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SUMMARY

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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), as well as involvement in water resource activities by other agencies. USACE constructs projects nationwide, primarily to improve navigation, reduce flood damage, and restore aquatic ecosystems. Reclamation constructs projects as authorized in the 17 arid and semiarid states west of the Mississippi River; these projects primarily provide water supply benefits, often to agricultural irrigation users. The 117th Congress may conduct oversight and may deliberate on authorization and funding of water resource development, management, and protection. The 117th Congress, like earlier Congresses, also may consider authorization of new or amended 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 land-use change and climate change, among other issues, have given rise to 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 water resource projects (e.g., groundwater recharge, nature-based flood risk reduction);
- reinvestment in aging water resource infrastructure and use of hydrologic science and real-time monitoring and forecasting to improve infrastructure operations;
- funding and financing of projects, including 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 largely relate to specific agencies. USACE-related topics that may be considered include efforts to update the agency's authorities to incorporate new mission areas and address the agency's aging infrastructure. 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; Congress may address how these issues affect water deliveries to irrigation districts and municipalities and how they impact threatened and endangered species, among others.

In addition to domestic water resource issues, some topics are international in character. Regarding freshwater bodies shared with Canada, potential topics for the 117th 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.

Cross-cutting topics (i.e., topics relevant to multiple agencies and programs) also are part of congressional water resource deliberations. For example, 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 and the Chesapeake Bay). Congress may be interested in the funding and performance of existing restoration efforts, including what changes, if any, may be necessary to improve project delivery and evaluation. In addition, 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. Many have expressed 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.

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Introduction

Demands on available water supplies have heightened local and regional water-use conflicts throughout the United States, particularly in the West and the Southeast. Development pressures, droughts, floods, and concerns about land-use change and climate change, among other issues, have increased stakeholder interest in federal financial and technical assistance for water resource projects. Many have expressed interest in constructing new water resource infrastructure (e.g., storm surge gates, water storage) at various locations, as well as in new types of projects (e.g., groundwater recharge, nature-based flood risk reduction). In addition, some stakeholders and Members of Congress have expressed interest in reinvestment in aging water resource infrastructure and in improved management of available water supplies through water science, monitoring, and operational changes. Water resource policy questions that the 117th Congress may consider include the following:

- What should 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 should water resource science, observation, and monitoring inform water resource management, project design, and operation?

Congress plays a role in water resources through authorization of, and appropriations for, projects and activities. Some of these projects are for facilitating navigation and expanding water supplies for irrigation and other uses. Other projects aim to achieve goals such as reducing flood and/or drought losses or restoring aquatic ecosystems.

Congress principally directs either the U.S. Army Corps of Engineers (USACE) in the Department of Defense or the Bureau of Reclamation (Reclamation) in the Department of the Interior (DOI) to plan, construct, operate, and maintain the majority of federally owned water resource projects. Reclamation projects generally are located in the 17 arid and semiarid states west of the Mississippi River;[1] these projects are designed principally to provide reliable supplies of water for irrigation and some municipal and industrial uses. USACE constructs projects nationwide primarily to improve navigation, reduce flood damage, and restore aquatic ecosystems. In recent years, USACE generally has constructed more new projects than Reclamation, although both agencies have continued to construct new facilities. Congress also 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). The water-related programs and activities of federal agencies other than USACE, Reclamation, and USGS are largely outside the scope of this report, which focuses on water resources issues.[2] This report also

[1] Pursuant to the Reclamation Act of 1902, as amended (32 Stat. 388), the Bureau of 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 (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 the Power Marketing Administrations. For more information, see CRS Report R42653,

does not address federal support for municipal water systems; municipal wastewater infrastructure; or environmental protections, such as water quality and wetlands regulations.[3]

This report covers broad categories of water resource topics that the 117th Congress may consider—projects and activities of USACE and Reclamation, as well as related issues such as Indian water rights settlements, international waters shared with Canada and Mexico, and water resource science at USGS. It also provides information on crosscutting topics, including support for aging and new water resource projects, protection and restoration of the environment, efforts to facilitate flood resilience and natural and nature-based infrastructure, and groundwater recharge.

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 through omnibus water resources development authorization acts. Congress typically appropriates funds for USACE activities in annual Energy and Water Development appropriations acts ($7.8 billion in FY2021).[4] At times, Congress also uses supplemental appropriations bills to fund USACE emergency activities. For example, Congress provided supplemental appropriations for USACE response and recovery activities for coastal and riverine floods totaling $17.4 billion during the 115th Congress and $3.3 billion in the 116th Congress.[5] In response to impacts of the Coronavirus Disease 2019 (COVID-19) pandemic, the House also passed the Moving Forward Act (H.R. 2) in the 116th Congress, which would have provided $15 billion in additional supplemental appropriations for USACE project construction and operations and maintenance. The 117th Congress may consider questions related to appropriations for USACE. For example, Congress may consider how trends in annual and supplemental appropriations amounts, processes, and requirements influence the effective, efficient, and accountable use of federal funding provided to USACE. It also may consider what effect a large infrastructure funding package, including supplemental appropriations for USACE, would have on the nation's economy and workforce.

