

FLOOD CONTROL INFRASTRUCTURE: SAFETY QUESTIONS RAISED BY CURRENT EVENT

HEARING BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

MARCH 1, 2017

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ONE HUNDRED FIFTEENTH CONGRESS
FIRST SESSION

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FLOOD CONTROL INFRASTRUCTURE: SAFETY QUESTIONS RAISED BY CURRENT EVENT

WEDNESDAY, MARCH 1, 2017

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 10:34 a.m. in room 406, Dirksen Senate Office Building, Hon. John Barrasso (chairman of the committee) presiding.

Present: Senators Barrasso, Carper, Inhofe, Capito, Wicker, Fischer, Moran, Rounds, Ernst, Cardin, Whitehouse, Gillibrand, Booker, Markey, and Harris.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Good morning. I call this hearing to order.

President Trump has made improving our Nation's infrastructure a top priority, and this Committee is continuing its effort to highlight our Nation's infrastructure needs.

As I have stated, infrastructure is critical to our Nation's prosperity. In personal meetings, I have met with members of this Committee, both sides of the aisle, and I will tell you that infrastructure is always listed as a top priority. It is a priority because it is a driver of our Nation's economy and it impacts every community.

This Committee has a long history of working together in a bipartisan way on infrastructure issues. I want to continue that tradition.

The Senate Environment and Public Works Committee has sweeping jurisdiction over our Nation's infrastructure. Our last hearing focused on highways and roads, and the needs of rural water systems, all of which are within this Committee's purview. Recent natural weather events in the last month in California and in other western States are highlighting the need to focus our attention on our levees and our dams and other structures that prevent catastrophic flooding in both rural and urban communities.

Earlier this month, more than 180,000 people were evacuated in California because storms caused serious damage to the Oroville Dam, the tallest dam in the United States. The potential threat of dam failure is a serious concern, a concern to State officials and to people living downstream of Oroville. Any future severe weather event could make the situation even more critical, and it is raising questions about the readiness of our flood prevention infrastructure.

Dams and levees across the Country need to be modernized and maintained if we are to prevent future disasters. So I believe any infrastructure bill that this Committee develops should consider the need to maintain and modernize these structures.

Winter weather events aren't just affecting California, but are occurring across the West, hitting towns big and small. These events include ice jam flooding in Northern Wyoming along the Big Horn River, in the towns of Worland, Manderson, Greybull, as well as towns located to the south like Riverton, Lander, Hudson, and areas of the Wind River Reservation.

This past month the ice jam floods have damaged over 100 homes in Worland, a city of roughly 5,000 people, so these floods have serious and lasting impacts.

In the past, blocks of ice the size of cars sit for weeks on playgrounds and front lawns. The river ice damages everything from public structures like water treatment plants and public parks to private homes and small businesses. These ice jams are regular occurrences harming small towns not just in Wyoming, but in other parts and States from the Dakotas to UpState New York.

For these small towns, the cost of cleanup and repair is an enormous burden from which it takes months to fully recover. In certain instances, flooding could be mitigated by the Army Corps providing more flexibility in allowing towns to take the steps they need to protect their communities.

Our Committee has jurisdiction over the environmental laws that impact the modernization of infrastructure. Oftentimes, in rural States, Federal one-size-fits-all rules can have absurd results on the ground. If we are moving a tree or a pile of dirt which might only take days to accomplish can make a difference in preventing a catastrophic flood, a town shouldn't have to go through a lengthy bureaucratic process to remove those features while the town floods yearly.

Bureaucratic red tape should be cut where people's lives and property are on the line, which is always the case when we are talking about flooding.

Dams and levees are the most common infrastructure to address flooding. However, new technology can also help mitigate the threat of flooding, including ice jams. I include language in Title I of the Water Resources Development Act this Committee enacted last Congress creating an Army Corps Pilot Program to develop innovative and cost-saving technology to address the threat of ice jams. The program needs to be implemented.

I would also like to note that in the past two WRDA bills this Committee provided additional authority to both the Corps and to FEMA to help States, local governments, and dam owners address deficient levees and dams. It is time to implement these authorities.

I also would like to hear what else this Committee and the Army Corps can do to improve existing infrastructure, building new infrastructure, reduce red tape, and develop lifesaving technology and materials to prevent flooding.

Now, with that, I now want to turn to Ranking Member Carper for his statement.

**OPENING STATEMENT OF HON. THOMAS R. CARPER,
U.S. SENATOR FROM THE STATE OF DELAWARE**

Senator CARPER. Thanks, Mr. Chairman. Thanks very much for bringing us together.

We welcome all of you. We are glad that you are here. You could be at a lot of different places, but it is important that you be here. We look forward to your testimonies and to the opportunity to ask some questions, just to have a good conversation.

The Chairman and I talk a lot about Mike Enzi's 80/20 rule. Mike Enzi is a Senator from Wyoming and he talks about the 80/20 rule as something that he and Ted Kennedy used to lead something called HELP, the Health, Education, and Pension Committee. And I would say to him, how does one of the most liberal Democrats and one of the most conservative Republicans get so much done, provide leadership to this Committee? And Mike said, we believe in the 80/20 rule. I said, what is that? And he said, Ted and I agree on 80 percent of the stuff, we disagree on 20 percent of the stuff, and what we focus on is the 80 percent where we agree.

Senator Barrasso and I agree on a lot. We especially agree on the need to invest wisely in infrastructure. Fortunately, it is not an especially partisan issue, as we heard last night in the President's State of the Union Address, although it was preciously short on how to pay for stuff, which is always the challenge, how to pay for stuff. It is easy to figure out how to spend the money; not so easy to figure out how to pay for it.

Democratic Senators continue to press for a consensus on the issue of infrastructure. It appears to me that we are one of the few Senate committees here, EPW, really talking about working on a bill in a bipartisan comprehensive way and intent on doing that, and I applaud our Chairman for his leadership there and for Jim Inhofe's leadership before that. I believe that members on both sides of the aisle feel an urgent need to move forward on a comprehensive infrastructure package, but in a thoughtful way, rather than to kick the can down the road, something that we are pretty good at here.

As a recovering Governor, I judge any legislation that makes these kinds of investments by asking a simple question, and that question is this: How does this proposal, whatever the proposal of the day is, how does it help create a more nurturing environment for job creation and job preservation? That is what I actually ask.

In addition to answering that question, I also believe something Lincoln used to say when Lincoln was asked a long time ago what is the role of government, and he replied, famously, the role of government is to do for the people what they cannot do for themselves. Wise words.

Flood control investments are not ones that average citizens can make for themselves, as you know. Not only do the construction of dams and levees create jobs, but these investments can also support local economies, help drive commerce, and put our communities on a path to civility.

One of the things that businesses need most is predictability and certainty, and they don't need floods and the kind of havoc that can create for their community and for their businesses. So it is important that we make investments, because when dams and levees

fail, they can result in loss of life and, as we know, economic destabilization and even economic devastation.

But as we work through this hearing and other infrastructure oversight and policy decisions, I think that we will struggle with maybe two central points. One is what is the role of Federal, State, and local government in addressing these infrastructure concerns, and, also, are the three levels of government up to the challenge. Are the three levels of government up to the challenge?

Something called the McKinsey Global Institute put out a 2013 report that you may be familiar with that said that we need to invest between \$150 billion and \$180 billion a year more in infrastructure at large just to make up for years of underinvestment that is hindering our Country on a multitude of levels, from limiting economic growth to threatening our personal safety.

This comprehensive report, which I commend for your reading, looks at all components of infrastructure, but this message of drastic need is easily applicable to what we are talking about today, and that is flood control.

The same report found that one of the best ways to invest and get the most out of our dollars is to maintain existing infrastructure. That probably doesn't come as a surprise to any of you. But whether it is a bridge or a dam, our Government has a fundamental responsibility to make sure that those structures are sound and continue to serve for their intended purpose, including protecting the lives that are impacted by the bridge or a dam's very existence.

As I mentioned earlier, infrastructure investment is critical for our economy in part because of the direct jobs we create from the construction and from the restoration work, as well as the displaced workers that we can bring back into our work force. They want to work. If they can actually do this work, then let's turn them loose. But just as important are the lives and property that are protected by these projects.

I am particularly looking forward to hearing from our friends from California, the Secretary of Natural Resources, John Laird, on his experience with the Oroville Dam and about California's nationally recognized flood safety program. I think it is critically important that we learn from each other's experience and that we take that shared knowledge forward through the legislative process.

In closing, the critical infrastructure of our Country is aging and in need of significant capital investment to help our economy continue to grow. The 2013 infrastructure report card issued by the American Society of Civil Engineers gave us a D, as in dog, to roads, drinking water, wastewater infrastructure; and then waterways and levees received a D-; ports of sea, bridges about a C+.

As we hear testimony, I am particularly interested in hearing how our witnesses think about the roles of the different levels of government, where there are gaps that need to be filled, and as it relates to protecting investing in and maintaining critical infrastructure such as levees and dams.

The concept of shared responsibility has been an overarching theme in many of our conversations. I am sure we will continue that conversation today.

I also hope to hear some thoughts on the concept of natural infrastructure protection as it relates to flood safety.

Finally, while traditional forms of infrastructure like roads and ports are essential to our economy, I feel that we need more investment to protect our natural infrastructure as well, such as our shorelines and our wetland ecosystems, and thanks very much to the Army Corps for all you do in that regard. Without these protections, risks to manmade infrastructure significantly increase and in many cases become unmanageable.

Finally, I am interested in how the Federal Government can be more efficient with our current funding streams and get the most out of every dollar of Federal investment, and I want to know how we can make sure that we are prioritizing the most critical investments and ensuring that we maintain the assets we have first, before building new assets that we can't afford.

No one-size-fits-all approach to solve our problems. We have to work across the aisle. I am encouraged that under the leadership of this man here we will.

Mr. Chairman, with that, I would ask unanimous consent that the testimony of American Rivers be submitted for the record, please.

Senator BARRASSO. Without objection.

Senator CARPER. Thank you so much.

[The referenced information follows:]

Senator CARPER. Thanks very much.

[The prepared statement of Senator Carper follows:]

Testimony of American Rivers

Hearing: “*Flood Control Infrastructure: Safety Questions Raised by Current Events*”

Senate Committee on Environment and Public Works

March 1, 2017

American Rivers appreciates the opportunity to submit testimony for the hearing on, “*Flood Control Infrastructure: Safety Questions Raised by Current Events*.” The recent flooding incident at the Oroville Dam in California has shined a national spotlight on the need to improve the way we manage floodplains as well as build and maintain water infrastructure. American Rivers commends the Environment and Public Works Committee (Committee) for supporting improvements to water infrastructure and floodplain management policy and we ask the Committee to please accept our testimony to that end.

American Rivers protects wild rivers, restores damaged rivers, and conserves clean water for people and nature. Since 1973, American Rivers has protected and restored more than 150,000 miles of rivers through advocacy efforts, on-the-ground projects, and an annual America’s Most Endangered Rivers ® Campaign. Headquartered in Washington, DC, American Rivers has offices across the country and more than 250,000 members, supporters, and volunteers.

Floodplain management and the safety that it provides to downstream communities is at the core of what American Rivers advocates for. We would like the Committee to consider the following policies which will be explained in further detail hereinafter.

- Require that climate change be taken into account when managing floodplains
- Require that natural and nature-based solutions be considered and implemented where possible in any forthcoming floodplain management policy
- Require that a dam owner take responsibility to properly maintain and if necessary remove their dam to ensure the safety of those downstream
- Oppose efforts to grant FERC the authority to override decisions by state water management agencies, federal natural resource agencies, and Native American tribes in the hydropower licensing process.

Rising Frequency and Severity of Flood Events

The economic costs to the nation associated with flood related damages are undeniable, unsustainable, and must be addressed. From 1998 to 2014, \$48.6 billion in FEMA Public Assistance Grants were spent on flood-related disasters¹. According to the National Oceanographic and Atmospheric Administration, 2016 was the 2nd highest year for the number

¹ *The Need for Flood Protection Standards*, NRDC, <http://www.nrdc.org/water/fema-assistance-grants.asp> (last visited Oct. 15, 2016).

of U.S. billion dollar disasters, with 15 events resulting in 138 fatalities and \$46 billion in direct costs. Inland flooding events causing billions of dollars in damage have increased in the U.S. in recent years, with four in 2016 alone.² This trend must not continue.

Climate change is exacerbating our nation's susceptibility to disastrous flooding events. The conventional approach to disaster preparation- armoring our riverbanks and floodplains- is no longer sufficient. The storms of our past are no longer reliable indicators of the storms of our future. Extreme precipitation events are becoming more and more common which will make flooding become frequent and severe for many parts of the country.³ A study by AECOM projected that climate change impacts and land use changes would result in an increase in depth and area of the 100 year flood by an average of 45 percent across the nation by year 2100.⁴ As a nation, we must account for future climate impacts and future conditions in the way we manage our flood risk and our nation's rivers.

The intense flooding that is happening across the nation can no longer be ignored, and American Rivers requests that the Committee consider policy requiring that climate change be taken into account when managing floodplains. This will help dam operators and floodplain managers to be better prepared for heavy precipitation events, which will lead to safer communities.

Reduce Flood Risk by Improving Floodplain Management

Traditionally, communities in the United States have attempted to control flood waters by using dams to capture excess flows and levees to channel water downstream as fast as possible. This highly structural approach to flood management is evident in California's Central Valley and the recent events at the Oroville Dam on the Feather River, the impetus for this hearing.

Like much of the Central Valley, the Feather River has been dammed to control the river's flow and reduce flood damage. As towns and cities were established in the river's floodplains, levees were also constructed to provide flood protection. Earlier this month significant rain events resulted in filling the reservoir of Oroville Dam, the tallest dam in the United States. Managers were forced to release water through both the spillway and emergency spillway- both of which experienced significant damage that could have resulted in a catastrophic dam failure. If erosion had undercut the emergency spillway weir, it could have resulted in a very large breach and

² NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2017). <https://www.ncdc.noaa.gov/billions/> (last visited Jan. 25, 2017)

³ Hartmann, D.L., A.M.G. Klein Tank, M. Rusticucci, L.V. Alexander, S. Brönnimann, Y. Charabi, F.J. Dentener, E.J. Dlugokencky, D.R. Easterling, A. Kaplan, B.J. Soden, P.W. Thorne, M. Wild and P.M. Zhai, 2013: *Observations: Atmosphere and Surface*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

⁴ *The Impact of Climate Change and Population Growth on the National Flood Insurance Program Through 2100*, AECOM, <http://www.aecom.com/fema-climate-change-report/> (last visited Feb. 28, 2017).

sudden release of impounded water downstream. This rush of water downstream would almost certainly have resulted in levee breaches, flooding populated areas like Yuba City, home to 60,000 people. Failure of such a massive dam was thought to be impossible, yet years of drought followed by heavy rains showed that even our largest engineered structures are susceptible to Mother Nature.

Communities that rely on dams and levees often assume that their structures will protect them against all major floods. This false sense of security can lead to development in floodplains and areas that would be inundated if a dam or levee were to fail. Dams can eliminate the natural seasonal flood cycle, which leads people to assume that developing in floodplains is safe. Levees constrict a river's flow, sending water downstream faster, and exacerbating flooding for neighboring communities. While these structures are usually effective at reducing flood damage, levees and dams are only designed to withstand a specific level of flooding. When that level is exceeded, these structures can fail with disastrous effects for the communities they are supposed to protect.

Despite significant investment in dams and levees to manage floods in the Central Valley, the one million Californians that live and work in the Valley and the \$70 billion worth of infrastructure, buildings, homes and agricultural land still experience significant flood risk. For this reason, the Central Valley Flood Protection Plan includes strategies to safely accommodate increased flood water on the valley's floodplains using multi-benefit projects that also provide ecosystem benefits.

This approach that gives rivers more room to accommodate flooding events and keeps people and buildings out of the floodplain is not incompatible with economic development. Multi-benefit floodplain management, or using natural and nature-based approaches, provides maximum ecosystem benefits of clean water supply, groundwater recharge, open space for recreation, and wetlands which absorb pollutants and provide critical habitat. Farming and other uses of the land may be compatible with regular flooding events. For instance, rice farming in the Yolo Bypass of California is compatible with normal seasonal floodplain inundation.

Multi-benefit or nature-based approaches to manage flood water not only enhance ecosystem services, they generally require less maintenance and repairs over the long term, and can improve the overall safety and resiliency of a flood management system — factors that are not always incorporated into the benefit cost analysis for water infrastructure projects.⁵ These approaches are less likely to result in catastrophic failure which results in lower flood recovery and rebuilding costs over time. In short, giving rivers more room to safely carry flood water is the best way to protect people and property from floods.

⁵ Small-Lorenz, S.L., B.A. Stein, K. Schress, D.N. Holstein, and A.V. Mehta. 2016 *Natural Defenses in Action: Harnessing Nature to Protect Our Communities*. Washington, DC: National Wildlife Federation.

The U.S. Army Corps of Engineers (Corps), the agency charged with reducing the nation's flood risk, has made some progress increasing the use of natural and nature based flood management approaches, but much more can be done. The Corps can be more effective in implementing natural and nature based solutions by improving its budgeting process to better accommodate funding for multi-benefit projects that achieve both ecosystem restoration and flood risk management. This more holistic and integrated approach to implementing nature based solutions will provide multiple benefits and fulfill two of the agency's missions.

In Section 1184, *Consideration of Measures*, of S.612, the Water Infrastructure Improvements for the Nation Act (WIIN Act), the Corps is authorized to consider natural, nature-based, and nonstructural ways to address flood risk management, hurricane and storm damage, and ecosystem restoration. This provision will allow natural ecosystems like floodplains to be replicated, restored, or preserved in order to improve our river systems. In addition, Congress clarified that restoration techniques, such as levee setbacks, may be implemented when repairing flood-damaged levees. Projects like this provide increased capacity to convey flood water and provide opportunity to restore floodplain wetlands.

The Corps Engineering Circular for the Proposed Implementation of Executive Order (E.O.) 11988, as amended by E.O. 13690, indicated that guidance would be developed on the implementation of natural and nature-based approaches when applying the Federal Flood Risk Management Standard. We strongly agree with the need for that guidance as well as additional guidance on the application of natural and nature-based approaches in riverine systems. While the Corps has made progress on the use of, and guidance on, these approaches in coastal systems particularly during implementation of the North Atlantic Coastal Study, we have been disappointed that the same level of attention and guidance have not been provided for the use of natural processes and nature-based approaches in riverine systems.

In order to implement both the WIIN Act requirement and fully implement E.O. 13690, we recommend the Corps develop guidance on the use of natural and nature-based approaches to water management including food risk reduction.

Natural and nature-based solutions should be implemented where possible as they are often the most resilient way to manage floodplains and they work with the environment to protect the surrounding community. American Rivers requests that the Committee consider requiring natural and nature-based solutions be considered and implemented where possible in any floodplain management policy that the Committee approves.

Dam Owners Need to be Responsible for Safety and Maintenance

The United States has more than 90,000 dams and more than 100,000 miles of levees⁷ and it is not always an option to give rivers more room to expand during a flood event. Also, according to the Association of State Dam Safety Officials, dams in the United States are degrading faster than they are being repaired, the number of high hazard dams has increased over time, and the cost to rehabilitate dams continues to rise. Dam or levee owners must be responsible for their infrastructure and ensure the integrity of their structures. American Rivers supports efforts to ensure that dams are adequately inspected for public safety, including the owner-responsible model for state dam safety programs. The dam owner-responsible approach ensures that dams undergo timely and thorough inspections, placing the responsibility for regular safety inspections on the dam owner who hires a third party engineer and submits the completed report to their state dam safety office for review. Both Massachusetts and Connecticut have adopted this approach in recent years after it became clear that there was not adequate state dam safety staffing to cover regular inspections. Alternatively, state fees from dam owners need to be adequate to ensure proper funding of dam safety offices to complete dam inspections.

In addition to ensuring the safety of water infrastructure during its useful lifespan, dam owners need to be responsible for its end-of-life costs. By 2020, seventy percent of dams in the United States will be more than 50 years old. Aging dams can pose a serious safety threat for individuals and entire communities. Currently, when building, permitting or licensing a dam, there is no accounting for the cost of maintaining and potentially removing the infrastructure at the end of its lifecycle. Dam owners and operators are not required to reserve funding for the ultimate disposition or replacement of the facility after it has exceeded its useful lifespan. Many dams which once served useful functions are no longer serving those purposes due to changes in technology or the economy, and have become public safety hazards and in some cases are damaging natural resources. Dams are not monuments; when they have reached the end of their useful life, they need to either be rehabilitated or removed. Those entities that have reaped the financial benefit of the structure should be paying for the cost of dealing with its long-term impacts. We need thoughtful and accurate accounting of the lifecycle cost of dams and to consider mechanisms to ensure that the costs of dealing with infrastructure that has exceeded its useful lifecycle are not borne entirely by federal taxpayers.

American Rivers also advocates for proactively informing property owners if they are within a zone that could be flooded by dam failures. When a dam fails and authorities come to evacuate downstream communities it should not be the first time those people become aware of the dangers of an upstream dam. Dams and levees provide a false sense of security for communities and the risks need to be made clear to everyone that is potentially in harm's way if a dam fails.

⁷ 2013 Report Card for America's Infrastructure, American Society of Civil Engineers, <http://www.infrastructurereportcard.org/> (last visited Feb. 28, 2017).

Dams and levees need to be properly maintained to ensure the safety of downstream communities. However, removal must also be considered as an option when a structure is no longer serving its intended purpose. American Rivers requests that the Committee consider policy that would promote dam owner responsibility and require them to maintain and if necessary remove their dam to ensure the safety of those downstream.

Hydropower Dams

Some in the hydropower industry have held up the length of time necessary to process hydropower licenses associated with the State Water Project, including the Oroville Dam, as examples for why the hydropower relicensing process should be streamlined. Specifically they use the example of the Oroville Dam as evidence to support their proposals to grant the Federal Energy Regulatory Commission (FERC) the authority to override state and federal agencies' conditions for the protection of federal lands, Native American Tribal interests, and state water rights and water quality in order to expedite licenses.

However, American Rivers believes that the Oroville Dam situation is a cautionary tale about FERC's willingness to override, at the request of the licensee, legitimate concerns raised by stakeholders. When Oroville began its relicensing process it was called to FERC and California's attention by conservation groups that the emergency spillway was inadequate if it had to be used and that it needed to be lined with concrete. However that warning was ignored and thus the crisis at the Oroville Dam ensued. The situation at Oroville should give Congress pause when deciding whether to consolidate more power into FERC's hands and limit the input of local stakeholders, as proposed by the National Hydropower Association.

Pursuing the National Hydropower Association's preferred path, featured in H.R. 8 and S. 1236 in the 114th Congress, of consolidating all decision making power at FERC will lead to more poor decisions. FERC should not be solely responsible for decisions regarding protecting state water rights' holders prerogatives, ensuring that state water quality standards are met, enforcing fish passage requirements necessary for the Departments of the Interior and Commerce to meet their statutory requirements under the Magnuson-Stevens Act and the Endangered Species Act, protecting Native American trust and treaty rights, and protecting property owned by federal agencies, all of which are key components of the hydropower licensing process.

FERC lacks the staff, skill, or expertise to properly evaluate all such aspects of dam regulation. Issues such as natural resource compliance or federal land management have been the province of federal land management and fisheries management agencies since the passage of the Federal Power Act in 1920. FERC also lacks the staff resources and expertise to enforce water quality standards, a power delegated to the States under the Clean Water Act, or to administer state water rights, which have been a matter of state law since the passage of the McCarran Amendment in 1952.

Hydropower licenses, once granted, last from 30 to 50 years. When a license expires, hydropower dams operate on annual licenses, so there is no risk of a power plant being taken off-line if a new license is not immediately granted. Thus there is no reason to risk a 30-50 year mistake in the name of expediting safety or environmental reviews. American Rivers urges the Committee to ensure that as the Senate debates potential changes to the Federal Power Act, that the lessons of the Oroville Dam spillway failure are not forgotten.

Conclusion

American Rivers appreciates the Environment and Public Works Committee taking the time to have a hearing on the important topic of flood control safety. As the nation's leading advocate for protecting and restoring rivers and their floodplains we respectfully request that the Committee take our recommendations into consideration when formulating policy on floodplain management. If any questions arise please email or call Meghan Boian mboian@americanrivers.org or 202-243-7037.

Senator BARRASSO. We have a number of guests here.

Senator Ernst, could I invite you to please introduce your guest to the Committee?

Senator ERNST. Thank you, Mr. Chair. I want to thank you, as well, for holding this important hearing today, and thank you for working with me to extend an invitation to a great Iowan on the panel today. I am pleased to introduce the mayor of Cedar Rapids, Mr. Ron Corbett, to this Committee. Mayor Corbett has been working tirelessly on behalf of the citizens of Cedar Rapids securing State and local funding to rebuild his community after the 2008 flood, and what they have done is truly impressive.

But critical assistance from the Corps is also needed to complete Cedar Rapids' flood risk management project, and this is something Mayor Corbett has been leading the charge on for years now. Cedar Rapids and communities across my State are in need of Corps assistance, but have run into hurdles trying to navigate the bureaucracy within the Corps and OMB. They just point fingers at each other, and it is an issue that we are trying to work through and resolve not just for the people of Cedar Rapids, for many communities across the State of Iowa and the Nation.

So we continue working through this. We also know that the city of Des Moines also has important levee work that needs to be done, and Cedar Falls has been working on a 408 permit application that still isn't approved.

In addition, how the current system is set up to calculate the economic benefits of flood control projects places Iowans at a disadvantage. The current metrics that the Corps and the Administration use prioritizes building beaches in front of multimillion dollar oceanfront homes over protecting the people of Cedar Rapids because the calculations are based on property value.

Cedar Rapids is Iowa's second largest city, and its success is critical to the economic well-being of the entire State. They have endured two significant flooding events in 8 years that have cost billions of dollars in devastation and recovery aid. The Corps has some discretion to help, and have simply made the decision to forego the assistance, even though the community worked with the Corps to develop a project to address that flood risk and worked with Congress to get it authorized.

So I look forward to the discussion today and, Mayor Corbett, thank you. I know you will be detailing for this Committee Cedar Rapids' very, very important story.

I am also eager to continue my conversation with you, General Semonite, thank you for being here today, to see if we can move forward on this.

Thank you very much, Mr. Chair.

Senator BARRASSO. Thank you, Senator Ernst.

Senator Harris, could I invite you to introduce your guest?

Senator HARRIS. Thank you, Mr. Chairman and Ranking Member Carper for scheduling this important hearing, as recent events in my home State highlight the necessity of Congress's support in assisting our State and local partners to maintain, repair, and upgrade our Nation's aging infrastructure, and especially when it comes to critical systems that could threaten the public safety of all Americans.

It is my distinct pleasure to introduce the Secretary of the California Natural Resources Agency, John Laird. Secretary Laird has over 40 years of experience working in public service, ranging from a budget analyst for then-U.S. Representative Jerome Waldie, a local elected official as Santa Cruz City Councilman and Mayor, and as a State legislator where he chaired the California Assembly budget committee. And I had the pleasure of working with him throughout those years, both when I was district attorney of San Francisco and as attorney general.

In his current role as Secretary of Natural Resources, he manages California's ecological and cultural resources, water reserves and supplies, and statewide environmental policies. Within his agency, he oversees 30 sub-departments, including the California Department of Water Resources, which is the lead agency working around the clock to repair Oroville Dam and to prevent catastrophic flooding.

Mr. Chairman, last week Secretary Laird and I had a chance to tour the Oroville Dam together, and he had an extraordinary understanding of the technical needs of the dam and levee infrastructure. I also want to comment that as he and I both noticed, it was an extraordinary example at the dam of Federal, State, and local agencies coming together to meet a need that was really a crisis in terms of its proportion. We saw folks that ranged from members of the National Guard, the United States Navy, FEMA, and California Emergency Services, together with the local sheriff, Butte County Sheriff Kory Honea, who came together to meet the challenge and the need, and they did it in a seamless way.

