**Testimony of the National Wildlife Federation**
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**U.S. House of Representatives Committee on Transportation and Infrastructure**
**Subcommittee on Water Resources and Environment**
***"Concepts for the Next Water Resources Development Act:***
***Promoting Resiliency of our Nation's Water Resources Infrastructure"***

**November 19, 2019**

Chair Napolitano, Ranking Member Westerman, and Members of the Subcommittee, thank you for the opportunity to testify before you today on the vital issue of improving the resilience of our nation's water resources infrastructure.

The National Wildlife Federation is the nation's largest conservation education and advocacy organization with 6 million members and supporters, and affiliate conservation organizations in 52 states and territories. Our members represent the full spectrum of people who care deeply about wildlife: they are bird and wildlife watchers, hikers, gardeners, anglers, hunters, foresters, and farmers. The National Wildlife Federation has championed clean and healthy rivers and streams since our founding in 1936. Conserving our wetlands, streams, rivers, and shorelines for wildlife and communities is at the core of our mission.

The National Wildlife Federation has extensive experience with all aspects of U.S. Army Corps of Engineers (Corps) planning, including ecosystem restoration, flood damage reduction, navigation, and reservoir operations. We also have the benefit of understanding needed water resources project and policy improvements from hundreds of organizations across the country. The Federation leads the Water Protection Network, a coalition of more than 250 local, regional, and national organizations working to ensure that America's water resources policies and projects are environmentally and economically sound. The Federation also has a long history working on large-scale ecosystem restoration efforts around the country that involve the Corps, including in the Everglades and Mississippi River Delta.

Healthy rivers, floodplains, wetlands, and shorelines are essential for resilient communities, resilient populations of fish and wildlife, and a vibrant outdoor economy. These natural systems also reduce the need for structural flood and storm damage reduction projects and improve the effectiveness and resilience of levees and other water resources infrastructure. As we anticipate more frequent and severe storms and weather events, it is essential that we consider all tools at our disposal, including the use of natural systems to help absorb floodwaters and buffer communities.

The value of natural systems for protecting communities is well recognized. In a 1972 study evaluating options to reduce flooding along Charles River in Massachusetts, the Corps concluded:

> "Nature has already provided the least-cost solution to future flooding in the form of extensive [riverine] wetlands which moderate extreme highs and lows in streamflow. Rather than attempt to improve on this natural protection mechanism, it is both prudent and economical to leave the hydrologic regime established over millennia undisturbed."[1]

Wetlands prevented $625 million in flood damages in the 12 coastal states affected by Hurricane Sandy, and reduced damages by 20 to 30 percent in the four states with the greatest wetland coverage.[2] Coastal wetlands reduced storm surge in some New Orleans neighborhoods by two to three feet during Hurricane Katrina, and levees with wetland buffers had a much greater chance of surviving Katrina's fury than levees without wetland buffers.[3] As aptly noted by the Reinsurance Association of America: "One cannot overstate the value of preserving our natural systems for the protection of people and property from catastrophic events."[4]

Through our extensive experience with Corps projects across the country—and with communities affected by those projects—it is clear that the Corps must do much more to protect, restore, and use healthy natural systems. To help ensure that the Corps can achieve these vital goals, the National Wildlife Federation respectfully urges Congress to continue to advance important ecosystem restoration projects and enact the following new policy reforms to:

- **Mainstream the Corps' Use of Natural Infrastructure:** Natural infrastructure is a critical, but underused, tool for reducing flood and storm damages while also increasing resilience. Congress should create incentives for non-federal sponsors to increase consideration of natural infrastructure solutions by: (1) clarifying that natural infrastructure solutions are subject to the decade-old limitation on the total non-federal cost share for non-structural measures, which eliminates the potential for excessive land-related cost burdens on non-federal sponsors; and (2) facilitating full consideration of cost-effective flood and storm damage reduction solutions for at-risk communities by adopting targeted criteria for waiving the non-federal cost share for feasibility studies while also requiring that those studies fully evaluate natural infrastructure solutions that can provide sustainable and less expensive protections.

- **Ensure Effective Mitigation and Analysis of Fish and Wildlife Impacts in Accordance with Long-Standing Legal Requirements:** Congress should ensure projects properly account for and address harm to fish and wildlife by: (1) clarifying the types of project studies that trigger the civil works mitigation requirements to ensure application of these requirements as Congress

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[1] American Rivers, Unnatural Disasters, Natural Solutions: Lessons From The Flooding Of New Orleans (2006) (quoting USACE, from Massachusetts Department of Fish and Game, *Functions of Riparian Areas for Flood Control*, http://www.mass.gov/dfwele/river/pdf/riparian_factsheet_1.pdf.)

[2] Narayan, S., Beck, M.B., Wilson, P., et al., The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. Scientific Reports 7, Article number 9463 (2017), doi:10.1038/s41598-017-09269-z (available at https://www.nature.com/articles/s41598-017-09269-z).

[3] Bob Marshall, *Studies abound on why the levees failed. But researchers point out that some levees held fast because wetlands worked as buffers during Katrina's storm surge,* The New Orleans Times-Picayune (March 23, 2006).

[4] Restore America's Estuaries, *Jobs & Dollars BIG RETURNS from coastal habitat restoration* (September 14, 2011) (http://www.estuaries.org/images/81103-RAE_17_FINAL_web.pdf).

unquestionably intended; and (2) directing the Corps to evaluate and develop mitigation for fish and wildlife resources in a manner that is consistent with recommendations developed by federal and state fish and wildlife experts pursuant to the Fish and Wildlife Coordination Act that derive from the special expertise of these experts (*e.g.*, methods and metrics for evaluating fish and wildlife impacts and needed mitigation). Failure to adequately mitigate impacts significantly undermines the resilience of the nation's fish and wildlife.

- **Accurately Account for Project Costs and Benefits, Including Ecosystem Services Lost and Gained:** Congress should modernize the criteria used to assess costs and benefits when planning federal water resources projects, including by accounting for increased ecosystem services as a project benefit and lost ecosystem services as a project cost. Fully accounting for costs and benefits is critical for making effective decisions regarding the planning, construction, budgeting, prioritization, and authorization of Corps projects to increase resilience. Ecosystem services are the direct and indirect contributions that ecosystems provide to our well-being, including benefits like flood control, water purification, and habitat for wildlife.

- **Increase the Corps' Capacity to Improve the Resilience of Water Resources Infrastructure, Including By Taking Full Advantage of Existing Authorities:** Congress should establish a Directorate of Ecological Services within the Office of the Chief of Engineers tasked with ensuring that the Corps takes full advantage of existing programs, authorities, and operations to use natural systems to protect communities from floods, minimize expenditures for emergency response and rebuilding, improve wildlife habitat, and strengthen the outdoor-based economy. This Directorate should have significant budgeting authority. Corps planning is hampered by an organizational structure that prevents the agency from creating and taking advantage of critical opportunities to effectively utilize the extensive public safety and wildlife benefits provided by healthy natural systems.

