Congressional Research Service
Informing the legislative debate since 1914

# Water Resource Issues in the 116th Congress

February 7, 2019

**Congressional Research Service**
https://crsreports.congress.gov
R45492

**CRS REPORT**
Prepared for Members and
Committees of Congress

Congressional Research Service
Informing the legislative debate since 1914

SUMMARY

R45492

February 7, 2019

**Nicole T. Carter**
Specialist in Natural Resources Policy

**Charles V. Stern**
Specialist in Natural Resources Policy

**Pervaze A. Sheikh**
Specialist in Natural Resources Policy

**Peter Folger**
Specialist in Energy and Natural Resources Policy

**Eva Lipiec**
Analyst in Natural Resources Policy

**Anna E. Normand**
Analyst in Natural Resources Policy

# Water Resource Issues in the 116th Congress

The 116th Congress may conduct oversight and deliberate on authorization and funding of water resource development, management, and protection. Congress engages in authorization and appropriations for water resource projects and activities of the U.S. Army Corps of Engineers (USACE) and the Bureau of Reclamation (Reclamation). USACE constructs projects nationwide, primarily to improve navigation, reduce flood damage, and restore aquatic ecosystems. Reclamation constructs projects in the 17 arid states west of the Mississippi River; these projects primarily provide water supply benefits, often to agricultural irrigation users. The 116th Congress, like earlier Congresses, also may consider Indian water rights settlements and may evaluate the focus of and funding for the water resource science activities of the U.S. Geological Survey (USGS).

Development pressures, droughts and floods, and concerns about changing hydrology from land-use change and climate change have engendered nonfederal interest in federal financial and technical assistance for water resource science and projects. Stakeholders are interested in a range of water resource issues, including

- new water resource infrastructure (e.g., storm surge gates, water storage) and new kinds of projects (e.g., groundwater recharge, nature-based flood risk reduction);
- reinvestment in aging water resource infrastructure and use of water science and real-time monitoring and forecasting to improve infrastructure operations;
- funding and financing of projects, and whether and how to shift from federally led projects to federal partnerships with state and/or local entities; and
- activities to protect and restore aquatic ecosystems and enhance flood resilience (including the use of nature-based approaches).

Some topics arise within the context of specific agencies. USACE-related topics for the 116th Congress may include funding and financing issues, such as use of the Harbor Maintenance Trust Fund; the status of investments in projects to deepen coastal harbors; USACE budgeting priorities; and oversight of USACE efforts to implement public-private partnerships and develop alternative financing opportunities. Some Reclamation-related water project and management issues during the 116th Congress may include the status of proposed new and augmented water storage projects, as well as efforts to address the agency's aging infrastructure and transition certain qualifying projects to nonfederal ownership. Congress also may address Reclamation drought mitigation activities in the Colorado River basin and other areas. In addition, Congress may explore ongoing issues associated with Reclamation's project operations in California and other areas. It may address how these issues affect water deliveries to irrigation districts and municipalities and threatened and endangered species, among others.

Some topics are international in character. Regarding freshwater bodies shared with Canada, potential topics for the 116th Congress include federal funding for activities supporting Great Lakes restoration and negotiations (and any resulting agreements) with Canada to modify the Columbia River Treaty. Potential topics related to Mexico include oversight of a binational agreement on water sharing during dry conditions in the Colorado River basin and Mexico's deliveries to the United States in the Rio Grande basin.

Crosscutting topics (i.e., topics relevant to multiple agencies and programs) also are part of congressional water resource deliberations. For example, the 116th Congress may consider the status and priority of new and ongoing federal efforts to restore large-scale aquatic ecosystems that have been altered or impaired by changes to their natural conditions (e.g., Florida Everglades, Chesapeake Bay). Congress may explore the funding and performance of existing restoration efforts, including what changes (if any) may be necessary to improve project delivery and evaluation. The 116th Congress may consider its guidance to multiple federal agencies on how to respond to flood hazards, including efforts related to enhancing the resilience of infrastructure and communities to flooding. There is interest in developing and evaluating approaches that protect natural elements that reduce flood risk (e.g., natural dunes) or are "nature-based" in comprehensive flood risk management (e.g., constructed dunes). Congress also may consider legislation and oversight on USACE supplemental appropriations for response to and recovery from floods.

# Contents

Introduction ..... 1
Projects and Activities of the U.S. Army Corps of Engineers ..... 2
Western Water and the Bureau of Reclamation ..... 4
Indian Water Rights Settlements ..... 5
Waters Shared with Canada and Mexico ..... 6
United States and Canada ..... 6
Great Lakes ..... 6
Columbia River Treaty ..... 7
United States and Mexico ..... 8
Colorado River and Rio Grande ..... 8
Water Resource Science at the U.S. Geological Survey ..... 9
Funding and Financing Aging and New Water Resource Projects ..... 10
Changing from Federal Infrastructure Projects to Federal Partnerships ..... 11
Protecting and Restoring the Environment ..... 11
Flood Resilience and Natural and Nature-Based Infrastructure ..... 12
Recharging Groundwater ..... 13
Conclusion ..... 14

## Appendixes

Appendix. Federal Water Resource Infrastructure ..... 16

## Contacts

Author Information ..... 17

# Introduction

The 116th Congress may conduct oversight and deliberate on authorizations and appropriations legislation related to water resource development, management, and protection. Demands on available water supplies have heightened local and regional water-use conflicts throughout the country, particularly in the West and Southeast. Development pressures, droughts and floods, and concerns about changing hydrology from land-use change and climate change engender nonfederal interest in federal financial and technical assistance for water resource science and projects. There is interest in new water resource infrastructure (e.g., storm surge gates, water storage) and new kinds of projects (e.g., groundwater recharge projects, nature-based flood risk reduction). In addition, there is interest in reinvestment in aging water resource infrastructure and in improved management of available supplies through water science, monitoring, and operational changes. Water resource policy questions relevant to the 116th Congress include the following:

- What will be the federal role in maintaining the performance and safety of existing water resource infrastructure?
- Under what conditions and how should the federal government be involved in planning and constructing water resource projects?
- How may federal and nonfederal water resource science, observation, and monitoring be performed and used to inform water resource management and project design and operation?