And it goes without saying that Secretary Laird has extensive knowledge of the needs of our Nation and the needs that we should consider when it comes to sufficiently maintaining our infrastructure and flood management systems. This, combined with his budgetary experience at all levels of Government, can shed light on how Congress should leverage funding streams to help address our aging infrastructure.

I know that in California alone there are approximately 1,400 dams, and nearly half of those are designated as "high hazard potential dams" by State officials. Realizing the devastation that could be caused by an aging dam infrastructure, California has invested approximately \$11 billion in flood control management in the past decade to protect nearly 7 million people and \$580 billion worth of assets, which include buildings, farmland, and crops, that are at risk.

The need for improvements aren't solely in California. For example, in States like Wyoming, we have invested more than \$1.2 billion of their State's funding for water infrastructure improvements, water storage, and supply projects, recycled and wastewater management and treatment, and drought and emergency relief water programs since 1975.

In addition, according to the Association of State Dam Safety Officials, it is estimated that non-federally owned dams throughout our Nation represent 96 percent of all dams in the United States and would need more than \$60 billion to sufficiently repair, which is a third of the cost that is urgently needed to repair the high hazard dams identified by the Association. This demonstrates that the

need is great across our Nation, and that is why I greatly appreciate the Chairman's willingness to continue prioritizing this conversation, and I look forward to working with my colleagues on this Committee to continue Federal support that is necessary and yet critical to maintain our infrastructure nationwide.

I look forward to hearing from you, Mr. Secretary. Welcome. And I appreciate all the members of the Committee and other witnesses for being here to discuss this crucial topic. Thank you.

Senator INHOFE.

[Presiding.] Well, thank you, Senator Harris. That was a very nice introduction.

Senator HARRIS. Thank you.

Senator INHOFE. Let me explain to everyone where we are today. I am alone. We have votes going on. I have already voted the first time. Several others will be voting and coming back. Now, I would say this, though, that there is staff from each member who is here today, so we are going to start with opening statements, and we will start with you, General Semonite. And if Senator Barrasso is not back, we are going to skip you, I say to our next witness, and go to the third, because he wants to be here during your opening statement.

General, you are on.

**STATEMENT OF LIEUTENANT GENERAL TODD T. SEMONITE,
COMMANDING GENERAL AND CHIEF OF ENGINEERS, U.S.
ARMY CORPS OF ENGINEERS**

General SEMONITE. Chairman Barrasso, Senator Inhofe, Ranking Member Carper, and distinguished members of the Committee, I am Lieutenant General Todd Semonite, Commanding General of the Corps of Engineers and the 54th Chief of Engineers. Thank you for the opportunity to be here today to discuss the role of the United States Army Corps of Engineers in dam and levee safety.

One of the Corps' primary objectives in constructing, operating, and maintaining dam and levee infrastructure is to reduce risk to public safety. Our efforts in this area are part of a larger array of management practices aimed to ensure our Nation is postured to safely enjoy a range of water resources benefits. For dam and levee safety, the Corps uses a risk-informed approach to ensure that these objectives are met in a transparent and disciplined manner.

Water plays a central role in the strength of our economy, the health of our community, and the diversity of our ecosystems. Unfortunately, many of our Nation has experienced what happens when we have too little water, too much water, or water that is not fit to consume or sustain natural habitat. In many ways the decisions that we have made as a Nation in developing, managing, and protecting our water resources have influenced how the Nation developed and where its people now live. The Nation's water resource infrastructure includes dams and levees built by the Federal Government, States, local authorities, and the private sector. Sustaining the benefits of these structures requires the appropriate investment of resources and the proper management of the risks that come with those benefits.

Although often planned and constructed as individual projects, many of our Nation's dams and levees now operate as integrated

components of a much larger water resource management system. The Corps owns and operates only a small fraction of the dams and levees in the Nation. Our portfolio includes 715 dams, which is less than 1 percent of over 90,000 structures identified in a 2016 national inventory of dams. The Corps also operates and maintains roughly 2,500 miles of levees, which is less than 10 percent of the roughly 30,000 miles now in the national levee inventory. From a functional perspective, the Corps generally constructed the dams and levees that it owns and operates to provide navigation or flood risk management benefits. However, many of these structures also support other uses, such as hydropower, water supply, and recreation.

Over time, these facilities have aged and deteriorated, and can only sustain their intended function with regular maintenance and periodic rehabilitation. In addition, many external factors will complicate efforts to sustain the viability of this infrastructure. Variables ranging from the frequency and intensity of natural hydrologic and seismic events to the sizes of the populations living and working near the infrastructure compound the difficulty of decisionmaking.

The Corps is addressing these challenges in a risk-informed manner. We make informed adjustments to ensure that resources are invested in an efficient and technically robust manner. For example, our dam safety program enables the Corps to extend the period that a project can provide some or all of its authorized benefits by investing in measures that reduce the principal safety risk at our dams to an acceptable level.

When it comes to addressing our Nation's dam and levee safety challenges, the Corps' responsibilities generally follow project-specific authorities for managing infrastructure that the Corps owns and operates. The Corps also has programmatic authorities for participating in the national community of dam and levee safety. In reaching decisions on potential safety measures at the dams or levees that it owns and operates, the Corps considers the public safety, economic and environmental risks posed by the infrastructure, the cost of reducing those risks, and the authorized project benefits that a proposed safety improvement would enable the project to continue to provide to society.

In summary, dams and levees are an important part of the Nation's water resource initiative. Management practices are aimed to ensure our Nation is well positioned to safely monitor and manage water resource infrastructure. For the dams and levees that our Corps owns and operates, we are working to balance the cost, responsibilities, risks and benefits in order to inform our decisions that guide the safe operation, proper maintenance, and effective management of risk. A similar framework of risk-informed management may also help meet these objectives for decisions on the safety of other dams and levees across the Nation.

I am honored to lead the United States Army Corps of Engineers, and I appreciate the opportunity to testify today and look forward to answering your questions. Senator Carper asked is the Government up to this challenge. The Corps of Engineers is up to this challenge. The vision of the Corps is to be able to engineer solu-

tions for the Nation's most critical challenges. We have the capacity and the competency to do just that.

Thank you, sir.

[The prepared statement of General Semonite follows:]

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT

OF

LIEUTENANT GENERAL TODD T. SEMONITE
COMMANDING GENERAL AND CHIEF OF ENGINEERS

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ON

**“The Status of The Nation’s Dam, Levee and Other Flood Control
Infrastructure”**

MARCH 1, 2017

Chairman Barrasso, Ranking Member Carper, and Members of the Committee, I am Lieutenant General Todd Semonite, Commanding General and Chief of Engineers. I am pleased to be here today to discuss the role of the U.S. Army Corps of Engineers (Corps) in dam and levee safety. Generally, our objective in this area is to reduce risks to public safety associated with dams and levees. Our efforts in this area are part of a larger system of management practices by the Corps, aimed at ensuring that our Nation is positioned to deliver a greater objective: to safely provide a range of water resources benefits to the Nation. For dam and levee safety, the Corps uses a risk-informed approach to assure that this objective is met in a transparent and disciplined manner.

Water plays a central role in the economy, the health of our communities, and the diversity of our ecosystems and natural landscapes. Unfortunately, many in our Nation have also experienced what happens when we have too little or too much water, or water that is not fit to sustain natural habitats. In many ways, the decisions that we have made as a Nation in developing, managing, and protecting our water resources have influenced how the Nation developed and where its people now live. The Nation's water resources infrastructure includes dams and levees built by the Federal government, states, local authorities, and the private sector over many years. Sustaining the benefits that these structures provide, where warranted, requires the proper management of the risks that come with those benefits.

Although often planned and constructed as individual projects, many of our Nation's dams and levees now operate as integrated components of a larger water resources management system. The Corps owns and operates only a small fraction of the dams and levees in the Nation – 715 dams (less than 1% of the 90,580 dams in the 2016 national inventory of dams) and roughly 2,500 miles of levees (less than 10% of the roughly 30,000 miles now in the national levee inventory). From a functional perspective, the Corps generally constructed the dams and levees that it owns and operates primarily to provide navigation and/or flood risk reduction benefits, but many of them also support other uses such as hydropower, water supply, and recreation.

Infrastructure designed and constructed for the conditions and practices of two generations ago now delivers its benefits in an ever-changing world. We know the infrastructure embeds the decisions and practices of the past in its construction, but what changes? Over time, all infrastructure ages and deteriorates, unless it is properly maintained and periodically rehabilitated. Our understanding of the frequency and intensity of hydrologic and seismic events also changes, as do the sizes of the populations living and working near the infrastructure. Meanwhile, the practice of engineering and science leaps ahead. Also, consider that in the last six years, the Nation has experienced five flood events that exceeded a 1 in a 1,000 chance of occurring.

The Corps is addressing these changes in a risk-informed manner. We make informed adjustments to ensure that our investments in safety going forward are appropriate. For example, our dam safety program enables the Corps to extend the period that a project

can provide some or all of its authorized benefits, by investing in measures that reduce the principal safety risks at our dams to an acceptable level.

For many dams and levees, the costs, responsibilities, risks, and benefits are now shared. As we make choices as to which of these structures warrant an improvement for safety and who should bear the costs, we must be careful to not create divides with one group bearing the costs, another gaining benefits, others being held responsible, and yet others absorbing the risk. Such a divided system is neither fair nor sustainable, in my view, and would complicate the task of establishing a better set of incentives to reduce these risks in the future.

When it comes to addressing our Nation's dam and levee safety challenges, major Corps responsibilities generally follow project-specific authorities for managing infrastructure that the Corps owns and operates. The Corps also has programmatic authorities for participating in the national community of dam and levee safety. In reaching decisions on potential safety measures at the dams or levees that it owns and operates, the Corps considers the public safety, economic, and environmental risks posed by the infrastructure, the costs of reducing these risks, and the authorized project benefits that a proposed safety improvement would enable the project to continue to provide to society. The Corps authorities for dams and levees are varied and include:

- Project-specific authorities for projects that include dams and/or levees. To date, the Corps has designed and constructed over 3,000 such projects.
- For 715 of the dams that the Corps constructed, the Corps is a self-regulated owner. For these dams, the Corps operates, maintains, and repairs the dams, including rehabilitation. In addressing potential safety concerns, the Corps uses a modern risk management framework to assess and characterize the risks, establish priorities, select risk reduction measures, and communicate the risks.
- For other dams that the Corps constructed, which are owned, operated, maintained, and repaired by non-federal entities, we rely on the qualified state dam safety programs to regulate the structures. Forty-nine of the States now have such a program. For these dams, the Corps may provide technical assistance on a reimbursable basis, when requested. The Corps also participates in the National Dam Safety Program, which is hosted by the Federal Emergency Management Agency. The National Dam Safety Program supports state dam safety programs and contributes state-of-the-art policies, practices, and training to state and other federal partners.
- The Corps owns roughly 2,500 miles of levees, which it maintains.
- The Corps constructed roughly another 10,000 miles of levees that local authorities own and maintain. Under its Public Law 84-99 program, the Corps also inspects periodically approximately 2,500 miles of levees constructed by local authorities.

There are few state levee safety programs and no recognized standards at the national level for those programs. In the absence of effective regulatory regimes at the state level (comparable to the ones at the state level for non-federal dams), the repair and rebuilding of many locally owned levees after a flood often falls on the Federal government and the U.S. taxpayer. Title IX of the Water Resources Development Act of 2007, and section 3106 of the Water Resources Reform and Development Act of 2014, may provide a way to address this concern. A primary purpose of these provisions was to build capabilities within the states for levee safety, as well as to develop national guidelines and align federal programs. The Corps has been working on a key part of this effort, by developing a national levee inventory.

In summary, dams and levees are an important part of the Nation's water resources infrastructure. Management practices aimed at ensuring our Nation is well-positioned to safely monitor and manage water resources infrastructure involve many parties, including Federal, state, and local agencies, and the private sector. For the dams and levees that the Corps owns and operates, we are working to align the costs, responsibilities, risks and benefits, in order to inform our decisions on providing for the safe operation, proper maintenance, and effective management of risk. A similar framework of risk-informed management may help meet these objectives for decisions on the safety of other dams and levees across the Nation.

This concludes my testimony. Thank you for allowing me to testify about the challenges we face together in the area of dam and levee safety. I would be happy to answer any questions you may have.

Senate Environment and Public Works Committee
Hearing entitled, "Flood Control Infrastructure: Safety Questions Raised by Current
Events"
March 1, 2017
Questions for the Record for Lt. General Semonite

Chairman Barrasso:

1. General Semonite, Section 1005 of the 2014 WRDA bill includes language that requires the Corps to accelerate the delivery of Water Resources Development Projects. This section requires agencies to coordinate environmental reviews, and meet deadlines. This issue is a priority for this Committee, and for President Trump, who highlighted the issue in his January 24, 2017, Executive Order on "Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects." It has been over a year and a half, and the Corps still has not implemented section 1005.

When is that going to happen?

Answer: The Corps of Engineers is fully committed to project acceleration and the President's Executive Order on Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects. Guidance for Section 2045(l), as amended by Section 1005(a)(1) and Section 1005(b) was issued in August 2016. Some of the requirements of Section 1005 are already included in existing guidance (such as guidance for Section 1001 of WRRDA 2014) and processes established for the conduct of feasibility studies (SMART Planning). The Corps has not issued guidance where the Corps' existing process is more restrictive under Section 1005. For example, the deadline established by section 1005(a)(1)(h)(5) is after the Corps' current timeline for projects seeking Congressional authorization. The Corps of Engineers expects to have implementation guidance for the remaining provisions of section 1005(a)(1) completed before July 2017. No guidance is necessary for section 1005(a)(2), technical correction to WRDA 2007's table of contents.

2. General Semonite, Section 1007 of WRDA 2014, requires the Corps to set benchmarks for how long it should take for the Corps to give permission to a local government to modify levees that were built by Corps and turned over to the local government. These so-called 408 permits are caught up in bureaucratic red tape. This is another section of WRDA 2014 that the Corps has not yet implemented. In section 1156 of the 2016 WRDA bill, Congress spoke to this issue again and required the Corps to impose deadlines on section 408 reviews and conduct them concurrently with other environmental reviews.

When will you take action to cut red tape for 408 permits?

Answer: Section 14 of the Rivers and Harbors Act of 1899, as amended, and codified in 33 USC 408 (Section 408), protects federal investment in Civil Works projects by prohibiting any permanent or temporary alteration or use of any Corps of Engineers (Corps) Civil Works project without the express permission of the Secretary of the Army, upon the recommendation of the

Chief of Engineers. This requirement is vital for ensuring that Corps projects are able to continue delivering the benefits that justified Congress's authorizing and funding their construction. The Secretary can give permission for a requested alteration upon determining that it is not injurious to the public interest and will not impair the Corps project's ability to meet its authorized purpose. This process protects the federal investment and insures that risk to life safety is not increased or shifted downstream or upstream.

The Section 408 process is led by Corps district offices and scalable to the size and scope of the alteration being proposed. The Corps will continue to seek ways to streamline the process. For example, the Corps has recently delegated specific Section 408 decisions that previously needed to be determined by Corps Headquarters down to the division office level. Most Section 408 decisions are still determined by Corps district offices. Other streamlining processes in place include the use of procedural review plans and categorical permissions on activities similar in nature with similar impacts.

The Corps is currently working on revisions to the current Section 408 process to improve the process and incorporate requirements from both Section 1007 and Section 1156. A revised process is anticipated by fall of 2017. In conjunction with the revised Section 408 process, a publicly available database will be developed to track Section 408 requests and the status of those requests.

3. General Semonite, under section 3014 of WRRDA 2014 the Corps is supposed to help communities certify their levees for the FEMA Flood Insurance Program if the Corps is already on-site, inspecting the levees. The Corps has not yet implemented this section. In section 3016 of WRRDA 2014, Congress amended the National Levee Safety Program - to require a onetime review of all levees in the inventory, to establish levee safety guidelines, to establish a levee hazard classification system, and to authorize technical assistance to states, communities, and levee owners.

In addition, the 2014 amendments authorized \$30 million a year for the Corps to provide levee rehabilitation assistance. The Corps has not yet implemented this section.

When is the Corps going to start using these authorities to help local governments with their levees?

Answer: In accordance with Section 3014 of WRRDA 2014, the Corps plans to use its levee risk assessment as the process to support accreditation recommendations to FEMA. FEMA has agreed to accept levee accreditation recommendations made by the Corps based on its levee risk assessment process. On a case by case basis, the Corps works with levee sponsors and FEMA on ongoing risk assessments to recommend a levee accreditation decision. Implementation guidance is currently being finalized.

Section 9004 of WRDA 2007, Inventory and Inspections of Levees, was amended by Section 3016(d) of WRRDA 2014 and Section 1130(b) of WRDA 2016. The Corps has established and is maintaining a National Levee Database (NLD). The NLD is a dynamic, searchable inventory

of information about levee systems and serves as a key national resource supporting decisions and actions affecting levee safety. The NLD was open for access in October 2011.

The Corps has completed the inventory and inspection of levee systems which it operates and maintains; those that are federally authorized and locally maintained; and those that are non-federal systems participating in the Corps Rehabilitation Program under 33 U.S.C. 701n. This includes approximately 2,500 levee systems, which total 14,700 miles of levees. Information associated with these levees is in the NLD and has been provided to levee sponsors and other stakeholders. The Corps has conducted a screening risk assessment and risk characterization for a majority of these 2,500 levees and anticipates completing all screenings of these levees by FY2018.

Approximately 15,000 miles of additional levees (beyond the 14,700 miles discussed above) has been identified in the NLD. The information available for these levees varies. The Corps is developing the procedures for conducting the one-time inventory, inspection, and review of these levees. Participation in this effort by states, Indian tribes, regional levee districts, and levee owners and operators will be voluntary. The Corps will coordinate through states and tribal executives to collect available levee information and to conduct the review using current Corps procedures on those levees upon request of the levee owners / operators. Information collected will be provided to levee owner/operators and other stakeholders. This effort is expected to begin this summer.

The remaining amendments in Section 3016 include the establishment of voluntary national technical levee guidelines; development of technical assistance and training materials to incentivize the creation of state and Tribal levee safety programs; establishment of a levee rehabilitation assistance program; and development of three reports to Congress related to levee safety challenges. Funds have not yet been made available to implement these efforts.

Ranking Member Carper:

Dakota Access Pipeline Related Questions:

4. Several news reports indicate that Energy Transfer Partners and its subsidiary Sunoco Logistics, who will operate the Dakota Access Pipeline, have violated environmental and other legal requirements leading to more than \$22 million in government fines since 2010. In fact, according to one report, a review of federal records found that Sunoco Logistics has had more hazardous materials leaks than any other company. To our knowledge, the United States Army Corps of Engineers (Corps) presented no alternative water supply plan to the tribes, or nearly 17 million people who live downstream, should this pipeline leak and contaminate the water supply. Does the Corps have or did it consider any options to provide access to clean drinking water to these citizens if the activities of Energy Transfer Partners and their subsidiaries related to the Dakota Access Pipeline contaminates their water supply? Why or why not? Please provide documentation.

Answer: The Corps' July 25, 2016, Environmental Assessment, Dakota Access Pipeline Project Crossing of Flowage Easements, and Federal Lands (Final EA) discusses potential impacts of the Dakota Access Pipeline on water supply and Dakota Access, LLC's (Dakota Access') possible responses in the event of a pipeline leak at the Lake Oahe crossing. *See* Final EA at page 38 (discussing potential impacts on water supply). Dakota Access, as the operator of the pipeline, would be responsible for any response to a leak, including addressing issues associated with water contamination. *Id.* We have provided a copy of the Final EA (NWO DAPL EA FONSI.pdf), which suggests possible responses Dakota Access could take. *Id.* at pages 38-89 (discussing shutting down certain water intakes and providing drinking water from a different source, perhaps even providing bottled water).

For general background and context, the Corps does not have authority to regulate oil pipelines. The Corps was required to consider three categories of requests submitted by Dakota Access for: (1) individual verifications that activities at more than 200 locations along the Dakota Access Pipeline (DAPL) route satisfied the terms and conditions of Nationwide Permit (NWP) 12 (under the Clean Water Act, 33 U.S.C. § 1344, or the Rivers and Harbors Act of 1899, 33 U.S.C. § 403), which authorizes activities required for the construction of utility lines in federally regulated waters; (2) permissions to cross or lay the pipeline in seven locations used by the Corps for navigation or flood control under section 14 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 408 (section 408); and (3) consent to cross flowage easements in Illinois and at Lake Sakakawea in North Dakota, and a real estate easement to lay the pipeline under a Corps-managed lake (Lake Oahe) and adjacent Corps-managed property in North Dakota under the Mineral Leasing Act, 30 U.S.C. § 185. Of the total length of the pipeline, only approximately three percent of its route is subject to Corps jurisdiction.

5. Please provide copies of all documents (including but not limited to emails, memos, white papers, telephone logs, presentations or meeting minutes) between a) the Corps and the Trump Administration or its transition team and b) the Corps and Energy Transfer Partners or any of its subsidiaries, between November 7, 2016 and January 24, 2017.

Answer: a) The Corps did not have any communications with the Trump transition team between November 7, 2016 and January 24, 2017.

Answer: b) The Corps has attached these documents.

- a. Specifically, did the Corps leadership make a recommendation regarding the Executive Order to the incoming Administration prior to the executive order being issued? If so, what was that recommendation? Please provide documentation, including copies of drafts of any recommendation and internal communications related thereto.

Answer: We interpret this question as asking about the Presidential Memorandum, Construction of the Dakota Access Pipeline, Memorandum for the Secretary of the Army, signed by the President on January 24, 2017. *See* Presidential Documents, 82 Fed. Reg. 8,661 (Jan. 30, 2017). The Corps did not make a recommendation to anyone regarding this Memorandum.

- b. Did the Corps review the Obama Administration's order for additional environmental impact studies on the Dakota Access Pipeline? Why or why not? If so, what did that review entail and what did the Corps recommend to the Obama Administration. Please provide documentation, including copies of drafts of any recommendation and internal communications related thereto.

Answer: The Corps reviewed the Memorandum for Commander, U.S. Army Corps of Engineers, Subject: Proposed Dakota Access Pipeline Crossing at Lake Oahe, North Dakota that was signed by the Assistant Secretary of the Army, Civil Works, on December 4, 2016. *See* document 20161204 ASA CW Memo to USACE.pdf. As a result, the Corps Chief of Engineers provided implementation guidance for the December 4 Memorandum to the Corps Northwestern Division and Omaha District on December 22, 2016. *See* document 20161222 DAPL, HQUSACE Implementation Guidance.pdf. The Corps did not provide a recommendation to the Obama Administration that was responsive to the December 4 memorandum.

6. We are concerned—given recent news reports and updated court documents about the drilling being nearly complete close to 50 days ahead of schedule—that Energy Transfer Partners or its subsidiaries might have been drilling without a permit and while project approval was under a court challenge.
- a. How did the Corps oversee drilling operations to ensure the company and its subsidiaries were meeting their legal obligations?

Answer: The Department of Transportation, Pipeline and Hazardous Material Safety Administration (PHMSA), Office of Pipeline Safety, provides oversight of pipeline construction for the federal government on federal lands. *See* <https://www.phmsa.dot.gov/pipeline/about>. PHMSA inspects oil pipelines during construction to verify that the pipeline complies with the construction standards in 49 C.F.R. Part 195. PHMSA performed this oversight on the Dakota Access Pipeline, and updated the Corps on Dakota Access, LLC's progress. The Corps has no evidence that Energy Transfer Partners or Dakota Access performed any work on Corps-managed federal lands prior the Corps issuing Dakota Access an easement on February 8, 2017. The Corps does not have jurisdiction to oversee drilling operations conducted on lands not managed by the Corps or otherwise under its jurisdiction.

- b. How does the Corps account for the drastically accelerated timeline for the drilling?

Answer: The Corps cannot account for Dakota Access' timeline for drilling because we do not monitor the speed of pipeline construction, and we do not have a role in the construction schedule or process.

- c. Are there any documents that demonstrate adequate supervision at the site? If so, please provide documentation.

Answer: The Corps will provide these documents, which will mainly consist of emails from PHMSA to the Corps.

7. We understand the US Army Corps of Engineers consulted and coordinated with only one tribe during the permitting process.

Answer: Your understanding is incorrect. Just focusing on the Lake Oahe crossing, throughout the two-year review process, the Corps consulted with 27 tribes. *See Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs*, No. 16-cv-1534, Declaration of Richard Harnois at para 6 and Exhibit 1 at pp. 8-9 (Dist. D.C. filed on Aug. 18, 2016)(Harnois Declaration with Exhibits.pdf).

- a. With which tribes did the Corps coordinate in the Dakota Access Pipeline permitting process? Please provide documentation that includes, dates, times, and the names of the individuals who participated in any consultation – written, in person, or otherwise.

Answer: Specific to North Dakota, we are providing a list of tribes with which the Corps coordinated. *See List of Tribes for Lake Sac and Lake Oahe.pdf*. We are also providing a copy of a declaration by a Corps employee that outlines the consultation process. *See Harnois Declaration with Exhibits.pdf*. We are also providing a record of tribal contacts, which has the dates, times, and names of individuals. *See Record of Tribal Contacts.pdf*.

- b. How does the Corps typically consult with the tribal governments and affected local communities when granting a permit for a project such as the Dakota Access Pipelines? What the laws, regulations and operating procedures govern this process? Please provide documentation or citations where appropriate.

Answer: The Corps generally follows the U.S. Army Corps of Engineers, Tribal Consultation Policy (Nov. 1, 2012). We have attached a copy. *USACE Native American Policy 2012.pdf*. The policy is purposefully general in nature because each of the federally-recognized American Indian and Alaska Native Tribes is a distinct and separate government, requiring a consultation process that may be unique to it. The Corps follows the procedures at 33 C.F.R. Part 325, App. C to fulfill its consultation obligations under Section 106 of the National Historic Preservation Act (NHPA) for its regulatory program (which includes its issuance of permits under the Clean Water Act). For other Corps undertakings not related to the regulatory program (such as providing permission under 33 U.S.C. § 408), the Corps complies with the Advisory Council on Historic Preservation's regulations at 36 C.F.R. Part 800 to comply with the NHPA. The Corps otherwise takes public comments when issuing either general or individual permits for the regulatory program. *See e.g.* 33 C.F.R. §§ 330.1(b) & 330.5(a)(2) (general permits); 33 C.F.R. § 325.3(a)(individual permits). For other Corps programs, the Corps would take public comments through the National Environmental Policy Act compliance process. *See generally* 42 U.S.C. § 4321 *et seq.*; 40 C.F.R. Parts 1500 -1508; 33 C.F.R. Part 230.

- c. Has the Corps made a determination that compliance with Executive Order satisfies the federal government's obligation to meet its trust and treaty obligations to affected tribal governments? If so, please provide documentation.

Answer: We interpret this question as asking about the Presidential Memorandum, Construction of the Dakota Access Pipeline, Memorandum for the Secretary of the Army, signed by the President on January 24, 2017. *See* Presidential Documents, 82 Fed. Reg. 8,661 (Jan. 30, 2017). Compliance with that Presidential Memorandum would not relieve the Corps from compliance with other laws, including any requirements associated with the government's trust relationship or a treaty obligation with a tribe. *See* Presidential Memorandum, 82 Fed. Reg. 8,661 (Jan. 30, 2017) (limiting application "to the extent permitted by law"). We have provided a copy of a Memorandum dated February 3, 2017 outlining Corps compliance with the Presidential Memorandum. *See* document 20170203 DAPL Technical and Legal Review (Redacted).pdf.

8. Which, if any, endangered species reside in the waters and lands impacted by the Corps permit? For any such species, what is the plan for their protection, conservation and restoration?

Answer: The U.S. Fish and Wildlife Service concluded that the potential effects of the pipeline on the pallid sturgeon, interior least tern, piping plover and its designated critical habitat, rufa red knot, whooping crane, and Indiana bat are "either insignificant or discountable." *See* attached letter from USFWS to the Corps dated May 2, 2016 at 18. The only exception is the Dakota skipper. *Id.* The USFWS prepared a Biological Opinion for the Dakota Skipper in May 2016, but any impacts would occur outside of the areas of the project that the Corps reviewed. *See* Final EA at page 61. We are providing a copy of the March 2016 Biological Assessment for the Dakota Access Pipeline Project, including the appendices, a copy of the May 2016 Biological Opinion for the Dakota Skipper, and other correspondence.