Protecting the nation's waters and increasing the resilience of the nation's water resources infrastructure will also require Congress to defend the integrity of the laws that drive these outcomes, including the National Environmental Policy Act, the Clean Water Act, and the Endangered Species Act. We also urge this committee to carefully oversee the Corps' compliance with the letter and spirit of these laws when planning, constructing, and operating projects.

In our testimony below, we describe the multiple benefits provided by healthy natural systems that are essential for resilient communities, wildlife, and water resources infrastructure. We then highlight the need to advance key ecosystem restoration projects to restore healthy systems, and provide more detailed explanations of the policy reforms outlined above.

## 1. Healthy Natural Systems Provide Multiple Benefits for People and Wildlife

Healthy natural systems provide multiple benefits for communities, wildlife, and the outdoor economy. Protecting, restoring, and using healthy systems to protect communities will increase the resilience of the nation's water resources infrastructure.

### Healthy Natural Systems Protect Communities

As highlighted earlier in this testimony, natural healthy natural systems provide critical protections for the communities. Healthy rivers, floodplains, wetlands, and shorelines can significantly reduce the

need for new flood and storm damage reduction projects, and provide important protections for structural projects like levees and floodwalls.

For example, wetlands act as natural sponges, storing and slowly releasing floodwaters after peak flood flows have passed, and coastal wetlands buffer the onslaught of hurricanes and tropical storms. A single acre of wetland can store one million gallons of floodwaters.[5] Just a 1 percent loss of a watershed's wetlands can increase total flood volume by almost seven percent.[6] Restoring a river's natural flow and meandering channel, and giving at least some floodplain back to the river, slows down floodwaters and gives the river room to spread out without harming homes and businesses.

Wetlands prevented $625 million in flood damages in the 12 coastal states affected by Hurricane Sandy, and reduced damages by 20% to 30% in the four states with the greatest wetland coverage.[7] Coastal wetlands reduced storm surge in some New Orleans neighborhoods by two to three feet during Hurricane Katrina, and levees with wetland buffers had a much greater chance of surviving Katrina's fury than levees without wetland buffers.[8] California's wetlands provide an estimated $16.6 billion in benefits each year (in 2013 dollars) by reducing flood damages, recharging groundwater, purifying water supplies, providing recreational opportunities, and supporting healthy populations of fish and wildlife.[9]

### Healthy Natural Systems Sustain Wildlife

Healthy rivers, floodplains, and wetlands provide vital fish and wildlife habitat and allow people and wildlife to benefit from natural flood cycles. In a healthy, functioning river system, precipitation events and other natural increases in water flow can deposit nutrients along floodplains creating fertile soil for bottomland hardwood forests. Sediment transported by these increased flows form islands and back channels that are home to fish, birds, and other wildlife. By scouring out river channels and riparian areas, these events prevent rivers from becoming overgrown with vegetation. They also facilitate breeding and migration for a host of fish species, and provide vital connectivity between habitat areas. In the deltas at the mouths of rivers, increased flows release freshwater and sediment, sustaining and renewing wetlands that protect coastal communities from storms and provide nurseries for multibillion dollar fisheries.

Wetlands are some of the most biologically productive natural ecosystems in the world, and support an incredibly diverse and extensive array of fish and wildlife. America's wetlands support millions of migratory birds and waterfowl. Up to one-half of all North American bird species rely on wetlands. Although wetlands account for just about 5 percent of land area in the lower 48 states, those wetlands are the only habitat for more than one third of the nation's threatened and endangered species and

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[5] Environmental Protection Agency*, "Wetlands: Protecting Life and Property from Flooding." EPA 843-F-06-001.* (2006) (factsheet).

[6] Demissie, M. and Abdul Khan. 1993. "Influence of Wetlands on Streamflow in Illinois." Illinois State Water Survey, Contract Report 561, Champaign, IL, Table 7, pp. 44-45.

[7] Narayan, S., Beck, M.B., Wilson, P., et al., The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. Scientific Reports 7, Article number 9463 (2017), doi:10.1038/s41598-017-09269-z (available at https://www.nature.com/articles/s41598-017-09269-z).

[8] Bob Marshall, *Studies abound on why the levees failed. But researchers point out that some levees held fast because wetlands worked as buffers during Katrina's storm surge,* The New Orleans Times-Picayune (March 23, 2006).

[9] Harold Mooney and Erika Zavalata (editors), Ecosystems of California, University of California Press (2016) at 684.

support an additional 20 percent of the nation's threatened and endangered at some time in their life. These same wetlands are home to 31 percent of the nation's plant species.[10]

## Healthy Natural Systems Drive the Outdoor Economy

Healthy rivers, floodplains, and wetlands are economic drivers for outdoor recreation and commercial fishery-based economies. Projects that restore those resources are also an important creator of jobs that are by necessity local and cannot be exported.

For example, wetlands are an economic driver for fish and wildlife associated recreation. Hundreds of species of birds, waterfowl, and wildlife and 90 percent of fish caught by America's recreational anglers are wetland dependent. In 2016, fishing, hunting, and other wildlife-associated recreation contributed $156.3 billion to the national economy. "This equates to 1% of Gross Domestic Product; one out of every one hundred dollars of all goods and services produced in the U.S. is due to wildlife-related recreation." Anglers alone spent "$46.1 billion on trips, equipment, licenses, and other items to support their fishing activities" while people who "fed, photographed, and observed wildlife," spent $75.9 billion on those activities.[11]

Ninety five percent of commercially harvested fish and shellfish are wetland dependent. Healthy coasts "supply key habitat for over 75% of our nation's commercial fish catch and 80-90% of the recreational fish catch."[12] Healthy rivers are equally important to these fisheries and the economic benefits they provide. Commercial fishing in the Apalachicola River and Bay (which relies on river flows to remain healthy) contributes $200 million annually to the regional economy and directly supports up to 85 percent of the local population.