Congress historically has played a role in water resources through authorization of and appropriations for regional and site-specific projects and activities. Some of the projects are for facilitating navigation and expanding water supplies for irrigation and other uses. Other projects are aimed at reducing flood and drought losses and restoring aquatic ecosystems. Congress principally has directed either the Bureau of Reclamation (Reclamation) in the Department of the Interior (DOI) or the U.S. Army Corps of Engineers (USACE) in the Department of Defense to plan and construct the existing stock of large federal water resource projects. Historically, Reclamation constructed projects in the 17 arid states west of the Mississippi River;[1] these projects were designed principally to provide reliable supplies of water for irrigation and some municipal and industrial uses. USACE constructs projects nationwide that primarily seek to improve navigation, reduce flood damages, and restore aquatic ecosystems. For more on the federal water resource infrastructure, see the **Appendix**.

In addition, Congress authorizes and funds selected water resource science and monitoring activities at multiple federal agencies. DOI's U.S. Geological Survey (USGS) has a prominent role in federal water resource science and observation (e.g., streamgages, groundwater information, and other water resource data).

In addition to USACE, Reclamation, and USGS, other federal agencies have water-related programs and activities; these other agencies are largely beyond the scope of this report.[2] This

[1] The Reclamation service area includes the states of Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

[2] For example, the Natural Resources Conservation Service in the U.S. Department of Agriculture (USDA) facilitates water resources development, primarily for flood control in small watersheds and for soil and water conservation purposes. Other federal agencies with water-related programs include the U.S. Environmental Protection Agency

report also does not address municipal water systems, municipal wastewater infrastructure, or environmental protections, such as water quality and wetlands regulations.[3]

This report first discusses some broad categories of water resource topics relevant to the 116th Congress—projects and activities of USACE, western water and Reclamation, Indian water rights settlements, international waters shared with Canada and Mexico, and water resource science at USGS. The report next covers the following crosscutting topics:

- funding and financing aging and new water resource projects,
- changing from federal infrastructure projects to federal partnerships,
- protecting and restoring the environment,
- flood resilience and natural and nature-based infrastructure, and
- recharging groundwater.

# Projects and Activities of the U.S. Army Corps of Engineers

Congress generally authorizes USACE water resource activities and makes changes to the agency's policies in an omnibus authorization bill. Congress typically appropriates funds for USACE activities in annual Energy and Water Development appropriations acts ($7 billion in FY2019). At times, Congress uses supplemental appropriations bills to fund USACE emergency activities. Supplemental appropriations for USACE response and recovery for coastal and riverine floods surpassed $17 billion during the 115th Congress. The 116th Congress may consider questions raised about this supplemental spending/appropriations. For example, how do trends in annual and supplemental appropriations amounts, processes, and requirements influence the effective, efficient, and accountable use of federal funding provided to USACE? For a more detailed discussion of USACE annual and supplemental appropriations and related policy questions, see CRS Report R45326, *Army Corps of Engineers Annual and Supplemental Appropriations: Issues for Congress*, by Nicole T. Carter.

An omnibus USACE authorization bill (typically titled a Water Resources Development Act and called WRDA) usually is considered biennially. The most recent omnibus USACE authorization acts are America's Water Infrastructure Act (AWIA; P.L. 115-270), enacted in October 2018;[4] the Water Infrastructure Improvements for the Nation Act (WIIN Act; P.L. 114-322), enacted in December 2016;[5] and the Water Resources Reform and Development Act of 2014 (WRRDA

(EPA), the National Oceanographic and Atmospheric Administration, the National Aeronautics and Space Administration, the Federal Emergency Management Agency, and energy-related agencies such as the Federal Energy Regulatory Commission and Power Marketing Administrations. For more information, see CRS Report R42653, *Selected Federal Water Activities: Agencies, Authorities, and Congressional Committees*, by Judy Schneider et al.

[3] For more on municipal drinking water infrastructure, see CRS Report R45304, *Drinking Water State Revolving Fund (DWSRF): Overview, Issues, and Legislation*, by Mary Tiemann. For more on municipal wastewater, see CRS Report 98-323, *Wastewater Treatment: Overview and Background*, by Claudia Copeland. For more on wetlands, see CRS Report RL33483, *Wetlands: An Overview of Issues*, by Laura Gatz and Megan Stubbs, and CRS Report R45424, *"Waters of the United States" (WOTUS): Current Status of the 2015 Clean Water Rule*, by Laura Gatz.

[4] Title I of America's Water Infrastructure Act (P.L. 115-270) is titled Water Resources Development Act of 2018 (WRDA 2018) and includes primarily provisions related to the U.S. Army Corps of Engineers (USACE).

[5] Title I of the Water Infrastructure Improvements for the Nation Act (WIIN Act; P.L. 114-322) is titled the Water Resources Development Act of 2016 (WRDA 2016) and primarily includes USACE-related provisions.

2014; P.L. 113-121), enacted in June 2014. The 116th Congress may follow the tradition of biennial consideration of legislation that authorizes USACE studies and projects.

Some USACE-related issues that the 116th Congress may address include the following:

- **Funding and financing** issues, such as the use of the Harbor Maintenance Trust Fund, investments in projects to deepen coastal harbors, USACE budgeting priorities, and oversight of USACE efforts to implement public-private partnerships and to develop alternative financing opportunities.
- **Project operations** topics, such as USACE policies on pricing for water storage; updates to operation manuals for USACE projects; recreational policies (including firearms regulations) at USACE projects and associated lands;[6] and security of USACE facilities, including cybersecurity.
- **Decisionmaking and planning** practices, such as USACE tribal consultation policies and practices; inclusion of nonstructural alternatives, including nature-based measures; consideration of future hydrologic conditions;[7] and approvals for modification to USACE projects.[8]

A persistent challenge for USACE is how to manage its $96 billion (according to a USACE estimate in early 2018) in authorized construction activities that are eligible for federal appropriations, often referred to as its *construction backlog*. For FY2019, annual USACE construction appropriations total $2.18 billion. Policymakers may consider whether—and, if so, how—to advance projects in the backlog.

In addition, USACE currently is studying multiple projects that are larger in scale than most past USACE projects. These include the Coastal Texas Protection and Restoration feasibility study for a project with an estimated cost between $23 billion and $32 billion.[9] Other studies of large-scale projects include the Great Lakes and Mississippi River Interbasin Study to control aquatic nuisance species (principally the Asian carp) and the New York/New Jersey Harbor and Tributaries study to reduce coastal storm risk for New York City and nearby areas.[10] Given the scale of federal and nonfederal investments that would be needed to construct these USACE projects and other projects in the current construction backlog, policymakers and project sponsors

[6] For background on the debate related to USACE recreation regulations related to the possession of firearms, see CRS Report R42602, *Firearms at Army Corps Water Resource Projects: Proposed Legislation and Issues in the 113th Congress*, by Nicole T. Carter.

[7] See CRS Report R44632, *Sea-Level Rise and U.S. Coasts: Science and Policy Considerations*, by Peter Folger and Nicole T. Carter.