9. The Army Corps of Engineers had begun to conduct an Environmental Impact Statement (EIS) to determine the pipeline's effect on tribal governments and the surrounding environment at the time of the release of the Executive Order? What is the current status of the EIS? Please provide a copy of any documents (including but not limited to emails, memos, white papers, telephone logs, presentations or meeting minutes) related to or any drafts of this EIS.

Answer: The Army published the notice of intent to prepare an Environmental Impact Statement (EIS) for Dakota Access's request for an easement at Lake Oahe. *See* Notice of Intent to Prepare an Environmental Impact Statement in Connection With Dakota Access, LLC's Request for an Easement to Cross Lake Oahe, North Dakota that the Army 82 Fed. Reg. 5,543 (Jan. 18, 2017). About a month later, the Army published a notice terminating the prior notice of intent to prepare an EIS that ended any further work on the EIS. *See* Notice of Termination of the Intent to Prepare an Environmental Impact Statement in Connection With Dakota Access, LLC's Request for an Easement To Cross Lake Oahe, North Dakota, 82 Fed. Reg. 11,021 (Feb. 17, 2017). The Army and the Corps have therefore ceased all activities associated with the preparation of an EIS.

We have provided a copy of the Federal Register notices, an email exchange between the Corps Omaha District and the Standing Rock Sioux tribe, a copy of a memorandum from the Chief of Engineers providing implementation guidance for the December 4, 2016 ASA(CW)

Memorandum, and a copy of a draft implementation plan from the Corps Omaha District. We have also provided a copy of a January 21, 2017 memorandum from the Acting Secretary of the Army to the ASA(CW) and the Corps on the Dakota Access pipeline, a copy of a February 3, 2017 memorandum from the Chief of Engineers to the Office of the Assistant Secretary of the Army for Civil Works, and a February 7, 2017 memorandum for the record from the Office of the Assistant Secretary of the Army for Civil Works.

Port of Wilmington:

10. The Diamond State Port Corporation (DSPC), intends to construct an access channel and turning basin to serve a container terminal that is under development on the Delaware River and to seek Federal maintenance of this navigation project under provisions of WRDA 86. This project will provide much needed jobs, it is vital to the economy and has a national impact. Furthermore, the project will be privately funded in a public/private partnership (P3). Federal assistance will be needed for permitting and approvals to begin the work, long term navigational maintenance and real estate saw agreement for dredged disposal sites. How can the Army Corps of Engineers help ensure all permits and project reviews be handled as quickly and judiciously as possible? What actions can DSPC take in its work with the Philadelphia District, the North Atlantic Division and headquarters here in DC to prevent unnecessary delays?

Answer: The Corps of Engineers Philadelphia District is working closely with the DSPC to ensure all the necessary actions take place as expeditiously as possible. Section 204 of the WRDA of 1986, as amended, authorizes the Corps to undertake studies and engineering, and to provide technical assistance in obtaining permits, necessary for construction by a non-federal interest, if the non-federal interest contracts with the Secretary to pay all of the cost of such studies, engineering and technical assistance. A Memorandum of Agreement (MOA) would need approval by the Assistant Secretary of the Army (Civil Works) before DSPC could conduct any studies that would lead to the design and construction of a new navigation channel under the provisions of Section 204 of the WRDA of 1986, as amended. Construction of the new navigation channel for the project would be dependent upon the Congressional authorization to pursue this course of action.

Senator Wicker:

11. General, Continuing resolutions have caused issues in our Corps Districts with “shovel ready” projects receiving priority over long-term flood control projects due to Army Corps of Engineer Headquarter guidance. Mobile and Vicksburg Districts in particular are being held hostage to Headquarters rather than having local control over projects under their jurisdiction. In my view, the Districts have a better understanding of the local project sponsors’ needs and could better prioritize various funding requests if they are able to.

As we move later into the current fiscal year, I remain concerned that the same policies will handicap the congressional intent of the Corps’ work plan in Mississippi. Under the current Headquarter guidance, many worthwhile projects that would reduce the risk of flooding to the

people would be left out for FY 17. As Chief, do you intend to manage the additional eight months of funding for FY 17 by imposing the same rules on the Districts as was done in FY 16?

Answer: Senator, I recognize that sometimes the continuing resolution period can be for many months, and that this reduces the time available in the fiscal year for the Corps of Engineers to execute the additional funding added by Congress for ongoing work. In developing the work plan to allocate the additional funding, the Executive Branch evaluates competing investments across the Nation, and seeks to select the investments, wherever they may be located, that maximize benefit to the Nation, consistent with directions provided in Appropriations Committee reports. Focusing the allocation of the added funding on work that can be executed within the fiscal year helps to maximize the benefits from that funding. The allocation process for the added funding does not preclude initiating or continuing long-term investments, provided that there are increments of work that, if funded, can be executed in the applicable fiscal year.

12. General, It has come to my attention that the MAT Sinking Unit's equipment is in need of replacement, which will further impact budget levels under the MR&T Operations and Maintenance Account. How can we work together to fund this worthwhile piece of equipment while not further putting my constituents at risk by using the Operations and Maintenance account which is so vital to the MR&T project?

Answer: The replacement of the Mat Sinking Unit (MSU) is being funded and budgeted through the MR&T's Construction account, and is not competing with MR&T Operation and Maintenance funding – in fact completion of the MSU is likely to reduce long-term O&M costs. A major component of the MR&T's Operation and Maintenance is channel improvement maintenance, which includes placing articulated concrete mat on the river indefinitely.

The risk spectrum for MR&T involves the balance of flood risk management to protect against the project design flood, providing a safe and reliable navigation channel, preserving and restoring natural resources through environmental stewardship, ensuring consistent recreational services to the public, and providing water security for generations to come. If the current MSU has a catastrophic failure and is unable to armor the vulnerable areas of the channel (scour areas), the system will realize significant risks. These risks include levee failures near populous areas, loss of channel alignment at multiple locations, and adverse impacts to navigation. Economic analysis indicates over the next 40 years the new MSU will provide 75% reduction in labor costs; 50% increase in productivity and improved safety; and 10% reduction of fuel consumption, preserving the Corps' ability to maximize risk reduction for the entirety of the MR&T system.

13. General, Since the initiation of the Mississippi River and Tributaries (MR&T) project in 1928, the nation has received a \$45 return for every dollar invested, not including positive environmental impacts. Despite all the benefits and life and safety risks at stake, administrations on both sides of the aisle have consistently underfunded the current capabilities and needs of MR&T. For example,

2015 Request	2015 Approp.	2016 Request	2016 Approp.	2017
Request	2017 Approp.			
\$245,000,000	\$302,000,000	\$225,000,000	\$345,000,000	\$220,000,000
				\$368,000,000

Each year, Congress has seen fit to plus up this essential project for my region of the country out of the Energy and Water funding allocation for the Corps. If we continue to underfund this project at current funding levels of \$300M to \$350M per year - it will take 30 more years to complete and will cost three times the estimated \$7.1B to complete.

Could you please provide our committee with your justification for these drastic reductions in budget requests? At the current pace of funding, what is your estimate on project completion, increased risk to life and property, and total cost? Do you believe the MR&T project should be on the list of infrastructure projects from this administration?

Answer: The annual Civil Works budget includes funds for the highest priority projects within the system for operation and maintenance as well as construction. These activities are in competition with many other worthwhile projects across the Nation for limited Federal resources.

As noted above, the current cost to complete the necessary elements of the MR&T Project to pass the Project Design Flood is estimated at \$7.1 billion. This estimate excludes certain tributary features, as well as the \$10.7 billion Morganza to the Gulf project authorized in WRRDA 2014, nor does it account for any recapitalization costs.

Senator Shelby:

14. The National Water Center in Tuscaloosa, AL serves as the nation's first federal center for researching, forecasting, and responding to water-related natural hazards—including floods, storm surge, and severe droughts. While the Water Center is led by NOAA, it is a collaborative effort between federal agencies, universities, and state entities.

The Federal Emergency Management Agency and United States Geological Survey, among others, have already committed personnel to aid the Center's operational mission. Given the Corps of Engineers expertise and authority in water management and flood risk reduction, the Water Center is a natural fit for the Corps' cooperation and collaboration. It is my understanding that NOAA has attempted to engage the Corps in joining the Water Center, but so far, the Corps has been reluctant to commit.

- a. Lt. General Semonite, do you have any information as to why the Corps has yet to commit personnel to the Water Center?

Answer: The Corps of Engineers has been engaged with NOAA's National Weather Service (NWS) in support of the National Water Center (NWC) at Tuscaloosa since January 2015, prior to its opening. Our senior leadership has been actively engaged for the last four years with NWS

and US Geological Survey (USGS) under the IWRSS (Interagency Water Resources Science and Service) program to advance initiatives of mutual interest. NWS weather forecast and USGS stream gaging program elements are essential and critical for the Corps to accomplish our water management mission. To that end, we have been collaborating with the NWC on weather forecasting, floods, storm surge, and droughts, specifically under the IWRSS program. At this point, an on-site role for Corps personnel at the NWC to directly support our water management mission, which is accomplished at a local and regional level, has not been well defined. However, recently (February 21, 2017), senior leadership from the three agencies (NWS, USGS, and Corps) met to discuss this very subject and developed a path forward.

- b. Can you assure me that the Corps of Engineers will rectify this issue and collaborate with the Water Center to advance the shared mission of addressing critical water-related matters facing our nation?

Answer: I assure you that the Corps has collaborated, and will continue to collaborate, with the NOAA's NWS in support of our shared water mission to benefit our Nation. In fact, some significant initiatives have been already accomplished by this collaboration. Specifically, under the IWRSS program, we prepared and executed two charters: Interoperability and Data Synchronization (IDS), and Flood Inundation Mapping (FIM). All agencies, including the Corps, continue to make good progress on implementation of tasks supporting IDS and FIM, which advance our shared mission. The Corps staff will continue to work closely with the NWC staff for the mutual benefit of our agencies.

Senator INHOFE. Thank you, General Semonite.
 Commissioner Wolf, we will pass over you temporarily and go to Mayor Corbett.

**STATEMENT OF HON. RON CORBETT, MAYOR,
 CEDAR RAPIDS, IOWA**

Mr. CORBETT. Thank you, Chairman Barrasso and Ranking Member Carper, Senator Ernst, Senators and staff members. On behalf of the citizens of Cedar Rapids and the people of eastern Iowa that work every day in Cedar Rapids, thanks for giving us an opportunity to tell our story today.

In June 2008, the Cedar River in Cedar Rapids crested more than 10 feet above any previous flood, at 31 feet. The unthinkable happened. The floodwaters covered 10 square miles, which is 14 percent of our city. 6,865 residential properties, 754 commercial industrial properties, 310 city facilities were damaged, totaling more than \$5.4 billion in losses. The flood devastated our residents, our businesses, our entire community.

But not all was lost. There are two things we didn't lose, Senators. One, we didn't lose any lives. Thanks to our emergency response team and the hundreds of boat rescues, no lives were lost in our community. And if you think about it, in the various disasters in each of your respective States and around the Country, oftentimes, during the news reports of the disaster, included in those reports is the death toll; and in Cedar Rapids no lives were lost. And in some bizarre way, today we feel, 9 years later, the fact that we were so successful in saving lives, that maybe goes against us.

And the second thing that wasn't lost was our will to rebuild our city stronger and better than what it was before the flood.

So as damaging and catastrophic of the 2008 floods, our recovery has been equally impressive by any standard. With your help, through FEMA, HUD, the Justice Department, along with the State and local government, the private sector, the nonprofit sector, the faith community, we began that journey to rebuild Cedar Rapids building by building, house by house, neighborhood by neighborhood. That included our infrastructure of water and sewer. Quite remarkable.

But as we were rebuilding, we always had one eye on the future, and that future meant a permanent flood protection system in Cedar Rapids. That confidence that our business community had and our residents had to reinvest, and the momentum that we have gained, has all been based on having long-term flood protection. So from the beginning we have been working with the Corps, and we were so anxious when the Corps was ready to reveal their plan for Cedar Rapids, only to unveil the plan that protected just one side of the river.

Imagine being a mayor or a resident of a community when you are told you are allowed to protect one side, but the other side isn't. How do you say that lives on one side of your river are worthy, but lives on the other side of the river are not worthy?

I asked why, and they said it is because of the benefit-cost ratio, a formula, some algorithm. Senators, we don't govern Cedar Rapids based on an algorithm. We rejected the benefit-cost ratio and

worked with the State to develop a funding mechanism to protect the west side.

So here we are, 9 years later, finding ourselves again disadvantaged by the benefit-cost ratio. It is based on value of property. And when Cedar Rapids is compared to other communities around the Country, we come up a little shorter because the values in our community or smaller Midwestern States just are not equal to the value in the larger communities.

This past September we had another event. We were able to win this time over the river, so we have evened the score. The river 1, community now 1. But now we know it is not a question of if it will flood again, but when. And we need to have that long-term flood protection for our community, so again, Senators, we seek your help.

Thank you.

[The prepared statement of Mr. Corbett follows:]



Mayor Ron Corbett
Cedar Rapids, Iowa
ron.corbett@cedar-rapids.org
319-286-5051

Chairman Barrasso, Ranking Member Carper, Senator Ernst and members of the Committee, thank you for the opportunity to testify today.

In June 2008, the Cedar River in Cedar Rapids, Iowa crested more than 11 feet above any previous floods at 31 feet. The flood waters covered 10 square miles—14 percent of our city. 6865 residential properties, 754 commercial and industrial properties and 310 City facilities were damaged totaling more than \$5.4 Billion in losses. This flood devastated our residents, businesses and entire community.

The 2008 Flood was catastrophic, but our recovery has been impressive by any standard. We have rebuilt our city facilities, including our City Hall, Central Fire Station, Police Station, Library, and many others. We adopted a flood mitigation plan, raised two bridges, and have also not only rebuilt, but took measures to protect our damaged water system, pumps and waste water facilities. These services are critical to supporting industry in Cedar Rapids. In 2016 we began construction of a levee and pump station that will provide immediate protection for one of our low lying districts, eliminating the need for temporary protection up to a 20 foot crest. When the entire system is completed this levee will protect to the 2008 flood volume. A second pump station is underway and will be completed in 2018. These combined efforts represent a 20 million dollar investment in permanent flood control.

The rebuilding of many city facilities and our plan for permanent flood protection has increased confidence from the business sector. But any financial investment made in the flood impacted area carries a higher risk due to the lack of permanent flood control. This could discourage or limit the amount of future investment in our City. Continued success will depend on us maintaining our momentum and avoiding losses from future flood events. Federal funding for flood mitigation is critical to maintain and grow the economy of Cedar Rapids.

The current Benefit Cost Ratio used to appropriate funding puts Cedar Rapids—and mid-west cities like us— at an extreme disadvantage. The BCR Risk formula favors higher valued properties outside of the mid-west. We believe the BCR should consider adjusting for property values of similar structures to account for this discrepancy.

Just this past September, our community once again faced a record high flood event. During that flood fight, the City spent over \$10 million on temporary flood protection measures. Our business community reported a loss of over \$27 million. This didn't include costs from some of our largest employers. We provided you with a copy of this report, which clearly outlines the enormous impact these flood events have on our business community.

If a flood happens in Cedar Rapids again, will our businesses be able to recover? The BCR formula should take into account a community's tolerance for such an event. Cedar Rapids is the second largest economic generator in Iowa, making our recovery critical not only for the City's survival but also for the State of Iowa. Quaker Oats, one of the largest food suppliers in our country is located in Cedar Rapids right near the river within our flood zone. If they flood again, we stand to lose this large industry, not just from the State of Iowa, but potentially from the country.

Despite experiencing the two largest recorded flood events in our City's history within just eight years, this recent flood did not increase our Benefit Cost Ratio by any meaningful amount. FEMA provided \$643 million in disaster recovery aid to our community for the 2008 flood, and will likely provide millions more for our 2016 flooding. How many more times will we have to receive millions in recovery aid before we finally receive funding for permanent protection that will eliminate the need for recovery funding?

Cedar Rapids has not been sitting back waiting for federal help. We have secured State and local funding, and have begun moving forward to protect our city. We are asking the Federal Government to step in and provide the remaining \$78 million needed to build a complete flood mitigation system to protect the City of Cedar Rapids.

Thank you.

Cedar Rapids Industry Impact Fact Sheet

- Breakfast cereal manufacturers in Cedar Rapids, Iowa produce **13%** of total U.S. output.¹
- Wet corn milling in Cedar Rapids, Iowa accounts for **8%** of U.S. domestic ethanol production.²
- Cedar Rapids based industry produces almost **6%** of U.S. manufactured search, detection, and navigation instruments.³
- The amount of packaging machinery manufactured in Cedar Rapids accounts for **1.5%** U.S. production totals annually.⁴
- Industry based in Cedar Rapids manufactures **1%** of US copper rolling, drawing, extruding and alloy related products in the United States.⁵
- The quantity of corn processed each year in Cedar Rapids exceeds the size of the domestic corn crop of Canada, the Republic of South Africa, or the Russian Federation.⁶
- In 2014, the amount of ethanol produced in Cedar Rapids, Iowa was greater than the total quantity manufactured in Canada or the People's Republic of China.⁷
- Worker productivity per employee in Cedar Rapids is **29%** higher than the United States national average.⁸
- Industry in Cedar Rapids, Iowa processes as much as **19%** of the global oat crop in value added manufacturing per year.⁹
- Cedar Rapids maintains the highest ranking in Human Capital and Knowledge Creation of any metropolitan area in Iowa.¹⁰
- Ethanol production in Cedar Rapids yields a quantity of Distillers Dry Grains (DDGs) equal to about 20% of annual U.S. exports.¹¹

¹ Cedar Rapids Economic Development Services (September, 2016). *Linn County, Iowa Industrial Output as Percent Share of Total United States Industrial Production*.

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ Cedar Rapids Economic Development Services. (December, 2016). *USDA Foreign Agricultural Service: Corn Production Statistics*. [Retrieved online.](#)

⁷ Cedar Rapids Economic Development Services. (December, 2016). *US Department of Energy, Alternative Fuels Data Center: World Fuel Ethanol Production by Country or Region 2015*. [Retrieved online.](#)

⁸ Cedar Rapids Economic Development Services. (July, 2016). *Workforce Productivity Analysis*.

⁹ Cedar Rapids Economic Development Services. (December, 2016).

¹⁰ Economic Development Administration. (December, 2016). *Innovation Index 2.0*. Retrieved online.

¹¹ Cedar Rapids Economic Development Services (December, 2016). *US Grains Council Website*. [Retrieved online.](#)

Senator BARRASSO.

[Presiding.] Well, thank you very much, Mayor Corbett.

You may have noticed people are coming and going. We are in the middle of two votes, so we will continue to come back and forth.

At this time, though, I would like to turn to Commissioner Terry Wolf, who is Chairman of the Washakie County Commission in Worland, Wyoming. He is a former member of the Wyoming Army National Guard, has a degree in administration of justice from the University of Wyoming.

Commissioner Wolf moved back to Worland in 1995 to work in the oil and gas industry. Upon transitioning out of the National Guard, Commissioner Wolf ran for a seat on the Washakie County Commission, was sworn into office January 2003. He was past President of the Wyoming County Commissioners Association, currently Vice President of the Wyoming Association of County Officers. Also serves on the National Association of Counties Public Land Steering Committee, and during his 15 years as a county commissioner he has represented the county as a Federal cooperating agency on the Big Horn National Forest Plan revision and the Big Horn Basin BLM Resource Management Plan revision.

So I want to welcome you to the Committee, Commissioner Wolf. I want to thank you for agreeing to testify here today. I see you have a number of other commissioners from the State of Wyoming who are here to cheer you on, and I see Pete Obermueller here, who is also the Executive Director of the Wyoming County Commission Association.

Commissioner WOLF.

STATEMENT OF HON. TERRY WOLF, CHAIRMAN, WASHAKIE COUNTY COMMISSIONERS, WYOMING

Mr. WOLF. Good morning, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee. Thank you for the opportunity to speak today. My name is Terry Wolf. I am the Chairman of the Board of County Commissioners in Washakie County, Wyoming. Washakie County is located in rural northwest Wyoming, with an annual revenue of only \$8 million. It is the third poorest county in Wyoming. Washakie is one of four counties in the Big Horn Basin. You can find a map in Appendix A in my written testimony. This area of Wyoming is well known for its sugar beets that are grown and processed into pure U.S.-made sugar for consumption. The high yield of agriculture production is dependent upon the Big Horn River.

Unfortunately, this same river that brings so much life also brings destruction to our communities in the spring when ice blocks the size of trucks and weighing up to 300,000 pounds jam up and block the flow of the river. The ice jams push the water over the banks and into the communities in Worland, Manderson, Basin, and Greybull, flooding homes and businesses and threatening the sugar processing plant that I already mentioned.

Mr. Chairman, I want to direct your attention to the before and after photos on the easel of the flooding that occurred in Worland on February 11th of this year. In the before photos you can see, in the foreground, an island in the middle of the river that was formed from sediment buildup over the course of years. In the after

photos you get a clear picture of the ice blocks creating a dam at that island and causing the flooding.

Over the course of a week, city, county, State officials, the Wyoming National Guard, and numerous volunteers worked tirelessly to protect public and private property and critical infrastructure threatened by the flood. We are still evaluating total cost to our communities in damage cleanup, but estimates will likely exceed \$150,000.

While this flood is heartbreaking by itself, what is important for the Committee to know is what happened in Worland a couple weeks ago is almost identical to the flooding in 2014. That same island gathered and held ice blocks and pushed over the Big Horn River into Worland, costing State and local governments nearly \$200,000 in recovery costs. For a rural county like Washakie, these costs are difficult to bear.

For a clear picture of the sediment buildup on this island, I direct your attention to the next aerial photos that show the 20-year span of buildup on that island. We at the local level must confront this issue because the exact same flooding is likely to occur year after year, depending on the severity of the winter. Following the 2014 flood, we pursued the possibility of removing the island. Initial estimates at the time indicated that the removal of 1.7 acres of area at a depth of at least 5 feet, requiring 1,700 truckloads would ensure free-flowing passage of ice blocks.

While a project like this is very small for an agency like the Army Corps, it is much too large for a community as small as ours to tackle on our own. Section 205 of the Flood Control Act of 1948 authorizes the Army Corps of Engineers to partner with local and State agencies on small damage reduction projects not specifically authorized by Congress. While we initially pursued a Section 205 project in 2015, we backed off after inquiries uncovered the likelihood of difficult and expensive bureaucratic hurdles and the potential of more stringent environmental permits to remove the sediment island.

Additionally, while the Federal share of costs associated with these small projects is significant, we were concerned that the local share was still much more than the rural agricultural-based county could meet. Finally, it appeared that the Army Corps simply hadn't used the Section 205 program for ice jams to the extent it had for other more traditional flood damage control measures in other areas of the Country and, therefore, may not have believed it had the flexibility necessary to deal effectively with the problem.

With that in mind, we were pleased to see Congress include language specific to ice jams in the Water Infrastructure Improvement Act for the Nation, passed just 2 months ago, in December 2016. That language requires that the Corps identify and carry out not fewer than 10 projects to demonstrate technologies and designs developed to prevent and mitigate flood damages associated with ice jams.

Removal of the island appears to be the solution to our flooding in Worland, but at the local level we are flexible enough to explore other options if the Army Corps is flexible enough to make use of this new language to research and explore cost-effective technologies to mitigate what is likely to be a repeated disaster in our

area. We remain concerned about the monetary and human capital costs associated with these projects. However, Washakie County stands ready to work alongside the Army Corps of Engineers on any viable and cost-effective solution for the protection of our community. We hope that Washakie County and the Big Horn River will be among the first of the cold region pilot projects.

Seasonal runoff or unique weather events are things over which we have no control, but floods caused by ice jams and a sediment island in the Big Horn River is something we can control with the Assistance of the Army Corps of Engineers. I am here to ask both the Corps and for your help to ensure that, as you move forward with funding infrastructure projects of great importance to the Nation, you do not forget about these small projects in rural areas that are of critical importance to our local communities.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Wolf follows:]

**Testimony of the Honorable Terrence D. Wolf
Chairman, Washakie County Board of County Commissioners and;
Past President, Wyoming County Commissioners Association**

**United States Senate Committee on Environment and Public Works Hearing on
“Flood Control Infrastructure: Safety Questions Raised by Current Events”
March 1, 2017**

Good morning Chairman Barrasso, Ranking Member Carper, and distinguished members of the committee. Thank you for the opportunity to speak to you today about a very local flood control challenge my small community has faced over the last several years.

My name is Terry Wolf, I am the Chairman of the Board of County Commissioners in Washakie County, Wyoming. Washakie County is located in rural northwest Wyoming, and with annual revenue of only \$8 million it is the third poorest county in Wyoming. Washakie is one of four counties in the Big Horn Basin. It is a semi-arid basin nestled between mountain ranges that is prime agricultural land. This area of Wyoming is well known for its sugar beets that are grown and processed into pure, U.S. made sugar for consumption. The high yield of agricultural production is dependent upon the Big Horn River that flows south to north out of Wind River Canyon through our basin.

Unfortunately, this same river that brings so much life also brings destruction to our communities in the spring when ice blocks the size of trucks and weighing up to 300,000 pounds jam up and block the flow of the river. The ice jams push the water over the banks and into the communities of Worland, Manderson, Basin, and Greybull, flooding homes and businesses and threatening the sugar processing plant I’ve already mentioned.

Mr. Chairman, I want to direct your attention to Appendix B at the end of my written testimony. Appendix B shows before and after photos of the flooding that occurred in Worland on February 11th of this year. In the before photos you can see in the foreground an island in the middle of the river that has formed from sediment buildup over the course of years. In the after photos you get a clear picture of the ice blocks creating a dam at that island and causing the flooding. There is a fantastic high definition drone video available here of the flood as it is occurring at this link: <https://www.youtube.com/watch?v=ZK9OaoVR6nY>.

Over the course of the week city, county, and state officials, the Wyoming National Guard, and numerous volunteers worked tirelessly to protect public and private property. Critical infrastructure threatened by the flood includes US Hwy 20, BNSF railroad, and critical energy and communications infrastructure. We are still evaluating the total costs to our communities in damage and clean-up costs, but estimates of state and local costs will likely exceed \$150,000.

While this flood is heartbreaking by itself, what is important for the Committee to know is that what happened in Worland a couple weeks ago is almost identical to the flooding in 2014. That same island gathered and held ice blocks and pushed the Big Horn River into Worland costing state and local governments nearly \$200,000 in recovery costs. For a rural county like Washakie, these costs are difficult to bear.

For a clear picture of the sediment build-up on this island I direct your attention to the aerial photos in Appendix C that show the 20-year build-up of that island. We at the local level must confront this issue or the exact same flooding is likely to occur year after year depending on the severity of the winter. Following the 2014 flood we pursued the possibility of removing the island. Initial estimates at the time indicated that removal of about 1.7 acres of area at a depth of at least 5 feet, requiring about 1,700 truckloads would ensure free-flowing passage of ice blocks.

While a project like this is very small for an agency like the Army Corps, it is much too large for a community as small as ours to tackle on our own. Section 205 of the Flood Control Act of 1948 authorizes the Army Corps of Engineers to partner with local and state agencies on small flood damage reduction projects not specifically authorized by Congress. While we initially pursued a Section 205 project in 2015, we backed off after inquiries uncovered the likelihood of difficult and expensive bureaucratic hurdles, and the potential of more stringent and expensive environmental permits to remove the sediment island. Additionally, while the federal share of costs associated with these small projects is significant, we were concerned that the local share was still more than a rural agricultural-based county could meet. Finally, it appeared that the Army Corps simply hadn't used the Section 205 program for ice jams to the extent it had for other, more traditional flood damage control measures in other areas of the country and therefore may not have believed it had the flexibility necessary to deal effectively with the problem.