Projects that restore natural systems also create jobs. Restore America's Estuaries reports that coastal restoration "can create more than 30 jobs for each million dollars invested" which is "more than twice as many jobs as the oil and gas and road construction industries combined."[13]

In Louisiana, a proposed $72 million project to restore a 30,000-acre expanse of degraded marsh near downtown New Orleans known as the Central Wetlands Unit would create 689 jobs (280 direct jobs and 400 indirect and induced jobs) over the project's life.[14] Implementation of the entire $25 billion dollars of restoration in Louisiana's Master Plan over the next fifty years would multiply those jobs hundreds of times over. In Florida, restoration of the Everglades will produce more than 442,000 jobs over the next 50 years and almost 23,000 short- to mid-term jobs for the actual restoration work. Restoring the Everglades is also predicted to produce a return of four dollars for each dollar invested.[15]

Coastal restoration projects carried out under the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program and Coastal Program in FY2011 returned $1.90 in economic activity for every dollar

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[10] Environmental Protection Agency, Economic Benefits of Wetlands, EPA843-F-06-004 (May, 2006) (factsheet).
[11] U.S. Fish and Wildlife Service, *2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: National Overview*, Issued August 2017. This study is the source for all quotes and data in this paragraph.
[12] Restore America's Estuaries, *Jobs & Dollars BIG RETURNS from coastal habitat restoration* (September 14, 2011) (http://www.estuaries.org/images/81103-RAE_17_FINAL_web.pdf).
[13] *Id*.
[14] Environmental Defense Fund, Profiles in Restoration: The Central Wetlands Unit, Part VI (May 3, 2010) (http://blogs.edf.org/restorationandresilience/category/central-wetlands-unit/).
[15] Everglades Foundation, Everglades Restoration a 4-to1-Investment (http://everglades.3cdn.net/79a5b78182741ae87f_wvm6b3vhn.pdf).

spent on restoration. In California, the rate of return was $2.10 for every dollar spent.[16] The Department of the Interior's FY2010 investment of $156 million for ecosystem restoration activities in the Chesapeake Bay, Great Lakes, and Everglades supported more than 3,200 jobs and contributed more than $427 million in economic outputs.[17] The Department of the Interior supported 12 to 30 jobs for every million dollars spent on restoration in FY2018.[18]

In Oregon, a $411 million investment in restoration from 2001 to 2010 generated an estimated $752 to $977 million in economic output. The 6,740 restorations projects completed during that time supported an estimated 4,600 to 6,500 jobs, including jobs in construction, engineering, wildlife biology, and in supporting local businesses such as plant nurseries and heavy equipment companies. On average, $0.80 of every $1 spent on a restoration project in Oregon stays in the county where the project is located and $0.90 stays in the state.[19]

### 2. Congress Should Mainstream Use of Natural Infrastructure to Reduce Flood Damages

America faces significant water resource challenges, driven in part by more intense coastal storms, more frequent and severe flooding, unprecedented droughts, and the unintended consequences from many already-constructed water resources projects. Natural infrastructure is a critical—but underused—tool for solving many of these challenges, while also increasing resilience by protecting and improving the health of the nation's rivers, floodplains, wetlands, and shorelines.

Natural infrastructure, both alone and in conjunction with structural projects, provides important protections from storms and floods. Natural infrastructure avoids the risks of catastrophic failure and overtopping of levees, a risk that has caused the Association of State Floodplain Managers to urge communities to use nonstructural measures whenever possible instead of constructing new levees, which should be limited to the option "of last resort."[20] Natural infrastructure can also provide important buffers that increase the effectiveness and resilience of structural measures.

Many approaches to water resources planning can restore and protect vital natural infrastructure. These include re-establishing the natural form, function, hydrology, and inundation of rivers, floodplains, and wetlands by removing or modifying levees (including moving levees further away from the river, *i.e.*, levee setbacks), dams, river training structures, cut offs, and culverts. Other approaches include purchasing flood or flowage easements; relocating flood-prone properties; using wetland buffers to protect levees; placing protections on wetlands and floodplains; utilizing water conservation and efficiency measures; establishing a navigation scheduling process; and improving management of existing water resources projects.

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[16] U.S. Fish and Wildlife Service, *Restoration Returns—The Contribution of Partners for Fish and Wildlife Program (PFW) and Coastal Program Restoration Projects to Local US Economies*, February 2014 (http://www.sfbayjv.org/resourcedocs/usfws-restoration-returns.pdf).

[17] The Department of the Interior's Economic Contributions (Department of the Interior, 2011) at 5, 106 (http://www.doi.gov/news/pressreleases/upload/DOI-Econ-Report-6-21-2011.pdf).

[18] U.S. Department of the Interior Economic Report FY2018 (Department of the Interior, 2019) at 4 (https://doi.sciencebase.gov/doidv/files/2018/pdf/FY%202018%20Econ%20Report.pdf).

[19] Whole Watershed Restoration Initiative, Oregon's Restoration Economy, Investing in natural assets for the benefit of communities and salmon (2012)( http://www.ecotrust.org/wwri/downloads/WWRI_OR_brochure.pdf).

[20] Association of State Floodplain Managers White Paper, National Flood Policy Challenges, Levees: The Double-edged Sword, Adopted February 13, 2007.

Living shorelines are an important example of natural infrastructure. Living shorelines are constructed with natural materials including vegetation, fiber logs, and marsh sills to protect coasts from erosion.[21] Living shorelines enhance coastal habitats, including by creating nursery grounds for fish and shellfish, providing feeding grounds for shorebirds and wading birds, and helping reduce water pollution. Living shorelines can be more effective at preventing erosion than structural projects and are highly resilient to storms, as demonstrated by a substantial body of scientific literature. A survey of the North Carolina coast after Hurricane Irene showed no visible damage in living shoreline projects, while 76 percent of bulkheads suffered damage.[22]

There is ample evidence that natural infrastructure solutions can provide highly effective flood and storm damage reduction for communities. For example:

- In the **Gulf Coast regions of Texas, Louisiana, Mississippi, and Florida**, nature-based solutions to reduce coastal flood risks are significantly more cost effective than structural solutions. A 2018 study shows that in this region, the average benefit-cost ratio for nature-based solutions is 3.5 compared to 0.26 for levees/dikes and 0.73 for home elevations. Restoring wetlands could prevent $18.2 billion of losses while costing just $2 billion to carry out. Restoring oyster reefs could prevent $9.7 billion in losses while costing just $1.3 billion. Restoring barrier islands could prevent $5.9 billion in losses while costing just $1.2 billion.[23]

- In southern **California**, the Surfers' Point Managed Shoreline Retreat Project is restoring 1,800 feet of shoreline with cobble beach and vegetated sand dunes east of the mouth of the Ventura River to "provide resilience and offset risk from sea level rise and storms for 50 years" while maintaining beach access and other coastal resources. Since the project began, Surfers' Point has become Ventura County's most visited beach. Even with only one of two phases completed, the restored beach and dunes withstood 2015-2016 winter high wave conditions without damage, while other locations such as the Ventura Pier and promenade were damaged and the Pierpont neighborhood east of the project site was inundated.[24]

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[21] While living shorelines may not be appropriate everywhere, they are a demonstrably viable, often more effective, and environmentally-preferable alternative to traditional structural projects like bulkheads.