[8] The Dakota Access Pipeline has brought attention to USACE easements and approvals to alter USACE projects. For more on USACE easements and approvals that may apply to segments of oil and gas pipelines, see CRS Report R44880, *Oil and Natural Gas Pipelines: Role of the U.S. Army Corps of Engineers*, by Nicole T. Carter et al.

[9] USACE, Galveston District, Southwest Division, *Coastal Texas Protection and Restoration Study, Draft Integrated Feasibility Report and Environmental Impact Statement*, October 2018, p. xix, https://www.swg.usace.army.mil/Portals/26/docs/Planning/Public%20Notices-Civil%20Works/Coastal-TX%20DIFR-EIS/Coastal%20Texas%20DIFR-EIS_Oct2018.pdf?ver=2018-10-24-162409-300.

[10] For more on the Great Lakes and Mississippi River Interbasin Study (GLMRIS), see the USACE website about the broad GLMRIS study and its constituent projects (e.g., USACE study of measures at Brandon Road Lock and Dam, which is part of the Chicago Area Waterway System, to control the movement of aquatic nuisance species from the Mississippi River basin to the Great Lakes basin), at USACE, *Great Lakes and Mississippi River Interbasin Study*, http://glmris.anl.gov/. For more on the New York/New Jersey Harbor and Tributaries feasibility study (including interim reports expected in 2019), see USACE, https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/.

are exploring options for construction financing and contracting and for sharing costs and responsibilities among project sponsors and beneficiaries.

# Western Water and the Bureau of Reclamation

Since the early 1900s, Reclamation has constructed and operated a variety of multipurpose water projects in the 17 states west of the Mississippi River. These projects include the California Central Valley Project (CVP) and major dams on the Colorado River (e.g., Hoover Dam) and Columbia River (e.g., Grand Coulee Dam) systems, among others.[11] This water storage and conveyance infrastructure historically was important for regional development and remains important today. Water supplies from these projects have been used primarily for irrigation; however, some municipalities also receive water from Reclamation projects. Many of the largest facilities produce hydropower and provide other benefits, such as flood damage reduction, recreation, and water for fish and wildlife purposes. However, the operations of some facilities are also controversial for the effects on the environment.

Over time, Reclamation's historical focus on building new projects has shifted to new mission areas. Construction authorizations for Reclamation slowed during the 1970s and 1980s. In 1987, Reclamation announced a new mission recognizing the agency's transition from a water resource development and construction organization to one primarily occupied with managing water resources in an environmentally and economically sound manner.[12] Since then, increased population; prolonged drought; fiscal constraints; and water demands for fish and wildlife, recreation, and scenic enjoyment have resulted in increased pressure to alter the operation of many Reclamation projects. Alterations to operations, project deliveries, and allocations often have been controversial because of potential impacts on water rights, contractual obligations, and local economies. Previous Congresses have expressed interest in both the management and operations of individual Reclamation projects and the broader policies and procedures that guide the agency's activities.

In recent years, Congress has expanded Reclamation's authorities and increased its funding support for alternative technologies to increase water supplies in the West. These technologies include water recycling and reuse, aquifer storage and recovery, and desalination, among others. Some support expanded authority and funding for these programs as critical to future efforts to address water shortages in the West. Others prefer that the agency focus its priorities on more traditional mission areas, including new and expanded water storage construction projects and maintenance of existing infrastructure.[13]

In contrast to USACE, there is no tradition of a regularly scheduled authorization vehicle (e.g., a WRDA) for Reclamation projects. Instead, Congress generally has considered Reclamation projects individually. However, occasionally individual project authorizations are rolled into an

[11] For more information on the Central Valley Project, see CRS Report R45342, *Central Valley Project: Issues and Legislation*, by Charles V. Stern and Pervaze A. Sheikh.

[12] Reclamation's current mission statement can be found at U.S. Bureau of Reclamation, "About Us: Mission/Vision," at http://www.usbr.gov/main/about/mission.html.

[13] The WIIN Act included new authorities in both areas. For additional information, see CRS Report R44986, *Water Infrastructure Improvements for the Nation (WIIN) Act: Bureau of Reclamation and California Water Provisions*, by Charles V. Stern, Pervaze A. Sheikh, and Nicole T. Carter.

omnibus bill.[14] Reclamation project authorizations have slowed considerably over time, in part due to the onset of congressional earmark moratoria beginning in the 112th Congress.

Several Reclamation-related water project and management issues may be the subject of legislation or oversight during the 116th Congress. Such issues may include, for example, the status of new and proposed water storage projects; dam safety issues at existing federal reclamation projects; and efforts to address the agency's aging infrastructure and transition projects to nonfederal ownership. In addition, Congress may address drought mitigation assistance, planning, and preparedness through oversight hearings and legislation (e.g., Energy and Water Development appropriations), especially if dry conditions persist or intensify in the Colorado River basin and in other western states.

Ongoing issues associated with the CVP and Reclamation's operation of pumps in the San Francisco Bay/San Joaquin and Sacramento Rivers' Delta (Bay-Delta), including the pumps' effects on water users and on threatened and endangered species, have been particularly controversial in recent years. Provisions enacted in 2016 under Title II, Subtitle J, of the WIIN Act addressed some of these controversies. The bill also authorized a new process and structure for authorizing Reclamation water storage projects. Many of the WIIN Act's Reclamation authorities are scheduled to sunset at the end of 2020; thus, the 116th Congress may discuss these authorities in its oversight capacity and/or propose them for reauthorization or modification.[15] Other river basins generating regular congressional interest include the Colorado River, Columbia River, Klamath River (California and Oregon), and Rio Grande River basins.

# Indian Water Rights Settlements

In the second half of the 19th century, the federal government pursued a policy of confining Indian tribes to reservations. The federal statutes and treaties reserving land for Indian reservations typically did not address the water needs of these reservations, a fact that has given rise to questions and disputes regarding Indian reserved water rights. Tribes have pursued quantification of their water rights through both litigation and negotiated settlements with the federal government and other stakeholders. Over the last 50 years, negotiated settlements have been the preferred course for most tribes, because they are often less lengthy and costly than litigation. The 116th Congress may consider under what circumstances (if any) Congress should approve new Indian water rights settlements and whether Congress should fund (and in some cases amend) existing settlements. Some support the resolution of Indian water rights settlements as a mutually beneficial means to resolve long-standing legal issues, provide certainty of water deliveries, and reduce the federal government's liability. Others may argue against authorization and funding of new settlements, either broadly (e.g., on the principle that new settlements are overly expensive or unjustified) or with regard to specific individual settlements and activities.