With that in mind we were pleased to see Congress include language specific to ice jams in the Water Infrastructure Improvements Act for the Nation, passed just two months ago, in December of 2016. Specifically:

SEC. 1150. ICE JAM PREVENTION AND MITIGATION.

(a) IN GENERAL.—The Secretary may carry out projects under section 205 of the Flood Control Act of 1948 (33 U.S.C. 701s), including planning, design, construction, and monitoring of structural and nonstructural technologies and measures, for preventing and mitigating flood damages associated with ice jams.

(b) INCLUSION.—The projects described in subsection (a) may include the development and demonstration of cost-effective technologies and designs developed in consultation with—

- (1) the Cold Regions Research and Engineering Laboratory of the Corps of Engineers;*
- (2) universities;*
- (3) Federal, State, and local agencies; and*
- (4) private organizations.*

(c) PILOT PROGRAM.—

(1) IN GENERAL.—During fiscal years 2017 through 2022, the Secretary shall identify and carry out not fewer than 10 projects under this section to demonstrate technologies and designs developed in accordance with this section.

(2) PROJECT SELECTION.—The Secretary shall ensure that the projects are selected from all cold regions of the United States, including the Upper Missouri River Basin and the Northeast.

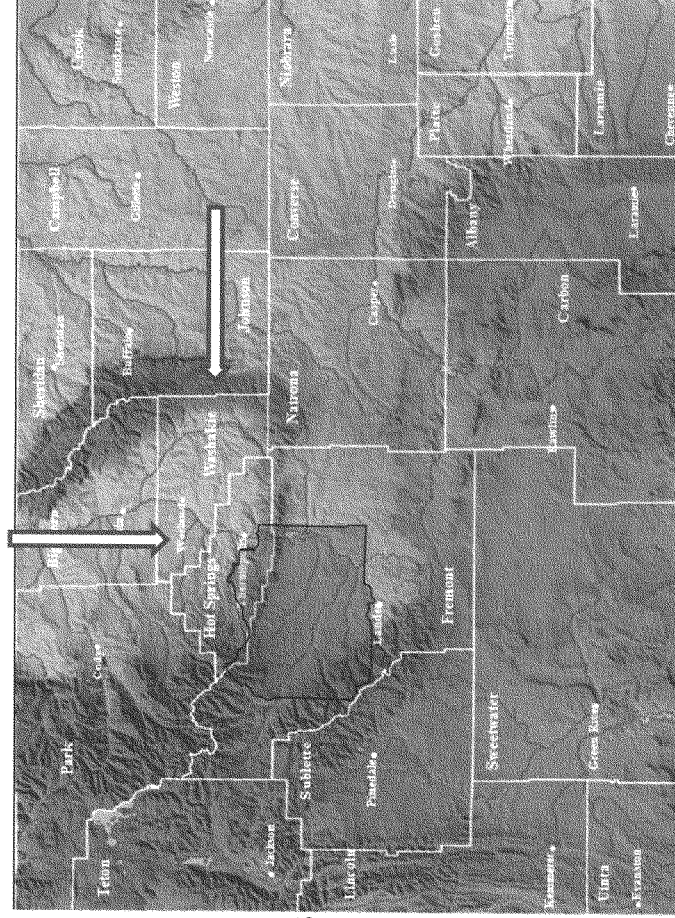
Removal of the island appears to be the solution to our flooding in Worland, but at the local level we are flexible enough to explore other options if the Army Corps is flexible enough to make use of this new language to research and explore cost effective technologies to mitigate what is likely to be a repeated disaster in our area. We remain concerned about the monetary and human capital costs associated with these projects. However, Washakie County stands ready to work alongside the Army Corps of Engineers on any viable and cost-effective solution for the protection of our community. We hope that Washakie County and the Big Horn River will be among the first of the cold region pilot projects.

Seasonal runoff or unique weather events are things over which we have no control, but the floods caused by ice jams and a sediment island in the Big Horn River is something we can control with assistance from the Army Corps of Engineers. I am here to ask for both the Corps and your help to ensure that as you move forward with funding infrastructure projects of great importance to the nation, that you do not forget these small projects in rural areas that are of critical importance to our local communities.

Thank you, Mr. Chairman.

Appendix A - Map

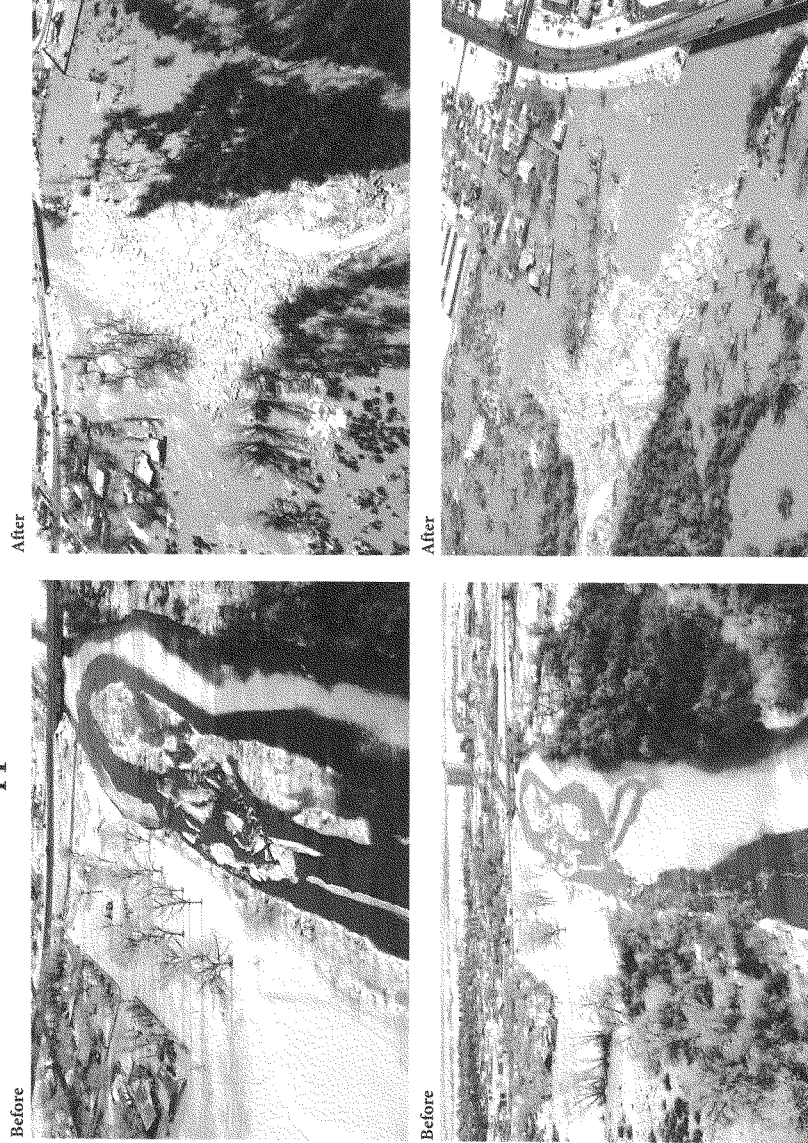
Washakie County, Wyoming



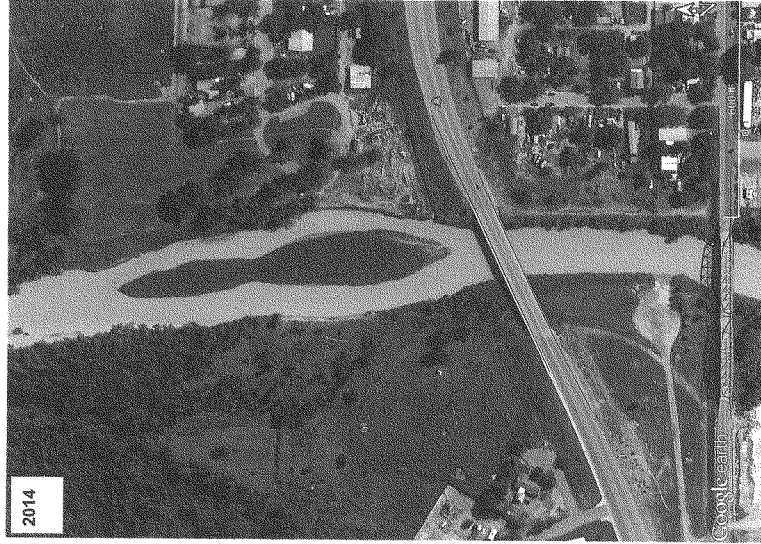
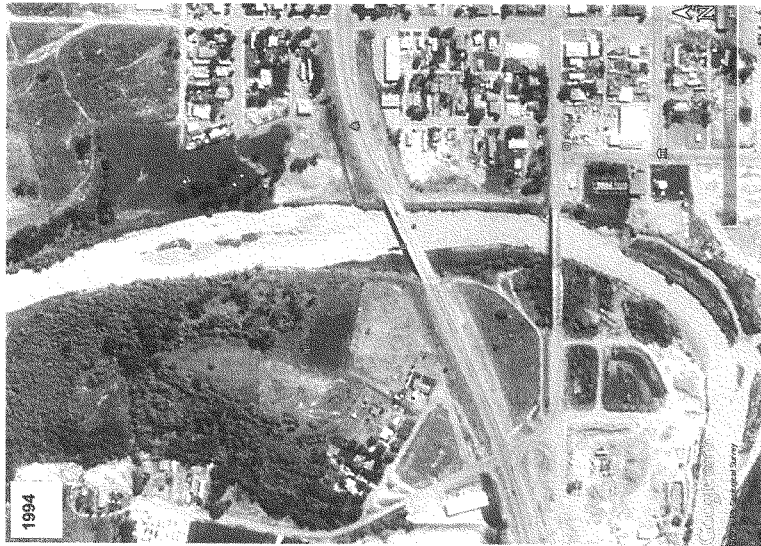
Location:
North
Central
Wyoming

Worland sits
directly on
the Bighorn
River

Appendix B - 2017 Worland Flood



Appendix C - Worland Sediment Island



Senator BARRASSO. Well, thank you so much, Commissioner Wolf. We look forward to questions.

If we could turn now to Secretary John Laird. Mr. Secretary.

STATEMENT OF SECRETARY JOHN LAIRD, DEPUTY SECRETARY FOR EXTERNAL AFFAIRS, CALIFORNIA NATURAL RESOURCES AGENCY

Mr. LAIRD. Thank you very much, Mr. Chairman, and also Ranking Member Carper, Senator Harris, and members of the Committee. On behalf of the State of California and Governor Brown, I thank you for the opportunity to provide testimony before this Committee at this particularly vital time on our issues.

As you know, our Nation's aging infrastructure is at a crossroads. One path is characterized by inaction, putting human lives, our natural resources, and the economy at risk; another path is shaped by deliberative policies, meaningful investment, coordination across all levels of government, and the incorporation of new science that can provide multiple benefits to common outcomes. Right now California approaches this situation with a sense of urgency.

Droughts and floods have always driven the evolution and growth of California water policy investment and scientific/technical understanding. This year is no different.

But after 5 years of the driest seasons in modern times, California is now in the midst of what is likely to be the wettest season on record, in the history of recordkeeping in California. This just demonstrates that California has the most variable weather of any State in the Nation and often depends on the bounty of just four or five storms per season to support our water system.

The number, size, and severity of storms this water year has strained the State's flood control and water management infrastructure, forcing evacuations, damaging roads, destroying homes, communities, and livelihoods. It is estimated that damage to California's highways alone from the storms this year is \$595 million thus far.

Most dramatically, damage to the main spillway on the Oroville Dam, the second largest reservoir in California, and, as the Chair said in his opening comments, the largest dam in the Nation, serves as the keystone of the California water project, and it was observed on February 7th by water managers. Damage to the main spillway and rapid erosion of the emergency spillway led to the emergency evacuation of nearly 200,000 downstream residents in Yuba, Sutter, and Butte Counties.

With crews working around the clock, the danger has since passed and residents have returned home. The reservoir remains, right now, at least 50 feet below the capacity level, and repairs continue as dam operators plan for an extended flood season due to an extremely high snowpack.

Over the last decade alone, over \$11 billion has been spent by Federal, State, and local agencies in California on flood control projects. California's extraordinary response to this year's storms was only possible due to local, State, and Federal cooperation and significant prior investments.

California has the leading dam safety program in the Nation, as recognized in a peer review by the Association of State Dam Safety Officials. But we can and must always do better.

This event has drawn much needed attention to the age, condition, maintenance, and financial needs of California and the Nation's flood control and water management systems. We should use the opportunity that is presented by this situation to invest in existing infrastructure and fund innovative projects that leverage science to meet the challenge of extreme weather and variable precipitation, and accomplish multiple benefits and goals within the investment.

While we welcome the partnership, California is not waiting for the Federal Government alone to meet this urgent need and real opportunity. As a first step, last Friday, Governor Brown redirected \$50 million from the State's General Fund and requested a \$387 million Proposition 1 appropriation from the State legislature to fund near-term flood control and emergency response actions.

To complement the immediate actions of our State agencies, as Secretary of Natural Resources, I have requested the following actions from our partner Federal agencies: that we expand inspection and review of all federally owned dams in California and parallel to California's efforts; to update the Federal operating manuals for key California reservoirs. It is imperative to revise these manuals to reflect current scientific knowledge. The Corps needs to be fully funded to complete these updates or allow non-Federal authorities to finance the work. My letter asked that we fund the recently enacted Water Infrastructure Improvements for the Nation Act, which authorizes a program for rehabilitation of high hazard dams at FEMA. Also, prioritize the publication of the program's rules to assist California and other States in this rehabilitation effort.

So we have an opportunity and we really look forward to working with our Federal partners, and I look forward to being able to answer questions.

[The prepared statement of Mr. Laird follows:]

**Prepared Testimony of John Laird, Secretary
Natural Resources Agency
State of California**

before the

**Committee on Environment and Public Work
United States Senate**

Oversight Hearing on “Flood Control Infrastructure: Safety Questions Raised by Current Events”

March 1, 2017

Good morning Chairman Barasso, Ranking Member Carper, Senator Harris, and members of the Committee. On behalf of the state of California, Governor Brown, and over 16,000 dedicated state employees of the 25 departments, conservancies, and commissions that comprise the California Natural Resources Agency, I thank you for the opportunity to provide testimony before this Committee on a critical and timely topic.

As you know, our nation’s aging infrastructure is at a crossroads. One path is characterized by continued inaction; insufficient funding; a lack of local, state, and federal cooperation; and further deterioration, putting human lives, our natural resources, and economy at risk. Another path is shaped by deliberative policies, meaningful investment, coordination across all levels of government, and the incorporation of new science that can provide multiple benefits to common outcomes. California approaches this situation with a sense of urgency. I hope my testimony helps provide some insight into California’s flood control and water infrastructure systems, answers questions raised, and contributes constructively as Congress considers how best to address the nation’s significant infrastructure needs and the safety of our citizens.

Current Events

Droughts and floods have always driven the evolution and growth of California water policy, investment, and scientific/technical understanding. This year is no different.

After five years of severe drought, California is in the midst of what is likely to be the wettest water year (Oct-Sept) on record. Severe winter storms—powered by atmospheric rivers—have brought torrential amounts of rain and significant snow to the state, particularly in the Northern Sierra (fig. 1). On satellite images the aptly named ribbons of moisture are fed by warm equatorial waters (fig. 2) and stream into the state with the equivalent of 7.5-15 times the rate of water at the mouth of the Mississippi River. California often receives a significant amount of its yearly precipitation from a handful of these weather events. But their number, size, and severity this water year has strained the state’s flood control and water management infrastructure; forcing evacuations, damaging roads, destroying homes, communities, and livelihoods.

Impacts to California are ongoing, and a myriad of local and state agencies are at this moment working to address emergency needs, battling swollen rivers, surveying troubled levees, and making necessary repairs. It’s estimated that damage to California’s highways alone from storms this year is over \$595 million so far. In San Jose, 50,000 residents had to be evacuated as the worst flooding in a century there inundated neighborhoods when local dam releases overwhelmed a creek’s capacity.

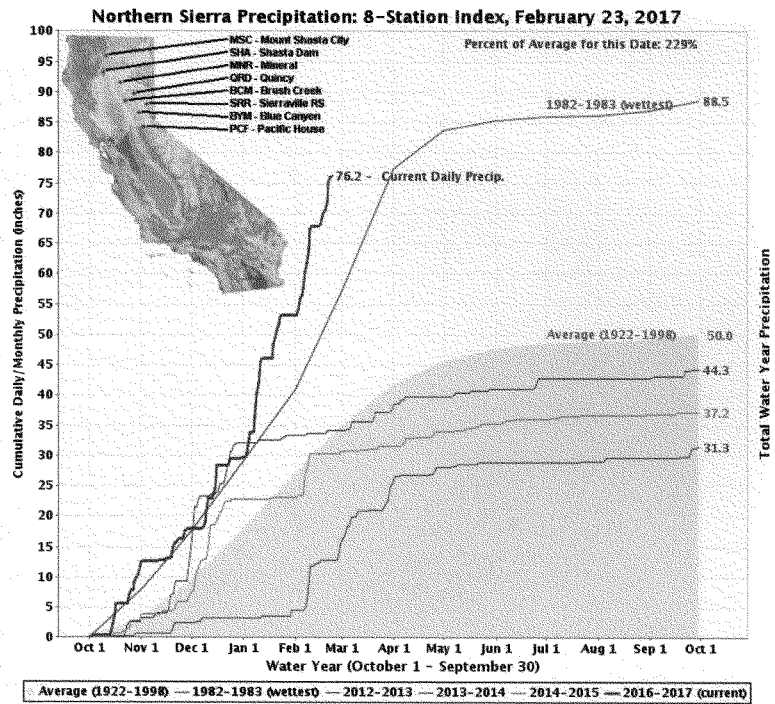


fig. 1

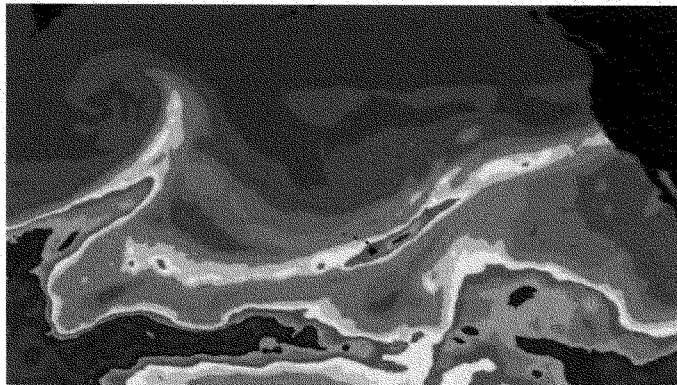


fig. 2

Most dramatically, damage to the main spillway on Oroville Dam—the tallest dam in the United States and the second largest reservoir in California that serves as the keystone of the State Water Project—was observed on February 7th by water managers. The damage diminished the capacity for safe reservoir releases, and relentless inflows from storms continued to fill the lake. These conditions led to the use of the dam's emergency spillway for the first time since the project was completed in 1968. Significant erosion of the emergency spillway began to occur as water flowed over the feature, though it was working as designed and engineered to prevent overtopping and damage to the dam itself. Yet, the possibility of the emergency spillway's rapid failure if the erosion continued warranted the emergency evacuation of nearly 200,000 downstream residents in Yuba, Sutter and Butte counties.

In an effort to prevent catastrophe, dam operators made a critical trade-off and drastically increased releases through the damaged main spillway, knowing that further deterioration of the spillway would occur with months of use still needed through the season. While there was additional damage to the main spillway, and the situation is ongoing, the spillway is holding up to intense use. After a three-day mandatory evacuation, residents were allowed to return to their homes on February 14. With the reservoir's water level now 50 feet below the emergency spillway, the immediate danger has passed. The situation has stabilized, but the emergency conditions and heightened awareness remain. Crews have been working around the clock, pouring tons of rock and concrete to fill erosion and secure the emergency spillway in case it needs to be used again. Dam operators are managing the reservoir's elevation to well below the top of the emergency spillway and balancing inflow and releases to remain prepared for future storms and the melting of the heavy snowpack that remains higher in the watershed. Debris removal operations at the base of the main spillway and dam are also under way in order to restore the function of the hydroelectric plant and its outlets. [\(fig 3\)](#)

California continues to prioritize the protection of human life, public safety, and property, while preparing for the possibility of additional severe winter storms. Local, state, and federal communication, coordination, and resources have benefited from critical investments and planning in previous years. Over the last decade alone over \$11 billion has been spent by federal, state and local agencies in California on flood control projects. And experience battling California's cyclical floods has developed critical expertise in our community's flood managers, scientists, engineers and emergency responders. The request and granting of a major federal disaster declaration for affected counties was important, and augments local and state resources overwhelmed by the scale of the storms, emergency response activities and costs for recovery. California's extraordinary response to this year's storms was only possible due to local, state and federal cooperation, and significant prior investments in the state's water, flood control, safety and emergency response systems.

California's dam safety program, one of the oldest in the nation, came into being after the 1928 collapse of the St. Francis Dam, which killed more than 450 people. The program is widely recognized as the best in the nation. But we can and must always do better. While the exact cause and circumstances that led to the damage to Oroville's main spillway are yet unknown, this event has drawn needed attention to the age, condition, maintenance and financial needs of California and the nation's flood control and water management systems. Critically, we must not simply view infrastructure through the lens of single purpose, single function undertakings, but instead should use the opportunity to fund innovative projects that leverage science to meet the challenge of extreme weather and variable precipitation, and accomplish multiple benefits and goals with the investment.

Bolstering Dam Safety and Immediate Investments in Water Infrastructure

While we welcome the partnership, California is not waiting for the federal government to alone meet this urgent need and real opportunity. As a first step, last Friday, Governor Brown redirected \$50 million from the state's General Fund and requested a \$387 million Proposition 1 appropriation from the state Legislature to fund near-term flood control and emergency response actions. In 2014, more than 67 percent of voters statewide passed Proposition 1. This \$7.5 billion water bond was put on the ballot through a bipartisan effort in the state Legislature that involved only two "no" votes. Proposition 1 advances the [California Water Action Plan](#), the five-year blueprint of near- and long-term actions pursued by the Brown Administration in order to create more resilient, reliable water systems and to restore important ecosystems. If the Legislature grants the Governor's requests on General Fund and Proposition 1 spending, California will be set to invest \$1.2 billion over the next two years in multi-benefit projects.

While California already boasts a model dam safety program, Governor Brown has proposed the passage of state legislation that would additionally direct the California Department of Water Resources (DWR) Division of Safety of Dams to require the owners of all 1,250 dams under its jurisdiction to complete an emergency action plan that is updated every ten years (subject to exemption by DWR for smaller, low risk dams) and to map inundation zones every ten years or sooner if local development patterns change. The Governor also proposes to require the DWR to identify additional scenarios beyond a complete dam failure that warrant separate inundation maps and to provide supplemental appropriations totaling \$7.5 million to forward fund the necessary staffing to do immediate, more extensive evaluations of dams and their ancillary components.

These investments are an important start, but more is needed to satisfy the \$50 billion in flood project needs statewide that DWR and the U.S. Army Corps of Engineers estimate exist.

To complement the immediate actions of our state agencies, as Secretary of Natural Resources, I have requested the following actions from our partner federal agencies:

- Expand inspection and review of all federally-owned dams in California. The inspections should parallel state efforts, including review of ancillary structures such as spillways.
- Update the federal operating manuals for key California reservoirs. It is imperative to revise these manuals to reflect current scientific knowledge. The Corps needs to be fully funded to complete these updates or allow non-federal authorities to finance this work.
- Fund the recently enacted Water Infrastructure Improvements for the Nation Act, which authorizes a program for rehabilitation of high hazard dams at the Federal Emergency Management Agency. Also, prioritize the publication of the programs rules to assist California and other states in this rehabilitation effort.

Understanding California's Flood Control/Water Infrastructure

"Flooding in the midst of drought is likely... Nothing focuses Californians' attention on our water resources like the extremes of flood and drought." — California Water Action Plan 2016 Update

Through five years of historic drought in California, thousands of rural drinking water wells went dry from groundwater depletion, urban and agricultural water deliveries were reduced or eliminated,

streams and rivers dwindled, fish and wildlife populations declined, and millions of trees died and fed catastrophic forest fires. This year's change in hydrology is welcome, but it presents its own set of difficult, yet related, challenges.

The dramatic shift from drought to deluge is a familiar pattern for Californians, and one that has shaped the development of our state and its water infrastructure.

No other state in the nation has a more varied and uncertain climate and hydrology than California (fig. 4). That variability in precipitation extends within the water year (Oct-Sept), between water years, and also to the geographic distribution of precipitation. The vast majority of California's snow and rain falls on the northern and eastern parts of the state during the winter months, with vast stretches of its southeast corner a hydrologic desert. While nearly two-thirds of the state's precipitation falls in the north and on the eastern slope of our state, the majority of Californians – who represent nearly 1 in 12 Americans – live far to the south and west.. Much of that precipitation falls on and along the Cascade range and the Sierra Nevada range as moisture-rich storms are forced up its slopes, condense, and shed their cargo as rain or snow. The Sierra Nevada snowpack acts as the state's largest natural reservoir, accumulating vast amounts of precipitation through the winter, and melting during the warm dry spring and summer months.

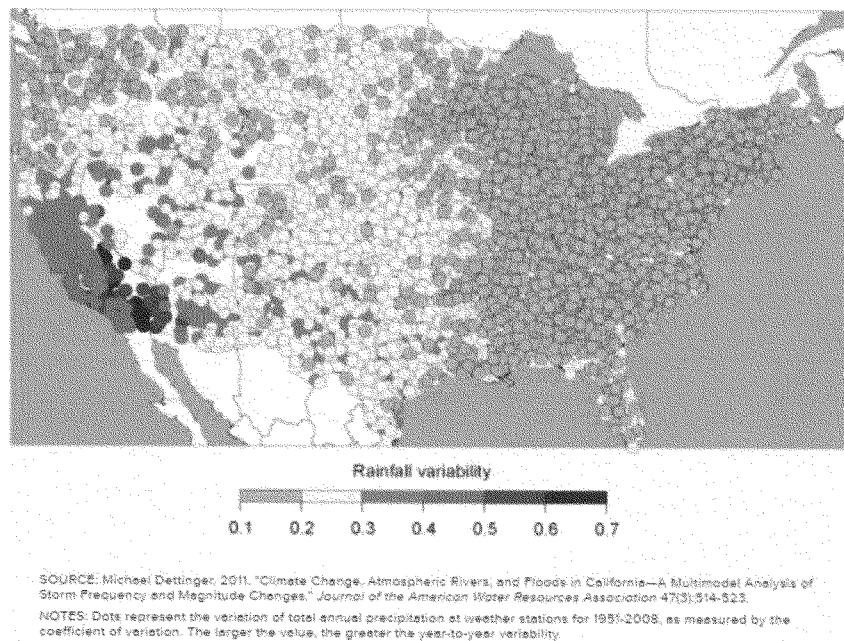


fig. 4

Before California was settled by westerners, the cycles of dry and wet periods that dominate California's hydrology fed and shrank vast wetlands that covered the Great Central Valley and the Sacramento-San Joaquin River Delta (Delta), and would fill Lake Tulare at the southern end of the San Joaquin Valley—once the largest lake west of the Mississippi. The discovery of gold in California in 1849 changed California's landscape forever. The Gold Rush ushered in settlers and miners who set to work building hundreds of miles of flumes and ditches to divert water so it could be used to sluice out gold. In the following years, as the precious metal became more difficult to find, miners turned to farming, spurring significant levee construction in the Central Valley, San Francisco Bay, and Delta as land was reclaimed for cultivation. And local water systems were first built in the early part of the 20th century to bring water to cities that were developing into booming metropolitan centers like San Francisco and Los Angeles. From the 1920's through the 1950's, the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation ushered in an era of significant federal investment in California water conservation, water supply, flood management and wildlife protection projects. And it was the construction of the Bureau of Reclamation's Central Valley Project, originally a project by the state of California before the Great Depression hit, and California's development of the State Water Project in the 1960's, that time capped the most ambitious and expansive water system in the world. (fig. 5)

Californians today are the inheritors of a water system born from the necessity of building certainty into California's hydrologic variability. Now, our state population is growing. Our hydrology and climate are changing. Our infrastructure is aging. As the assumptions and understandings of the earlier eras give way to better science, advances in technology, and new understandings, the limitations of today's failing water infrastructure means we must invest in the infrastructure of tomorrow.