[22] S. Sharma et al., *A Hybrid Shoreline Stabilization Technique: Impact of Modified Intertidal Reefs on Marsh Expansion and Nekton Habitat in Northern Gulf of Mexico,* 90 Ecological Engineering, 339-50 (2016); Amanda S. Lawless et al., *Effects of shoreline stabilization and environmental variables on benthic infaunal communities in the Lynnhaven River System of Chesapeake Bay*, 457 J. of Experimental Marine Biology & Ecology, 41-50 (2014); J. E. Manis et al., *Wave Attenuation Experiments Over Living Shorelines Over Time: A Wave Tank Study to Assess Recreational Boating Pressures,* 19 J. of Coastal Conservation, 1-11 (2015); S. Crooks & R. K. Turner, *Integrated coastal management: sustaining estuarine natural resources*, in 29 Advances in Ecological Res., 241–289 (Nedwell, and Raffaelli., eds. 1999); Rachel K. Gittman et al., *Marshes with and without Sills Protect Estuarine Shorelines from Erosion Better than Bulkheads During a Category 1 Hurricane*, 102 Ocean & Coastal Mgmt., 94-102 (2014).

[23] Borja G. Reguero et al., "Comparing the Cost Effectiveness of Nature-Based and Coastal Adaptation: A Case Study from the Gulf Coast of the United States," PLoS ONE 13, no. 4 (April 11, 2018), https://doi.org/10.1371/journal.pone.0192132.

[24] Jean Judge et al., "Surfers' Point Managed Shoreline Retreat Project," in *Case Studies of Natural Shoreline Infrastructure in Coastal California: A Component of Identification of Natural Infrastructure Options for Adapting to Sea Level Rise (California's Fourth Climate Change Assessment).* (The Nature Conservancy, 2017), 9-15, https://scc.ca.gov/files/2017/11/tnc_Natural-Shoreline-Case-Study_hi.pdf.

- In northern **California**, the Napa Valley Flood Control Project is using a community-developed "living river" plan to reduce flood damages along the flood-prone Napa River. This plan replaces the Corps' originally-proposed floodwalls and levees with terraced marshes, wider wetland barriers, and restored riparian zones. The Project will restore more than 650 acres of high-value tidal wetlands of the San Francisco Bay Estuary while protecting 2,700 homes, 350 businesses, and over 50 public properties from 100-year flood levels, saving $26 million annually in flood damage costs.[25] Though only partially complete, the project was credited for lowering flood levels by about 2 to 3 feet during the 2006 New Year's Day flood.

- In **Florida**, the Corps is using wetland restoration in the Upper St. John's River floodplain to provide important flood damage reduction benefits. The backbone of this project is restoration of 200,000 acres of floodplain which will hold more than 500,000 acre-feet of water—enough to cover 86 square miles with 10 feet of water—and will accommodate surface water runoff from a more than 2,000 square mile area. The Corps predicts that this $200 million project will reduce flood damages by $215 million during a 100-year flood event, and provide average annual benefits of $14 million. This project was authorized by Congress in 1986 to reduce flood damages along the river.

- In **Illinois**, a 2014 study conducted for the Chicago Wilderness Green Infrastructure Vision, found that natural systems are the least costly and most efficient way to control flooding. Wetlands in the seven-county Chicago metropolitan area provide an average $22,000 of benefits per acre each year in water flow regulation. This study also found that watersheds with 30 percent wetland or lake areas saw flood peaks that were 60 to 80 percent lower than watersheds without such coverage, and that preventing building in floodplain areas could save an average of $900 per acre per year in flood damages.[26]

- In **Iowa**, the purchase of 12,000 acres in easements along the 45-mile Iowa River corridor saved local communities an estimated $7.6 million in flood damages as of 2009. The easement purchase effort began after the historic 1993 floods when river communities in east-central Iowa recognized the need for a more effective approach to reducing flood damages.

- In **Massachusetts**, a 1972 Corps study showed that upstream wetlands were playing a critical role in reducing flooding in the middle and upper reaches of the Charles River by storing millions of gallons of water and preventing $17 million each year in flood damages. This led the Corps to preserve 8,000 floodplain acres to ensure future flood storage, at a cost of just one-tenth of the structural project it had previously planned to build. This approach was sanctioned by Congress in 1974 when it authorized the Charles River Natural Valley Storage Area. These floodplain wetlands are credited with reducing major floods, including in 1979, 1982, and 2006. The Corps

[25] Napa County California website at https://www.countyofnapa.org/1096/Creating-Flood-Protection.
[26] Will Allen, Ted Weber, and Jazmin Varela, *Green Infrastructure Vision: Version 2.3: Ecosystem Service Valuation.* (The Conservation Fund: 2014), 13-15, https://datahub.cmap.illinois.gov/dataset/c303fd2e-beaf-4a75-a9ec-b27c6da49b69/resource/028c9b69-bb19-425e-bb92-3d33656bea4c/download/tcfcmapgiv23ecosystemservicesfinalreport201412v2.pdf.

estimates that this project has prevented $11.9 million in flood damages while providing recreational benefits valued at between $3.2 and $4.6 million.[27]

- In **New York**, restoration of wetlands and lands adjacent to 19 stream corridors in Staten Island "successfully removed the scourge of regular flooding from southeastern Staten Island, while saving the City $300 million in costs of constructing storm water sewers."[28] Some 400 acres of freshwater wetland and riparian stream habitat has been restored along 11 miles of stream corridors that collectively drain about one third of Staten Island's land area. A 2018 study commissioned by the City of New York found that using "hybrid infrastructure" that combines nature, nature-based, and gray infrastructure together could save Howard Beach, Queens $225 million in damages in a 100-year storm while also generating important ecosystem services.[29]

- In **Oregon**, the Portland Bureau of Environmental Services restored 63 acres of wetland and floodplain habitat, restored 15 miles of Johnson Creek, and move structures out of high risk areas to reduce flood damages in the Johnson Creek neighborhood. In January 2012, when heavy rainfall caused Johnson Creek to rise two feet above its historic flood stage, the restored site held the floodwaters, keeping nearby homes dry and local businesses open. An ecosystem services valuation of the restored area found that the project would provide $30 million in benefits (in 2004 dollars) over 100 years through avoided property and utility damages, avoided traffic delays, improved water and air quality, increased recreational opportunities, and healthy fish and wildlife habitat.[30]

- In **Texas**, restoration of a 178-acre urban wetland—formerly an abandoned golf course—acted as a sponge to store 100 million gallons of water during Hurricane Harvey, protecting 150 homes in Houston's Clear Lake community from serious flooding. This project will store up to a half billion gallons of water and protect up to 3,000 homes when it is completed in 2021.[31]

- In **Vermont**, a vast network of floodplains and wetlands, including those protected by 23 conservation easements protecting 2,148 acres of wetland along Otter Creek, saved Middlebury $1.8 million in flood damages during Tropical Storm Irene, and between $126,000 and $450,000 during each of 10 other flood events. Just 30 miles upstream, in an area without such floodplain and wetland protections, Tropical Storm Irene caused extensive flooding to the city of Rutland.