In recent years, omnibus USACE authorization bills (typically titled Water Resources Development Act and called "WRDA") have been considered biennially.[6] The most recent omnibus USACE authorization acts are WRDA 2020 (Division AA of Consolidated Appropriations Act, 2021; P.L. 116-260), enacted in December 2020;[7] WRDA 2018 (Title I of

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] For more information on the U.S. Army Corps of Engineers (USACE) annual appropriations process and recent appropriations, see CRS Report R46320, *U.S. Army Corps of Engineers: Annual Appropriations Process and Issues for Congress*, by Anna E. Normand and Nicole T. Carter.

[5] For more information on USACE supplemental appropriations, see CRS In Focus IF11435, *Supplemental Appropriations for Army Corps Flood Response and Recovery*, by Nicole T. Carter and Anna E. Normand.

[6] For more information on recent omnibus water resources authorization acts, see CRS In Focus IF11322, *Water Resources Development Acts: Primer*, by Nicole T. Carter and Anna E. Normand.

[7] For more information on enactment of Water Resources Development Act (WRDA) 2020, see CRS In Focus

America's Water Infrastructure Act [AWIA]; P.L. 115-270), enacted in October 2018;[8] WRDA 2016 (Water Infrastructure Improvements for the Nation Act [WIIN Act]; P.L. 114-322), enacted in December 2016;[9] and the Water Resources Reform and Development Act of 2014 (WRRDA 2014; P.L. 113-121), enacted in June 2014. Prior to 2014, the last WRDA was enacted in 2007. The 117th Congress may follow the tradition of biennial consideration of legislation that authorizes USACE activities, including studies and projects.

Some USACE-related issues that the 117th Congress may address include the following:

- **Project operations** topics, such as USACE policies on pricing for water storage; updates to operation manuals for USACE projects; recreation policies (including firearms regulations) at USACE projects and associated lands;[10] efforts to mitigate and control invasive species and harmful algal blooms;[11] 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;[12] consideration of future hydrologic conditions;[13] and approvals for modification to USACE projects.[14]

A persistent challenge for USACE is how to manage its $98 billion in authorized construction activities that are eligible for federal appropriations, often referred to as its *construction backlog*.[15] For FY2021, annual USACE construction appropriations totaled $2.7 billion. Given the backlog of USACE projects, Congress may consider whether—and, if so, how—to advance authorized studies and construction projects that remain unfunded, or whether to deauthorize some studies and projects. WRDA 2020 included a requirement for an annual report to identify authorized studies and projects that USACE could carry out if funds were available. Congress may consider such reports, if and when they are published, when crafting appropriations bills for USACE projects in the future. Congress also may oversee USACE efforts to implement public-

IF11700, *Water Resources Development Act of 2020*, by Nicole T. Carter and Anna E. Normand.

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

[9] 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.

[10] 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.

[11] For more information, see CRS In Focus IF11666, *U.S. Army Corps of Engineers Invasive Species Efforts*, by Anna E. Normand and R. Eliot Crafton.

[12] For more information, see CRS Report R46328, *Flood Risk Reduction from Natural and Nature-Based Features: Army Corps of Engineers Authorities*, by Nicole T. Carter and Eva Lipiec.

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

[14] For example, the Dakota Access Pipeline, which crosses USACE-controlled lands at Lake Oahe, 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.

[15] $98 billion was the estimated total for these activities by USACE, as of early 2020. It does not reflect FY2021 appropriations or projects authorized in WRDA 2020.

private partnerships and alternative financing opportunities, as well as new and amended processes related to USACE study and project deauthorization.[16]

Congress also may conduct oversight or make further changes to specific USACE authorities, such as how USACE implements statutorily mandated changes to the expenditure of funds from the Harbor Maintenance Trust Fund (HMTF) for improvements to coastal and inland harbors and the Inland Waterway Trust Fund (IWTF) for improvements to inland and intracoastal waterways.[17] The following laws enacted during the 116th Congress altered various aspects of how the trust funds are used to pursue these improvements and how projects are funded using these trust funds:

- The CARES Act (P.L. 116-136) directed that funding from the HMTF for activities designated as harbor operations and maintenance in an amount up to the prior fiscal year's HMTF deposits would not count against annual discretionary budget limits.
- WRDA 2020 further altered the CARES Act's HMTF adjustment to be the sum of (1) the amount of the deposits into the fund two years prior (for context, FY2019 deposits were $1.8 billion) and (2) an amount starting at $500 million in FY2021 and increasing by $100 million annually to $1.5 billion for FY2030 and thereafter.
- WRDA 2020 made another adjustment for funding regarding certain additional measures at qualifying ports; the adjustment applies for 10 years and expands funding from $50 million to $70 million annually.
- WRDA 2020 authorized HMTF expenditures to pay for a broader set of activities and provided direction on the use of HTMF funds for various categories of navigation projects.
- WRDA 2020 adjusted the IWTF contribution to waterway construction projects to allow more investment from the general fund toward these projects. It reduced the IWTF contribution from 50% to 35% for any waterway construction project funded from FY2021 through FY2031. The change increased the contribution from the general fund from 50% to 65% for these projects.

Western Water and the Bureau of Reclamation[18]

Since the early 1900s, Reclamation has constructed and operated a variety of multipurpose water projects in the 17 states west of the Mississippi River.[19] These projects have included 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.[20] Water storage and conveyance infrastructure provided by these and other Reclamation projects historically was

[16] See below section, "Funding and Financing Aging and New Water Resource Projects."

[17] For more on the Harbor Maintenance Trust Fund, see CRS In Focus IF11645, *Distribution of Harbor Maintenance Trust Fund Expenditures*, by John Frittelli and Nicole T. Carter. For more on inland waterways, see CRS In Focus IF11593, *Inland and Intracoastal Waterways: Primer and Issues for Congress*, by Nicole T. Carter and John Frittelli.

