee Program**

DOE, through its Title 17 Innovative Loan Guarantee Program, can help finance catalytic, replicable, market-ready renewable energy, including hydropower. Through this program, loans can enhance existing facilities including powering non-powered dams or upgrading existing hydropower facilities. The Water Subcabinet will continue to work with the Member Agencies’ individual stakeholders to bring increased visibility to this program.

## **Bureau of Reclamations WaterSMART Program**

The Bureau of Reclamation's WaterSMART (Sustain and Manage America's Resources for Tomorrow) Program provides a framework for Federal leadership and assistance to stretch and secure water supplies for future generations. Through WaterSMART, Reclamation leverages Federal and non-Federal funding to work cooperatively with states, tribes, and local entities as they plan for and implement actions to increase water supply reliability through investments in existing infrastructure and attention to local water conflicts. As part of implementing the WaterSMART Program, Reclamation has partnered with USDA's NRCS to align program resources to improve the impact of the agencies' respective drought resiliency and water efficiency investments. Through continued and more focused collaboration across federal agencies, WaterSMART will be a central focus of efforts to integrate infrastructure planning to achieve these goals.

Increasing collaboration between the programs briefly described above along with similar water resources programs across the Federal government are critical to accelerating investment in the Nation's rural and urban water infrastructure. Since members of the Water Subcabinet oversee a number of programs that develop and maintain our Nation's water infrastructure, the Water Subcabinet is the appropriate entity to coordinate existing financial tools and develop new financial tools to incentivize State, local, and private investment needed modernize America's water infrastructure, including for drinking water, desalination, water reuse, wastewater, irrigation, flood control, transportation on our rivers and inland waterways, and water storage and conveyance.

Key to meeting current and future water infrastructure needs will be leveraging the financial resources of creditworthy, non-Federal entities by facilitating long-term, low interest loans, repayable to the U.S. Treasury. This will require clarifying WIFIA, and any other identified program(s), for consistent application under the Federal Credit Reform Act with other existing Federal infrastructure loan programs. This fosters opportunity for locally led investment in critical infrastructure, including water infrastructure, preparedness, resilience, and disaster response, reducing the reliance and delay of direct Federal appropriations for State and local projects, thus saving taxpayer dollars.

The Water Subcabinet will continue to examine opportunities to promote integrated planning among agencies for Federal investments in water-related infrastructure.

**Sec. 8. Water Sector Workforce.** Trained water-sector professionals are vital to protecting public health and the environment through strategic planning, operation and maintenance of treatment facilities, and implementation of water management programs. Within 150 days of the date of this order, the Water Subcabinet, in consultation with the Secretary of Labor, the Secretary of Health and Human Services, the Secretary of Education, the Secretary of Veterans Affairs, and the heads of other agencies, as appropriate, shall identify actions and develop recommendations to improve interagency coordination and provide assistance and technical support to State, local, tribal, and territorial governments in order to enhance the recruitment, training, and retention of water professionals within drinking water, desalination, water reuse, wastewater, flood control, hydropower, and delivery and storage sectors. Such recommendations shall be submitted to the Chairman of CEQ, the Assistant to the President for Domestic Policy, the Assistant to the President for Economic Policy, and the Chairman of the Council of Economic Advisers.

Pursuant to section 8 of Executive Order 13956, the Water Subcabinet submits the following initial report and recommendations.

Report on Recommendations to Ensure Maintenance and Sustainability of America’s Water Workforce

The Water Subcabinet has been convening weekly meetings of a Water Subcabinet Workforce Workgroup (Workgroup) since August of 2020. The Workgroup has identified challenges in recruiting, training, and retaining water professionals in the seven water workforce sectors highlighted in the E.O. The Workgroup then developed recommended actions to address the challenges facing these sectors, as well as the water workforce generally. This Report serves to document those identified challenges and present the Workgroup’s recommended actions to enhance the recruitment, training, and retention of water professionals.

This report is organized in the following manner: (1) presentation of overarching cross-sector challenges to recruiting, training, and retaining water professionals in the water workforce, (2) presentation of sector-specific challenges, and (3) presentation of recommended actions to address both overarching and sector-specific challenges.

Note, during the Workgroup’s regular meeting, the Workgroup made the following modifications to the list of the workforce sectors: the desalination sector is very similar to the water reuse sector in terms of workforce challenges, therefore for purposes of this report and for efficiency reasons, the desalination sector has been integrated into the water reuse sector section.

**I. Presentation of Overarching Cross-Sector Challenges to the Recruitment, Training, and Retention of Water Professionals in the Water Workforce.**

The Workgroup identified the following cross-sector challenges to recruitment of water professionals:

- Effective advertisement and ultimately reaching the full potential applicant pool can be difficult and has never been coordinated across federal agencies;
- These sectors have struggled to recruit a diverse workforce; and
- For potential water sector employees, a path toward professional growth and development may not be well thought out, established, or articulated to potential applicants.

The Workgroup identified the following cross-sector challenges to training of water professionals:



- Technology is advancing quickly, and training does not always keep up with those technological advancements; and
- Courses may be required in person with online course availability being limited.
- Due to specific and cross-cutting skills required, academic training may not be available, and on the job training may be the only option for career development and advancement.

The Workgroup identified the following cross-sector challenges to retention of water professionals:

- In certain sectors, the retirement profile of water sector employees indicates that roughly one third of the workforce will be eligible for retirement in the next ten years; and
- For potential water sector employees, a path toward professional growth and development may not be well thought out, established, or articulated to water sector employees.