While sometimes necessary and appropriate, large scale structural projects, on the other hand, typically cause significant harm to the environment and can have negative secondary effects. For example, such projects often increase flooding downstream, induce development in high risk areas, and come with the very real risk of catastrophic failure and overtopping endangering surrounding communities.

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[27] American Rivers, Unnatural Disasters, Natural Solutions: Lessons From The Flooding Of New Orleans (2006) (Charles River Valley Natural Storage Area case study); and https://www.arcgis.com/apps/MapJournal/index.html?appid=0bf97d033a8642b18c2e8075d4b5ecfe.

[28] Cooper Union, Institute for Sustainable Design, *The Staten Island Bluebelt: A Study In Sustainable Water Management* (http://cooper.edu/isd/news/waterwatch/statenisland). These effort was started in 1990.

[29] The Nature Conservancy, *Urban Coastal Resilience: Valuing Nature's Role*. (2015), https://www.nature.org/content/dam/tnc/nature/en/documents/urban-coastal-resilience.pdf.

[30] "Johnson Creek Restoration, Portland, Oregon," Naturally Resilient Communities, accessed November 12, 2019, http://nrcsolutions.org/johnson-creek-restoration-portland-oregon/.

[31] Exploration Green, 2018, https://www.explorationgreen.org/.

The National Wildlife Federation appreciates the WRDA 2018 provision that directs the Corps to consider the use of natural infrastructures, alone or in combination with structural measures, whenever those solutions "are practicable."[32] Despite this, the Corps continues to fail to adequately consider natural infrastructure solutions where they are practicable for storm and flood damage reduction.[33]

As a result, it is clear that Congress will need to take additional steps to ensure that the Corps mainstreams the use of natural infrastructure solutions. One approach is to create natural infrastructure incentives for non-federal sponsors by: (1) clarifying that natural infrastructure solutions are subject to the decade-old limitation on the total non-federal cost share for non-structural measures, which eliminates the potential for excessive land-related cost burdens on non-federal sponsors; and (2) facilitating full consideration of cost-effective flood and storm damage reduction solutions for at-risk communities by adopting targeted criteria for waiving the non-federal cost share for feasibility studies while also requiring that those studies fully evaluate natural infrastructure solutions that can provide sustainable and less expensive protections.

### 3. Congress Should Ensure Continued Progress on Ecosystem Restoration Projects

The National Wildlife Federation greatly appreciates the committee's role in overseeing the Corps' implementation of important projects designed to restore the nation's waters. We urge Congress to ensure that the Corps continues to advance important ecosystem restoration projects, including those designed to restore coastal Louisiana and America's Everglades.

#### Restoring Coastal Louisiana

As a partner in the Restore the Mississippi River Delta Coalition, the National Wildlife Federation has worked for years to restore critical habitat in coastal Louisiana. The Louisiana Coast is in the midst of a land loss crisis with dramatic implications for our national economy and world class natural resources. Since the 1930s, the state has lost about 1,900 square miles of land to the Gulf. Recent catastrophes, such as Hurricanes Katrina and Rita, and the Deepwater Horizon oil disaster, exacerbated the coastal crisis. Without action, Louisiana is projected to lose up to another 4,000 square miles within the next 50 years.

In Title VII of the Water Resources Development Act of 2007, Congress authorized the Louisiana Coastal Area program, consisting of high priority projects for slowing the current trend of coast-wide wetland loss and resource degradation. Despite the fact that these projects were found to be in the federal interest, very little federal money has been appropriated to the Louisiana Coastal Area program since its authorization. Instead, several of the projects it contains, though renamed, have been advanced by the state with oil spill settlement dollars.

Title VII of WRDA 2007 also tasked the Corps with developing, in concert with the state of Louisiana, a comprehensive coastal management plan "for protecting, preserving, and restoring the coastal Louisiana ecosystem." To date, the Corps has not engaged in such a process. In the meantime the state of Louisiana has produced two successive Coastal Master Plans, in 2012 and 2017, based upon a widely

[32] America's Water Infrastructure Act of 2018, Pub. Law 115-270, § 1149(c).
[33] The Corps' implementing guidance states that this WRDA 2018 provision requires no changes at all in the way the Corps plans projects. U.S. Army Corps of Engineers, Implementation Guidance for Section 1149 of the WRDA of 2018 (April 12, 2019).

lauded scientific and stakeholder engagement processes, which propose fundamental changes to the management of the lower Mississippi River. Among these are diversions of river water into the collapsing Mississippi River delta at Ama on the west bank of the river, and Union on the east bank.

Louisiana's 2017 *Comprehensive Master Plan for a Sustainable Coast (CMP)*, based upon a science-based selection process, propose diversion projects upriver from New Orleans at Ama and Union that could fulfill the goals of the CMP and reduce the flood threat downriver. Ama would divert water that would otherwise need to be carried by the Bonnet Carre Spillway, away from the Lake Pontchartrain basin in Louisiana and Mississippi Sound in Mississippi and Alabama. The Union Diversion would divert water into the Pontchartrain Basin upriver from Bonnet Carre, allowing it to pass through the swamps surrounding lakes Maurepas and Pontchartrain, where wetlands would reduce the amount of excess nutrients reaching Mississippi Sound and Lake Pontchartrain, reducing harmful algal blooms.

The state of Louisiana submitted proposed Ama and Union Diversion feasibility studies for inclusion in the Section 7001 report that Congress will soon receive. The National Wildlife Federation urges Congress to authorize these proposed studies, and to examine outcomes from other ongoing studies to improve overall flood control, navigation, and ecosystem restoration of the lower Mississippi River. We also encourage an increased federal investment in and commitment to the goals of the Louisiana Coastal Area program, as we work to restore a coastal ecosystem that is facing some of the highest rates of sea level rise and subsidence in the world.

### Restoring America's Everglades

The National Wildlife Federation appreciates the committee's continued support for efforts to restore America's Everglades. The "River of Grass" is an ecological treasure, supporting a vast array of threatened and endangered plants and wildlife. It provides the drinking water for 8 million people and is a vital source of Florida's commercial and recreational fishing, outdoor recreation, and tourism. Located along the southern tip of Florida, the Everglades' network of mangroves and wetlands, along with the surrounding coral reefs and seagrasses, function as the first line of defense against hurricanes, storms, and flooding, reducing storm surges and absorbing floodwaters.

The best tool we have to make Florida more resilient is Everglades restoration. Centuries of draining Florida's wetlands and altering the flow of water have limited water management flexibility in parts of South Florida, causing recurring sea grass die-offs and toxic algae outbreaks that wreak havoc on Florida's economy and wildlife. Key Everglades restoration projects aim to help capture and clean water from Lake Okeechobee and send it south to the Everglades and Florida Bay, where it is desperately needed. This will reduce the volume and frequency of damaging discharges and toxic algae outbreaks in Florida's delicate coastal estuaries.