[18] This section was authored by Charles V. Stern, Specialist in Natural Resources Policy.

[19] The organization that later became the Bureau of Reclamation was first authorized under the Reclamation Act of 1902 (32 Stat. 388). For detailed background on Reclamation, see CRS Report R46303, *Bureau of Reclamation: History, Authorities, and Issues for Congress*, by Charles V. Stern and Anna E. Normand.

[20] 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.

important for regional development and remains important today. Water supplies from these projects are used primarily for irrigation; however, some municipalities also receive water from Reclamation projects for drinking water and industrial uses. In addition, many of the largest projects constructed by Reclamation produce hydropower and provide other benefits, such as flood damage reduction, recreation, and water for fish and wildlife purposes. The operations of some facilities are controversial for their 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 1988, 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.[21] Since then, several developments—including increased population in western states; prolonged drought conditions; 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 and project water deliveries often have been controversial because of potential impacts on preexisting 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, various enacted laws have expanded Reclamation's authorities and increased funding 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 stakeholders support expanded authority and funding for these programs as critical to future efforts to address water shortages in the West. In Section 4007 of the WIIN Act, Congress included authorization for the first new authority in decades for Reclamation to support water storage project construction.[22]

In contrast to USACE, there is not a tradition in Congress to introduce authorizing legislation (e.g., a WRDA) for Reclamation projects on a periodic schedule. Instead, Congress generally has considered Reclamation authorization proposals sporadically and, in recent years, has included Reclamation project and program authorities as part of larger omnibus authorizing or appropriations legislation.[23]

Several Reclamation-related water project and management issues may be the subject of legislation or oversight during the 117th Congress. Such issues may include, for example, the status of new and proposed water storage projects under Section 4007 of the WIIN Act (and whether to extend authority under that section); dam safety issues at existing federal reclamation projects; and efforts to address the agency's aging infrastructure and transition projects to nonfederal ownership.

Another ongoing issue for Reclamation, which has been particularly controversial in recent years, is 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

[21] Bureau of Reclamation, *Reclamation Faces the Future*, (U.S. Department of the Interior: 1988), p. 1. Hereinafter, *Reclamation Faces the Future*.

[22] See CRS In Focus IF10626, *Reclamation Water Storage Projects: Section 4007 of the Water Infrastructure Improvements for the Nation Act*, by Charles V. Stern.

[23] The last omnibus bill addressing key Reclamation policy areas and new or revised project and program authorizations was in the Consolidated Appropriations Act, FY2021 (P.L. 116-260), enacted in December 2020. 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.

threatened and endangered species. Several Reclamation provisions in Title II, Subtitle J, of the WIIN Act addressed these controversies and were memorialized by the Trump Administration in revised operational parameters that were finalized in 2019. The 117th Congress may oversee CVP operations and any proposed changes by the Biden Administration, and it also may consider extension or modification of Reclamation's WIIN Act authorities (most of which are scheduled to expire at the end of 2021). Other river basins where Reclamation has a prominent role in water management issues—including the Colorado River, Columbia River, and Klamath River Basins, among others—also may generate congressional interest.

Drought in the Western United States

As the primary federal water management agency in the western United States, Reclamation plays a significant role in the federal response to western drought, in particular through drought mitigation assistance, planning, and preparedness. In recent years, much of the West and particularly the Southwest has faced extended drought conditions that received some level of congressional attention. As of early 2021, much of the West (in particular the Southwest and California) remained in drought. If dry conditions persist or intensify in the Colorado River Basin and other western areas, drought in the West likely will continue to receive attention during the 117th Congress. Congress may address drought through oversight hearings and legislation, including any newly proposed authorities and guidance for Reclamation to prepare for and mitigate the effects of drought. Congress also may consider regular and/or supplemental appropriations that support drought response activities (e.g., drilling of temporary wells).

Indian Water Rights Settlements[24]

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, giving rise to questions and disputes regarding Indian reserved water rights.[25] Tribes have pursued formal recognition and quantification of their water rights through both litigation and negotiated settlements with the federal government and other stakeholders. Over the last 50 years, many tribes have used negotiated settlements because they are often less lengthy and costly than litigation. The 117th Congress may consider under what circumstances (if any) Congress should approve new Indian water rights settlements (including related federal actions) and whether Congress should fund (and in some cases amend) federal actions approved in existing settlements. Many tribes and Members of Congress support 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 are concerned with the cost of new settlements in general and, in some cases, with specific individual settlements and activities.

After Indian water rights settlements involving the federal government are negotiated, federal action is necessary for the settlements' approval and implementation.[26] As of early 2021, 38

[24] This section was authored by Charles V. Stern, Specialist in Natural Resources Policy.

[25] Dating to a 1908 Supreme Court ruling, courts generally have held that many tribes have a reserved right to water sufficient to fulfill the purpose of their reservations and that this right took effect on the date the reservations were established. Therefore, in the context of a state water law system of prior appropriations, which is common in many U.S. western states, many tribes have water rights senior to those of non-Indian users with water rights and access established subsequent to the Indian reservations' creation.

