Complete Statement of Charles V. Stern
Specialist in Natural Resources Policy for the Congressional Research Service
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Hearing on Issues Associated with Aging Water Resource Infrastructure in the United States
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Chairman Schatz, Ranking Member Lee, and members of the subcommittee, my name is Charles Stern. I am a Specialist in Natural Resources Policy for the Congressional Research Service (CRS). Thank you for inviting CRS to testify on issues related to aging water resource infrastructure.

The federal government owns water resource infrastructure with a total replacement value of more than $352 billion. As these dams, levees, diversion structures, hydropower facilities, and other water resource infrastructure continue to age, decisionmakers are faced with the question of whether to continue to operate federal water projects under the current statutory framework, or to alter existing policies to increase the focus on repair, rebuilding, or transfer of these assets. My testimony will focus on water resource infrastructure owned by the federal government.

Overview of Aging Water Resource Infrastructure

Aging conditions are a significant challenge for the multiple types of federally owned and operated water resource infrastructure. These facilities are varied and complex, and include dams, canals, levees, locks, floodwalls, hydropower facilities, and related infrastructure. They have been constructed over two centuries to serve a number of purposes. As a result, a system of shared responsibilities to plan, construct, finance, operate, maintain, and repair this infrastructure has emerged over time, with various units of state and local government, nongovernmental organizations, and the private sector involved in the development and management of individual projects.

The Bureau of Reclamation (Reclamation) and the Army Corps of Engineers (Corps) are the principal agencies charged with constructing the federal government's largest investments in water

infrastructure. Other agencies and federal entities such as the Natural Resources Conservation Service, the Tennessee Valley Authority, and the U.S. section of the International Boundary and Water Commission, among others, also have played roles in water resource development.

Federal water resource infrastructure receives significant use, and in many cases individual facilities are operating beyond their original design lives. On average, Corps and Reclamation facilities were built more than 50 years ago, and some were built more than 100 years ago. They are used for commerce, recreation, flood hazard protection, electric power generation, crop production, and conservation of fish and wildlife. While appropriations for the maintenance of these facilities have remained flat or are declining in real terms over the previous 30 years, agencies and stakeholders have noted an uptick in needs for major project maintenance and repairs that they believe are likely to continue over time.

Risks Associated with Aging Water Resource Infrastructure: Failure, Service Interruptions

The risks associated with aging water resource infrastructure have been documented by agencies and stakeholders and include, among other things, threats to public safety, loss of services and capacity, and hindrance of future economic growth. Under some circumstances, failure of water resource infrastructure may result in the loss of life and property. Congress has responded to past events, including the failure of facilities near populated areas, by authorizing and funding inspection and repair programs that focus on specific types of infrastructure, such as dams and canals.

Perhaps a more common scenario than outright failure of a facility is reduced or lost services. While it is difficult to measure the exact effects of aging infrastructure, deteriorating infrastructure may be affecting services such as water supply, hydropower production, and movement of commodities. Some of the examples of service disruptions documented by federal agencies that have been connected to aging assets include reservoir storage restrictions for dam safety, decreasing hydropower unit availability, and increasing lock unavailability. Specific examples include:

- Reservoir Storage Restrictions: According to the Corps and Reclamation, at least twelve federal reservoirs are currently operating at lower storage levels than designed as a result of dam safety concerns, some of which relate to aging infrastructure;
- Hydropower Unavailability and Forced Outages: According to agency data, overall hydropower peak availability over the last 10 years was down by about 7% and 9% at Corps and Reclamation units, respectively. Forced outages for both agencies were also up over this same period. There is insufficient information to determine the extent to which these trends are attributable to aging infrastructure (as opposed to other causes), but some have assumed there is a correlation;
- Lock Unavailability: According to Corps data, lock unavailability, which often occurs due to repairs related to deteriorating infrastructure, has increased by approximately 45% over the last 20 years in terms of the number of lock outages and has increased by almost three-fold in terms of hours of repair.

Federal agencies have taken steps to address their aging water resource infrastructure based on statutory direction and Administration initiatives. This includes, among other things, inspections and safety programs focusing on specific infrastructure types (e.g., dams, levees), as well as implementation of broader asset management strategies that are risk-based and which target funding to certain assets. These programs and activities have generally focused on identifying and addressing the highest risks to public safety and operations among specific facility types and classifying the level of risks and conditions at other facilities.