The Comprehensive Everglades Restoration Plan, authorized in WRDA 2000, laid out a roadmap to restore America's Everglades, with both the federal government and the state responsible for 50 percent of project costs. In recent years, the state of Florida has funded Everglades restoration at more than $200 million a year, while federal appropriations have significantly lagged behind. In order to maximize the benefits of, and advance the progress made towards, restoring America's Everglades, the federal government must invest at least $200 million in Army Corps Everglades restoration efforts each year. In addition to robust, consistent funding for Everglades restoration to proceed, it will be important that component projects with the Comprehensive Everglades Restoration Plan are not prevented from advancing due to any new construction starts limitations.

### Brandon Road Lock and Dam Project

The National Wildlife Federation has worked for many years on protecting the Great Lakes and all of our nation's waters from the ongoing threat and harm of aquatic invasive species, specifically the invasive Asian carp. Asian carp have devastated iconic fisheries throughout the country and now threaten the Great Lakes and their connected inland lakes and rivers, too. Asian carp are not just a Great Lakes problem, or a Mississippi River problem, or a Kentucky Lake problem. They are an American problem, and it will take a united national effort to stop them.

Specifically in the Great Lakes, invasive Asian carp will undermine fisheries throughout the Great Lakes region – as filter feeders with no native predators, they reproduce rapidly and consume the base of the food chain, starving out forage, native and sport fish. Silver carp are a safety threat to boaters and anglers, leaping out of the water when disturbed by boat motors, and even paddles, threatening tourism-reliant communities.

The Corps submitted a Chief's Report for the Brandon Road Lock and Dam project in the summer of 2019. This Lock is about 50 miles south of Chicago and represents our best opportunity to provide a long-term structural deterrent to Asian carp. The Brandon Road plan would install a gauntlet of smart technologies to stop invasive Asian carp while allowing commercial navigation to continue. All the Great Lakes governors and the Ontario and Quebec premiers have signed on to a resolution supporting the plan. In addition, over 200 hunting, fishing, outdoor recreation industry and conservation organizations support the Brandon Road plan. This project is essential to help protect the fishery, the economy and quality of life in the Great Lakes region.

## 4. Congress Should Ensure that the Corps Effectively Analyzes and Mitigates for the Adverse Impacts of Corps Projects on Fish and Wildlife

For decades, Congress has required mitigation for adverse impacts to fish and wildlife caused by Corps water resources projects. Congress established detailed planning requirements to ensure effective mitigation in WRDA 2007, where it also clearly stated that the mitigation requirements must be met whenever the Corps selects a project alternative in "any report."[34] The Act's legislative history reiterates that the "increased mitigation requirements apply to all new studies and any other project that must be reevaluated for any reason."[35] Rather than follow these clear directives, the Corps has explicitly limited its compliance with the WRDA 2007 mitigation requirements to reports submitted to Congress for authorization.[36]

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[34] 33 U.S.C. § 2283(d)(1)("the Secretary shall not submit any proposal for the authorization of any water resources project to Congress in any report, **and shall not select a project alternative in any report**, unless such report contains" the detailed mitigation plan required by WRDA 2007) (emphasis added).

[35] Congressional Record Senate, S11981 September 24, 2007 (Consideration of Water Resources Development Act of 2007—Conference Report, Senator Barbara Boxer Environment and Public Works Committee Chair).

[36] U.S. Army Corps of Engineers, Implementation Guidance for Section 2036 (a) of the Water Resources Development Act of 2007 (WRDA 07) - Mitigation for Fish and Wildlife and Wetlands Losses (August 31, 2009). The Corps' interpretation violates the most fundamental principles of statutory construction by: (1) ignoring an entirely independent clause in the statute ("and shall not select a project alternative in any report"); and (2) failing to give meaning to the adjective "any" that qualifies the term "report" in that independent clause. See, e.g., *TRW Inc. v. Andrews*, 534 U.S. 19, 31 (2001); *U. S. v. Nordic Village*, 503 U.S. 30, 36 (1992); *Perrin v. United States*, 444 U.S. 37, 42 (1979); *United States v. Manasche*, 348 U.S. 528, 538-539 (1955).

To assist the Corps in properly evaluating fish and wildlife impacts and needed mitigation, the Corps is also required to consult with the U.S. Fish and Wildlife Service on fish and wildlife impacts from individual Corps projects and on opportunities for mitigating any such impacts. State fish and wildlife agencies are also encouraged to consult with the Corps on project-specific impacts and mitigation opportunities. The Corps is required to give "full consideration" to these expert recommendations.

Regrettably, the Corps often fails to adhere to these important requirements, leading to projects and long-term project operations that cause profound harm to the nation's fish and wildlife. For example, both of these requirements were ignored during the Corps' recent update to the Apalachicola-Chattahoochee-Flint (ACF) water control manual with devastating consequences.

For decades the Corps' operation of the ACF system has starved Florida's vitally important Apalachicola River and Bay of essential freshwater flows. The impacts have been so devastating that the state of Florida advised Congress that "the ecosystem and, indeed, the very way of life for generations of Floridians will be devastated" if flow patterns that mimic the historic flow regime are not restored for the Apalachicola River.[37] However, instead of improving conditions in the Apalachicola River and Bay, the Corps' new water control manual will make the already dire conditions even worse by holding significantly more water back for upstream water supply, initiating drought restrictions earlier and more frequently, and severely restricting flows to the Apalachicola River more often and for longer periods of time.[38]

Many of the problems with the new ACF water control manual could have been avoided had the Corps addressed the important recommendations made by the U.S. Fish and Wildlife Service in the project's Final Fish and Wildlife Coordination Act Report. These recommendations included utilizing a different approach for analyzing impacts and for developing alternatives that would reduce the adverse environmental and wildlife impacts *without* jeopardizing other authorized purposes.

In this update, the Corps also refused to adopt a mitigation plan for "substantially adverse" damage to fish and aquatic resources in the Chattahoochee River. The Corps argued that it is not required to mitigate for this significant harm because the new water control manual does not have to be submitted to Congress for approval.

To address these problems, Congress should: (1) clarify the types of project studies that trigger the civil works mitigation requirements to ensure application of these requirements as Congress unquestionably intended; and (2) direct the Corps to evaluate and develop mitigation for fish and wildlife resources in a manner that is consistent with recommendations developed by federal and state fish and wildlife experts pursuant to the Fish and Wildlife Coordination Act that derive from the special expertise of these experts (*e.g.*, methods and metrics for evaluating fish and wildlife impacts and needed mitigation).