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

Indian water rights settlements had been federally approved, with total costs to the federal government in excess of approximately $8.0 billion. Of these, 34 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 DOI), pursuant to congressional directions in enacted laws. 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, was authorized by Congress in Title X of P.L. 111-11 to provide $120 million per year in appropriations for qualifying tribal water settlement projects through FY2029.[27]

The primary challenge facing new settlements is the availability of federal funds to implement ongoing and future agreements that require federal resources, although 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. However, obtaining federal funding for these projects can be difficult. Some settlements also are controversial for their potential to affect existing water rights and allocations.

The 116th Congress enacted two new settlements in P.L. 116-260 (the Confederate-Salish Kootenai Tribe and Navajo Nation [Utah] settlements), amended another settlement (the Aamodt Settlement in New Mexico), and authorized preliminary federal actions related to another proposed settlement (the Kickapoo Settlement in Kansas). Other proposed settlements, such as the Hualapai Settlement in Arizona, were considered but not enacted. These and other settlements may be considered by the 117th Congress.[28]

Waters Shared with Canada and Mexico

Great Lakes[29]

Federal, state, provincial, local, and tribal governments in the United States and Canada have sought to work together to address environmental challenges in the Great Lakes and restore the ecosystem. The United States and Canada collaborate through several mechanisms, including the Great Lakes Water Quality Agreement (GLWQA) and the International Joint Commission (IJC).[30] In 2012, the United States and Canada amended the GLWQA, a commitment originally signed in 1972 that provides a framework for identifying binational priorities and implementing actions to improve water quality. The framework provisions 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 algal blooms, toxic chemicals, and discharge from vessels.[31] Many GLWQA goals are addressed through the federal Great Lakes Restoration Initiative (GLRI),

[27] The fund was authorized by Congress in Title X of P.L. 111-11.

[28] For more on Indian water rights settlements, see CRS Report R44148, *Indian Water Rights Settlements*, by Charles V. Stern.

[29] This section was authored by Eva Lipiec, Analyst in Natural Resources Policy.

[30] EPA, "What is GLWQA?," at https://www.epa.gov/glwqa/what-glwqa; International Joint Commission (IJC), "Role of IJC," at https://ijc.org/en/who/role.

[31] 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.

administered by the Environmental Protection Agency (EPA).[32] Congress authorized appropriations for GLRI to increase incrementally from $300 million in FY2021 to $475 million in FY2026.[33] Administration requests for GLRI funding between FY2018 and FY2021 grew from $0 to $320 million.[34] Congress appropriated between $300 million and $330 million annually to GLRI for these years.[35] Several other federal agencies within the Departments of Agriculture, the Army, Commerce, Health and Human Services, Homeland Security, the Interior, State, and Transportation also support activities to address Great Lakes restoration. These agencies may receive funding through GLRI appropriations transferred from EPA or may be appropriated funds for Great Lakes activities or national-level programs that address issues in the Great Lakes directly.[36]

IJC is a binational organization established by the 1909 Boundary Waters Treaty between the United States and Canada to investigate and recommend solutions to transboundary water issues.[37] Among its responsibilities, IJC publishes assessments of progress toward, and recommendations on, how to meet the GLWQA's objectives. The first assessment in 2017 found that the United States and Canada had made progress, including accelerated restoration of contaminated areas of concern, development of binational habitat conservation strategies, prevention of new aquatic invasive species (such as Asian carp), and comprehensive reporting on groundwater science.[38] It also identified 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. IJC recommendations in the first assessment focused on restoration funding, inadequately treated or untreated sewage, toxic and nontoxic contaminants, phosphorus loads, introduced invasive species, remedial actions in areas of concern, climate change adaptation, public engagement, and binational Great Lakes monitoring. IJC issued its second assessment in December 2020.[39] The second assessment retained the original recommendations and provided additional recommendations; these additional recommendations focused on the effectiveness of restoration programs, harmful algal blooms in Lake Superior, and public and stakeholder outreach.

[32] 33 U.S.C. 1268. For more information on the Great Lakes Restoration Initiative (GLRI), see CRS In Focus IF10128, *Great Lakes Restoration Initiative (GLRI)*, by Pervaze A. Sheikh.

[33] P.L. 114-322 and P.L. 116-294. Other federal agencies' programs fund Great Lakes restoration projects as well.

[34] The Administration requested $0 in FY2018, $30 million in FY2019, $30 million in FY2020, and $320 million in FY2021 for GLRI. See EPA, *Justification of Appropriation Estimates for the Committee on Appropriations* for FY2018 (p. 155); FY2019 (p. 199); FY2020 (p. 208); and FY2021 (p. 232).

[35] Congress appropriated $300 million in FY2018, $300 million in FY2019, $320 million in FY2020, and $330 million in FY2021 to GLRI (P.L. 115-141; P.L. 116-6; P.L. 116-94, and P.L. 116-260).

[36] More information about federal agency funding for Great Lakes restoration can be found in congressionally mandated annual budget crosscuts (33 U.S.C. 1268a). The most recent Great Lakes restoration crosscut was released in November 2020. See Office of Management and Budget, *Great Lakes Restoration Crosscut: Report to Congress*, November 2020.

[37] Treaty Between the United States and Great Britain Relating to the Boundary Waters, and Questions Arising Between the United States and Canada, January 11, 1909, 36 Stat. 2448, T.S. No. 548. For additional information, see CRS In Focus IF10761, *The International Joint Commission (IJC)*, by Eva Lipiec and Pervaze A. Sheikh.

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

[39] IJC, *Second Triennial Assessment of Progress on Great Lakes Water Quality*, December 2020.