Addressing Aging Infrastructure

Challenges associated with management of the federal government's aging water resource infrastructure have been identified in past assessments. Generally speaking, two of the primary areas where observers have noted challenges are evaluation of needs and financing for rehabilitation.

Measurement and Evaluation

While we know that federal water resource assets are aging and that this is generally likely to result in reduced performance and increased costs over time, outside of the aforementioned inspection programs there is limited publicly available information on the magnitude and timing of the issue. Previous independent expert assessments noted that detailed information on the condition and associated upgrade needs of water resource infrastructure are generally unavailable at project and aggregate levels. Available needs estimates may encompass more than just aging infrastructure repairs. For instance, they may include upgrades needed for optimal economic performance along with those to maintain public safety, security, and current services. Other estimates may be based on informal field surveys that are insufficient for long term planning. The absence of comprehensive, authoritative information at project and aggregate levels complicates efforts to evaluate the needs of these facilities. It also makes it difficult to gauge year-to-year progress in meeting the challenges of aging infrastructure at the local, regional, and national levels.

In contrast to water resource infrastructure, other federally supported infrastructure programs, including those for water supply and transportation, are required by Congress to report regularly on estimated future needs. The Environmental Protection Agency (EPA) and states conduct needs assessments for wastewater and drinking water treatment facilities, and the Department of Transportation (DOT) regularly publishes a needs survey for highway, bridge, and transit infrastructure. In both cases, agencies regularly report on needs using a consistent methodology at project and aggregate levels. For the EPA assessments, aggregate reported needs are based on a peer reviewed, random sample of facilities that is broken down by need type. Individual project cost estimates must be documented in the form of capital improvement plans and other project-specific information. While these assessments and the infrastructure they evaluate are not without their own challenges and limitations, they provide a data set and baseline for performance that is not available for most federally owned water resource infrastructure.

Financing for Rehabilitation

Observers such as the National Research Council (NRC) have judged that regardless of available information on the extent of the problem, aging water resource infrastructure is likely to pose an increasing challenge to federal agencies over time. This is assumed to be the case due to increasing repair needs and appropriations which some observers believe will be flat or declining, as they have been over the past 30 years. As a consequence, observers have also noted that financing arrangements outside of traditional appropriations are likely to be needed to maintain these projects.

Observers have proposed alternative financing arrangements for multiple infrastructure types, including water resource infrastructure. However some water resource projects may face greater challenges than other project types when it comes to implementing these options. In contrast to other projects which are owned by state or local governments and which receive funding from those sources, many water resource projects have historically received most or all of their funding from the federal government. These projects may also have beneficiaries or users that are difficult to identify, or who may not be able to provide viable revenue streams to fund project upgrades. Even federal projects that are largely self-funding or which have identifiable beneficiaries have experienced difficulties accessing capital due to statutory and budgetary limitations resulting from federal ownership, among other things. This is the case for some federal hydropower and irrigation projects that have customers who are interested in financing upgrades, but are generally not authorized to commit future revenues toward these purposes because they are federal facilities.

The challenges for aging federal water resource projects to obtain financing outside of regular appropriations manifest themselves in some of the commonly proposed policy solutions to increase other types of infrastructure spending. Some of the options that have been considered, and the challenges they pose for federal water resource infrastructure, are discussed below.

Special Purpose Entities (SPE): Infrastructure banks, corporations, and other special purpose entities have regularly been proposed as a means to finance infrastructure investments, but have yet to be authorized at the federal level (although they have been authorized by some states). Water resource infrastructure has not been consistently included among the potential recipients in many such proposals, nor has it regularly benefited from funding provided by state infrastructure banks (these state entities have generally focused on transportation projects). This may in part be due to the fact that, in order for projects to receive financing from an SPE, they must demonstrate credit worthiness and proof of a revenue stream that will allow for repayment. Additionally, since many water resource projects are federal assets, commitment by the federal government of any future project revenues may require full budgetary treatment of costs (i.e., full scoring for these costs in a budget and appropriations context).