After Indian water rights settlements are negotiated, federal action is necessary for their approval and implementation.[16] As of 2018, 36 Indian water rights settlements had been federally

[14] The last omnibus bill addressing key Reclamation policy areas and new or revised project and program authorizations was Title II, Subtitle J of the WIIN Act in 2016. Prior to that, a public lands omnibus bill in 2009, P.L. 111-11, included multiple Reclamation subtitles. The last time Congress enacted a stand-alone omnibus Reclamation authorization bill was the Reclamation Projects Authorization and Adjustment Act (P.L. 102-575), enacted in 1992.

[15] For a discussion of these provisions, see CRS Report R44986, *Water Infrastructure Improvements for the Nation (WIIN) Act: Bureau of Reclamation and California Water Provisions*, by Charles V. Stern, Pervaze A. Sheikh, and Nicole T. Carter.

[16] "Federal action" may be in the form of administrative approval or, if the settlement requires it, congressional approval.

approved, with total costs in excess of $5.8 billion. Of these, 32 settlements were approved and enacted by Congress and 4 were administratively approved by the U.S. Departments of Justice and the Interior. After approval, any federal projects associated with approved Indian water rights settlements generally have been implemented by Reclamation or the Bureau of Indian Affairs (both within the Department of the Interior), pursuant to congressional directions. Congress has appropriated discretionary and mandatory funding (and, in some cases, both) for these activities, including in recent appropriations bills. One of the primary mandatory funding mechanisms for Indian water rights settlements, the Reclamation Water Settlements Fund, is currently authorized to provide $120 million per year in appropriations for qualifying tribal water settlement projects through FY2029.

The 115th Congress considered but did not enact legislation proposing congressional approval of new settlement agreements. The primary challenge facing new settlements is the availability of federal funds to implement ongoing and future agreements that require federal resources (not all settlements require these resources). Indian water rights settlements often involve the construction of major new water infrastructure to allow tribal communities to access water to which they hold rights, and obtaining federal funding for these projects can be difficult. Some settlements also are controversial for their potential to affect existing water rights and allocations. For more on Indian water rights settlements, see CRS Report R44148, *Indian Water Rights Settlements*, by Charles V. Stern.

# Waters Shared with Canada and Mexico

## United States and Canada

### Great Lakes

Federal, state, provincial, local, and tribal governments in the United States and Canada have sought to work together to address environmental challenges and restore the Great Lakes ecosystem. In 2012, the United States and Canada amended the Great Lakes Water Quality Agreement (GLWQA), a commitment originally signed in 1972 that provides a framework for identifying binational priorities and implementing actions that improve water quality. The revised agreement is intended to help the United States and Canada better anticipate and prevent ecological harm. It includes new provisions to address aquatic invasive species; habitat degradation and the effects of climate change; and continued threats to people's health and the environment, such as harmful algae, toxic chemicals, and discharge from vessels.[17]

The United States and Canada both have provided funding to advance the goals of the GLWQA. In 2016, for example, Congress authorized appropriations of $300 million annually from FY2017 to FY2021 for the Great Lakes Restoration Initiative under Title IV of the WIIN Act.[18] Although the Trump Administration sought to eliminate funding for the initiative in FY2018, Congress appropriated $300 million to continue restoration efforts in the Consolidated Appropriations Act,

[17] EPA, "United States and Canada Sign Amended Great Lakes Water Quality Agreement/Agreement Will Protect the Health of the Largest Freshwater System in the World," press release, September 7, 2012. The text of the amended agreement is available at https://binational.net//wp-content/uploads/2014/ 05/1094_Canada-USA-GLWQA-_e.pdf.

[18] For more information on the Great Lakes Restoration Initiative, see CRS In Focus IF10128, *Great Lakes Restoration Initiative (GLRI)*, by Pervaze A. Sheikh.

2018 (P.L. 115-141). The Trump Administration requested $30 million for Great Lakes restoration in FY2019.[19]

The International Joint Commission, a binational organization established by the 1909 Boundary Waters Treaty to investigate and recommend solutions to transboundary water issues, issued the *First Triennial Assessment of Progress on Great Lakes Water Quality* in November 2017. The report found that the United States and Canada had made progress toward meeting many of the GLWQA's objectives, including accelerated restoration of contaminated areas of concern, development of binational habitat conservation strategies, the absence of newly introduced aquatic invasive species (such as Asian carp), and comprehensive reporting on groundwater science. It also identified significant challenges, such as the increase in harmful algal blooms in Lake Erie, the slow pace in addressing chemicals of mutual concern, the spread of previously introduced invasive species, and insufficient investments in infrastructure to prevent the discharge of untreated or insufficiently treated waste into the Great Lakes.[20]

In addition to the ongoing challenges identified in the 2017 report, Congress has expressed concerns about a proposed deep geologic repository for nuclear waste by the Bruce nuclear power facility in Kincardine, Ontario. The proposed site, located about 1 kilometer inland from Lake Huron, would hold low- to mid-level waste materials currently being stored above ground in warehouses.[21] The explanatory statement accompanying the Consolidated Appropriations Act, 2018, directed the U.S. Secretary of State to submit a report to the Committees on Appropriations detailing the actions taken to date, and planned for the future, to engage the government of Canada to jointly refer the proposed repository to the International Joint Commission for research and study. It further directed the Secretary to report on the diplomatic and legal steps the Department of State plans to take to address concerns about the protection of the Great Lakes water basin and to review alternatives for the proposed repository that will not risk the health, safety, and economic security of residents of the Great Lakes basin.[22]

## Columbia River Treaty

The Columbia River crosses the boundary between southwest Canada and the northwest United States. The Columbia River Treaty (CRT) is an international agreement between the United States and Canada for the cooperative development and operation of the water resources of the Columbia River basin to provide for flood control and power. The CRT resulted from more than 20 years of negotiations between the two countries, both of which ratified the treaty in 1961. Implementation began in 1964. The CRT has no specific end date, and most of its provisions continue indefinitely in the absence of action by the United States or Canada, with the exception of certain flood control operations that will change after 2024. Beginning in September 2024, either nation can terminate most CRT provisions with at least 10 years' written notice (i.e., as

[19] EPA, *Justification of Appropriation Estimates for the Committee on Appropriations*, February 2018, p. 145. As of early February 2019, the appropriated amount for Great Lakes restoration in FY2019 was not available.

[20] International Joint Commission, *First Triennial Assessment of Progress on Great Lakes Water Quality*, November 28, 2017.

[21] Kevin Bunch, "Low Probability, High Impact: Radionuclides, Nuclear Waste and the Great Lakes," Great Lakes Connection, August 4, 2017.