Some Members of Congress and stakeholders have expressed concerns about high water levels in the Great Lakes.[40] Great Lakes water levels generally have risen annually since historic low levels in 2013,[41] contributing to flooding and erosion of private and public properties and infrastructure along the shoreline.[42] In 2020, Congress authorized USACE to complete a Great Lakes coastal resiliency study to assess and provide recommendations to Congress on potential coastal storm and flood measures, among other actions.[43] Some stakeholders argue that an IJC regulation plan (Plan 2014) implemented in 2017 might have led to higher water levels in the Great Lakes.[44] Other stakeholders contend that rising waters in the Great Lakes are primarily a function of above-normal precipitation amounts.[45]

The 117th Congress also may focus on the potential effects of specific proposed projects in the Great Lakes Basin. In recent years, proposed projects have included the establishment of a deep geologic repository for nuclear waste, the development of an open-pit gold and zinc mine, and the construction of water diversions for industrial and commercial uses.[46]

Columbia River Treaty[47]

The Columbia River originates in southwest Canada and crosses the international border into the northwest United States before ultimately draining into the Pacific Ocean. 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.[48] 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. 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 2014, each nation became able to provide notice of its intent to terminate most CRT provisions with at least 10 years' written notice. To

[40] For example, IJC, "If You Experienced High Water Impacts in 2019, We Need to Hear from You," press release, December 12, 2019, at https://ijc.org/en/if-you-experienced-high-water-impacts-2019-we-need-hear-you; and U.S. Representative John Katko, "In Anticipation of High Water Levels Along Lake Ontario, Reps. Katko, Morelle Lead Bipartisan Great Lakes Delegation in Requesting Relief for Shoreline Communities amid COVID-19 Pandemic," press release, April 27, 2020.

[41] National Oceanic and Atmospheric Administration (NOAA) and U.S. Army Corps of Engineers, "The Great Lakes Dashboard," at https://www.glerl.noaa.gov/data/dashboard/GLD_HTML5.html.

[42] For example, see impacts of high water levels noted in IJC, Great Lakes-St. Lawrence River Adaptive Management Committee, "2017 High Water Levels: A Summary of Reported Impacts," fact sheet, April 2019, at https://ijc.org/sites/default/files/2019-08/Final_QuestionnaireFactSheet_20190815.pdf; and Garret Ellison, "As the Great Lakes Surge to Record Heights, Coastal Areas Face a Time of Reckoning," *MichiganLive*, March 28, 2020.

[43] P.L. 116-260, Div. AA, Sec. 211.

[44] Marian Hetherly, Veronica Volk, and Emily Russell, "Resentment Growing Against IJC and Plan 2014," *WBFO* (Buffalo Toronto Public Media), June 13, 2019.

[45] IJC, International Lake Ontario-St. Lawrence River Board, *Lake Ontario-St. Lawrence River 2019 High Water Levels Questions and Answers*, January 2020.

[46] Ben Thorp, "Ontario Power Generation Formally Ends Effort to Place Nuclear Waste Storage Site New Lake Huron," Michigan Radio, June 24, 2020; Aquila Resources, "Back Forty Mine," at http://backfortymine.com/; and Wisconsin Department of Natural Resources, "City of Racine Water Diversion Application," at https://dnr.wisconsin.gov/topic/WaterUse/Racine.

[47] This section was authored by Charles V. Stern, Specialist in Natural Resources Policy.

[48] Treaty Between Canada and the United States of America Relating to Cooperative Development of the Water Resources of the Columbia River Basin, January 17, 1961.

date, neither country has given notice of termination but both countries have indicated an 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, a self-funded agency within the U.S. Department of Energy that markets the hydropower from federal facilities in the U.S. portion of the basin, share a joint role as the U.S. entity overseeing the CRT. From 2009 to 2013, the U.S. entity undertook a review of the CRT. Based on studies and stakeholder input, the U.S. entity 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.[49] For its part, the Province of British Columbia released in March 2013 a recommendation to continue the CRT with modifications within the treaty framework.[50] In October 2016, the U.S. Department of State finalized negotiating parameters and authorized talks with Canada to begin in May 2018; between 2018 and 2020, U.S. and Canadian teams held 10 rounds of negotiations.

If the executive branch comes to an agreement regarding modification of the CRT, the Senate may be asked to weigh in on future amendments to or 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.[51]

Colorado River and Rio Grande[52]

The United States and Mexico share the waters of multiple rivers, including the Colorado River and the Rio Grande.[53] 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*), which established the International Boundary and Water Commission (IBWC) to oversee the U.S.-Mexico border and water treaties.[54]

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. Basin hydrologic conditions may shape what actions are taken under a supplementary agreement with Mexico, known as Minute 323, "Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin" (in effect from September 2017 through December 2026).[55] For Congress, binational

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

[50] Province of British Columbia, "Columbia River Treaty Review: B.C. Decision," March 13, 2014, at http://blog.gov.bc.ca/columbiarivertreaty/files/2012/03/BC_Decision_on_Columbia_River_Treaty.pdf.

[51] For more information on the Columbia River Treaty, see CRS Report R43287, Columbia River Treaty Review, by Charles V. Stern.

[52] This section was authored by Charles V. Stern, Specialist in Natural Resources Policy.

[53] 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.

[54] 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).

[55] International Boundary and Water Commission, Minute 323, September 21, 2017.