[37] Testimony of Jonathan P. Steverson, Executive Director of the Northwest Florida Water Management District, "Effects of Water Flows on Apalachicola Bay: Short and Long Term Perspectives", United States Senate Committee on Commerce, Science and Transportation Field Hearing, August 13, 2013 at 4.

[38] The excessive damage that would be caused by the new water control manual has forced the state of Alabama and conservation organizations, including the National Wildlife Federation, to challenge the manual in court.

### 5. Congress Should Modernize the Corps' Benefit-Cost Analysis Process to Better Account for Project Costs and Benefits, Including by Accounting for Ecosystem Services

The Corps' benefit-cost analysis process is biased towards the approval of costly, large-scale structural projects even when less costly, natural infrastructure or nature-based solutions are available. This bias can lead to the construction of projects that significantly and unnecessarily undermine resilience.

Among many other problems, Corps cost analyses do not account for costs associated with detailed technical design specifications; full life-cycle costs; or costs associated with delays due to lack of funding and/or sub-optimal funding streams. As a result, Corps cost estimates can dramatically understate the actual costs to both taxpayers and non-federal sponsors to construct a project. Importantly, Corps cost analyses also fail to account for the costs of lost ecosystem services.

| Examples of Projects With Grossly Inaccurate Original Cost Estimates | | | |
|---|---|---|---|
| **Project** | **Original Estimate (millions)** | **2010 Estimate (millions)** | **Percentage Increase** |
| Louisiana Hurricane Protection | $85 | $738 | **768%** |
| Sacramento Flood Protection | $57 | $270 to $370 | **374% to 549%** |
| Rio de Flag River | $24 | $85 | **254%** |
| Monongahela Locks & Dam | $556 | $1,700 | **206%** |
| Olmstead Lock & Dam | $775 | $2,124 | **174%** |
| Folsom Dam Flood Gates | $215 | $450 to $650 | **109% to 202%** |
| McAlpine Locks & Dam | $220 | $427 | **94%** |
| Marmet Lock | $223 | $406 | **82%** |
| South Florida Ecosystem Restoration | $1,540 | $1,970 | **28%** |
| Oregon Inlet Jetty (annual costs) | $4.5 | $5.5 | **22%** |

A 2013 GAO report found that at least two-thirds of the 87 Corps flood control projects budgeted for construction between FY2004 and FY2012 experienced cost increases. One project cost $10 million more than the authorized estimate because the construction site could not be accessed without carrying out major rehabilitation of a tunnel access point. The cost of a pumping plant required by a second project increased from the original estimate of $800,000 to $10.7 million due to design changes required to handle the actual site conditions.[39]

The Corps' benefit analyses are equally problematic. They fail to account for benefits resulting from increases in ecosystem services; often lack justifications for claimed benefits; and include benefits that would be derived from activities that are contrary to law, policy, and sound resource management. For example, Corps benefit analyses may include: (1) agriculture and development benefits created by draining wetlands; (2) development benefits resulting from new or intensified use of floodplains or wetlands, including future induced development; (3) flood damage reduction benefits from new or intensified use of lands subject to flood easements or permanent conservation easements; and (4) benefits from draining wetlands on federally owned lands.

[39] Government Accountability Office, Army Corps of Engineers, Cost Increases in Flood Control Projects and Improving Communication with Nonfederal Sponsors, GAO-14-35 (December 2013) at 11, 14, 15.

Corps benefit-cost analyses are also plagued by invalid assumptions, inaccurate data, and basic math errors. The Government Accountability Office (GAO) found that a number of major Corps studies "understated costs and overstated benefits, and therefore did not provide a reasonable basis for decision-making" because they "were fraught with errors, mistakes, and miscalculations, and used invalid assumptions and outdated data."[40] GAO also found that these problems were pervasive at the Corps, concluding that "the Corps' track record for providing reliable information that can be used by decision makers … is spotty, at best."[41] In one case, the Department of the Army Inspector General found that the Corps had deliberately and intentionally manipulated data to achieve a positive benefit-cost ratio that would support large scale construction of longer locks on the Upper Mississippi River.[42]

The many problems with Corps benefit-cost analyses may result in the approval of projects whose actual costs and benefits bear little to no relation to the benefit-cost ratio used to obtain congressional approval. To help the Corps accurately account for project costs and benefits, Congress should modernize the criteria used to assess costs and benefits—and level the playing field for natural infrastructure—including by requiring the Corps to account for increased ecosystem services as a project benefit and lost ecosystem services as a project cost.

### 6. Congress Should Increase the Corps' Capacity to Improve the Resilience of Water Resources Infrastructure, Including By Taking Full Advantage of Existing Authorities

Many existing programs and projects can be modernized to increase resilience while still satisfying authorized project purposes. Changes can be initiated through supplemental environmental impact statements, general or limited reevaluation studies, or through congressional adoption of a "study resolution" that allows the Corps to examine a particular water resources problem in a specific area that has already been investigated.

Water control manuals, operating plans, and operations and maintenance activities can readily be reevaluated through the National Environmental Policy Act (NEPA) review process—and many of these activities likely require a supplemental review as a matter of law. At a minimum, these types of studies should be used to ensure that Corps projects do not inadvertently increase flood risks, divert flood waters onto other communities, or create ecosystem-wide harm to vital natural systems.

For example, the NEPA process should be used to evaluate alternatives to the Corps' use of river training structures to reduce dredging costs in the middle Mississippi River to reduce this project's inadvertent impacts. The Corps' extensive use of river training structures to maintain navigation in the middle Mississippi has increased flood heights by *6 to 15 feet* in this portion of the river and destroyed vital fish and wildlife habitat.[43] Importantly, navigation can be readily maintained even if many of these structures would modified or removed to reduce flood risks.

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[40] Government Accountability Office (GAO-06-529T), Corps of Engineers, Observations on Planning and Project Management Processes for the Civil Works Program, March 2006.

[41] *Id*.

[42] U.S. Department of the Army Inspector General, *Report of Investigation*, Case 00-019, 2000, at 6.

[43] The middle Mississippi River is the 195-mile segment between the confluence of the Missouri River (located north of St. Louis, MO) and the confluence of the Ohio River (located near Cairo, IL). The middle Mississippi is the first section of free-flowing River below the River's lock and dam navigation system. The middle Mississippi, like the rest of the River, has been severely degraded by the Corps' approach to maintaining navigation on the river.

Updating out-of-date water control manuals can improve the health of the environment and reduce flood risks. Many water control manuals have not been updated in decades and as a result, they cannot account for current needs or environmental conditions, including changes in rainfall, flood levels, snowmelt patterns, and land use patterns. Outdated plans also fail to use modern scientific tools or state-of-the-art management approaches that can both ensure effective operation of federal projects *and* protect the environment. The impacts can be devastating.