[22] U.S. Congress, House Committee on Appropriations, *Consolidated Appropriations Act, 2018, Legislative Text and Explanatory Statement, Book 2 of 2*, committee print, 115th Cong., 2nd sess., March 2018, p. 1770, https://www.govinfo.gov/app/details/CPRT-115HPRT29457/CPRT-115HPRT29457. The statement directed that the report be delivered to the committees 60 days after enactment; P.L. 115-141 became law on March 23, 2018.

early as 2014). To date, neither country has given notice of termination, but both countries have indicated a preliminary interest in modifying the CRT.

Future operation of USACE facilities on the Columbia River and its tributaries is central to CRT discussions. USACE and the Bonneville Power Administration (BPA, a self-funded entity within the U.S. Department of Energy that markets the hydropower from the federal facilities in the U.S. portion of the basin), in their joint role as the U.S. Entity overseeing the CRT, undertook a review of the CRT from 2009 to 2013. Based on studies and stakeholder input, USACE and BPA provided a regional recommendation to the U.S. Department of State in December 2013. The recommendation was to continue the treaty after 2024, with modifications. For its part, the Canadian entity overseeing the CRT (the Province of British Columbia) released in March 2013 a recommendation to continue the CRT with modifications "within the Treaty framework."[23] The U.S. Department of State finalized its negotiating parameters and authorized talks with Canada in October 2016. Negotiations began in May 2018; four rounds of negotiation had concluded by the end of 2018.[24]

If the executive branch comes to an agreement regarding modification of the CRT, the Senate may be asked to weigh in on future versions of the treaty, pursuant to its advice and consent role. In addition, both houses of Congress may weigh in on CRT review and negotiation activities through their oversight roles. For more information on the CRT, see CRS Report R43287, *Columbia River Treaty Review*, by Charles V. Stern.

## United States and Mexico

### Colorado River and Rio Grande

The United States and Mexico share the waters of multiple rivers, including the Colorado River and the Rio Grande. These shared surface waters are important to many border community economies and water supplies. In 1944, the United States and Mexico entered into the Treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (hereinafter 1944 Water Treaty) to establish the International Boundary and Water Commission (IBWC) to oversee the U.S.-Mexico border and water treaties.[25]

Congress has been involved in recent U.S.-Mexico water sharing issues primarily through oversight. This involvement includes oversight of IBWC's actions to manage the Colorado River's water and infrastructure to improve water availability during drought and to restore and protect riverine ecosystems. Hydrologic conditions and U.S. state and congressional action on a drought contingency plan for the three U.S. Colorado River lower basin states (California, Arizona, and Nevada) may shape what actions are taken under an agreement with Mexico. The agreement is Minute 323, "Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin," which is in effect from September 2017 through December 2026. For Congress, binational Colorado River oversight

[23] U.S. Entity, "U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2023," December 13, 2013, http://www.crt2014-2024review.gov/Files/Regional%20Recommendation%20Final,%2013%20DEC%202013.pdf.

[24] For information on the status of negotiations, see U.S. Department of State, "Columbia River Treaty," at https://www.state.gov/p/wha/ci/ca/topics/c78892.htm.

[25] Treaty Between the United States of America and Mexico Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., February 3, 1944, 59 Stat. 1219, at https://www.ibwc.gov/Files/1944Treaty.pdf (hereinafter 1944 Water Treaty).

topics may encompass Minute 323 implementation and operations and deliveries during shortage conditions.

On multiple occasions since 1994, Mexico has not met its Rio Grande water delivery obligations to the United States within the five-year period prescribed by the 1944 Water Treaty. Since 2014, Congress has directed the U.S. Department of State to report annually on Mexico's deliveries and on efforts to improve Mexico's treaty compliance. The IBWC is working to identify opportunities to improve the predictability and reliability of Mexico's water deliveries to the United States.

For more information on binational Rio Grande and Colorado River water sharing, see CRS Report R45430, *Sharing the Colorado River and the Rio Grande: Cooperation and Conflict with Mexico*, by Nicole T. Carter, Stephen P. Mulligan, and Charles V. Stern.

# Water Resource Science at the U.S. Geological Survey

The USGS has conducted water resource science since 1889.[26] It is a primary agency for conducting large- and small-scale studies of water resources throughout the country, addressing both water quality and water quantity. These activities assist decisionmakers and federal agencies in managing water resources at all levels of government.

The USGS is divided into seven mission areas, including the Water Resources Mission Area (also referred to as the USGS water mission). The USGS water mission covers scientific activities that involve collecting, assessing, and disseminating hydrological data and analysis and research on hydrological systems. The USGS water mission focuses on several water-related conditions, such as streamflow, groundwater, water quality, and water use and availability. The agency's current scientific plan for the USGS water mission centers on several focus areas. [27] The focus areas include collection and dissemination of water data and monitoring for the country, flood inundation science and information, and modeling linkages between human activities and the water cycle, among others.

The implementation and operation of streamgages by the USGS is a perennial issue for Congress. The USGS, under its Water Resources Mission Area, makes publicly available real-time monitoring data from approximately 8,200 streamgages, 1,900 water quality-sampling stations, and 1,800 groundwater observation wells across the nation.[28] These observations support disaster responses by the Federal Emergency Management Agency, water infrastructure operations by USACE and Reclamation, flood forecasting by the National Oceanic and Atmospheric Association's (NOAA's) National Water Service, and drinking water and ecosystem management by state and federal regulatory agencies (e.g., U.S. Environmental Protection Agency).

Over the years, the demand for streamgages has exceeded the available resources. Some streamgages in the program are implemented and operated with cooperative partners. USGS has the authority to match the cost of a streamgage by up to 50%; however, in practice, the cooperative partners' cost share is often greater than 50%. Relying on cooperative partners to

[26] 25 Stat. 939 Chap 411 directed the U.S. Geological Survey (USGS) to conduct a hydrographic survey to measure streamflow of arid basins in the west to investigate sites for reservoirs and other hydraulic works for the dual purpose of water storage for irrigation and the prevention of floods.

[27] E. J. Evenson et al., *U.S. Geological Survey Water Science Strategy-Observing, Understanding, Predicting, and Delivering Water Science to the Nation*, USGS, USGS 1383-G, 2013.

[28] National Academies of Sciences, Engineering, and Medicine, *Future Water Priorities for the Nation: Directions for the U.S. Geological Survey Water Mission Area*, 2018, at https://doi.org/10.17226/25134.

maintain or expand observations is a persistent challenge for USGS. Congress traditionally has focused its attention on the National Streamflow Information subprogram and the Cooperative Water subprogram under the Water Resources Mission Area, both of which fund streamgages throughout the nation. The 116th Congress may conduct oversight of USGS water observation programs and their funding.