Colorado River oversight topics may encompass Minute 323 implementation and operations and deliveries during shortage conditions.[56]

Congress also has shown interest in Rio Grande-related issues. 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.

Water Resource Science at the U.S. Geological Survey[57]

The USGS has conducted water resource science and surveys since 1889. It is an agency in DOI that conducts 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.

Activities undertaken by the USGS are divided into five mission areas, including the Water Resources Mission Area (hereinafter referred to as *Water Resources*).[58] Water Resources covers scientific activities that involve collecting, assessing, and disseminating hydrological data and analysis and research on hydrological systems. Water Resources focuses on several water-related conditions, such as streamflow, groundwater, water quality, and water use and availability.

The agency's current scientific plan for Water Resources originally was developed for 2007 through 2017; it was revised in 2013 to reflect issues for the following 5-10 years.[59] The report centers on several focus areas, including 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. In 2018, the Water Science and Technology Board of the National Academies of Sciences, Engineering, and Medicine (NAS) published a report to address inquiries from the USGS, such as identifying the nation's highest-priority water science and resources challenges over the next 25 years and providing recommendations on how to address the highest-priority national water challenges.[60] The 117th Congress may consider directing the USGS to update its scientific plan based on recommendations in the NAS report. Many of these 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 the USGS develop a robust water accounting system that incorporates human activities affecting water.

[56] Separate but related to Minute 323 are actions in the U.S. portion of the basin pursuant to the Colorado River Drought Contingency Plans, which were formally approved by Congress in 2019 under P.L. 116-14.

[57] This section was authored by Anna E. Normand, Analyst in Natural Resources Policy.

[58] See CRS In Focus IF11433, *The U.S. Geological Survey (USGS): FY2021 Appropriations Process and Background*, by Anna E. Normand, for more information on the USGS and its mission areas.

[59] 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.

[60] National Academies of Sciences, Engineering, and Medicine, *Future Water Priorities for the Nation: Directions for the U.S. Geological Survey Water Mission Area*, 2018.

Water monitoring implementation and operation by the USGS is a perennial issue for Congress. The USGS, under Water Resources, makes available to the public real-time water monitoring data from approximately 8,200 streamgages, 1,900 water quality-sampling stations, and 1,800 groundwater observation wells across the nation.[61] 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 National Water Service, and drinking water and ecosystem management by state and federal regulatory agencies (e.g., EPA).

Over the years, streamgage operation costs have exceeded the available federal resources. Many streamgages are operated cooperatively with nonfederal partners, who share the cost of streamgages and data collection. The average nonfederal cost-share contribution increased from 50% in the early 1990s to 69% in FY2020.[62] In the early 2000s, the USGS designated federal priority streamgage (FPS) locations based on five identified national needs. The SECURE Water Act of 2009 (Title IX, Subtitle F, of P.L. 111-11) directed the USGS to operate no fewer than 4,700 federally funded streamgages by FY2019. In FY2020, 3,470 of the 4,760 FPSs designated by the USGS were operational. Although USGS funding for cooperative streamgages and FPSs has remained level (in nominal dollars) from FY2017 through FY2021, Congress directed $43 million to the new Next Generation Water Observing System (NGWOS), an effort to establish dense water monitoring networks in representative watersheds to model streamflow in analogous watersheds.[63] The 117th Congress may consider outlining the future direction for the USGS Streamgaging Network through oversight or legislation. Policy options to consider may include pursuing the FPS mandate and NGWOS simultaneously, amending the SECURE Water Act of 2009, and assessing the relative emphasis of NGWOS in the agency's streamgaging enterprise.

Funding and Financing Aging and New Water Resource Projects[64]

The majority of the nation's dams, locks, and levees are more than 50 years old.[65] Aging infrastructure may need investments in rehabilitation and repair, aside from routine operation and maintenance, to provide desired benefits and maintain safety. Potential decreased performance or 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.[66] At the same time, there are demands from state and local interests

[61] National Academies of Sciences, Engineering, and Medicine, *Future Water Priorities for the Nation: Directions for the U.S. Geological Survey Water Mission Area*, 2018.

[62] The USGS Cooperative Matching Funds Program provides up to a 50% match with tribal, regional, state, and local partners pursuant to 43 U.S.C. §50.

[63] The USGS initiated the Next Generation Water Observing System pilot project in the Delaware River Basin with $1.5 million in FY2018. Congress increased this funding to $8.5 million in FY2019 and FY2020 and to $24.5 million in FY2021.

[64] This section was authored by Anna E. Normand, Analyst in Natural Resources Policy.

[65] The majority of Reclamation's facilities are more than 50 years old, and USACE infrastructure averages more than 55 years old. These agencies generally design infrastructure such as dams for a 50-year service life. See CRS Report RL34466, *The Bureau of Reclamation's Aging Infrastructure*, by Charles V. Stern.

[66] According to a 2019 study by the Association of State Dam Safety Officials (ASDSO), the combined total cost to rehabilitate the nonfederal and federal dams in the National Inventory of Dams (see https://nid.sec.usace.army.mil/) would exceed $70 billion, including approximately $3 billion for high-hazard federal dams and $19 billion for high-hazard nonfederal dams. See ASDSO, *The Cost of Rehabilitating Our Nation's Dams*, 2019. In 2019, USACE

for new water resource facilities, and the backlog of new projects authorized for federal funding has grown in recent years. The last time Congress appropriated major *additional* funding for federal water resource infrastructure (i.e., funding in addition to annual regular discretionary appropriations and supplemental appropriations in response to storm events) was in the American Recovery and Reinvestment Act of 2009 (P.L. 111-5).