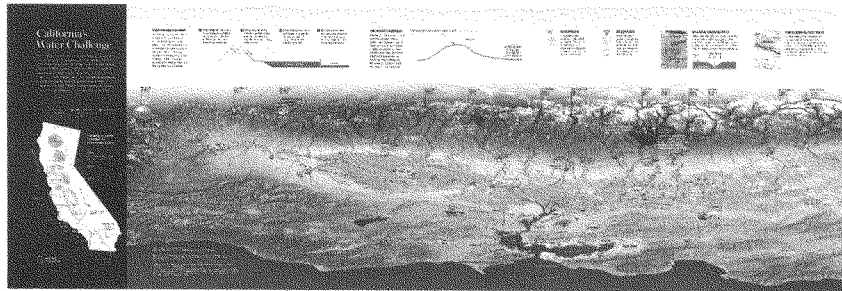


fig. 5

Senate Environment and Public Works Committee
Hearing entitled, "Flood Control Infrastructure: Safety Questions Raised by Current
Events"
March 1, 2017
Questions for the Record for Secretary John Laird

Chairman Barrasso:

1. Mr. Laird, in a letter dated February 24, 2017, the National Marine Fisheries Service ("NMFS") suggests the safety of California citizens comes second to reducing temporary impacts to endangered fish under the Endangered Species Act. The letter makes clear that NMFS thinks California should delay repairs to the Oroville Dam, to reduce water levels slowly. NMFS also thinks that reductions in water flows should occur only at night – so California workers have to do spillway repairs in the dark as well as in the water.

The letter goes on to recommend that California:

- "Deploy as many people as possible to survey and respond to fish stranding. . ."
- "implement fish rescues as possible"
- "Put boats, equipment, and people on the river to survey for fish stranded in pools."
- "In the case of fish rescues the numbers and species of fish should be identified and pictures taken."

This letter appears to suggest that NMFS thinks you should use more people to rescue fish than you use to repair the dam. Despite all these and other demands, the California Department of Water Resources stopped the flow of water on Monday, February 27, 2017.

Are you concerned that the state is now open to a lawsuit under the ESA for not following NMFS recommendations?

Secretary John Laird response:

No. In fact, the California Department of Water Resources was implementing many of the recommendations before it even received NMFS's letter. Throughout this process, the Department of Water Resources has been working closely with the California Department of Fish and Wildlife and with NMFS and other federal regulatory agencies to ensure that the critical work of repairing the spillway to protect Californians moves forward as expeditiously as possible, while at the same time protecting our vulnerable fish populations. And while the safety of the people below the dam will remain our top priority, with the cooperative approach of the regulatory agencies to date (as demonstrated by NMFS's follow up letter dated February 28, 2017), we do not anticipate having to choose between protecting human health and safety and compliance with environmental regulations.

Ranking Member Carper:*Better Coordination*

2. Three years ago, California developed a comprehensive water action plan to address both short- and long-term needs. In developing and implementing this plan, California must have learned some important lessons that could be applicable to what we are experiencing across the nation. A wise man once said, if you want to go fast, go alone, but if you want to go far, go together. When it comes to infrastructure, I think we can go further together. What are the funding and programmatic gaps that California identified that could be filled by the federal government?

Secretary John Laird response:

At Governor Brown's direction, the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture developed an action plan toward achieving water sustainability. Released in early 2014, the California Water Action Plan detailed the policy, program, and funding steps required to get there. In 2016, we updated the California Water Action Plan to reflect progress we have made and to incorporate several additional goals. Fundamental to the drafting and implementation of our action plan has been the importance of partnerships. Coordination and alignment of objectives is critical, but even more important is the sharing of interest in the outcomes. We know that when all stakeholders see benefits, the work of project and policy implementation moves ahead. We agree with you that "going together" provides the strongest footing in this journey toward sustainability.

Significant infrastructure investments are needed across the water sector to achieve sustainability. This begins with "green infrastructure" improvements in our upper watersheds. California state law now recognizes the forests and meadows of our upper watersheds to be part of our water infrastructure system, key to water supply, flood management, and ecosystem health. Continued and expanded Federal investment in healthy forest and watershed initiatives would complement California's work in these regions. Further down the watershed, flood management infrastructure is vital to protecting human health and safety, as well as property assets worth hundreds of billions of dollars. Continued and expanded commitments from the U.S. Army Corps of Engineers to strengthen levees, expand flood bypasses, and restore related floodplains would help us address current deficiencies and prepare for climate-driven changes in hydrology. Continued and expanded Federal assistance with local agency financing of water supply infrastructure is also needed. Several Federal programs provide low or no-interest loans to help public water agencies make needed capital investments; these programs should be continued and expanded where possible. Federal programs aimed at expanding and improving wastewater treatment and recycled water distribution systems will help keep our waterways clean and provide new sources of useable water, providing drought-proof strategies currently under-utilized across the state.

Flexibilities

3. Since states are the primary authority for allocating, administering, protecting, and developing water resources, what can federal agencies do to act on flood control infrastructure needs aside from providing more funding, especially as we continue to see extreme weather and variability in water the supply?

Are there flexibilities or program changes that the federal government could implement that would be helpful to you?

Secretary John Laird response:

While increased and adequate funding is certainly a significant part of addressing the flood control and water infrastructure needs in our state and nation, changes to and greater coordination of existing authorities and resources can also be of great benefit.

Because spending, oversight, and programs that intersect with water supply and flood control management are spread between numerous federal agencies (U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Department of Agriculture, U.S. Environmental Protection Agency, etc.) reforms that allow agencies to better align goals and priorities with local and state government at a watershed scale can improve the efficacy of efforts to address our challenges.

There is a significant and widely-recognized need for flood damage reduction projects to be conducted on a system/watershed basis to maximize effectiveness, reduce costs, avoid delays, and unite federal, state, and local resources. California fully supports implementation of watershed-based flood risk planning and budgeting. Augmenting the ability of the Corps to lead the development of a more programmatic approach to water resources management at the federal level is essential to our continued federal, state, and local coordination.

Additionally, incorporating new scientific and technical understandings and tools can improve outcomes and goals in both current and new or proposed infrastructure projects. The clearest example being the update of flood control manuals by the U.S. Army Corps of Engineers, which absent the appropriation of resources to update them, should at least be allowed to be funded by state or local entities.

California's multi-purpose reservoirs are tasked with providing flood protection, water supply, supporting ecosystem function and health, and affording recreational opportunities. Facilities with flood control responsibilities are governed by a water-control manual that specifies calendar-based storage limits to facilitate flood management. This has worked historically with an abundant snowpack providing a natural reservoir backstop for water supply and ecosystem services. Recent dry years and record warming, and this year's floods, have given a glimpse of a future when the snowpack will be variable, limited or non-existent. The current collection of water control manuals are based on historical hydrology and technology and limit the functional operation of reservoir facilities to meet the myriad of resource management demands. The forecast informed and coordinated reservoir operations program offers an opportunity to improve supply reliability and ecosystem service without compromising flood protection by incorporating

modern forecasting and management technologies. Federal support for these efforts will enable California and other states, particularly in the West, to advance this important adaptation strategy for water management in a changing climate.

Senator BARRASSO. Thank you very much for being with us and for sharing your insight, Secretary Laird.

Mr. LARSON.

**STATEMENT OF LARRY A. LARSON, P.E., CFM, DIRECTOR
EMERITUS/SENIOR POLICY ADVISOR, ASSOCIATION OF
STATE FLOODPLAIN MANAGERS INC., WISCONSIN**

Mr. LARSON. Thank you, Chairman Barrasso, Ranking Member Carper, and the rest of the Committee staff.

I have been working in the water resources profession for 55 years. In fact, my first job out of engineering school was to work for the California DWR on the State water project, which, as you know, the Oroville Dam is the key.

I also, for 25 years, ran the dam safety program and the floodplain management program in the State of Wisconsin.

The Association of State Floodplain Managers represents 17,000 professionals across the Nation who manage flood risks to reduce flood losses every day. This includes both structural and non-structural approaches, such as land use, building permits, community planning, mapping, stormwater management, and the rest. We have been very concerned about the status of the Nation's flood risk management infrastructure, and in light of the ever-increasing rainfall intensity we get even more worried.

Some of our major concerns include this. Flood damages in the Nation are really unknown. We don't know how much floods cost us every year. That is a real problem.

Flood mapping. In order for communities and States to effectively manage flood risk, they need flood maps, and good flood maps. Of the 3.5 million miles of rivers and coastlines in the United States, the NFIP has mapped about 1.5 of them, and only half of that has a 100-year flood elevation that they need to regulate properties.

The NFIP maps are the base flood maps used by all those 22,000 communities, all the States, and all the Federal agencies. They may build off of them, but they start with them.

The NFIP now has a good process for mapping and could map all communities in the Nation in 12 years if fully funded as authorized.

Topography is also key. The USGS has a digital elevation program called 3DEP, and they, if funded, can do the mapping for the Nation in the next 8 years.

Residual risk mapping. One of the key areas this Nation has ignored is residual risk, below dams and behind levees, areas that will flood when structures either overtop or fail. However, even if dam failure maps are available, Federal Government policy is not to release the maps to the public. We don't quite understand that. No one knows how the risk is if they are in a risk zone. It is not appropriate that they find that out at 2 a.m., when law enforcement knocks on their door and says you have to leave. We must figure out how to solve that problem.

And we must be forward-thinking on national standards. We need standards for dams and levees both. You in Congress have set up programs in the Corps to develop levee standard and FEMA to develop dam standards. Neither of those are funded, however, and we must get on with that.

Add to this low standard the fact that we have mapped and built flood infrastructure to yesterday's flood, and not tomorrow's flood, I am pleased to hear that I think California is doing more of that all the time, and the rest of us need to do that too. We need to figure out how to keep those low hazard dams from becoming high hazard dams because development occurs downstream. There are a couple of States that have figured that out, and we need to do it nationally.

We are pleased to see the Congress and Administration looking at the issue of infrastructure, but our experience shows that financial incentives are very difficult to apply to these projects versus other kinds of projects. Private financing will not suffice. We are going to have substantial Federal investment in this, as well as State and local investment.

Private investors tell us that they need national standards to ensure that what they are funding, or might fund, is designed, constructed, operated, and maintained to appropriate national standards. Investments should look beyond structural flood control. Non-structural projects, stormwater management, green infrastructure, nature-based approaches are appropriate.

Funding should also serve to help build State capability. You realize only the States have the authority to oversee private dams and levees. The Federal Government cannot tell a private dam or levee owner to fix a dam or fix a levee; the States have that authority, if they use it. I have run programs that do have that.

You set up some process in WIIN to build State capability in dams, but that must be funded to get underway. It is a smart investment of taxpayer money.

In conclusion, the U.S. is facing a substantial need to repair and upgrade, and sometimes remove, our flood control structure. If you simply appropriated the programs you have already authorized in the flood risk management program, the 3DEP, the national levee safety program, the national dam safety program, we would make a big step. The threatened failure of Oroville Dam and the actual failure of 80 dams in South Carolina in the past 2 years points out that we have a public wake-up call.

Thank you very much.

[The prepared statement of Mr. Larson follows:]



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Larry A. Larson, P.E., CFM

TESTIMONY

**Flood Control Infrastructure: Safety Questions Raised by
Current Events**

Before the
Senate Committee on Environment and Public Works

By
Larry A. Larson, CFM, P.E.
Director Emeritus

Association of State Floodplain Managers

March 1, 2017

Introduction

The Association of State Floodplain Managers (ASFPM) is pleased to participate in this hearing about flood risk management and the safety of our nation's flood control infrastructure. We appreciate the opportunity to discuss our views and recommendations for improvement and for implementation of comprehensive flood risk management. We thank you, Chairman Barrasso, Ranking Member Carper and members of the Committee for your interest in this subject that has recently vividly presented itself as a problem.

ASFPM and its 36 chapters represent more than 17,000 state and local officials, as well as private sector and other professionals engaged in all aspects of structural and nonstructural flood risk management. This includes floodplain management and flood hazard mitigation, management of local floodplain ordinances, flood risk mapping, engineering, planning, community development, hydrology, forecasting, emergency response, water resources development and flood insurance. All ASFPM members are concerned with reducing our nation's flood-related losses. For more information on the association, its 14 policy committees and chapters, visit www.floods.org.

The extreme flooding in West Virginia, Louisiana, Missouri, South Carolina and California vividly illustrates the potential threat to public safety of inadequately maintained infrastructure, limitations of engineered flood control structures, the importance of public awareness of potential flooding and challenges of a changing climate. Dramatic rainfall events have led to failures of numerous smaller high hazard dams – notably 80 dam failures in South Carolina just in 2015 and 2016. The problem exists nationwide and we have received a wake-up call. Much of our infrastructure has exceeded its originally intended design life, which requires assessment, remediation or replacement.

One of the key issues the nation has chosen to ignore is the issue of residual risk. We have trillions of dollars of investment in this nation protected in some fashion by flood control infrastructure. We have seen in New Orleans and most recently in northern California the dramatic impacts failure or the threat of failure might bring. The failure consequences in New Orleans were dramatic and perhaps we were not far from a failure in northern California that would have immediate flooding consequences for tens of thousands of people and left the state's water supply vulnerable to severe shortage. Yet when FEMA attempts to show these residual risks on maps, they are overridden by concerns about releasing security information, even though nature continues to fail dams and levees each year while we have seen none of that from terrorists. When people mention that residual risk flood insurance is a good idea, they are shouted down for suggesting people are even at risk. Due to aging infrastructure, underfunded maintenance, significant development and population (and hence rapidly escalating risk) within "protected" areas, and finally an uncertain understanding of flood risk in the future due to climate, our nation and citizens perhaps have never been more at risk than they are today, and it will only be worse tomorrow.

As the nation considers substantial investment in infrastructure, the undertaking must involve attention to flood control structures and their maintenance, upgrading and repair as well as conscious integration

with non-structural flood risk management techniques. These flood threats to public safety cannot be met by private financing alone, but will continue to require substantial federal investment.

Mapping of flood risk areas is woefully incomplete and requires a major commitment of resources to assure the availability of reliable, accurate flood risk information. ASFPM has estimated a further investment of \$4.5 billion to \$7.5 billion is needed to provide maps for every community in the nation that would cover all unmapped areas and to update existing, but very outdated maps.

The ongoing use of the 100-year event as the basis for both insurance risk and infrastructure design is placing communities at risk, especially when we consider the very real changes in future conditions that will occur from land use change and climate. We see many instances where protection of property with levees based on the 100-year standard means that we free up land for development that will be at risk to people and to the federal taxpayers.

Overview of Managing Flood Risk in America

Flooding is the most costly and most frequent cause of disasters in America. Flood damage has cost the nation's taxpayers more than \$200 billion since 2005. We are seeing years with up to 14 separate billion dollar disasters, 85-90% of them from flooding. The recent and ongoing flooding in California is an example we can learn from, even though California probably manages flood risk better than most states in the nation.

The U.S. has a varied history of how we manage flood risk. Until the early 20th Century, managing flood risk was handled by local governments or private property owners. During this period, Congress authorized the Corps of Engineers to construct levees in Sacramento and on the Mississippi River.

The Corps' role expanded greatly with the devastating 1927 flood on the Ohio and Mississippi Rivers that saw hundreds of miles of levees overtopped and thousands of people in the lower Mississippi River basin displaced. Congress authorized a plan to provide flood protections from Cairo, Illinois to the Gulf of Mexico called the Mississippi River and Tributaries (MR&T) project. The Corps constructed a couple thousand miles of levees and included a number of relief outlets along the route to divert extreme flood flows into backwater areas to relieve pressure on the levees to prevent levee failure. The Corps purchased flowage easements in those overflow areas to allow them to be occasionally flooded. For example, the Birds point (opened in 1937) and New Madrid Floodway (opened 2011) to save the levees downstream. Other by-pass systems exist on the MR&T to utilize the approach the Dutch call "Room for Rivers." In other words, we accept that Mother Nature can always throw a larger flood at us than we can afford to design. So instead we can plan for emergency overflow areas that allow the river to flow into historical floodplain areas where damage is limited. These by-pass areas can be used for lower damage activities like farming that will not experience long-term damage from occasional flooding. Surprisingly, this approach is seldom used in the U.S., but MR&T and the Yolo by-pass on the Sacramento River are two successful examples.

In the 1936 Flood Control Act, Congress authorized the Corps to construct levees and other flood control structures. Most of the projects were only constructed by the Corps after a non-federal sponsor stepped up to acquire the right-of-way and promise to operate and maintain (O&M) the project after it was constructed. Since 1986, the non-federal sponsor must also cost share the construction, usually 35% of the cost. Unfortunately, many of those non-federal sponsors did not perform the necessary O&M and the “protected” populations cannot be assured the structures will protect them during flooding to the design level of protection. The Corps has a program called Rehabilitation and Inspection (RIP) in PL 84-99 that allows the Corps to come in and repair a levee that has been damaged or fails in a flood, at either 100% or 80% federal taxpayer cost. Concern has been expressed that some non-federal sponsors put off needed O&M, hoping the Corps will do some of that work under PL 84-99 after the levee is damaged.

In the 1950s and 1960s, visionaries like Gilbert F. White were proposing a new approach to managing flood risk: that is to adjust where and how people build instead of adjusting our rivers and ecosystems. The NFIP was designed to do that and ensure people living at risk paid at least some part of the cost of that risk. The NFIP would map the flood risk areas and make flood insurance available, and in return communities and states would guide new development and redevelopment to be less at risk. While the concept of that program makes sense, some elements, like subsidized flood insurance and its approach to managing average events (only the 100-year flood, but not extreme events) have led to a \$24.6 billion program deficit. Most of this debt comes from extreme flooding events, such as Hurricanes Katrina, Rita, Wilma, Irene and Sandy, and the rainfalls that are becoming more extreme and frequent in the last decade, such as the one in Baton Rouge just recently.

The NFIP is the nation’s primary flood risk reduction tool. The program helps to identify and map flood hazard areas, assess flood risk, implement strong land use and building standards to prevent future disaster losses, and undertake mitigation to reduce damage to older at-risk buildings. Other agencies like the Corps, USGS, NOAA and others work with the NFIP to collect and develop data and integrate federal actions. The adoption of floodplain management standards by more than 22,000 NFIP participating communities results in \$1.7 billion in flood losses avoided every year according to FEMA data. The mitigation programs within the NFIP, Increased Cost of Compliance (ICC) and Flood Mitigation Assistance (FMA) have mitigated, on average, 1,850 buildings annually between 2010 and 2014. The NFIP is not an insurance program; rather it is a comprehensive flood risk reduction program that happens to also sell flood insurance as one of its tools.

Many federal agencies are involved in managing flood risk, and many programs promote using nature to reduce flooding. Examples include the conservation programs in USDA, coastal management programs in NOAA and water quality/stormwater programs in EPA. Agencies like HUD and DOT recognize the advantage of building in a way that will ensure housing, bridges and roads that are safe and resilient now and in the future.

In the past 30 years there has been a trend toward using more nature-based or nonstructural approaches. Important advantages of this trend are that communities and states can implement these approaches on their own due to smaller costs and the ability to integrate them into holistic approaches

that address more than just flood loss reduction. Especially important are social issues, local economic issues and long-term environmental considerations that are attractive to local residents and tourists.

Managing flood risk in the rest of this century

For decades, floodplain managers have been studying and seeing how flood risks change over time. When a watershed develops, unless there are sufficient land use and design standards in place, downstream flooding often gets worse due to a watershed that is “hardened” with more concrete and other impervious surfaces. Because we have not mapped dam failure inundation areas, inadvertent development downstream of dams results in a formerly low hazard dam becoming a high hazard dam, triggering necessary – but costly – upgrades to the dam. Intense development in vacant lands protected by levees greatly increases the risks associated with catastrophic failure; yet we have no national levee design standards. All of these development related concerns are challenges for managing flood risk.

Perhaps a more significant challenge is the impact of climate change. The fact is, today, we are seeing flooded roads in residential subdivisions during regular high tide, storm drains flowing backwards, and buildings that are islands along our coasts. This is not a theoretical or abstract “what might happen” scenario; rather local floodplain managers are dealing with the conditions as they are happening today and those conditions are getting worse. In addition to sea level rise projections that are getting higher as we better understand the causal factors including the melting of the Greenland ice sheet, we are also witnessing more intense rainfall and extreme flood events in several areas of the nation. ASFPM is trying to do its part by assisting communities in preparing for these conditions. One project we have underway right now is to identify and mainstream techniques for incorporating future conditions into local capital improvement planning (CIP) so communities can account for the full costs and potential impacts of hundreds of billions of dollars in infrastructure investment along the coasts over the next several decades.

Investing in America’s Flood Risk Reduction Infrastructure

We are keenly aware of the alarming state of infrastructure overall in this nation pointed out by the Report Card put out by the American Society of Civil Engineers—much flood control infrastructure is a “D”. We are reminded of this problem every day when we use our roads, bridges and public transportation or drink water and use the bathroom. ASFPM is pleased that Congress and the Administration are contemplating a significant infrastructure investment package. ASFPM strongly recommends that a priority be placed on America’s flood risk reduction infrastructure. This infrastructure includes the following types of projects:

- Data (mapping, topography)
- Stormwater management
- Dams
- Nonstructural flood mitigation
- Levees

Investment in these types of projects should be guided by the following principles:

- *Greater incorporation of nature based approaches.* Sometimes, a nature based approach is an effective alternative to a more traditional structural approach. However, far more often nature based approaches can be effectively incorporated into a flood risk reduction project to bring additional benefits to the community as well as the environment. For example, in Hamilton City, California a setback levee project is allowing for the reconnection and restoration of over 1,300 acres of floodplain riparian habitat. Making “room for the river” in this way reduced the construction cost of the levee and made the project cost-effective.
- *Account for future conditions and build in resiliency.* Flood risk changes over time. Given that our infrastructure projects are often nursed long past their expected design life, standards applied to infrastructure development must include full accounting of future conditions, as reasonably and scientifically possible. Otherwise, the federal taxpayer will be on the hook again and again for flood damage that repeats over and over. A basic resiliency standard that would be easily applied is a flood protection level that is at least 2 feet above (3 feet above for critical facilities) the existing 100-year flood elevation where appropriate. Critical facilities need added protection because they must be operational and accessible during major flood events.
- *No adverse impacts.* A basic legal principle in America is that one property owner cannot do something on their property that will adversely impact another person’s property. Sometimes this legal principle has been ignored when building flood control structures. There are illustrations that property owners are seeing those impacts. For example, in floods along the Mississippi River, which splits Illinois and Missouri, property owners in one state attempt to breach the levee on the other state to relieve the pressure on their own levee. For structural projects like levees, these can have adverse impacts not only across the river, but also on properties upstream or downstream. It is important that all flood mitigation activities ensure the activity does not impact other properties or that the impact has been mitigated financially or by some other means.

Financing vs. Funding

We are pleased to see the strong discussion on the need for investing in repairing and improving that infrastructure, but our experience does not show that financing alone (i.e., private-public-partnerships (P3)) is a path to success. We believe there needs to be real dollar investments of taxpayer funding to save our crumbling infrastructure. Current taxpayers benefit, so we should not pass this cost to future generations.

In conversations we have had with large global capital investors, they indicate a hesitancy to invest in infrastructure like levees. They say it’s because they have no way to determine if the levee is designed, constructed, operated or maintained to quality standards or if it will withstand expected future conditions. They indicate that if adequate national standards existed, and they were assured these kinds of projects meet all those standards, and that the owner has an assured source of revenue to pay off loans, they could be a partner. Similarly, a P3 roundtable hosted by USEPA in 2012 found that while P3

arrangements are somewhat common with some forms of water infrastructure (drinking water and wastewater systems), to help finance the construction, retrofit and/or operations of such systems they are essentially non-existent for urban stormwater retrofits, which is another kind of flood risk management infrastructure. The report noted that the P3 model is highly complex, needing expertise in contracting at the public level and is not a panacea for all types of infrastructure. So while financing is one tool in the toolbox, it is a minor one as applied to flood risk management infrastructure. Funding is a much more immediate and widespread need and a more successful tool.

What is included in infrastructure? While most consider any public transportation systems or water and sewer systems might be appropriate, we would urge all federal taxpayer investments in those or other systems must account for future conditions expected during the lifetime of that infrastructure. It will be costly enough to do this once. We cannot afford to rebuild that infrastructure time and again because we did not take into account expected sea level rise, future watershed development that increases runoff and floods, or predictable increased rainfall that creates the kind of extreme flood events we have seen in the last decade.

Furthermore, if any of this infrastructure is privately owned, the federal taxpayer investment must be tailored to provide only partial funding, and only then if it is conditioned on verifiable future funding by the responsible entity.

- **For the infrastructure package under consideration by the Administration and Congress, ASPFM recommends robust funding of infrastructure in addition to any financing incentives**

Data Infrastructure

Fundamental to any flood risk reduction infrastructure is data to understand how floods may occur (flood studies), where floods will impact people and property (topography and flood maps) and how any new infrastructure (both large flood control structures and smaller, non-structural measures) affects flooding. The data is important for the purposes of flood preparedness, response, recovery and mitigation. While significant investments have been made to better understand flooding and map such areas, we have a long way to go to identify all flood risks and how they will impact people and property.

Acquiring LiDAR Topography for the Entire Nation

One program ASPFM wishes to highlight is the 3D Digital Elevation Program (3DEP) at USGS. The primary goal of 3DEP is to systematically collect enhanced elevation data in the form of high-quality light detection and ranging (LiDAR) for the nation. With better topography, FEMA flood map updates could take much less time, flood maps would be far more precise, and flood forecasts can be more accurate and timely. Beyond flood, LiDAR based topography is helpful for infrastructure project planning of other hazards as well. For example, 3DEP data was used to discover a surface rupture along the Tacoma fault in the State of Washington. This discovery led to a redesign of the structural elements of a \$735 million suspension bridge across the Tacoma Narrows, to mitigate against potential catastrophic failure.

- **ASFPM recommends completion of the 3DEP Program for the nation in 8 years by providing the necessary funding to accomplish that goal**

Mapping All Flood Risks for the Entire Nation

Communities and citizens need maps showing where and to what extent an area will flood. This is needed by the community to help direct new development and plan for notification and evacuation when it floods, and to inform property owners of their level of risk. This enables them to decide if and how to build, whether to buy flood insurance and how to evacuate when needed. Banks and real estate agents need that data so they can advise prospective buyers.

The NFIP has mapped about 1/6 of the nation's 3.5 million river and coastal miles. Most of those maps were completed where people already live in order to determine flood insurance rates. What are the aspects of flood mapping that need improvement?

- Map ahead of development so people and property are protected. Often people are surprised when they build, and then are told later that they are in a floodplain. That means we need to map cornfields and cow pastures because that is the land that will be developed next
- We must map residual risk areas, like dam failure zones and levee failure zones. People need to know they are living or buying in a residual risk area so they are not surprised when told to suddenly evacuate and they know where to go. NFIP maps do not show these failure zones because DHS has a fear terrorists will blow up dams! The actual probability of this occurring is very low; in the meantime, nature is failing dams every year and people have lost or may lose their lives and property. In just the last two years, South Carolina alone has had 80 dam failures due to back to back flooding events.
- Flood maps must be publically available. Unfortunately, most federal dam failure and inundation maps of emergency or uncontrolled spillway releases are classified as For Official Use Only (FOUO – see the Corps of Engineers Letter at the end of this testimony). While it is useful for the emergency manager to know the dam or levee failure zone, citizens who live there also need to know so they can take appropriate risk reduction actions (such as plan for evacuations or purchase flood insurance). It is almost unthinkable that the first time a citizen knows they are at risk is when law enforcement knocks on their door at 2 a.m. and tells them they have to evacuate NOW.
- The NFIP finally has a good process to acquire LiDAR for topography and updated computer modeling techniques to produce accurate flood mapping. What it lacks is financial resources and direction from Congress to get every one of the 22,000 NFIP communities an updated and accurate map in the next 10 years. A recent national survey by ASFPM of local floodplain managers indicates that the number one tool/data need is updated flood maps.
- Consideration of major infrastructure investment—public and private—highlights the urgency of providing accurate flood risk data and accelerating the pace of current mapping work at FEMA and the LiDAR data collection work at USGS.