Public Private Partnerships (PPP): Public private partnerships involve arrangements in which a nonfederal or private entity assumes some risk or responsibility for a project. As applied to transportation programs, public-private partnerships have generally provided for the transfer of state or local projects to private entities, who are in turn authorized to make upgrades and institute user fees to repay these costs. Due to the aforementioned issues with revenue streams, such a model may not be viable for all federal water resource projects. Proposed legislation in the 113th Congress, such as S. 566 and Section 2025 of the Senate-passed Water Resources Development Act of 2013 (S. 601), would authorize a pilot program to allow the Corps to shift a limited number of construction projects to nonfederal entities. It is unclear whether this pilot program could be used for aging facilities, but it appears to differ from the framework of transportation PPP's referenced above in that no user fees would be authorized under this authority.

Observers have noted that because of their revenue generating potential, federal hydropower projects are a natural fit for some sort of PPP-like authority. A 2012 report by the NRC noted that outside of the Bonneville Power Administration, only a few Corps hydropower units have been upgraded for increased reliability and productivity. Applied to hydropower projects, a PPP model could allow operators to enter into contracts with a private company to finance the upfront costs for project repairs

and upgrades. In exchange, the private entity would receive a commitment of a portion of future revenues associated with the upgrades that would be sufficient to repay the investment and result in a profit. Such an arrangement may have associated budgetary scoring requirements if it commits future federal revenues to an outside source.

"Innovative" Finance: Innovative finance for infrastructure projects is typically a shorthand term for some mix of loans, traditional funding, and/or other financing. Such a program was recently proposed under Title X of S. 601. It would allow the Corps (as well as the EPA) to provide direct loans or loan guarantees to selected projects that meet certain criteria. Similarly, a Loan Guarantee program for rehabilitation projects by the Bureau of Reclamation was previously authorized in Title II of P.L. 109-451, the 21st Century Water Works Act, but has yet to be funded. These programs would fund a portion of qualifying projects with direct loans or loan guarantees, and leave the remainder of project costs to be funded through other financing (either traditional appropriations or other sources). While some view these authorities as promising, repayment ability may still pose issues for some projects with insufficient revenue streams, and some projects may need to have new user fees authorized before they can utilize these programs. Disagreement regarding the executive branch scoring of Reclamation's loan guarantee program suggests that even after authorization, these programs may face additional hurdles.

In addition to the aforementioned financing alternatives, some have proposed increasing nonfederal participation in selected federal projects through proposed and existing authorities. Specifically, some have proposed allowing more contributions from nonfederal partners, raising existing fees, or pursuing divestment of some federal water resource assets (although the latter is generally authorized on a project-by-project basis). Recent changes, such as congressional enactment of expanded Corps authority to receive project funding from nonfederal contributors, could address aging infrastructure issues for some projects. Another option is outright transfer of some federal projects to nonfederal entities. For example, some Reclamation stakeholders favor increased flexibility for the Bureau to transfer ownership of existing federal projects to nonfederal entities, thereby allowing them to

use these projects as collateral to obtain financing. In its 2012 report on Corps infrastructure, the National Research Council noted that divestment of some Corps resources may be considered to better manage the agency's portfolio, but that the prospects for greater private sector involvement will vary by project type. How to prioritize among those water resource assets that should remain a fully federal responsibility, those which require increased user funding, and those which should be transferred to nonfederal entities may be a key question going forward for the Executive Branch and Congress.

My testimony today focused on federally owned water resource infrastructure, but many observers have noted that aging infrastructure issues are perhaps an even larger threat to nonfederal water infrastructure. Most observers note that needed repairs for nonfederal dams, levees, and other facilities are probably greater than the federal needs noted above. Some of these facilities have been proposed for additional support or have received increased federal support in the past. Additional federal funding for this nonfederal infrastructure would likely require new authorities.

In closing, publicly available information and data are currently limited, but federal water infrastructure assets are aging over time. Many have concluded that needs associated with this process will increase. Therefore, if these conditions are to be addressed, policy makers are faced with deciding what changes to existing policies are most appropriate, and the extent to which they should be authorized.

This concludes the remarks of my prepared statement. Thank you for the opportunity to appear before the Subcommittee today. I would be happy to address any questions you may have.