Some proposals call for funding mechanisms that might leverage federal funding more than current available financing mechanisms; this might entail authorizing or modifying loan programs for water resource infrastructure or making water resource projects eligible for funding from an infrastructure bank.[67] Other proposals include using existing or new revenue streams from project beneficiaries (e.g., hydropower revenues, user fees) to fund project repairs and upgrades or deauthorizing and transferring projects to nonfederal entities, such as state or local governments.[68] Congress previously enacted authorities to allow local sponsors to pursue projects with limited federal support or with expectations of future federal reimbursement or credit; these authorities are being used to expedite some new projects.[69]

Some stakeholders have expressed frustration with the pace of authorization and federal funding for new water resource projects and rehabilitation and repair of existing water resource structures. The 113th Congress initiated an approach for nonfederal interests to pursue water infrastructure projects through the authorization of the Water Infrastructure Finance and Innovation Act (WIFIA, enacted in Title X of WRRDA 2014). WIFIA authorized USACE and EPA to provide loans and loan guarantees for certain water resources, 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 (23 U.S.C. §601 et seq.). Although Congress has appropriated funding since FY2017 for EPA's WIFIA program to provide assistance to projects,[70] Congress first funded USACE's program in FY2021 appropriations.[71] In that act, Congress created a WIFIA account for USACE and provided $12.2 million specifically to support dam safety projects for nonfederally owned dams and $2 million for USACE administrative expenses to carry out the WIFIA program. Under the Federal Credit Reform Act of 1990 (P.L. 101-508), appropriations for federal credit programs, such as WIFIA,

estimated a backlog of $20 billion to address its dam safety concerns, and Reclamation estimated its current portfolio of dam safety modification projects would cost between $1.4 billion and $1.8 billion through FY2030. For more information, see CRS Report R45981, *Dam Safety Overview and the Federal Role*, by Anna E. Normand. USACE estimates 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. See USACE, Institute for Water Resources, *Estimating USACE Capital Stock, 1928 to 2016*, December 2018. This USACE study did not analyze how decline in the capital stock value 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 $3.8 billion as of the most recent publicly available estimate (early 2020).

[67] For example, in February 2018, the Trump Administration released *Legislative Outline for Rebuilding Infrastructure in America*, which proposed expanding 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. See White House, *Legislative Outline for Rebuilding Infrastructure in America*, February 2018, pp. 11 and 13.

[68] The *Legislative Outline for Rebuilding Infrastructure in America* also proposed user fee collection and retention at USACE water resource projects (p. 29).

[69] 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.

[70] See CRS In Focus IF11193, *WIFIA Program: Background and Recent Developments*, by Elena H. Humphreys.

[71] Division D of P.L. 116-260. Recently, USACE has referred to its program as the Civil Works Infrastructure Financing Program (CWIFP).

primarily cover long-term credit subsidy costs (2 U.S.C. §661a). The volume of loans and other types of credit assistance that WIFIA can provide is determined primarily by the appropriations amount and subsidy cost assumed for each loan, as well as any by credit assistance cap established by Congress. In P.L. 116-260, Congress capped the total amount of loans supported by the USACE appropriation at $950 million.[72]

The 117th Congress may conduct oversight of the EPA and USACE WIFIA programs.[73] Congress also may consider, through appropriations legislation, expanding the eligible uses of future loans to other purposes authorized by WIFIA (e.g., restoration of aquatic ecosystems, navigation improvements, drinking water infrastructure). In addition to EPA and USACE WIFIA, some stakeholders support authorization of a similar authority (commonly known as the Reclamation Infrastructure Financing and Innovation Act, or RIFIA), for the Bureau of Reclamation. Such a program would focus on water supply projects in the western United States.

Protecting and Restoring the Environment[74]

The 117th Congress may consider legislation and may conduct oversight of how threatened and endangered species listings and related critical habitat designations and environmental mitigation requirements affect water resource project construction and operations. Congress also may choose to engage in other environmental topics related to water resources, such as habitat restoration and aquatic species conservation in the Bay-Delta; habitat mitigation for endangered species through the modification (e.g., fish ladders) or removal of dams; the reduction of invasive species associated with federal water resource projects;[75] and opportunities for public-private partnerships for conservation and restoration of estuaries, rivers, and coastlines.

Congress may consider the status and priority of federal efforts to restore large-scale aquatic ecosystems altered or impaired by development, habitat loss, and federal water resource projects. To date, Congress has authorized restoration activities in the Everglades, Great Lakes, and Gulf Coast, among other regions.[76] Other restoration efforts that may receive congressional attention include activities in the Chesapeake Bay,[77] Rio Grande River Basin, and Klamath River Basin. Numerous issues pertaining to these and other ecosystem restoration initiatives might emerge. For example, Congress may consider legislation to authorize restoration efforts for the Salton Sea and Puget Sound; it also may conduct oversight over the implementation of restoration activities in the Everglades, Great Lakes, and Gulf Coast.

[72] The actual amount of CWIFP loans may be lower than $950 million, as it would be determined by various factors, including the subsidy cost for each project receiving assistance.

[73] For more information on CWIFP, see CRS Insight IN11577, *U.S. Army Corps of Engineers Civil Works Infrastructure Financing Program (CWIFP): Status and Issues*, by Anna E. Normand and Elena H. Humphreys.