The 116th Congress also may address the recommendations in the 2018 report by the National Academy of Sciences (NAS) on how the USGS water mission area may address expected challenges over the next 25 years. Many recommendations focused on water data collection, delivery, standards, and incorporation into comprehensive models. The NAS report also highlighted potential integration of advanced observation capabilities and data informatics and recommended that USGS develop a robust water accounting system that incorporates human activities affecting water.

# Funding and Financing Aging and New Water Resource Projects

U.S. water infrastructure is aging; the majority of the nation's dams, locks, and levees are more than 50 years old.[29] Failure of these structures could have significant effects on local communities as well as regional and national impacts. Major capital investments for the repair and rehabilitation of these facilities would cost billions of dollars.[30] To date, no comprehensive federal funding solutions for aging water resource infrastructure have been enacted.

Some propose funding mechanisms that might be more conducive to major capital investments than the current available funding options, such as the authorization or modification of loan programs for some water resource infrastructure types or the inclusion of water resource infrastructure among the eligible recipients of funding from an infrastructure bank or broad infrastructure initiative.[31] Other proposals include using revenues from project beneficiaries (e.g., hydropower revenues, increased user fees) to fund project repairs and upgrades, or de-authorizing and/or transferring projects to nonfederal entities, such as state or local governments.[32] Still others

[29] The majority of Reclamation's facilities are more than 50 years old, and USACE infrastructure averages more than 55 years old. See CRS Report RL34466, *The Bureau of Reclamation's Aging Infrastructure*, by Charles V. Stern.

[30] The Association of State Dam Safety Officials has estimated the cost for rehabilitating the nation's nonfederal dams at around $60 billion, which includes almost $19 billion for the rehabilitation of nonfederal high-hazard dams (Association of State Dam Safety Officials, *The Cost of Rehabilitating Our Nation's Dams: A Methodology, Estimate & Proposed Funding Mechanisms*, updated 2016, https://damsafety.org/dam-owners/dam-rehabilitation-funding). USACE estimates that about $24 billion of additional investment over 10 years (i.e., $2.4 billion per year) would be needed to sustain the capital stock value of existing USACE infrastructure (USACE, Institute for Water Resources, *Estimating USACE Capital Stock, 1928 to 2016*, December 2018, https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll2/id/3051). This USACE study did not analyze how the capital stock value decline without such an investment may affect performance and safety of the infrastructure or the services supported by the infrastructure. Needed repairs to Reclamation facilities totaled $3.2 billion as of the most recent publicly available estimate, which is from 2008 (U.S. Congress, Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, Statement of Robert W. Johnson, Hearing on Reclamation's Aging Infrastructure, 110th Cong., 2nd sess., April 2008).

[31] For example, in February 2018, the Trump Administration released *Legislative Outline for Rebuilding Infrastructure in America*, which proposed expanding the an EPA-operated loan and loan guarantee program to nonfederal water resource projects (e.g., water supply, navigation and flood and storm damage reduction), including deauthorized USACE projects (The White House, *Legislative Outline for Rebuilding Infrastructure in America*, February 2018, p. 11 and p. 13, https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf, hereinafter referred to as White House 2018 Legislative Outline for Infrastructure).

[32] The Trump Administration's *Legislative Outline for Rebuilding Infrastructure in America* also proposed user fee

think Congress requires more uniform information on the extent of this issue before it considers major funding solutions.[33] In the 115th Congress, proposed legislation would have required increased reporting by Reclamation on the agency's aging infrastructure backlog (H.R. 660, Bureau of Reclamation Transparency Act, which passed the House). (See also discussion below on "Changing from Federal Infrastructure Projects to Federal Partnerships.")

# Changing from Federal Infrastructure Projects to Federal Partnerships

Some stakeholders have expressed frustration with the pace of authorization and federal funding of water resource projects, which has resulted in some local sponsors pursuing projects with limited federal support or with expectations of future federal reimbursement or credit.[34] Language authorizing increased nonfederal contributions to Reclamation project costs (as well as federal contributions to nonfederal projects) was enacted in Section 4007 of the WIIN Act. Congress in WRRDA 2014, the WIIN Act, and AWIA expanded nonfederal entities' ability to use their funds to advance USACE projects and to receive up-front or be reimbursed for the federal portion of project study and construction costs. Such new partnership models present opportunities for advancing projects more quickly than the status quo, but they also raise concerns regarding federal oversight in planning decisions and the use of federal funds. Other related questions include what the appropriate federal amount of investment and use of these new authorities should be and whether these authorities allow nonfederal sponsors to exert influence over the use of limited federal water resource infrastructure funds.

The 113th Congress initiated another approach through the authorization of Title X of WRRDA 2014, the Water Infrastructure Finance and Innovation Act (WIFIA). The title authorized a pilot program, to be administered by USACE and the Environmental Protection Agency (EPA), for loans and loan guarantees for certain flood damage reduction, public water supply, and wastewater projects. WIFIA was modeled after a similar program that assists transportation projects, the Transportation Infrastructure Finance and Innovation Act, or TIFIA, program. To date, only the EPA portion of the WIFIA program is operational. Although the WIIN Act and AWIA amended and extended the EPA's WIFIA authority,[35] no similar legislative changes were made to the USACE WIFIA program. In FY2019, USACE continues to develop its policies to implement its WIFIA authority.

# Protecting and Restoring the Environment

The 116th Congress may engage in discussions of how threatened and endangered species designations and related critical habitat and environmental mitigation requirements affect water

collection and retention at USACE water resource projects (White House Infrastructure Legislative Outline for Infrastructure, p. 29).

[33] An example of this position is represented in the requirements of S. 40, the Bureau of Reclamation Transparency Act.

[34] For example, see testimony provided by nonfederal witnesses at U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Water Resources and Environment, *America's Water Resources Infrastructure: Approaches to Enhanced Project Delivery*, 115th Cong., 2nd sess., January 18, 2018.

[35] For more information, see CRS Report R43315, *Water Infrastructure Financing: The Water Infrastructure Finance and Innovation Act (WIFIA) Program*, by Jonathan L. Ramseur and Mary Tiemann.

resource project construction and operations. The 116th Congress also may choose to engage in other environmental topics related to water resources, such as habitat restoration and aquatic species conservation in the Sacramento and San Joaquin Rivers' Delta, the reduction of harmful algal blooms associated with federal water resource projects, and opportunities for public-private partnerships for conservation and restoration of estuaries and rivers.