ASFPM's *Flood Mapping for the Nation Report* estimates that the cost to provide flood mapping for the entire country will be between \$4.5 billion and \$7.5 billion.

- **ASFPM recommends full funding (to the authorized amount) for FEMA to implement the National Flood Mapping Program and complete flood mapping for the entire nation in 12 years**
- **ASFPM recommends that dam failure and inundation maps from emergency or uncontrolled spillway releases be publically available and no longer be classified as FOUO**

Dam Infrastructure

There are 90,580 dams in the nation, and about 3,300 of them are considered major dams (50-feet deep and store 5,000 acre-feet of water or a dam of any height with storage of 25,000 acre-feet). An acre-foot of water is enough for two families for an entire year. By 2025, 70% of the dams in the U.S. will be more than 50 years old, which is one reason ASCE gave U.S. dams a grade of "D" in 2013. Dams are classified by the hazard they present if they fail. A dam is classified "high hazard" if it is likely a person could die if the dam fails. As our population grows and development continues, the overall number of high-hazard potential (HHP) dams increases, with the number climbing to nearly 15,500 in 2016. Due to the lack of investment, the number of deficient high-hazard potential dams has also climbed to an estimated 2,170 or more. The Association of State Dam Safety Officials estimates it will require an investment of nearly \$22 billion to repair aging, yet critical, high-hazard potential dams.

The federal government has built many dams and is responsible to maintain the ones it owns. While the federal portfolio is relatively small in number, it contains many of the most important and largest dams in the nation. FEMA and the Corps also have an inventory of dams in the U.S. called the National Inventory of Dams. Federal agencies suffer for lack of financial resources to maintain their dams, just as other owners do.

There are no national standards for the design, construction, operation and maintenance of dams and levees in the U.S. Different federal agencies may use the standards the Corps uses for its own dams or levees, but there is no agreed upon national standards. This practice must not continue.

ASFPM applauds Congress for creating a national dam grant program in FEMA in the 2016 WINN Act/WRDA to provide grants for the repair or removal of small dams. That program was also wisely designed to integrate such activities with ongoing local hazard mitigation planning and flood risk reduction programs and act as an incentive for states to maintain strong state dam safety programs. However, it has not been funded.

- **ASFPM recommends fully funding to the dam repair/removal program to its fully authorized limit**

Levee Infrastructure

The Corps of Engineers levee inventory seems to show about 2,000 miles of levees owned and maintained by the Corps; 12,000 miles of levees owned and maintained by non-federal entities that are in the Corps PL 84-99 program; and perhaps as many as 30,000-35,000 total miles of levees. FEMA coordinates its information of levees with the Corps, so those levees are included in these numbers. There are many small levees built by private owners to reduce flooding of agriculture lands, but there may now be people living behind those levees thinking they are somehow protected. There are also miles of levees with no known owner.

The ongoing use of the 100-year event as the basis for insurance risk and infrastructure design is placing communities at risk, especially when we consider the very real changes in future conditions that will occur from land use change and climate. We see many instances where protection of property with levees based on the 100-year standard means that we free up land for development that will be at risk from flooding in events that exceed the project design standard and often to depths of flooding that are greater than they would have been without the protection measure. A good example of this is leveed areas that receive overtopping upstream and fill the interior area like a bathtub to depths greater than would have been experienced without the levee system.

Congress created a National Levee Safety Program in the 2014 WRRDA. In that program, the Corps, in addition to a national inventory of levees, is to establish a Levee Safety Committee of national experts to work with the Corps, states and other federal agencies to establish national standards for design, construction, operation and maintenance of levees. This is an important first step, but it has not been funded. These standards must also take into account the population and land use in the residual risk areas to establish standards for public notification of risk and for emergency action plans. The nation is losing valuable time to get this effort of establishing standards underway.

Then national levee design standards must include design planned failure sections into the levee or overflow areas such as that employed in MR&T. Most countries utilize this approach, but in this nation we have not, meaning that any levee failure is likely to become catastrophic because everything in the failure zone is not designed for flooding, so it is extensively damaged. This and other forms of resilience in structural measures, such as designing for future conditions are critically important standards.

- **ASFFPM recommends immediate and full funding of the National Levee Safety Program at The Corps of Engineers**
- **ASFFPM recommends that the national levee safety standards include programmed resiliency for all levees (such as failure sections), standards for managing land use and residual risk for areas protected by levees and areas subject to flooding if a levee fails, and a minimum protection standard of the 500-year flood or probable maximum flood for all levees protecting populated areas**

State Role in Dam and Levee Safety

Only states have the authority to enforce dam and levee standards directing owners to repair or remove non-federal dams or levees. The Corps and other federal agencies must operate and maintain the dams they own, but have no authority to force other entities to properly build or maintain those dams. There are some effective state dam safety programs, but all states need such programs.

The National Dam Safety Program in FEMA has been successful in assisting states set priorities for increasing the number of dam inspections and developing Emergency Action Plans. ASDSO indicates annual inspection percentages for high hazard dams have been near 100% for the past several years. Those inspections have shown that many dams are deficient and need repair, upgrading or removal. Funding for rehabilitation/removal of high hazard dams is often necessary to assist dam owners in making these necessary public safety upgrades.

The emergency action plans (EAP) percentage for state-regulated high hazard dams has reached 78%, a significant improvement from less than half about 10 years ago. Important work remains. The incident at Oroville Dam in California illustrates the importance of a strong EAP to help protect people in situations when operation of a dam does not go as planned. The NDSP has developed tools that provide low-cost alternatives to states and dam owners in the development of EAPs and also supported training on EAPs and dam safety emergency preparedness for dam owners, regulators and local officials.

Full funding of the NDSP is important to public safety to help ensure continued progress in inspection and identification of deficient dams and in the development of EAPs.

States should get credit for effective dam and levee safety programs under any disaster deductible that is being discussed as part of the Disaster Relief Act aimed at reducing federal disaster costs. Effective state dam safety and levee safety programs definitely reduce the cost and need for federal disaster declarations. Those state programs can be evaluated to provide credit for those that reduce risk of failure to the structure itself, and even more credit for those that address the flood risk associated with the residual risk failure zones.

- **ASFPM recommends that Congress fully fund the National Dam Safety Program to its authorized level**
- **ASFPM recommends Congress develop incentives for the creation of state laws that make inundation maps publically available and that address land use downstream of dams to prevent the intensification of downstream risk similar to the laws in Virginia and Wisconsin**

Appropriate Federal Role with Regard to Dams and Levees

The federal government has a role to help develop and oversee national standards and to provide technical assistance for the proper design, construction, operation and maintenance of dams and levees. Maintaining an inventory of dams and levees at the national level is a key data need.

We see that maintaining a structure like a dam or levee is so important, yet there is a huge failure to do that effectively by non-federal owners/sponsors nationally. This demonstrates that we should only permit dams and levees that are owned by an entity that has taxing authority and to obtain bonds or other assurances at the time of permitting to ensure that O&M and emergency repairs will be done. The federal taxpayer should not be responsible for repairing these structures if the owner/sponsor fails to do what they promised.

Stormwater Management Infrastructure

Stormwater is the accumulation of water from rainfall that is not from the overflow of streams or rivers. Most communities have stormwater systems that funnel water into pipes and usually into water bodies like rivers or streams. Managing stormwater is one of the biggest and most expensive problems facing cities across the nation. Damage due to urban stormwater flooding is increasing significantly. Consider that in Illinois and Michigan, the most costly flood events were urban stormwater events in the greater Chicago and greater Detroit areas (which is amazing in Illinois given past floods along the Mississippi River that runs along the entire western border of the state). The majority of flood insurance claims in the Chicago metro area are stormwater related. The EPA estimates funding needs for stormwater management and projects to correct sewers that overflow is in excess of \$100 billion over the next 20 years.

Stormwater management infrastructure was initially developed to satisfy water quality standards and reduce pollutant loads. However, it also can reduce or increase flood risk. If undersized (as many old systems are) the stormwater management infrastructure can exacerbate flooding. However, with consideration of an area's flood potential stormwater management infrastructure can be designed to have co-benefits that improve water quality and reduce flooding impacts. Further, stormwater management infrastructure is often categorized as gray or green. "Traditional" gray stormwater infrastructure consists of engineered structures such as pipes, storm drains and concrete paved channels. Green infrastructure harnesses the power of nature to contain some of the initial runoff and includes things like permeable pavement, bio-swales, green streets, stormwater parks, etc. Green infrastructure can be paired with grey infrastructure to effectively meet a community's water quality goals and flood loss reduction goals. For example, with green infrastructure, demand on the existing gray infrastructure is reduced thereby raising the capacity of the gray systems.

Too often, stormwater programs and floodplain management programs are not integrated, even at the local level. This may be partly due to the programs coming to the local community in separate stovepipes—stormwater from EPA focused on water quality and flooding concerns focused on water quantity from either FEMA or USACE. An example of this disconnect is that the NFIP will provide flood insurance for stormwater flooding, but it does not map these risk areas or require communities to ensure development in them is properly protected.

- **ASFPM supports USEPAs ongoing leadership in developing tools and data as it relates to stormwater management, green infrastructure and flood loss reduction**

- **USEPA, USACE and FEMA should collaborate to address the disconnect between water quality and quantity that results in exacerbating current problems for one while mitigating the other**

Nonstructural Flood Mitigation Infrastructure

Aside from the three major categories above, there are other important components to the nation's overall flood risk reduction infrastructure that don't involve large flood control structures:

- **Environmental restoration.** These projects can be done in conjunction with other infrastructure projects such as levees. An example of such a project is when an existing deficient levee is replaced by a levee set back from a river channel and the land between the new levee and river is restored to a natural floodplain. Such natural floodplains serve to store, slow and filter water while providing water resources and the setback levee cost is reduced because it is subject to less erosion from the river and because it is on higher ground doesn't have to be as high to provide a specified level of protection.
 - **Floodproofing.** Utilities such as water and wastewater treatment plants, as well as public buildings and other facilities can often be floodproofed through elevation, or making them watertight through floodproofing, or can be relocated to safer areas. Many of these may be critical facilities and if they are not functional during and after a flood the community greatly suffers. A source of largely shovel ready projects that have also been found to be cost effective is the FEMA Hazard Mitigation Assistance Program¹. Typically there are about three times the numbers of projects submitted for HMA grants than there are funds available to implement these cost saving measures.
- **For the infrastructure package under consideration by the Administration and Congress, ASFPM recommends the inclusion of environmental restoration projects that help reduce flood losses as well as projects eligible under FEMA's Hazard Mitigation Assistance program**

Other Ways the Federal Government Can Help

While mapping flood risk areas and investing in flood risk reduction infrastructure are two major ways the federal government can help with reducing flood risk in the nation, there are other important ways the federal government can help.

First is to focus on building state-capability to manage flood risk. One trend we are seeing overall is that while the federal and local governments (and some states) are investing in flood risk management, many other states are not. ASFPM believes federal programs that help build state capability such as the National Dam Safety Program, National Levee Safety Program and the Community Assistance Program-State Services Support Element (CAP-SSSE) should be not only funded to their full authorized amounts, but also ensure they are being administered in such a way to incentivize states to bring as much as possible to the table. As stated earlier in this testimony, states have the ultimate authority over land use

¹ FEMA HMA projects also can include stormwater management projects and smaller/localized flood protection projects such as retention/detention basins, channel modifications, etc.

(it is often delegated by states to communities) and many flood risk reduction programs are coordinated at the state level.

Second is providing technical assistance. FEMA's CAP-SSSE program helps build state capability by using states to provide technical assistance to communities. The Corps' Silver Jackets program is an innovative way of bringing the technical know-how of the federal family of agencies to states. Finally, small technical assistance programs like the USACE's Planning Assistance to States (PAS) and Floodplain Management Services (FPMS) are often oversubscribed, yet allow the Corps expertise to be applied in states and communities nationwide. ASFPM also supports the newly introduced Digital Coast Act (S. 110), which provides data and tools to coastal managers dealing with flooding and other coastal risks.

- **ASFPM recommends that technical assistance programs of the USACE (FPMS, PAS, and Silver Jackets) be expanded to meet demand from states and communities**

Third, there are many federal programs that actually act as disincentives to states, communities and individuals in reducing flood risk. For example, if a community does not participate in the NFIP – the most basic action any community can take to reduce flood risk, most forms of disaster assistance are still available. And even if it were unavailable, communities have six months after a disaster declaration to join the program and receive the assistance retroactively. Instead, what if federal policy were such that no disaster assistance in any form for anywhere in the community was available if the community didn't participate in the NFIP? This is why ASFPM is so supportive of the FEMA disaster deductible concept. At its core, it tries to incentivize states to take its share of responsibility of reducing flood risk and those that do more pay less of a deductible. Another example of a disincentive is the Corps of Engineers PL 84-99 program, which allows non-federal levee owners to shift much of the cost of ongoing maintenance of the levee after a disaster to the federal taxpayer without really requiring much of anything in return in terms of actions to more permanently reduce flood risk.

Finally, recognizing that Congress and the administration are looking to reform the U.S. Tax Code, ASFPM believes that tax incentives can be very beneficial. ASFPM is supportive of any of the following six ideas:

1. Exempt all flood loss reduction projects at the federal, state and local level from federal taxation.
2. Reform the casualty loss deduction to better target the deduction as well as incentivize those that have mitigated.
3. Develop a hazard mitigation tax credit much like the energy efficiency tax credits that are given to property owners.
4. Revise the historic rehabilitation tax credit to authorize hazard mitigation and extend to private historic homes.
5. Support the concept of a disaster savings account to support mitigation activity.
6. Develop a tax deduction to reduce flood insurance premiums for low to moderate income property owners who struggle with flood insurance affordability.

Conclusion

Flood risk reduction in the U.S. has relied on a multi-faceted set of measures. This includes structural approaches, such as levees, flood walls, dams and channels. Nonstructural methods such as ensuring development in flood hazard areas are built to reduce flood damage; using regional or watershed based stormwater retention ponds; land use management and hazard mitigation for individual structures in the form of elevation, buyouts or flood proofing. The nonstructural programs involve elements of the National Flood Insurance Program and Hazard Mitigation Grant Program authorized by the Stafford Act. They also include programs from agencies like USDA and others whose watershed conservation programs support utilizing nature-based approaches to reduce flooding. The Corps of Engineers works with non-federal sponsors on water resources projects to reduce flood losses and provide technical assistance to states and communities through programs such as Silver Jackets.

ASFPM recently updated our publication *National Flood Programs and Policies in Review* (http://www.floods.org/ace-images/NFPPR_2015_Rev8.pdf), which puts forth our positions on a variety of national programs and policies that can either help or hurt the nation's ability to reduce flood risk and damage. Section 2, beginning on page 24, highlights multiple flood loss reduction programs and policies in a variety of agencies, and on page 40, section *Structural Projects—Balancing Economics, Environment and Equity* discusses levees, dams and PL 84-99 Rehabilitation and Inspection Program (RIP) in USACE. We encourage you to read our positions and recommendations on the challenges of our national flood programs and infrastructure needs.

The Association of State Floodplain Managers appreciates this opportunity to share our observations and recommendations with the Committee. For any further questions on this testimony, contact Larry Larson ASFPM Director Emeritus at larry@floods.org (608) 828-3000 or Meredith Inderfurth, ASFPM Washington Liaison at (703) 448-0245.



DEPARTMENT OF THE ARMY

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Senate Environment and Public Works Committee
Hearing entitled, "Flood Control Infrastructure: Safety Questions Raised by Current
Events"
March 1, 2017
Questions for the Record for Mr. Larry Larson

Ranking Member Carper:

Gaps in Flood Mapping

1. Your testimony indicates that potential inundation areas from dam or levee failures are not shown on current flood maps. Will these gaps in floodplain maps necessarily be caught when a map is updated or is greater attention or authority needed to make sure that the maps reflect the real risks to local communities?

Even where the dam failure areas are mapped, the lack of publically available information is caused by DHS deciding the maps should be "For Official Use Only (FOUO)" because someone in DHS thinks the threat of terrorism to the dam outweighs the every year threat of a dam failing or overtopping during flood events. Just in 2015 and 2016 alone over 80 dams failed in the state of South Carolina. These failures occur every year around the nation.

When dam failure maps and information is not available to the public, people do not know when they or their property are at risk. They need this information when they decide whether to buy property, and for sure when and where to evacuate when a dam failure is imminent.

These dam failure zones will not be shown on NFIP flood maps unless Congress directs the NFIP to show these failure areas on NFIP flood maps. Some states that develop their own dam failure maps already have shown these zones on the maps for years without issues.

Senator Wicker:

2. You stated in your testimony that dams should only be permitted if there are financial assurances that operation, maintenance, and emergency repairs will be done. Can you explain how to achieve this? Is there a role for the federal government in this space?

One of the biggest problems with dams is lack of adequate operation and maintenance (O&M), which is the responsibility of the dam owner. These costs are significant, so if the owner does not have a bond, or the ability to raise the revenue with user fees to those who benefit, the owners do not perform the O&M and turn to Congress to provide federal taxpayer funds to perform repairs and upgrades that should have been done under ordinary O&M.

The federal government has two key roles;

- (1) to lead the development of national standards for design, construction, operation and maintenance of dams. FEMA and USACE should lead a committee to develop these standards.*
- (2) FEMA should implement the Dam Safety Grant Program authorized in WIIN 2016 to repair or remove dams. The program is designed to build state capability to establish state dam safety programs and implement them in accordance with the national Standards mentioned above and to manage a grant program to assist dam owners. Having states manage dam safety programs is imperative because the federal government does not have authority to regulate private dams to ensure they are built and operated and maintained to safety standards. Only the states have that authority under the constitution. They can have authority to ensure dams meet standards or to remove them if they present a safety risk.*

Senator INHOFE.

[Presiding.] Thank you. I just noticed, it was called to my attention, that Senator Grassley has come and seated behind Mayor Corbett. Did you want to be recognized for anything?

Senator GRASSLEY. I didn't come here to mess anything up.

Senator INHOFE. All right. Well, then don't mess anything up. That's good.

Senator GRASSLEY. I just wanted to make sure you understand that Iowa, and particularly Cedar Rapids—

[inaudible].

Senator INHOFE. Well, I didn't tell him that Cumberland and Anita, Iowa is where all of my family was born, so we are sensitive to those problems.

I will begin, because the Chairman is voting now, then we will go to Senator Carper.

General Semonite, in my hometown of Tulsa we have nearly 20 miles of levee, a system that was built by the Corps of Engineers back in the 1940's. We have about 10,000 people living within that. We have \$2 billion of infrastructure, including a refinery, a very large refinery. Seventy years old, they are desperate and in need of repair and upgrades. Congress authorized a feasibility study and expedited budget consideration in last year's WIIN Act. That was our effort. With the risk assessment taking over a year longer than promised, Tulsa is concerned about more delays in the lack of the Corps prioritizing the project. It is my hope that we can get this done.

Now, I am sure that you looked at that before, in preparing for this hearing. Our concern is these are old and there is not a week that goes by when I am back that this isn't called to my attention. What kind of a commitment can you make that we are going to get this thing started?

General SEMONITE. Thanks, Senator. You bring up a good point. When you talk about levees, I think right now we have about 15,000 miles of levees that we constructed, but the Corps actually only has about 2,500 of those that we actually maintain. So we have to be able to continue to reach out to find out what can we do to assist. Several people here have talked about everybody has to pull their share to be able to work side-by-side. On this particular one, this goes back to that flood risk management study and to be able to make sure that we can review this, get this thing done, and understand how we are going to be able to come through on that.

I don't know exactly the details of where we are at on that, and I would like to have my staff come back to you on it.

Senator INHOFE. It would be a good idea. And I would like to ask that you personally look at this because it is something that should not have gone this long and it is critical.

Second, I only have one more question, then we will go to Senator Carper. That is, General Semonite, while I have you here, I wanted to raise a concern of mine. Congress has authorized and, in fact, made it a priority for the Corps to work with private partners to develop and maintain recreational areas at Corps lakes. However, there seems to be an anti-development mentality within the Corps, at least within the Tulsa district, that I think needs to

be overcome. In fact, I am going to give you a quote, a senior staff member within the Tulsa district told my State director, and this is a direct quote, he said, "If I had my way, I would end the lake development altogether."

I would just like to ask you does this reflect a philosophy within the Corps that you are willing to talk about?

General SEMONITE. Sir, it certainly does not reflect our Corps philosophy. We are very aggressive on continuing to find many, many different options on recreation. Some of these are Corps-owned and Corps-maintained. There are other ones where we have concessions to come in and do recreation.

Senator INHOFE. But is one option to end all development?

General SEMONITE. No, sir. I think every one of these projects is different. I don't know the exact details of what was said, but our philosophy is to continue to look at how we can continue to partner with the stakeholders and to try to continue to find a good compromise solution on that. So I will find out what is out there and get back with you, OK, sir?

Senator INHOFE. Oh, that is good. Thank you, General.

Senator CARPER.

Senator CARPER. Thanks, Mr. Chairman.

To our friends, welcome. Senator Grassley, nice to see you out there in the audience. You have the back of your mayor there. Good work.

Before I say anything, I just want to say to General Semonite how much we in the Del Marva Peninsula appreciate the opportunity to work with the Philadelphia Regional Office. The folks there, you have terrific people and we are grateful for all the good that they do with their lives on behalf of the folks that we serve in Delaware, the eastern shore of Maryland, eastern shore of Virginia. So thanks.

We sometimes get to work with your folks from the Maryland office, the Baltimore Office.

General SEMONITE. Yes, sir.

Senator CARPER. We are grateful for that too.

Someone mentioned, I don't know, maybe it was Mr. Larson, somebody mentioned the funding, and I understand that in some cases we have passed legislation authorizing new support for non-Federal dam repair and rehabilitation efforts beyond the traditional Federal role. We haven't appropriated the money. I am reminded of a law in this Country called mandates, unfunded mandates law. That is it, unfunded mandates law, where we basically set standards and say you have to do this, but we don't provide the money to do it.

I don't know if that is the situation here or not. Is it?

Mr. LARSON. Well, that was in the WIIN that set up that grant program with FEMA. That has not been funded. And the first thing that has to happen when it is funded is FEMA needs to put together experts nationwide to put together standards for dams for design, construction, operation, and maintenance; and then with that in mind they can set up criteria for which dams they fund and make sure that the work is done appropriately. We need those national standards and that program needs to be funded. Now, that

is the one that was just passed in December, so this is your first crack at trying to get it funded this round of funding.

Senator CARPER. All right, thanks.

Back to General Semonite. Events such as the near failure of the spillways at Lake Oroville have further highlighted the issues and risks associated with dams near populated areas, as you know. Although the Federal role in dam rehabilitation and repair traditionally has been focused on rehabilitation of Federal facilities and support for State dam safety programs, some have argued for an increased Federal role in non-Federal dam safety and rehabilitation, sort of following up on what I was asking Mr. Larson.

But, in particular, recently passed legislation I have alluded to authorized new support for non-Federal dam repair and rehabilitation efforts beyond traditional Federal role. The extent to which these authorities are funded remains to be seen. We will get a budget from the President and the Administration hopefully in a couple weeks, and we will have an opportunity to see what they suggest; do hearings and move forward.

But, General, aside from funding these critical programs, what more could the Federal Government do to address the risks posed by failing levee and dam infrastructure?

General SEMONITE. Senator, that is a great question, and this panel today really is the perfect time to ask that question because these rivers, these flood management structures are all intertwined. This is a system, so you will have some Federal, you will have State, local, and private. All of it has to work together. Anything that one element does is going to affect the other.

So clearly we have some Federal structures, but I think the other thing is we have an awful lot of expertise. We have 5,000 certified dam and flood control experts in the Corps that not only take care of our 715, but are more than available to go to other places. Oroville is a great example. We have 50 people out there that have been working for the last several weeks side-by-side with John's guys to continue to be able to make sure we are looking at what can we do to mitigate the current risk, but also to be able to make sure what about be able to rebuild, and how can we use some of the lessons learned in the Federal areas to be able to go back in and help the State.

Same thing, some of the things that these gentlemen are doing here may be great opportunities out in the field. How do we wrap those back in to learn how to run our Federal systems better? So I think it is a shared understanding of the technical competence to be able to make sure that we are all working side-by-side.

Senator CARPER. OK. I was going to ask a question relating to shared responsibility. I think you pretty well answered that, so I am going to ask a question, maybe a first cousin of that.

How can States, particularly smaller States like our State of Delaware, ones with coastline, coordinate and/or pool resources to help the Corps complete bigger and more efficient flood control projects?

General SEMONITE. Sir, obviously some studies, if there are some things out there. I mean, we have an unbelievable relationship all through the vertical team, and our districts are talking to the States and imbedded in the States, if there are some things where

we think we can lean on some of the State expertise to be able to help get justification or to be able to have better understanding of the return on investment. Senator Barrasso talked about the value of making sure we are making the taxpayers' dollars go a little bit further. I don't know if I have an exact answer back into Delaware, but wherever we can team with this Federal team to be able to make this whole system more resilient, that is what we are really trying to do.

Senator CARPER. All right, thanks so much.

Senator BARRASSO.

[Presiding.] Senator Capito.

Senator CAPITO. Thank you, Mr. Chairman.

Thank all of you. I would like to ask General Semonite a question, just prefacing it by reminding those who are watching and the General himself might recall that last summer West Virginia had one in a thousand-year flood occurrence that took the lives of, I think, 23 West Virginians lost their life. It was very fast and the Corps has been trying to repair these communities and these waterways.

So my question is in the WRDA bill that we passed at the end of last year, I am just kind of putting this feather back into your cap to remind you that the Secretary will conduct studies to determine the feasibility of implementing projects for flood risk management, ecosystem restoration, navigation water supply, recreation, and other water resources in the Kanawha River Basin, which is pretty much fully encompassed in this southern part of West Virginia, but also Virginia and North Carolina. So I am just asking you, General, to make a commitment that you are moving forward on that study and what we might expect from that.

General SEMONITE. Yes, Senator. We will certainly do that. You talked about how fast that happened. I think you had 10 inches of rain in less than 24 hours.

Senator CAPITO. Right.

General SEMONITE. This is where we are seeing, whether it is climate change or other hydrological events, the surge of some of the flash opportunities here is unbelievable and we have to be able to negate that risk. But we definitely will have that commitment to continue to support.

Senator CAPITO. Thank you so much. And that gets me to another question connected with that particular incident. Howard's Creek, which is not a large body of water, it sounds small, it is a larger creek, but it is the one that rose and really took so many lives so quickly. So when you are looking at small waterways, is the best use of your resources in these, because there are so many, you obviously can't be everywhere, is to train the local, not just State, but even locals to try to take this opportunity to improve Howard's Creek so this doesn't happen again? I mean, is that how you move forward from something like this?

General SEMONITE. Yes, Senator. There is obviously a lot of flood fighting that can be done to be able to mitigate this. I think the mayor from Cedar Rapids made a very good point: all lives are just as critical; all property is just as important wherever you are living in the United States. So whether it is a large facility or a small facility, a large river or a small stream, we are just as committed

to be able to partner to make sure that we can mitigate those damages that are out there.

If that is not done through structural, and we had some good discussions here, it is a lot of those other components. How do you do that through training? How do we make sure that we have some of the greener aspects to be able to do it, whether it is zoning and other things? How the vertical team all represented here can share some of those lessons learned to be able to make sure communities have that capability, I think that is an important tool.

Senator CAPITO. Well, thank you. I think that is good and I am sure the city of Cedar Rapids had that rapid rise as well, and it was very costly.