## **II. Presentation of Sector-specific Challenges to the Recruitment, Training, and Retention of Water Professionals in the Water Workforce.**

The Workgroup acknowledges that each of the cross-sector challenges apply to each of these specific sectors. This section focuses only on those challenges (other than the over-arching cross-sector challenges) which are unique to each specific sector.

The Workgroup identified the following challenges specific to the drinking water sector:

- Small and rural communities as well as some tribal communities occasionally struggle with wage-related challenges to recruitment, training, and retention;
- Some potential employees may struggle with affordability and accessibility of courses required to obtain certifications necessary to work in this sector; and
- Training requirements within this sector are sometimes very job-specific and can result in turnover challenges.

The Workgroup identified the following challenges specific to the wastewater sector:

- Small and rural communities as well as some tribal communities often struggle with wage-related challenges to recruitment, training, and retention;
- Some potential employees may struggle with affordability and accessibility of courses required to obtain certifications necessary to work in this sector; and
- Training requirements within this sector are sometimes very job-specific and can result in turnover challenges.

The Workgroup identified the following challenges specific to the water reuse sector:

- Rapidly developing technologies and methodologies result in the need for rapidly changing skills sets;
- The types of skills and training for jobs in this sector can be more technical than other sectors, meaning that there is sometimes little transferability from other sectors;
- The rapidly developing technological advancements in this sector sometimes results in the need for rapidly changing skill sets and the need for new courses needing to be developed to teach those skills;

- There can occasionally be a more significant reliance on private/public partnerships in this sector than in other sectors, and developing and sustaining those relationships can sometimes be challenging; and
- There is a significant need for highly-functioning and closely coordinated interface between the science/research part of this sector and the application part of this sector.

The Workgroup identified the following challenges specific to the flood control sector:

- Specific skill sets necessary for this sector are not readily available and therefore the pool of employees, such as dam and levee safety engineers, is not large; and
- Due to the age of many flood risk mitigation projects, in many cases there are only a handful of people (operators, engineers, etc.) that are familiar with exact characteristics and operation of individual projects. Progress is being made on this by implementing regularly scheduled reviews of projects, but this is still a challenge.

The Workgroup identified the following challenges specific to the hydropower sector:

- Jobs in this sector are traditionally in rural locations, which poses unique recruitment and retention challenges.

The Workgroup identified the following challenges specific to the water delivery and storage sectors:

- Jobs in the aquifer storage and recovery projects generally require the combination of specific skills sets (engineering, chemistry, hydrogeology, microbiology, etc.) not commonly held by one person; and
- Jobs in this sector are traditionally in rural locations, which poses unique recruitment and retention challenges.

### **III. Presentation of Recommended Actions to Address Challenges in the Recruitment, Training, and Retention of Water Professionals in the Water Workforce**

The Workgroup identified the following recommended actions to address challenges in the water sector workforce:

1. The Workgroup recommends that each of the federal agencies comprising the Water Subcabinet create their own workforce initiative plans, modeled after EPA's workforce initiative titled, "America's Water Sector Workforce Initiative," and specifically addressing those sectors with which the agency has specific involvement and equities.
  - a. Each workforce initiative plan should identify challenges specific to the water workforce sectors with which each agency has equities or involvement, identify partnerships to help address challenges facing each of those water workforce sectors, and provide commitments by the agency and their partners to address those challenges.
  - b. Multiple agencies could consider compiling joint initiatives, to the extent that the sectors with which they have involvement and equities overlap.
2. The Workgroup recommends that the Water Subcabinet investigate the possibility of and work with private industry and industry partners on a Water Sector Workforce Scholarship Challenge.

- a. The goal of this Challenge would be to provide an annual (rate of recurrence should be evaluated based on partnership interest and availability of funds) competition for a compendium of scholarship opportunities for the water sector workforce.
  - b. The scholarships would not necessarily be funded by the federal government, rather by non-governmental/private entities, and the Water Subcabinet could work with the water industry and private entities to see who could best host the scholarships.
  - c. The availability of scholarships will, therefore, be contingent upon building new partnerships and leveraging existing partnerships with both non-governmental and private entities with equities in the water sector.
3. The Workgroup recommends that the Water Subcabinet develop, coordinate and host a Water Sector Workforce Job Fair.
4. The Workgroup recommends that the Water Subcabinet work across sectors to identify and develop apprenticeship opportunities.
5. The Workgroup recommends that the Water Subcabinet develop and coordinate a grant program to provide grant for high schools to develop a water management program, focusing on courses that would prepare high school students for careers in the water sector workforce.
  - a. Where appropriate, dual enrollment of courses between colleges and high schools could present high school students the ability to take courses, such as operator certification courses, so as to be well-suited to enter the water sector workforce soon after graduation.
6. The Workgroup recommends that the Water Subcabinet work across the agencies to develop a cross-agency federal water policy leadership program.
  - a. The purpose of this program would be to allow water specialists from the different Water Subcabinet agencies to spend time at each agency learning about the water policy issues that are unique to each of the federal agencies.
  - b. This type of program would allow for a robust understanding of the interworking of water policy across the federal agencies.
7. The Workgroup recommends that the Water Subcabinet develop a Federal Interagency Online Water Sector Workforce Database. This database could house:
  - a. The Water Subcabinet agencies' workforce initiative plans;
  - b. Available employment courses and training resources;
  - c. Information on the Water Sector Workforce Scholarship Challenge; and
  - d. Information on the Water Sector Workforce Job Fair.