The 116th Congress may consider the status and priority of federal efforts to restore large-scale aquatic ecosystems that have been altered or impaired by development, habitat loss, and federal water resource projects. Congress has authorized restoration activities in the Everglades, Great Lakes, Gulf Coast, and elsewhere.[36] Other restoration efforts that may receive attention include the Bay-Delta, Chesapeake Bay,[37] Salton Sea, Klamath Basin, and elsewhere. Numerous issues pertaining to these ecosystems have emerged. For example, Congress might consider legislation to authorize a framework for governance and a comprehensive restoration plan for the Salton Sea; it also may conduct oversight over the implementation of restoration activities in the Everglades and Gulf Coast region.

Funding for existing and newly authorized restoration initiatives could face challenges in the 116th Congress as decisionmakers evaluate investment priorities.[38] Congress may look at the funding and performance of existing restoration efforts. Decisionmakers also may evaluate restoration initiatives on how well they balance demands for water resources and species' conservation needs.

# Flood Resilience and Natural and Nature-Based Infrastructure

The 116th Congress may consider responses to flood disasters, including improving flood resilience, which is the ability to adapt to, withstand, and rapidly recover from floods. In the United States, flood-related responsibilities are shared between the federal and state governments. Congress has established various federal programs that may be available to assist U.S. state, local, and territorial entities and tribes in reducing flood risks, including structural and nonstructural measures. States and local governments have significant discretion in land use and development decisions (e.g., building codes, subdivision ordinances). Congress has been and may continue to be concerned about the nation's and the federal government's financial exposure to flood losses, as well as the economic, social, and public health impacts on individuals and communities.[39]

Congress may consider the costs and benefits of protecting and restoring natural features that provide flood control and erosion benefits. Natural features, such as coral reefs, mangroves, dune systems, coastal wetlands, and the like, can dampen wave energy, slow erosion, and absorb floodwaters, among other benefits. Congress has established several programs across a number of

[36] For more information, see CRS Report R42007, *Everglades Restoration: Federal Funding and Implementation Progress*, by Charles V. Stern, CRS Report R43249, *The Great Lakes Restoration Initiative: Background and Issues*, by Pervaze A. Sheikh, and CRS Report R43380, *Gulf Coast Restoration: RESTORE Act and Related Efforts*, by Charles V. Stern, Pervaze A. Sheikh, and Jonathan L. Ramseur.

[37] For more information, see CRS Report R45278, *Chesapeake Bay Restoration: Background and Issues for Congress*, by Eva Lipiec.

[38] The WIIN Act authorized or amended the authorizations for federal restoration efforts in the Great Lakes, Lake Tahoe, Everglades, and other federal restoration activities.

[39] For more information, see CRS Report R45017, *Flood Resilience and Risk Reduction: Federal Assistance and Programs*, by Nicole T. Carter et al.

agencies to conserve and restore these types of areas. For example, the Coastal Barrier Resources Act (P.L. 97-348) established the Coastal Barrier Resources System in coastal areas with low development.[40] The program aims not only to limit future federal expenditures and protect habitat but also to preserve naturally dynamic areas that may absorb flooding and erosion impacts.

Approaches that mimic nature and are "nature-based" are used as part of flood management and risk reduction. These features sometimes are referred to as *living shorelines* or *green infrastructure*.[41] Some local, state, and federal agencies and programs support nature-based infrastructure, especially if there are multiple benefits (e.g., erosion reduction, habitat restoration, and water quality benefits). Federal agencies such as the Fish and Wildlife Service, NOAA, USACE, and EPA may be involved in the restoration, protection, or construction of these nature-based features. The WIIN Act required USACE to consider "natural features" and "nature-based features" in addition to structural and nonstructural measures when studying the feasibility of flood risk management, hurricane and storm damage reduction, and ecosystem restoration projects.[42] Interest in the nation's infrastructure and changes in environmental conditions (e.g., hydrologic conditions associated with a changing climate) may prompt the 116th Congress to examine the implementation and funding of nature-based infrastructure, and protection of natural features that reduce flood risk.

# Recharging Groundwater

Groundwater, the water in aquifers accessible by wells, is a critical component of the U.S. water supply. It is important for both domestic and agricultural water needs, among other uses.[43] Nearly half of the nation's population uses groundwater to meet daily needs; in 2015, about 149 million people (46% of the nation's population) relied on groundwater for their domestic indoor and outdoor water supply. The greatest volume of groundwater used every day is for agriculture, specifically for irrigation. In 2015, irrigation accounted for 69% of the total fresh groundwater withdrawals in the United States.

Congress generally has deferred management of U.S. groundwater resources to the states, and there is little indication that this practice will change. However, Congress, various states, and other stakeholders recently have focused on the potential for using surface water to recharge aquifers and the ability to recover the stored groundwater when needed. Some see aquifer recharge, storage, and recovery as a replacement or complement to surface water reservoirs, and

[40] For more information, see CRS In Focus IF10859, *The Coastal Barrier Resources Act (CBRA)*, by Eva Lipiec and R. Eliot Crafton. For information about other programs that conserve or restore coastal habitats, see CRS Report R45460, *Coastal Zone Management Act (CZMA): Overview and Issues for Congress*, by Eva Lipiec and CRS Report R45265, *U.S. Fish and Wildlife Service: An Overview*, by R. Eliot Crafton.

[41] The term *living shoreline* "encompasses a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastline, and tributaries.... A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural 'soft' elements alone or in combination with some type of harder shoreline structure (e.g. oyster reefs or rock sills) for added stability" (NOAA, Guidance for Considering the Use of Living Shorelines, 2015, p. 7, at https://www.habitatblueprint.noaa.gov/wp-content/uploads/2018/01/NOAA-Guidance-for-Considering-the-Use-of-Living-Shorelines_2015.pdf). The term *green infrastructure* often is used to describe measures to mitigate stormwater issues. Stormwater features may include permeable pavement, bioswales (i.e., raingardens placed in long, narrow spaces such as along roads), and rainwater harvesting systems, among other measures.

[42] 33 U.S.C. §2289a.

[43] For more information, see CRS Report R45259, *The Federal Role in Groundwater Supply: Overview and Legislation in the 115th Congress*, by Peter Folger et al.

there is interest in how federal agencies can support these efforts.[44] In the congressional context, there is interest in the potential for federal efforts to facilitate state, local, and private groundwater management efforts (e.g., management of federal reservoir releases to allow for groundwater recharge by local utilities).