I want to shift to dams. We live in a mountainous State. We have hundreds, I think 614 dams. Most of them have been studied, although several of them, high hazard dams, have not been rated, rated as in r-a-t-e-d. So we can't just tell are they satisfactory, poor, unsatisfactory, or where their rating is.

How can we prioritize our projects if we don't have full-out rating and accurate information on the existing dams that we have throughout the States?

General SEMONITE. So, Senator, let me give you at least the Federal perspective. On our 715 dams, they are rated, we know exactly where they are at. There are five different rating code and, if need be, I can tell you exactly where the Federal inventory and portfolio are with respect to that.

Senator CAPITO. OK.

General SEMONITE. I think the challenge is the Federal rating system, which is a very robust rating system, how does that then get incorporated into States, local, local communities, and even private communities so that then, somewhere, we have the ability to understand how to rack and sack them. The Corps does run the dam safety data base. We have 12,000 dams that are in that data base. I think we have to go back and look at the standards, and if there are some areas where we haven't had the level of fidelity in the rating, then we will go back and do whatever we can to help advise how we can do that better.

I am not necessarily aware that there is contention there; I think it is just how do we continue to do a better job on that.

Senator CAPITO. Well, you know, in fall fairness to the State, the State has six people working in this area. When you have 700 structures and other issues that they are dealing with, it is a manpower issue, it is technical issue. So I am glad to know that, with your expertise at the Corps—and the Huntington Corps is really most, but we do have some Pittsburgh Corps too, I want to give them a shout out, they have been very good. We also have some Baltimore Corps, so they are doing well. Our State, with its odd shape, we get good exposure to the Corps. I will say that. And we have lots of water.

So I appreciate your willingness to coordinate with our State to make sure that we get these dams and these structures up safe. Also for these fast water occurrences, which we just had another one again this morning, we need to be able to cope better on the ground. We are great at recovering and helping people, but preven-

tion is where we would really like to be. So I appreciate your input here.

Thank you.

Senator BARRASSO. Thank you, Senator Capito.

Senator WHITEHOUSE.

Senator WHITEHOUSE. Thank you, Chairman. I am delighted that we are having this issue. I want to take a minute to respond to the point that Mr. Larson made, which I think is incredibly important, particularly for us who are here representing coastal States.

One of the basic facts about climate change is that the vast majority of the heat that has hit the planet and is trapped here as a result of climate change, as a result of our carbon emissions, has been absorbed by the oceans. I see the General nodding. Of course. The oceans are our great cooling system, and the excess heat goes into the oceans in enormous amounts. And there is a very basic physics proposition called the law of thermal expansion, so when the ocean gets warmer, it rises. And for coastal States we are seeing real problems. We have 9 feet of sea level rise projected for this century along Rhode Island's shores. Nine feet of sea level rise.

This shows itself already in places like this. These are summer cottages along our Rhode Island coast, and this is after a recent storm. And the lady who owns that house, I remember speaking to her. She was about maybe 60-plus years old, and she remembers as a little girl that house had a yard. They could play in the yard of it. And on the other side of the yard was a road that people could drive down to the beach in, and then there was a little parking area where the cars could park that had come down the little road, and on the other side of the little parking area was a beach which she remembers as a little girl was a long run across the beach in the hot sun to get her feet into the cool water from the hot sand of the beach.

All of that is gone now and the house has gone into the sea. We are seeing this over and over and over again, and it is worsening and it is accelerating. So people may want to quarrel about climate change here for a variety of reasons, but this is not funny along our coasts. It is for real.

Here is Downtown Newport just after Sandy, which missed us, by the way. This is a very small side effect of the big hit that was nearby. And this is not ordinarily kayakable, as you can see from the stores that have their floors filled with the harbor, basically.

So the problem that we have that I would like to make sure the General is listening to as well is exactly what Mr. Larson said. He said that when you are dealing with this problem, you need flood maps, and you need good flood maps; and what we are preparing for is yesterday's flood and not tomorrow's flood.

I think I have quoted you correctly, Mr. Larson.

In Rhode Island we have done our own independent review of FEMA's coastal flood mapping, and our Coastal Resources Management Agency and our university find that the FEMA maps are, frankly, just dead wrong. They have all sorts of errors. They fall way short of incorporating experienced levels of storm surge. They don't accurately reflect dune protection for the land behind it; they exaggerate dune protection by amounts that are really astonishing. They rely on very outdated models. The models are so bad that

when they run the transects in the model along the beach, showing where the harm is going to be, they find a 5-foot differentiation at the model line in some of their transects. That is a symptom of a flawed model, when you have 5-foot differentiations.

And the result is that the flood mapping along our shores, and I think along other shores as well, is badly erroneous, which means that a lot of people who are depending on FEMA flood mapping to assess the risk to their homes are being misinformed. And we really need to get this right, because if it is happening in Rhode Island, it is happening everywhere. A number of the other States that have cross-checked what their data is against the FEMA models show that the FEMA models are a failure. When we have asked FEMA to recreate its modeling, they can't go back and recreate the models, which is another very strong sign of a failure in the process.

So when I am forced to look at homes like this going into the water, that families have, in some cases, had for generations, they have been passed on and on, like I said, this isn't funny. And it is bad enough when this body won't pay any attention to climate change, for reasons that I won't go into here, and it is hitting home in this way in my home State, but then when we have to try to quantify the damage and we don't get good information because FEMA simply has it wrong, that is very significant.

My time has expired. I wanted to emphasize Mr. Larson's point.

I thank you, Chairman, for hosting this and allowing him to bring it forward.

General, this is not your Army Corps problem; this is a FEMA problem, but to the extent that the Army corps and FEMA interact on so much of this coastal stuff, I want to make sure you know and take home how badly their mapping fares against a professional assessment done by the affected States.

With that, I will conclude. I thank you.

Senator BARRASSO. Thank you, Senator Whitehouse.

Senator ROUNDS.

Senator ROUNDS. Thank you, Mr. Chairman.

General Semonite, first of all, thank you for your service. We appreciate you being here today. We appreciate what you do on a regular basis. I just wanted to talk a little bit about I am from South Dakota and we have the Missouri River, which comes right down to the middle of our State. We have the main stem dams, which provide a huge amount of benefit and most certainly has been a good thing for our State, along with all of the States surrounding us.

I am becoming increasingly concerned about the potential for Missouri River flooding as a result, this year, of the snowpack levels and the decrease in available storage capacity in the Missouri River reservoirs. Through regular communication with the Corps and the South Dakota Department of Environment and Natural Resources, it has come to our attention that mountain snowpack levels are about 133 percent of average between the Fort Peck and the Garrison basins.

What is the Army Corps' plan to manage water levels in the Missouri to prevent flooding along the upper Missouri this year? I know that right now NOAA is predicting above average precipita-

tion in the coming weeks. Does the Corps have concerns about the increased risk of flooding that could be caused by above average rainfall, and what is the Corps doing to address these concerns? This is one of the major issues that occurred in 2011 and we have a lot of folks out there that are watching the fact that we are just at the flood level, just at the base of the exclusive flood control today. Where is the Corps at right now and what do you anticipate in terms of your ability to manage what may very well be some significant inflows?

General SEMONITE. Senator, great question. Yes, the Corps is very concerned about snowpack across all of the United States. We are watching California very, very closely right now. Through any of these systems, you know, several years ago we had scenarios where, if you get too much snow, then obviously you can't be able to bring down the flood pool enough to be able to absorb that. So we watch it the best we can. This was authorized in WRDA 2014.

The challenge, I think, is the ability to be able to do the monitoring and the modeling to do that. Right now we don't necessarily have appropriated funds to go to the next level to be able to model that to a higher extreme, so we are doing the best we can. We are taking the tools that are available. I think the question is are we able to project what that would equate to when it comes back to what is going to happen to those pools.

So that is not a good answer, but the bottom line is we are always concerned about snowpack. I am not sure that we have the fidelity right now and the science to be able to understand as much as we would like to know on how that is going to project.

Senator ROUNDS. We had major floods in 2011. The Corps actually did an in-house review and actually asked for outside folks to come in and help them. They recommended that you have additional monitoring equipment put into the plains area. That was in 2014. You have had 2015, 2016, 2017. Now coming up on 2018. This last summer we had field hearings in which representatives from the Corps told us exactly what you did just now, and that was you didn't have the appropriation.

I don't think, in looking back at it in our review, that it has ever even been requested. What I would like to know, No. 1, is are you planning on putting in a request for it? And, second of all, if you did, since you are not going to have it this year, do you have plans to at least attempt to modify by releasing some early flows so that we don't have the possibility of the kind of floods that we had in 2011?

General SEMONITE. Sir, I have to get back with you on that to be able to make sure I understand exactly the details of what we are prepared to do. I know there are some funding challenges. That is not, obviously, acceptable, but the bottom line is I think we are doing everything we can with the funds available to be able to project what is going to happen.

We are concerned and we look at what those projections could be. We clearly have the authority under the water control manuals to be able to start bringing that water down just based on the analysis we have right now.

I owe you a better answer, sir, on what we can do to be able to fix that.

Senator ROUNDS. There is a real interest on the part of the upper basin after 2011. A lot of people out there are concerned right now because they can see the water levels, as well, and they can read the reports. Do you have any plans for communication with local communities along the way in terms of the review that you are doing? In 2011, it seemed to me that one of the biggest concerns, matter of fact, March 3d of 2011, in a report in the Omaha Herald, one of the officials indicated that we are going to be just fine this year, unless it rains. That is not a way to run a major main stem system, and I am hoping that is not going to be the comment this year, that we are relying on lower or less than normal rainfall downstream. If that is the case, we have real problems.

General SEMONITE. Yes, sir. And to address your issue on the collaboration, we are talking every single day back and forth with the hydraulic experts, back into the State, to the local communities. We want to be very transparent and collaborative on how we can do that to make sure that we are learning from you and you are learning from us. But right now our goal is to try to continue to be able to bring those capabilities down to be able to absorb whatever we think we would project for that snowpack that is coming.

Senator ROUNDS. Would you continue to provide input or at least to provide information on at least a biweekly basis to the local communities about where you are at in the flood control and any plans you have for some perhaps more stable early releases to relieve some of the flow along the Missouri later on?

General SEMONITE. Sir, I certainly see no reason why we can't do that. I would think we would be doing it now. Most of our stuff is, a lot of times, posted on the Web so it can be 24/7, everybody can see what we are doing, we are seeing the same thing from the State. If there is any reason why we aren't being as collaborative, as transparent as we should be, I will fix that.

Senator ROUNDS. I think more than anything else we really want to know is whether or not you are prepared, since flood control is the No. 1 priority along there, that if we are up into the exclusive flood storage position already, which I believe we have just entered into in the first week in March, that you are prepared to begin to take actions to release perhaps some additional flows to mitigate what might be some significant flows in a shorter period of time later on.

General SEMONITE. Senator, I certainly want to try to make that happen. Every one of those facilities has specific authorizations and different rule curves on how they will work. I want to make sure that we are operating inside the authorities and the parameters that we have established in the law and those rule curves to be able to make sure we are doing it.

Yes, I think we want to meet that intent. I want to make sure, though, that we are doing it in the authority of our current water control manuals.

Senator ROUNDS. I know my time has expired, but what I am getting at, General, and with all due respect, sir, flood control is the No. 1 priority, and that would be above navigation needs or above other types of needs. Flood control is No. 1. Am I correctly stating that?

General SEMONITE. Sir, life safety, without a doubt, is No. 1.

Senator ROUNDS. Thank you, sir. I appreciate it. And, once again, thank you for your service. I know you have a tough job to do there. Thank you.

Senator BARRASSO. Thank you, Senator Rounds.

Senator HARRIS.

Senator HARRIS. Secretary Laird, you and I know about the long-standing debates in California about water. A very famous person once said whiskey is for drinking; water is for fighting. So one place in California that highlights that point is the Sacramento-San Joaquin Delta.

Will you talk a little bit about your observations and analysis of the infrastructure in the Delta? It is often the subject of debate about where that precious water goes in terms of the farmers who rely on it and also environmentalists who are concerned, rightly, about the endangered species that live in that body of water. And that seems to occupy a lot of the discussion about the Delta.

But I have a concern about another point, which is that we may not have that debate if the infrastructure that supports the Delta is compromised or is weak in any way.

So, please, if you could address that.

Mr. LAIRD. Thank you, Senator. That is a very good question. For the uninitiated, all those rivers flow into the one place, and then through an estuary to the ocean, and there are hundreds and hundreds of miles of levees that have created what are known as the Delta Islands, which are farmed, which have been farmed in a way that now they have dropped to 20 or 25 feet below sea level. And they are protected by levees that were originally constructed to be agricultural levees and not high protection urban levees.

And we just had a break in the last 2 weeks in the middle of a storm. The Delta Island flooded, and it will be hard to clean up and repair. And the challenges are Senator Whitehouse mentioned sea level rise. If there is a 1 foot sea level rise, it would change a flood event in the western Delta from 100 years to 10 years, meaning more frequency.

With the subsidence in these islands, if there were a major seismic event and a number of these levees failed, salt water would actually drain from the San Francisco Bay into the Delta and you would have real difficulty recovering farmland. There might be an interruption of water supply.

So the question is it is a huge ticket to do all the repair work that might need to be done. The voters, in 2006, brought \$3 billion to the table. The voters, in 2014, brought \$7.5 billion to the table for everything, the flood control we are talking about here, storage, and some of these levee improvements. So we know we have a lot to do. We are trying to do the high priority projects, and it is a complex system.

The one other thing is some of these islands are not very highly inhabited, so the one where they did the evacuations for the levee breach in the last 2 weeks, they evacuated 20 homes. You can imagine if that is the tax base to do the kind of repairs that need to be done. It looks to State and Federal and other entities to really help or else you can't complete it.

Senator HARRIS. And to emphasize the significance of it, that body of water is the largest estuary on the west coast, isn't that correct?

Mr. LAIRD. It is.

Senator HARRIS. And the farmland that body of water supports produces 50 percent of the fruits and vegetables consumed by the Nation.

Mr. LAIRD. The Federal and State water projects together in the Central Valley provide water to 3 million acres of irrigated agriculture. So the question is there could be an interruption in water supply for that, but there could be just damage to farmland itself in the Delta with how the breaks happen.

Senator HARRIS. So how can my colleagues and I support what California needs to do to make sure that the infrastructure around that body of water, in addition to the Oroville Dam, is supported, understanding that the ramifications are pretty extreme and national in terms of the exposure and consequence if we don't repair it?

Mr. LAIRD. I think that, really, we are bringing all this money to the table, and the question is, within the flexibility of the Federal Government, can you have loan guarantees. Only 3 percent of the dams in California are State dams, so there are some places where there are local districts or there are private entities, utility companies have a number of these dams, that a loan guarantee would make all the difference in terms of them being able to finance the repairs or the upkeep. And obviously if there is an infrastructure bank or revolving loan funds or other things, those would be helpful as well.

If you look at the Central Valley of California, it flooded regularly for 80 years, from statehood into the 1930's, and there were two reasons: they couldn't correctly measure how much water was going by and everything that was designed was not really designed for the capacity. But the Federal Government stepped in the 1930's and joined with the State and locals, and, with that breadth of economic support, that brought the modern flood system with weirs and levees and other things that Sacramento is second only to New Orleans in danger from a catastrophic flood event, and it is that effort that has protected Sacramento and other areas in that time.

Senator HARRIS. Thank you.

Thank you.

Senator BARRASSO. Thank you, Senator Harris.

Senator ERNST.

Senator ERNST. Thank you, Mr. Chair.

Mayor Corbett, thanks again for being here. Mayor, do you believe the safety of your citizens and the economic security of your region is vulnerable because you haven't been able to get the critical assistance that we talked about earlier from the Corps? And, if so, could you explain further on that?

Mr. CORBETT. Thank you, Senator. Yes, our community is vulnerable not just from a life safety standpoint, but from an economic standpoint. As I made mention in my opening remarks, the recovery of Cedar Rapids has been phenomenal, as we actually gained population in the last census and the business community has rein-

vested in our town. So we do have that momentum and that restored confidence in our community.

Now, we haven't sat idly by the last 9 years since the flood. We have actually been working locally to incorporate flood mitigation efforts in our town. Right after the flood, the recession hit 4 months later. Our own citizens voted for a sales tax referendum, an increase of one penny for 60 months, to help provide additional resources to our community; and our State government stepped up. You know it very well, you were there in the State legislature and approved a funding mechanism when the Corps, through the cost-benefit ratio, said that they could only even recommend protecting the east side of Cedar Rapids, and not the west side.

We rejected that formula that said one side of town was worthy; the other side of town wasn't worthy. Our mechanism with the State is going to pay 100 percent of the west side flood protection. So our ask of the Federal Government is just the 65 percent for east side flood protection. But until there are some changes in the cost-benefit ratio, we are going to be compared with other communities around the Country that just have higher property values.

Senator ERNST. Yes, absolutely. Quite well put, Mayor. I want to thank you for the hard work that you have done for the community of Cedar Rapids and for the State of Iowa. Thank you.

General Semonite, it is good to see you again. Thank you for taking the time to sit down with me and go over these tough issues.

I wrote to you last fall, asking about how human safety is considered in the decision process to budget and fund flood risk reduction projects. The Corps then sent me a letter back, in December, stating that these decisions are determined on a case-by-case basis. And then a list was provided to me of the Fiscal Year 2017 projects that were funded for construction because of the significant risks they pose to human safety.

Now, they also have low BCRs. They are very similar to what we see in Cedar Rapids. And I noticed that four out of the five projects were in California. Can you explain to me why the lives and livelihoods of Californians are worth more than the lives and livelihoods of Iowans, particularly since California is a very vast State with large amounts of economic resources?

General SEMONITE. Senator, great question. I think I said, when you were out, every single American, every single property have all the same value. We have to be able to continue to take care of all of the Country. And Cedar Rapids has done better than almost anywhere else in figuring how to mitigate this significant challenge.

You are very, very aware you have an authorized project. The big question is the ability to be able to find funding to be able to do it, and the mayor is exactly right, there are a lot of concerns out there. We are worried. We made a significant Federal investment when it came to the authorization of that. We are continuing to figure out to do every single thing we can to try to find how we can now secure the right amount of money to be able to at least start that.

The challenge we have, and this goes back to, I think, why we are all here today, is that the requirements grossly exceed the

amount of money in the Federal budget. Just the Federal dams alone, \$24 billion to be able to buy down the worst ones.

Now, we are getting funded to capacity and the Congress has done a good job of taking care of us on the Federal ones, but when it comes to all of these other areas for flood control, the question is how can we try to hit all those requirements. The best thing we can do is to continue to work with you to figure out are there other parameters or other solutions that we can somehow be able to figure out how to take care of the mayor out there.

The benefit-cost ratio can't be the right answer, because like you said, sir, we can't run this Country on an algorithm. We have to think about the passion of the people and all the work they have done out there. But right now we continue to try to champion that project the best we can. We will continue to be able to work with you. But I think at the end of the day, when the Administration has to figure out how much can we afford, elements like this are going to have to figure out are there some of those that you can then take a look at that risk and where can we afford to be able to buy that risk down.

Senator ERNST. I appreciate that, General, and I do look forward to working with you on a solution that will not only benefit those that live in more urban areas or urban States, but also those that are finding challenges in the rural areas. This is a very important project not just for Cedar Rapids, but for the well-being of the entire State of Iowa. So I will continue to push for that. I am glad that we can work together.

Mr. Chairman, I want to thank you for bringing this Committee together today to talk about these important issues. I know that we struggle with some of those same issues in Wyoming, in Iowa, in Nebraska, and I look forward to finding that solution with you. Thank you very much.

Senator BARRASSO. Well, thank you very much, Senator Ernst. I look forward to continuing working with you on this, as we discussed in the meeting in your office, the critical need for this additional work. So thank you for all your efforts. Thank you.

Before I begin my questioning, I would like to demonstrate the impact that ice jam flooding has had in communities in Wyoming. This is the Northern Wyoming Daily News from Tuesday, February 14th. You have seen this, Commissioner Wolf.

One hundred plus homes evacuated. Ice jamming along Big Horn River causes second major flood in 3 years, with pictures of the Wyoming National Guard placing sandbags in Wyoming. So this is affecting different parts of the Country and I just wanted to visit with you, if I could, Commissioner Wolf, because last week many people from Big Horn County went to Grable to celebrate the life and mourn the death of our fire chief, Paul Murdoch. The gym at the high school was jammed. People came in fire trucks from all around. He died after fighting not a fire, but an ice jam on the Big Horn River in an effort to prevent flooding in Grable. He left behind a wife. He was 53. Left behind two sons. It was a real tragedy.

So can you talk about the other human consequences of the flooding, in addition to the abandoned homes and the damage and the property damage? Can you go a little bit beyond that?

Mr. WOLF. Thank you, Senator Barrasso. Yes, that was a tragic time that happened with his passing. A couple of folks in our courthouse were family, related to him, and we extend our condolences, too.

When we look at what happened out there on the ground, when that flood inundated the homes and got close to the local businesses and displaced over 100 homes, as you had mentioned, those families were away from their homes for almost, I think, four to five nights, and when you look at the toll there, they don't know what they are going to come back to.

Law enforcement did a very good job between the Worland Police Department and the Washington County Sheriff's Department trying to get families in and out of their homes if the ability was there for them to go in and at least get some belongings to get by. I think many of them thought it was just maybe an overnight deal, but upriver of this ice jam that had already flooded we had several other jams that had not come down yet, and with the normal flood stage there right at that point where the bridges are in Worland runs at 10.5 feet. We hit a high of 15 feet, and with other ice jams coming down, we didn't want to take the chance of letting them in there and cause injury or loss of life just from people being there. Those big chunks of ice are just dangerous to be around even if the water recedes.

Senator BARRASSO. You know, the pictures that you showed showing the growth of the island in the middle of the Big Horn River are striking. I think people looked at that and said, wow. The testimony states removal of the island could be a simple and effective solution for ice jam flooding in the city of Worland. As you point out, if the Big Horn River selected, as a pilot project to demonstrate innovative solutions for ice jams, I think we could solve this problem. In fact, it may be the only way, given the cost and the bureaucratic red tape and the permits that would be required.

So, given that, do you believe that the Corps should have the good sense to step in to address situations like this, where the safety impact on the lives and the property are so great that, if a town can't afford to proceed on its own, that they should step in?

Mr. WOLF. I do think so, Mr. Chairman, that they should step in. I do look at it, though, at a State and local level there, that we need to have some skin in the game and work with the Corps in this project. There is firsthand knowledge that we have that we have seen over the years that might be able to add to some solutions to the problem that they may not see, not being there on a regular basis. One of the things that we have looked at short-term is removal of that island that is out there, sandbar that has built up over time, and reinforce the riverbank, and then also, along with that, short-term solutions would be to put in place backflow prevention that goes back into the city on the storm drains, because even though some of the areas didn't get hit by the water overtopping banks, the water flow backed up the storm drains and flooded around buildings in some of the local areas. So that is one thing.

In the long-term, we would like to get some berms in place to tie in around the north side of Worland.

So I think we can work together, and I talked with the General earlier today and made some progress, I believe.

Senator BARRASSO. That would be great.

General SEMONITE, can you comment on that? Do you have the ability to help towns like Worland to remove that simple island that causes so much damage each year? Or do you believe you don't have the statutory flexibility?

General SEMONITE. Sir, thanks for the question. Senator, I think, first of all, I want to thank you for what you did to be able to get that pilot organized, the tender for night stem actions were in work in the next 5 years. We have a lot of expertise in cold regions. I am from a small town in Vermont. The Connecticut River has ice jams all the time. I have seen flooding in my own town, so I certainly know the complexity that is out there.

I don't think we have a challenge with authorities, and it goes back to what you said earlier, I think, sir, when it comes to the 205 challenges, we want to be able to continue to reach out to do whatever we need to do for this Nation, whatever the Nation needs the Corps with expertise. Sir, the only reason that we should not be able to do something is because of the lack of funding. I mean, it should be the fact that we just can't afford it, the Nation can't afford, and this is where the best thing we could do is understand the requirement, come forward to be able to articulate that in Congress, where in fact we think there could be some use of that, and then if in fact the Administration and the Congress feels that we should step up, then that is obviously a budgetary decision. But I don't think that our hands are tied, necessarily, right now from an authority perspective, Senator.

Senator BARRASSO. And in terms of authority, I want to switch to something in the opening statement. I included that language in the Water Resources Development Act the Committee enacted last Congress, creating an Army Corps Pilot Program to develop innovative cost-saving technology to address the threat like this. In developing this technology, the programs would involve consultation, of course, with the co-regions research, engineering laboratory of the Corps. You talked about your upbringing and your familiarity, so will you commit, then, to work to implement this program in an expeditious manner to develop the required technologies to help alleviate these sorts of threats?

General SEMONITE. Sir, the language in WRDA was very, very clear exactly what the scope of that program was. We already have that under gear to figure out how would we go ahead and do it. I think the only challenge would be is if at some point we don't have the funding to be able to execute the follow-on of some of those technologies. But I think it goes back to not only what the Corps can do; how can we continue to learn not only what other areas in America do, but this happens in other places in the world. We have to get some innovation to figure out how can we somehow use technology to be able to mitigate some of this risk.

Senator BARRASSO. Senator Cardin.

Senator CARDIN. Thank you, Mr. Chairman. Thank you very much for holding this hearing.

As to the general concerns we have on dam maintenance, in Maryland we have 346 dams. I was surprised to learn that num-

ber. Two are under the jurisdiction of the Army Corps, and we thank you very much for the attention that has been paid to the two dams in Maryland that are under the Army Corps' supervision, the Jennings Randolph Lake, which affects Maryland and West Virginia, and in Cumberland, Maryland and Ridgeley, West Virginia.

We also have a lot of other dams in our State that are highly regulated along the Susquehanna. The Conowingo Dam is one of the major sources of electricity in the east coast of the United States.

But I want to go to the attention of the lesser known dams that we have in our State that are no longer performing the function for which they were constructed originally. We have the Bloede Dam on the Patapsco in Patapsco State Park that I was told was the first hydroelectric dam in the Country. That might be right, may be wrong, but it is an old dam that no longer serves its function and has really no purpose. But because of the way dams are maintained and financed and owned, there is no reserve for the removal of that dam.

So that dam now is still there. It is a public safety hazard; we have had several drownings because it is on a State Park and individuals like to swim, and they swim near the dam and the currents there have caused people to lose their life. It also adversely affects our environment and the water flow; it affects farming operations in an adverse way. So I guess my question is there any way that we can figure out how we can, either moving forward, recognize that there is a life cycle for dams and that there is a need to remove dams that no longer are useful for their intended purpose? If you have suggestions on that, I would appreciate it.

Lieutenant General, it looks like you have a thought.

General SEMONITE. Sir, just maybe an observation on how we are doing it, Senator. Fifteen of the worst dams, the Federal dams, equate to probably \$12 billion of repair. So the question is do we use taxpayers' money to fix all of those dams or have some of those actually outlived their point?

So of the 15, 5 of them right now we are working with Congress to divest those 5. Three of them are already basically approved, and they are in Kentucky. They will come back out. There is another one right now that Olmstead is actually replacing, so this is actually on one of the rivers. I think you have a great point. There are times that we have to take a good look at and say is it really worth the return on investment to fix a dam or, for all the reasons you stated, especially when it comes to environmental, life safety, maybe it is time to take some of those dams out. So this is where I don't know the particular dam you are talking about; it is not a Federal dam. But certainly on our side we are trying to do the same thing, because the worst thing we can do is use very, very limited taxpayers' dollars to fix a dam that doesn't actually serve the intended purpose.

Senator CARDIN. Is there any experiences in the State on how you can decommission them?

Mr. LARSON. Thanks, Senator. I ran the Dam Safety Program in the State of Wisconsin. We had the authority to tell an owner either you fix it up or take it out. There may be instances, and this may be the case you are talking about, where we could not find an

owner. In that case, we ask our State legislature to set up a fund to remove the dams. I think the States need to step up and do that. They are not Federal dams. These are non-Federal dams. And we did, we had a fund where we removed those dams that were no longer serving a purpose.