Outdated operating procedures and flawed planning aggravated already horrific flooding in Houston during Hurricane Harvey. During Harvey, the Corps of Engineers released at least 13,000 cubic feet of water per second from the Addicks and Barker reservoirs to reduce the risks of overtopping and to protect homes upstream.[44] But those same releases caused extensive flooding downstream in Buffalo Bayou, flooding some 4,000 homes that would otherwise have remained dry despite Harvey's onslaught.[45] More than 5,000 of the 14,000 homes located inside the reservoirs also flooded. The in-reservoir homes were built on some 8,000 acres of land that the Corps opted not to buy when the reservoirs were constructed in the 1940s, even though the Corps knew the land would flood during large flood events. At least 4,000 homes were built inside the reservoirs since Tropical Storm Allison devastated large areas of Houston in 2001.[46]

Updating the management plans for these reservoirs and quickly completing critical structural upgrades would help protect Houstonians during future flood events.[47] These reservoirs have been classified as two of the six most dangerous flood control dams in the United States for many years. Storage capacity could be restored by removing silt and sediment that have accumulated over the last 60-plus years of operation, and public safety would be improved by upgrading gages and other tools that track the quantity of water released from the reservoirs and by ensuring that the public is fully aware of the potential for flood risks from both typical and emergency reservoir operations.

The importance of improving reservoir management and safety is not limited to Houston. The Corps operates 707 dams that it owns across the country, operates 75 hydropower facilities, and manages flood control operations at 134 dams constructed or operated by other federal, nonfederal, or private agencies. Many of these dams have operating plans that date back 50 years, including many of central California's 35 federal flood control dams where outdated plans are damaging rivers and wildlife and threatening community safety.

Updating operations and maintenance plans can also produce significant improvements to river health and resilience. For example, the vast majority of operations and maintenance plans for the Mississippi River navigation system are more than 40 years old.[48] As a result, the Corps continues to carry out the

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[44] Preliminary U.S. Geological Survey data suggests that the actual releases were much higher than what was supposed to be a maximum release of 13,000 cubic feet per second because the gages measuring the releases were not working properly (https://af.reuters.com/article/africaTech/idAFL2N1LQ0IL).

[45] KHOU.com, Houston Texas, *Buffalo Bayou to remain at record level; Barker, Addicks reservoirs have peaked* (September 1, 2017) (http://www.khou.com/weather/hurricanes/hurricane-harvey/controlled-release-of-barker-addicks-reservoirs-to-impact-thousands/468348109).

[46] Al Shaw, Lisa Song, Kiah Collier, Neena Satija, *How Harvey Hurt Houston, in 10 Maps,* ProPublica (January 3, 2018) (https://projects.propublica.org/graphics/harvey-maps).

[47] A 2009 master plan limits releases from the reservoirs to 2,000 cubic feet per second. http://www.swg.usace.army.mil/Portals/26/docs/2009%20Addicks%20and%20Barker%20MP.pdf at 8.

[48] As a result of extensive pressure, the Corps recently reassessed some, but not all, of its management activities for a segment of that system known as the Middle Mississippi River.

same operation and maintenance activities that have devastated the ecological health of the Mississippi River and the species that rely on it. These outdated operations and maintenance activities are destroying critical backwater, side channel, wetlands, and instream habitats; altering water depth; destroying bathymetric diversity; causing nonnative species to proliferate; and severely impacting native species.[49] Modern approaches exist for operating this system that would both maintain a vibrant navigation system and improve the health of the river.

Where multiple studies are authorized or required for a river or coastal system, those studies could be used to inform a comprehensive review of potential improvements to the system. For example, multiple planning process are underway, should be initiated through new environmental reviews, or are authorized for the Mississippi River, including:

(a) Studies examining whether and how the Corps should dispose (i.e., transfer ownership to a non-federal interest/recommend removal) of the Upper St. Anthony Falls, Lower St. Anthony Falls and Lock and Dam 1—these studies are underway.

(b) Updates to the water control manuals, and required environmental impact statements, for the Upper Mississippi River lock and dam system—these studies should be initiated through a new environmental review with a goal of establishing a more natural hydrologic regime for the River that includes regular periods of lower flows to allow regeneration of wetlands and wildlife habitat.

(c) A new update to the Corps' navigation maintenance actions for the middle Mississippi River between St. Louis, MO and Cairo, IL—this study should be initiated through a new environmental review with a goal of significantly reducing flood height increases caused by excessive construction of river training structures designed to reduce navigation dredging costs.

(d) An assessment of alternative management regimes for the Old River Control Structure, which controls the amount of water diverted from the Mississippi River to the Atchafalaya Basin—this study was authorized in WRDA 2018.

(e) A study examining whether to increase the height of significant portions of the Mississippi Rivers & Tributaries Project mainline levee system—this study is underway.

(f) Lower Mississippi River Restoration feasibility studies that will look at restoration projects for eight separate reaches—these studies were authorized in WRDA 2018.

(g) Assessment of projects to restore Louisiana's coastal wetlands, including through Mississippi River sediment diversions—these studies are underway.

These studies could—and should—be used to inform a comprehensive plan for increasing the resilience of the Mississippi River and its extensive water resources infrastructure. This could be achieved by evaluating and adopting alternatives that protect and restore the natural functions of the Mississippi

[49] U.S. Geological Survey, Ecological Status and Trends of the Upper Mississippi River System 1998: A Report of the Long Term Resource Monitoring Program (April 1999); Johnson, B. L., and K. H. Hagerty, editors. 2008. U.S. Geological Survey, *Status and Trends of Selected Resources of the Upper Mississippi River System,* December 2008, Technical Report LTRMP 2008-T002 (Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin).

River, as required by the National Water Resources Planning Policy. This policy, which was established in WRDA 2007, requires that "all water resources projects" are to protect the environment by "protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems."[50]

Congress should increase the Corps' capacity to improve the resilience of the nation's water resources infrastructure by establishing a Directorate of Ecological Services within the Office of the Chief of Engineers tasked with ensuring that the Corps takes full advantage of existing programs, authorities, and operations to use natural systems to protect communities from floods, minimize expenditures for emergency response and rebuilding, improve wildlife habitat, and strengthen the outdoor-based economy. This Directorate should have significant budgeting authority.

## Conclusion

The National Wildlife Federation calls on the committee and Congress to enact the common sense reforms outlined in this testimony that would promote the resilience of the nation's waters and water resources infrastructure. We also respectfully ask the committee to continue to advance critical ecosystem restoration projects, defend the integrity of the nation's vitally important environmental laws, and oversee the Corps compliance with the letter and spirit of these laws when planning, constructing, and operating projects.

[50] 42 U.S.C 1962-3 (established by § 2031(a) of the Water Resources Development Act of 2007, and immediately applicable to all water resources projects).