[74] This section was authored by Pervaze A. Sheikh, Specialist in Natural Resources Policy.

[75] For example, see CRS In Focus IF11666, *U.S. Army Corps of Engineers Invasive Species Efforts*, by Anna E. Normand and R. Eliot Crafton.

[76] For more information, see CRS In Focus IF11336, *Recent Developments in Everglades Restoration*, by Pervaze A. Sheikh and Anna E. Normand; 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.

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

Funding for existing and newly authorized restoration initiatives could be predicated on whether restoration efforts contribute toward economic recovery and climate change adaptation. Several stakeholders argue that ecosystem restoration efforts could create conservation jobs and provide ecosystem services that help to mitigate the effects of climate change (e.g., provide habitat for migrating species). Congress 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[78]

The 117th Congress may consider, as past Congresses have, reducing the nation's flood risk, including through efforts to improve flood resilience, or the ability to adapt to, withstand, and rapidly recover from floods. In the United States, flood-related responsibilities are shared. For example, 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 through investments in structural and nonstructural measures, as well as flood insurance and mitigation programs.[79] 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 of floods on individuals and communities.

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 agencies to conserve and restore these types of features. For example, the Coastal Barrier Resources Act (P.L. 97-348) established the Coastal Barrier Resources System in coastal areas with low development.[80] 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. The 117th Congress may consider the costs and benefits of protecting and restoring natural features that provide flood control and erosion benefits.

Approaches that mimic nature and are *nature-based* can be used as part of flood management and risk reduction. These features sometimes are referred to as *living shorelines* or *green infrastructure*.[81] Some local, state, and federal agencies and programs support nature-based

[78] This section was authored by Eva Lipiec, Analyst in Natural Resources Policy.

[79] For more information, see CRS Report R44593, *Introduction to the National Flood Insurance Program (NFIP)*, by Diane P. Horn and Baird Webel, and CRS Insight IN11515, *FEMA Pre-Disaster Mitigation: The Building Resilient Infrastructure and Communities (BRIC) Program*, by Diane P. Horn.

[80] 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.

[81] There are multiple definitions for the terms *living shorelines* and *green infrastructure*. Generally, 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." See NOAA, *Guidance for Considering the Use of Living Shorelines*, 2015, p. 7. The term *green infrastructure* often describes measures to mitigate stormwater problems. Under statute, *green infrastructure* includes a "range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater

infrastructure, especially if there are multiple benefits (e.g., erosion reduction, habitat restoration, water quality benefits). Federal agencies, such as the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Association, USACE, and EPA, support the restoration, protection, or construction of natural and nature-based features.[82] Continuing congressional interest in the nation's infrastructure and changes in environmental conditions, such as hydrologic conditions associated with a changing climate in some areas, may prompt Congress to examine the implementation and funding of nature-based infrastructure and the protection of natural features that reduce flood and erosion risk.

Recharging Groundwater[83]

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.[84] 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.[85] 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.[86]

Congress generally has deferred management of U.S. groundwater resources to the states, and there is little indication 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 there is interest in how federal agencies can support these efforts.[87] In the congressional context, some have expressed 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,

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and reduce flows to sewer systems or to surface waters" (33 U.S.C. 1362(27)).

[82] For more information about NOAA and USACE's authorities and activities regarding natural and nature-based infrastructure, see CRS Report R46145, *Nature-Based Infrastructure: NOAA's Role*, by Eva Lipiec, and CRS Report R46328, *Flood Risk Reduction from Natural and Nature-Based Features: Army Corps of Engineers Authorities*, by Nicole T. Carter and Eva Lipiec.

[83] This section was authored by Peter Folger, Section Research Manager.

[84] For more information, see CRS Report R45259, *The Federal Role in Groundwater Supply*, by Peter Folger et al.

[85] Cheryl A. Dieter and Molly A. Maupin, *Public Supply and Domestic Water Use in the United States, 2015*, USGS, Open-File Report 2017-1131, 2017.

[86] Cheryl A. Dieter et al., *Estimated Use of Water in the United States in 2015*, USGS, Circular 1441, 2018. 2015 is the most recent year for which these data are available. Nearly all groundwater withdrawals in 2015 were freshwater (about 97%); the remainder (3%) were saline water withdrawals.

[87] 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.

Congress provided general authority for Reclamation to support new and enhanced federal and state surface and groundwater storage projects under certain, limited circumstances.[88]

In some states, federal water projects and state-implemented groundwater enhancement activities are interrelated. A connection between federal water projects and groundwater enhancement already exists in Arizona, as part of the Central Arizona Project,[89] 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 CVP is integral to the water supply and delivery infrastructure of California, that project also is 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 previous Congresses 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 117th Congress, particularly if drought trends continue in the southwestern 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 water resource issues that the 117th Congress may consider. 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 117th Congress may consider some measures proposed but not enacted in the 116th Congress, as well as new legislative proposals. In the water resource area, legislative activity often has been 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.

Congress and other decisionmakers often make water resource decisions within a complicated context. These decisions may involve existing federal infrastructure and its 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.

[88] For more information, see CRS In Focus IF10626, *Reclamation Water Storage Projects: Section 4007 of the Water Infrastructure Improvements for the Nation Act*, by Charles V. Stern. 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.

[89] For more information on the Central Arizona Project, see https://www.cap-az.com/about-us/background.

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