Although Congress has authorized aquifer storage, recharge, and/or recovery for some individual projects, general congressional guidance in this area has been limited. Under the WIIN Act, Congress provided general authority for Reclamation to support new and enhanced federal and state surface and groundwater storage projects under certain, limited circumstances.[45]

A connection between federal water projects and groundwater enhancement already exists in Arizona, as part of the Central Arizona Project, and is implemented via state law. More recently, California enacted three groundwater laws known collectively as the Sustainable Groundwater Management Act (SGMA), which directed the California Department of Water Resources to identify water available for replenishing groundwater in the state. Because the California Central Valley Project is integral to the water supply and delivery infrastructure of the state, that project is also recognized as part of the surface water resources potentially important for recharging aquifers as the SGMA is implemented. Other western states with significant Reclamation water infrastructure also may look to enhance their sources of water for aquifer recharge by using water from federal projects.

A number of bills introduced in the 115th Congress would have addressed groundwater recharge, storage, and recovery in various ways. Whereas some bills addressed the concept broadly, others attempted to facilitate and, in some cases, add requirements for groundwater storage projects in specific locations. Similar legislation may be introduced in the 116th Congress, particularly if drought trends continue in the western United States and more groundwater is pumped in lieu of surface water supplies, potentially leading to the broad and long-term drawdown of aquifers.

# Conclusion

Many factors shape the water resource issues before the 116th Congress. These factors include demand for reliable water supplies; hydrologic conditions, such as droughts, floods, and effects of climate change; issues regarding safety and performance of existing infrastructure, and interests and concerns about alternative financing and public-private partnerships.

The 116th Congress may consider some measures proposed but not enacted in the 115th Congress, as well as new legislative proposals. In the water resource area, legislative activity often is specific to the federal water resource management agencies or to water use by particular sectors, including energy, agriculture, navigation, recreation, and municipal and industrial use. Occasionally, Congress takes up broader water resource policy issues, such as coordination of federal water resource activities, programs, science, and research.

---

[44] An example of a major aquifer storage project currently operating within a larger water storage framework is the Kern Water Bank, a water storage bank that operates on about 20,000 acres southwest of Bakersfield, CA. As of 2018, the bank could store about 1.5 million acre-feet of readily available water underground, with the ability to recover approximately 240,000 acre-feet within a 10-month period. Since its construction in 1996, the bank has formed an important component of California's water storage network. For more information, see http://www.kwb.org/index.cfm/fuseaction/Pages.Page/id/330.

[45] No significant federal restrictions apply to Reclamation's authorities to deliver water for purposes of aquifer recharge, storage, and recovery. USACE authorities also do not restrict the nonfederal use for groundwater recharge of water stored or released from USACE reservoirs. Both agencies acknowledge that some state restrictions affect the use of the delivered or stored waters for groundwater activities. For more information, see CRS Report R45259, *The Federal Role in Groundwater Supply: Overview and Legislation in the 115th Congress*, by Peter Folger et al.

Congress and other decisionmakers often make water resource decisions within a complicated context. These decisions may involve existing federal infrastructure and their beneficiaries, multiple or conflicting objectives, various legal decisions, multiple environmental and natural resource statutes, and long-established institutional mechanisms (e.g., water rights and contractual obligations). These decisions also occur within a federalist framework in which water resource responsibilities are shared with state, local, and tribal governments and the private sector.

Broad water resource questions for the 116th Congress described herein include the following:

- For existing water resource facilities, including aging dams, levees, and navigation channels, what will be the federal role and level of investment in maintaining performance and safety?
- For planning and construction of new or expanded water resource projects, what will be the circumstances, conditions, and nature of federal involvement?
- For water resource project design and operations, how may federal and nonfederal science, observation, and monitoring be used to improve performance?

# Appendix. Federal Water Resource Infrastructure

Most of the large dams and water diversion structures in the United States were built by, or with the assistance of, the Bureau of Reclamation (Reclamation) or the U.S. Army Corps of Engineers (USACE). The two agencies' projects differed in that

- Reclamation projects historically were designed principally to provide reliable supplies of water for irrigation and some municipal and industrial uses.
- USACE projects have been planned primarily to improve navigation and reduce flood damages; power generation, water supply, and recreation often have been included as secondary or incidental benefits.

Reclamation currently manages hundreds of dams and reservoirs in the 17 arid states west of the Mississippi River.[46] These projects provide water to approximately 10 million acres of farmland and 31 million people. Reclamation also operates 58 power plants capable of producing 40 billion kilowatt-hours of electricity annually (enough for approximately 3.5 million homes), which generate more than $1 billion in revenues annually.[47]

USACE operates nationwide, and its activities are diverse. USACE has constructed thousands of flood damage reduction and navigation projects throughout the country, involving nearly 12,000 miles of commercially active waterways and nearly 1,000 harbors and including 702 dam and reservoir projects (with 75 hydroelectric plants generating 68 billion kilowatt-hours annually). USACE is responsible for maintaining these projects. Additionally, USACE constructed, usually with nonfederal participation, roughly 9,000 miles of the estimated 100,000 miles of the nation's levees, but the agency operates and maintains only 900 miles. The remaining levees are operated by nonfederal entities, often local governments or special districts.

The number of federal water resource construction activities decreased during the last decades of the 20th century, marking the end of earlier expansionist policies that had supported large federal up-front investments in dams and hydropower facilities, navigation locks and channels, irrigation diversions, and flood control levees, as well as basin-wide planning and development efforts. Fiscal constraints, changes in national priorities and local needs, few remaining prime construction locations, and environmental and species impacts of the construction and operation of federal projects all contributed to this shift.

[46] Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

[47] U.S. Department of the Interior, *Budget Justifications and Performance Information Fiscal Year 2017*, Bureau of Reclamation, 2016, p. General Statement-2, at http://www.usbr.gov/budget/.

## Author Information

Nicole T. Carter
Specialist in Natural Resources Policy

Charles V. Stern
Specialist in Natural Resources Policy

Pervaze A. Sheikh
Specialist in Natural Resources Policy

Peter Folger
Specialist in Energy and Natural Resources Policy

Eva Lipiec
Analyst in Natural Resources Policy

Anna E. Normand
Analyst in Natural Resources Policy

## Disclaimer

This document was prepared by the Congressional Research Service (CRS). CRS serves as nonpartisan shared staff to congressional committees and Members of Congress. It operates solely at the behest of and under the direction of Congress. Information in a CRS Report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to Members of Congress in connection with CRS's institutional role. CRS Reports, as a work of the United States Government, are not subject to copyright protection in the United States. Any CRS Report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS Report may include copyrighted images or material from a third party, you may need to obtain the permission of the copyright holder if you wish to copy or otherwise use copyrighted material.