Mr. LAIRD. And, Senator, we have removed just a high profile one in Monterey County. We have an agreement with Interior and the State of Oregon to remove four dams on the Klamath River. There is one in Ventura County that has silted up to the point that, by 2020, it will have a zero percent capacity and we will have what was once a 7,000-acre foot dam completely with silt ponded.

And you nailed the problem. We raised the money from private donors and different public funds to deal with these dam removals because they were safety, it was fish, it was outlived the usefulness. And some of the ratepayers had to contribute, but in some of these cases they are on such a small base and the cost for removing the dam is so big that we have to leverage some other money.

Senator CARDIN. And we have no responsible party, I understand, that would pay to remove this dam. Therefore, we have to look for either a public source or some way in which there is a broader base to pay for removal of the dam. Your experiences could be very helpful to other States, so one of the things I guess I would encourage is that this subject be best practices shared as to how you were able to do this, because in my State we have been unable to take care of this circumstance.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you very much, Senator Cardin.

Senator GILLIBRAND.

Senator GILLIBRAND.

[Remarks made off microphone.]—New York State because we have quite a lot of dams. New York is particularly vulnerable because, according to the American Society of Civil Engineers, we are actually eighth in the Nation when it comes to high hazard potential dams. The average age of our dams are nearly 70 years old.

New York is also vulnerable to major storms and flooding associated with storm surges along our coast. Hurricane Irene and Tropical Storm Lee resulted in major flooding across New York State; massive damage to homes and businesses and lives. During Hurricane Irene and Tropical Storm Lee, New York failure of three low hazard and one intermediate hazard dams.

We are very fortunate that prior to those storms important repairs were made in some instances, one particularly with the Gilboa Dam in Schoharie County, absent which we may have seen far more devastation in the Mohawk Valley and the city of Schenectady.

Now, while New York State has a strong and longstanding dam safety program in place, we do not know where or when the next storm will occur, and whether it will be more intense than the last. So I think we really can't have a serious conversation about the safety of dams, levees, and other flood infrastructure without also addressing the impacts of climate change and extreme weather.

Sea level rise and storm surge threatens infrastructure all across our coast. Increased amount of precipitation due to hurricanes,

nor'easters, or other extreme weather events threatens our dams and levees as well.

So, first, does the Army Corps provide any guidance to States to help them take the potential impacts of global climate change into account when carrying out their dam safety programs?

General SEMONITE. Senator, thanks for the question. Yes, we certainly do provide a lot of capability. We have a lot of regional expertise. I said earlier we have 5,000 dam safety experts in the Corps. So even in the New York district you have several districts that work in the State of New York. All of those people are there able to provide that capability.

We have also found that we have to be able to localize some of the real, real high end experts in a regional center, so we have built some regional centers. Mr. Helpin, sitting right behind me, he runs our national dam safety center, so not only are we able to come and help in a State capacity, but whatever we can do on any of our technical competence or be able to show lessons learned, we are certainly willing to do that. We are Mosul, Iraq, fixing that dam in Iraq right now because we are that level.

So the challenge is going to be what is the level of support that we can give and how do we work that through on a reimbursable basis, because that is how the Corps works, but we are more than willing to partner if there are any specific issues you have in New York that I can help with.

Senator GILLIBRAND. Well, what steps do you actually take to focus on resiliency? What can you take to make sure a dam is more resilient to handle extreme weather?

General SEMONITE. So I think there is the physical piece, first of all. Some of the things that we have learned on our dams, on our structures: how do we go back in and worry about vegetation; how do we worry about making sure that the right inspections are done; the technical competency. I think the softer side is another big area, though. What are we doing and how do you mitigate that? Things like in our Federal dams, ma'am, we have these water control manuals, so we know how much water do we want to keep in the dam; where do we see the storm coming; how do we bring that back down. Obviously, that is a balance with drought.

So the more that we can do this through technical affiliations or relationships and we can give some advice, I think that is one of the things that we can certainly offer; not just necessarily a structural fix, but how do we continue to work this through a risk-informed decisionmaking process to be able to make sure the whole entity is engaged.

Senator GILLIBRAND. And when you are assessing if something is a high hazard dam or not, are future climate change impacts taken into consideration in making that judgment? I will just give you an example. In New York we have 7,000 dams, and 403 of them are classified as high hazard dam structures. Arguably, would more be classified as high hazard if you were also taking into account future climate change impacts?

General SEMONITE. Senator, we look at climate change, sea level rise with every single thing we do. When we are going to build a new structure, we obviously put that into the design.

I think the other thing that is really most important is not so much the fact of where the water is going to be, but how that water comes. Some of the other testimoneys today talked about flashes. In California right now we are very concerned about this pineapple express type scenario where you could have a lot of microbursts happen all at once. So it is not just the fact of where the water is, but how is that water going to come. And if it is going to come so fast that the system can't pass that water in a manner, then that is when we really have the challenges out there.

Senator GILLIBRAND. And so you are you analyzing those sets of facts when judging which dams are critical?

General SEMONITE. Yes, Senator, exactly right.

Senator GILLIBRAND. Thank you.

Thank you, Mr. Chairman.

Senator BARRASSO. Well, thank you very much.

Everyone has had one round of questions. I didn't have any other.

Senator Harris, anything else?

Well, I want to thank all of our guests for being here. I think this was very, very helpful for all of us. Some of you traveled long distances. I appreciate all of the witnesses for being here.

At this time, I ask unanimous consent to place into the record additional testimony we received from the Association of State Dam Safety Officials and the Upper Mississippi, Illinois, and Missouri River Association and the Flood Plain Alliance for Insurance Reform. So, if there is no objection, those will be included in the record.

[The referenced information follows:]



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TESTIMONY BY DAN DELICH
FLOODPLAIN ALLIANCE FOR INSURANCE REFORM (FAIR)

SUBMITTED TO:
THE U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
FOR A HEARING ON

Flood Control Infrastructure: Safety Questions Raised by Current Events

MARCH 1, 2017

The Floodplain Alliance for Insurance Reform (FAIR), a coalition of local levee and drainage boards, watershed management agencies, water utilities and electric power companies, is grateful for the chance to share information and experience related to flood control infrastructure.

We are thankful to Members of the Committee for your continued vigilance on the flood challenges facing the U.S. and appreciate the leadership shown last year to complete action on the Water Resources Development Act.

Summary Points

- Legislation and policy tied to flood control infrastructure, floodplain management and the NFIP must be based on transparent, actionable data with compelling economic and public safety benefit determinations.
- An estimated 123.3 million people or 39 percent of the nation's population live in counties directly on the shoreline and are responsible for 45 percent of the Nation's GDP.
- In North America, 50% of the population lives within 2.17 miles of freshwater. Globally, 90% of the population lives within 6.2 miles of a freshwater body.

- Economic growth, including greater concentrations of people and wealth in periled areas and rising insurance penetration, is the most important driver of increasing losses.
- Beyond the IPCC assessment that the concentration of wealth and population near waters accounts for increased flood losses, our aging water infrastructure – particularly the age and condition of our dams and levees – will only exacerbate our nation’s flood damages.
- While coastal counties in the U.S. were experiencing the onset of a 40 percent population surge, annual per capita investment in water resources infrastructure was well on its way to tumbling from \$70/person in the mid-1930s to the \$18/person investment we have today.
- If we are in for more extreme weather as the climate changes, anthropogenic or otherwise, Federal return on investment data for structural approaches confirms that our flood infrastructure must be enhanced and expanded while greatly increasing surface water storage.

Floodplain Alliance for Insurance Reform

FAIR promotes consensus flood hazard reduction policies that are clear, achievable and adaptable to place-based variation. We advocate balanced and cost-effective approaches that retain well-conceived structural solutions among the options to reduce flood hazard levels for people, property, and commerce in developed lowland areas. FAIR member communities are recognized participants in the National Flood Insurance Program (NFIP) Community Rating System, a voluntary program to incentivize community floodplain management activities that exceed the minimum NFIP standards. Several of our members are non-federal sponsors with the U.S. Army Corps of Engineers (Corps) on longstanding federal projects that have worked to save lives and dramatically reduce hurricane, storm and inland flood damage. FAIR members fulfill their commitments to maintain and improve flood protection while also serving local and regional needs related to economic development, water supply and treatment, stormwater management and water quality improvement.

FAIR works to ensure that legislation and policy tied to flood control infrastructure, floodplain management and the NFIP are based on transparent, actionable data with compelling economic and public safety benefit determinations. Consistent with Executive Order 13563, entitled “Improving Regulation and Regulatory Review,” we believe that:

“Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science. It must allow for public participation and an open exchange of ideas. It must promote predictability and reduce uncertainty. It must identify

and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative.”¹

The balance of this testimony is organized into four parts:

- I. **Coasts and Rivers: The Population & Economic Pivots of America**
- II. **U.S. Storms and Flooding: The Concentration of People & Wealth**
- III. **Aging Water Infrastructure & the Exacerbation of Flood Loss**
- IV. **Going Forward**

I. Coasts and Rivers: The Population & Economic Pivots of America

Data published by the U.S. Census Bureau, National Ocean Service and Bureau of Economic Analysis reveal that U.S. coastal counties are our most populous areas and that they generate a disproportionately large share of the nation’s gross domestic product (GDP). An estimated 123.3 million people or 39 percent of the nation’s population lived in counties directly on the shoreline in 2010. These counties contributed 45 percent of the country’s economic output while accounting for less than 10 percent of U.S. land area, excluding Alaska.²

According to the American Association of Port Authorities, the U.S. Atlantic Coast is home to more major ports than the rest of the Western Hemisphere combined. Nationally, seaport cargo activity supports the employment of more than 23 million Americans, accounts for 26 percent of the U.S. economy, and in 2014 generated nearly \$4.6 trillion in economic activity and more than \$321 billion in federal, state and local taxes.³ The U.S. Census Bureau estimated that from 1970 to 2010, the population of coastal counties increased by almost 40 percent, and there is little indication that these coastal migration and wealth trends will soon abate.

The U.S. inland is similarly populous and productive in the areas directly adjacent to our abundant and strategically advantageous network of rivers. Stratfor Enterprises, LLC, in its August 24, 2011, monograph, “The Geopolitics of the United States, Part 1: The Inevitable Empire” makes the case that:

“The most distinctive and important feature of the North America is the river network in the middle third of the continent. The network consists of six distinct river systems: the Missouri, Arkansas, Red, Ohio, Tennessee and, of course, the Mississippi. The unified nature of this system greatly enhances the region’s usefulness and potential economic and political power. The Greater Mississippi Basin is the continent’s core, and whoever controls that core not only is certain to dominate the East Coast and Great Lakes regions but will

¹ 76 Fed. Reg. at 3,821 (Jan. 21, 2011).

² U.S. National Ocean Service. *National Coastal Population Report*. March 25, 2013. Available at: <http://oceanservice.noaa.gov/news/weeklynews/mar13/population.html>.

³ American Association of Port Authorities. Available at: <http://www.aapa-ports.org/advocating/content.aspx?ItemNumber=21150>.

also have the agricultural, transport, trade and political unification capacity to be a world power — even without having to interact with the rest of the global system.”⁴

In text adapted from *Water in Environmental Planning* by Thomas Dunne and Luna Leopold, we are reminded that:

Valley floors are attractive areas for human settlement. They have often provided avenues for colonization, especially through mountainous regions and often provide the most convenient transportation corridors. Valley soils are usually more fertile and take to irrigation better than other soils, making them ideal for cultivation. The rivers themselves provide a reliable water supply for drinking, agriculture, manufacturing, and waterborne transport. The flat topography of the valley floor allows for easy residential, commercial, and municipal development. Often because of these benefits of living near the water, societies have chosen to accept the risk of periodic flooding.⁵

Additionally, peer-reviewed research published in 2011 examined the distance of human populations to freshwater bodies (i.e., rivers and lakes).⁶ The study found that half of the world’s population lives within 1.86 miles of a river or lake, and 90 percent of the global population lives within 6.2 miles of a freshwater body. With respect to North America (US and Canada), half of the population lives within 2.17 miles of freshwater.

The research demonstrates that access to freshwater is of crucial importance to humans. Traditionally, people have inhabited places close to rivers or lakes to ensure water supply for several purposes, including household water supply and water for agriculture and livestock. Human population has increased rapidly during the past century, from 1.6 billion in 1900⁷ to 6.9 billion in 2010.⁸ Over the same period, the percentage of the global population living in urban areas has increased from around 16% in 1900 (i.e., 0.3 billion people)⁹ to over 50% in 2010 (i.e., 3.5 billion).¹⁰

Indeed, evermore people around the world and the U.S. live and work in coastal and riverine communities, which often are also urban areas, for a reason — these are the significant strategic, historical and cultural areas, and the predominant economic production zones. Of the 50 U.S.

⁴ Stratfor. The Geopolitics of the United States, Part 1: The Inevitable Empire. Available at: <https://www.stratfor.com/analysis/geopolitics-united-states-part-1-inevitable-empire>.

⁵ Dunne, T., and L.B. Leopold. 1978. *Water in Environmental Planning*. New York: W.H. Freeman and Company. Pg. 394-395.

⁶ Kumm, M., H. de Moel, P.J. Ward, and O. Varis. 2011. How Close Do We Live to Water? A Global Analysis of Population Distance to Freshwater Bodies. *PLoS One* 6(6): e20578. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3110782/>.

⁷ Klein Goldewijk, K., A. Beusen, and P. Janssen. 2010. Long-term dynamic modeling of global population and built-up area in a spatially explicit way: HYDE 3.1. *The Holocene*: 20:565–573.

⁸ United Nations. *World Population Prospects: The 2008 Revision*. 2008. United Nations Population Division, New York.

⁹ *Supra* at footnote 6.

¹⁰ United Nations. *World Urbanization Prospects: The 2009 Revision*. 2010. Population Division of the Department of Economic and Social Affairs of the United Nations. Available at: <http://esa.un.org/unpd/wup/>.

state capital cities, for example, only four (Tallahassee, Helena, Carson City, Raleigh) were not founded upon bodies of coastal or inland water.

A seminal flood policy report published in 1966 by the U.S. Task Force on Federal Flood Control Policy, which was chaired by prominent geographer Gilbert F. White, asserted that:

“Use of flood plains involving periodic damage from floods is not, in itself, a sign of unwarranted or inefficient development. It may well be that the advantages of flood plain location outweigh the intermittent cost of damage from floods. Further, there are some kinds of activity which can only be conducted near a watercourse.”¹¹

II. **U.S. Storms and Flooding: The Concentration of People & Wealth**

The Federal Emergency Management Agency (FEMA) reports that floods are the costliest and most commonly occurring hazard in the U.S. Between 1980 and 2013, the U.S. suffered more than \$260 billion in flood-related damages.¹² Today’s hearing title, “Flood Control Infrastructure: Safety Questions Raised by Current Events,” reveals the committee’s interest not only in the high rainfall totals, looming snowmelt and related flood and infrastructure circumstances presently in California, but also for flood peril around the nation. It is well known that the U.S. has suffered considerable, widespread flood and storm-related losses in recent years. A sampling of 12 of the larger events, dating back to Hurricane Katrina in 2005, is listed below in descending order along with reported NFIP payment totals:

- Hurricane Matthew, October 2016 (\$295M)
- Louisiana Severe Storms and Flooding, August 2016 (\$2.1B)
- Torrential Rain in Texas, April 2016 and June 2015 (\$913M)
- South Carolina Flooding, October 2015 (\$136M)
- Florida Flooding, April 2014 (\$111M)
- Colorado Flooding, September 2013 (\$69M)
- Superstorm Sandy, October 2012 (\$8.4B)
- TS Isaac, August 2012 (\$556M)
- Hurricane Irene, August 2011 (\$1.3B)
- Hurricane Ike, September 2008 (\$2.7B)
- Hurricane Katrina, August 2005 (\$16.3B).¹³

¹¹ U.S. Task Force on Federal Flood Control Policy, *A Unified National Program for Managing Flood Losses*, (Washington, DC, House Document No. 465, Aug. 22, 1966), 13.

¹² FEMA, *Examining DHS’s Misplaced Focus on Climate Change*, (testimony before the Committee on Homeland Security, Subcommittee on Oversight and Management Efficiency, U.S. House of Representatives, July 8, 2015). Available at: <https://homeland.house.gov/hearing/subcommittee-hearing-examining-dhs-s-misplaced-focus-climate-change/>.

¹³ FEMA, Significant Flood Events. Available at: <https://www.fema.gov/significant-flood-events>.

Because of these recent, multiple flood disasters, the Congress has received voluminous testimony, reports and surmises on causality, including the July 2015 FEMA statement cited above, which to varying degrees identify development patterns, population demographics, aging and/or poorly maintained infrastructure, and the effects of long-term changes in weather patterns and climate.

The Intergovernmental Panel on Climate Change (IPCC), the world's most visible scientific body on climate change, has examined these complex issues, and in its most recent 2014 report on impacts and vulnerability the Panel reached the following conclusions:

- Direct and insured losses from weather-related disasters have increased substantially in recent decades, both globally and regionally;
- Economic growth, including greater concentrations of people and wealth in periled areas and rising insurance penetration, is the most important driver of increasing losses; and,
- Apart from detection, loss trends have not been conclusively attributed to anthropogenic climate change; most such claims are not based on scientific attribution methods.¹⁴

In other words, the cost associated with flooding is increasing, but – according to the IPCC – the spike in flood-related costs is better explained by the fact that people and wealth are concentrating evermore near water (see **Coasts and Rivers** section above) than by climate change.

Examining the scope of the problem from a different perspective, Professor Roger Pielke, Jr., a faculty member at the University of Colorado since 2001 and a hearing witness before this Committee in 2013, has found that flood losses as a percentage of GDP dropped by about 75 percent from 1940-2012 (Fig 1).¹⁵

¹⁴ Arent, D.J., R.S.J. Tol, E. Faust, J.P. Hella, S. Kumar, K.M. Strzepek, F.L. Tóth, and D. Yan, 2014: Key economic sectors and services. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 680-681. Available at: http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap10_FINAL.pdf.

¹⁵ Pielke, R., Jr., *Hearing on Climate Change: It's Happening Now*, (testimony before the Committee on Environment and Public Works, U.S. Senate, July 18, 2013). Available at: https://www.epw.senate.gov/public/index.cfm/hearings?id=CFE32378-96A4-81ED-9D0E-2618F6DDFF46&Statement_id=0E3F12A5-0990-4F12-A31A-38260D7B9663.

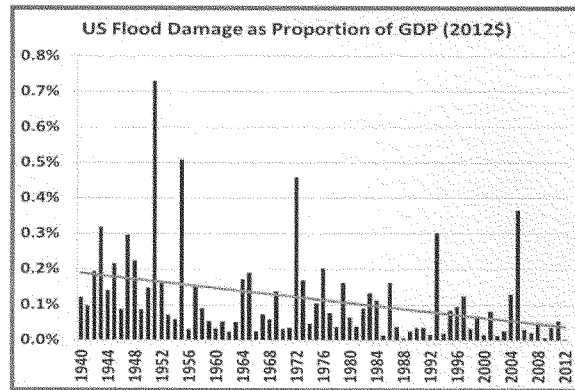


Figure 1. US flood losses as a percentage of US GDP. Annual flood losses have decreased from about 0.2% of the US GDP to <0.05% since 1940. Flood loss data from NOAA HIC:

<http://www.nws.noaa.gov/hic/> GDP data from OMB:

<http://www.whitehouse.gov/sites/default/files/omb/budget/fy2014/assets/hist10z1.xls>¹⁶

III. Aging Water Infrastructure & the Exacerbation of Flood Loss

As reported recently in the *New York Times*, “after two weeks that saw evacuations near Oroville, Calif., and flooding in Elko County, Nev., America’s dams are showing their age. Nearly 2,000 state-regulated high-hazard dams in the United States were listed as being in need of repair in 2015, according to the Association of State Dam Safety Officials.”¹⁷

Western Dams and Reservoirs

In “Cadillac Desert: the American West and its Disappearing Water,” Marc Reisner writes, “In the East, to ‘waste’ water is to consume it needlessly or excessively. In the West, to waste water is *not* to consume it – to let it flow unimpeded and undiverted downstream.”¹⁸

In Chairman Barrasso’s home state of Wyoming, approximately 70 percent of the water supply comes in the form of snow. Snowmelt occurs from March through June, but peak water demand,

¹⁶ After Downton, M., J.Z.B. Miller, and R. A. Pielke, Jr. (2005), Reanalysis of the U.S. National Flood Loss Database. *Natural Hazards Review* 6:13-22

¹⁷ Griggs, T, Aisch, G., Almukhtar, S. (Feb. 23, 2017). America’s Aging Dams Are in Need of Repair. *The New York Times*. Available at: <https://www.nytimes.com/interactive/2017/02/23/us/americas-aging-dams-are-in-need-of-repair.html>.

¹⁸ Reisner, M. 1993. *Cadillac Desert: the American West and its Disappearing Water*. New York: Penguin Books. Pg. 12.

primarily for irrigation, occurs long after the snow is gone and when precipitation and stream flow are low. So as not to waste the water, it is stored until needed using dams and reservoirs.

Underscoring the importance of water storage in the West, on January 24, 2017, the Wyoming delegation reintroduced a bill to expand the Bureau of Reclamation's Fontenelle Reservoir in the southwestern portion of the state. "Expanding water storage will give our farmers, ranchers and communities a reliable supply of water in order to keep their livestock and crops healthy. More water storage capacity also provides an economic incentive for new businesses to grow and create jobs in southwest Wyoming," said Chairman Barrasso.

Senator Enzi noted, "Access to a good source of water in Wyoming doesn't always come easy, but it's vital to our livelihood." And Congresswoman Cheney praised the reservoir expansion bill, saying, "This increase in active storage capacity will mean more water to our local communities which can lead to more economic growth and jobs. The reliable storage of our water is an ever-present infrastructure priority in Wyoming, an arid Western state."

According to the U.S. Army Corps of Engineers National Inventory of Dams, there are some 1,617 dams in Wyoming (Fig. 2) and approximately 79,000 dams nationwide.¹⁹

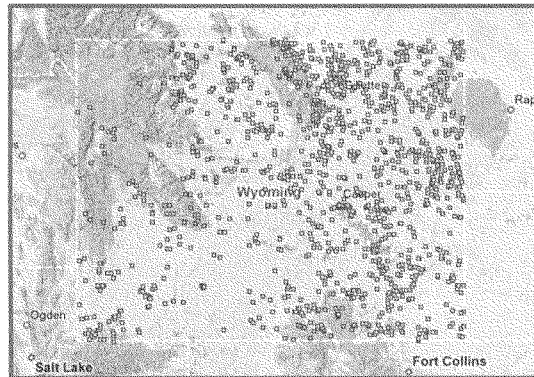


Figure 2. Location of dams in Wyoming. (Source: USACE National Inventory of Dams).

In many ways, dams and reservoirs provide the lifeblood for Wyoming and other western states. They enable farmers and ranchers to grow crops and raise life stock, they protect citizens from

¹⁹ U.S. Army Corps of Engineers National Inventory of Dams. Available at: <http://nid.usace.army.mil/>

devastating floods, they support abundant fisheries and recreation, they provide reliable access to clean drinking water, and they provide renewable hydroelectric power for homes, industry, and even Yellowstone National Park where one-third of the Park's energy is generated by the flow of the Gardiner River. Westerners simply cannot afford to waste water. With dams, reservoirs, and levees, water is put to work in ways that natural systems and processes alone cannot.

Yet, Wyoming's water controls are aging. More than half of the dams in Wyoming are greater than half a century old (Fig. 3). Nationwide, the average age of dams is 52 years old. By 2020, 70% of the total dams in the United States will be over 50 years old.²⁰

In their most recent Infrastructure Report Card, the American Society of Civil Engineers (ASCE) graded the nation's dams a letter "D."²¹ And as our water infrastructure ages, the risk of failure increases. Beyond the IPCC assessment that the concentration of wealth and population near waters accounts for increased flood losses, our aging water infrastructure – particularly the age and condition of our dams and levees – will only exacerbate our nation's flood damages.

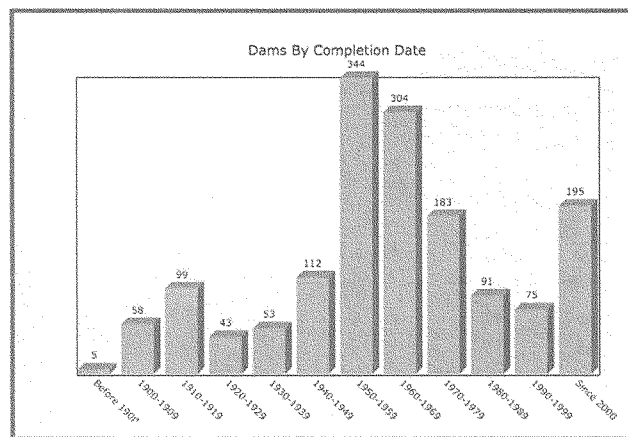


Figure 3: Completion date of dams in Wyoming. (Source: USACE National Inventory of Dams).

²⁰ *Id.*

²¹ American Society of Civil Engineers. 2013. Report Card for America's Infrastructure: Dams. Available at: <http://www.infrastructurereportcard.org/dams/>

Corps Civil Works Programs & Levee Systems

The closing paragraph in a recent Fresno Bee editorial stated, “the storms of 2017 offer [Gov. Jerry] Brown and legislators a grand opportunity to return to what helped build California in the first place: infrastructure.”²² The same argument could be made nationwide for the Army Corps Civil Works Program, including the flood control mission.

In a presentation delivered by a former Director of Civil Works for the Corps,²³ flood control levees were given a grade of “D” or “poor” in the 2013 Report Card for America by ASCE. This is so, at least in part, because of recent historical U.S. investments in this category of critical infrastructure. At roughly the same time that coastal counties in the U.S. were experiencing the beginnings of a 40 percent population surge (see **Coasts and Rivers** section above), annual per capita investment in flood and navigation works was well on its way to tumbling from \$70/person in the mid-1930s, to \$56/person in the 1960s, to the current \$18/person investment (as of 2011) (Fig. 4).

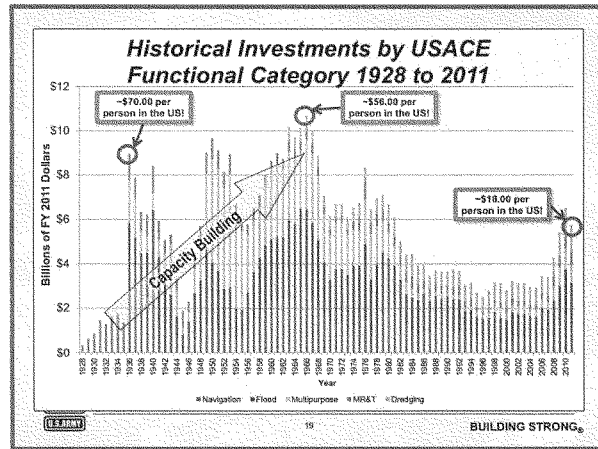


Figure 4: Historical Investments by USACE from 1928-2011. (Source: USACE).

²² After California Floods, Infrastructure is Suddenly Sexy (Feb. 27, 2017). Editorial. *The Fresno Bee*. Available at: <http://www.fresnobee.com/opinion/editorials/article135288169.html>.

²³ Stockton, S., *The State of U.S. Infrastructure – Past, Present and Future* (presentation to the Society of American Military Engineers, Nov. 6, 2014). Available at: <http://docs.acec.org/pub/ad921929-ed87-ac98-4ea4-80eb189a22e0>.

Expressed as a percentage of GDP, Corps Civil Works spending has declined from 0.8% (1935) to approximately 0.035% today (2011), representing a decline by a factor >20 as a % of GDP (Fig. 5). As the Corps slide states, it is evident that "current spending levels will not sustain service levels." As referenced in the previously cited *Fresno Bee* editorial from Feb. 27, 2017, if it is the case that we are in for more extreme weather as the climate changes, anthropogenic or otherwise, our existing levees and dams must be shored up, and we need to greatly increase surface water storage by expanding and building reservoirs.

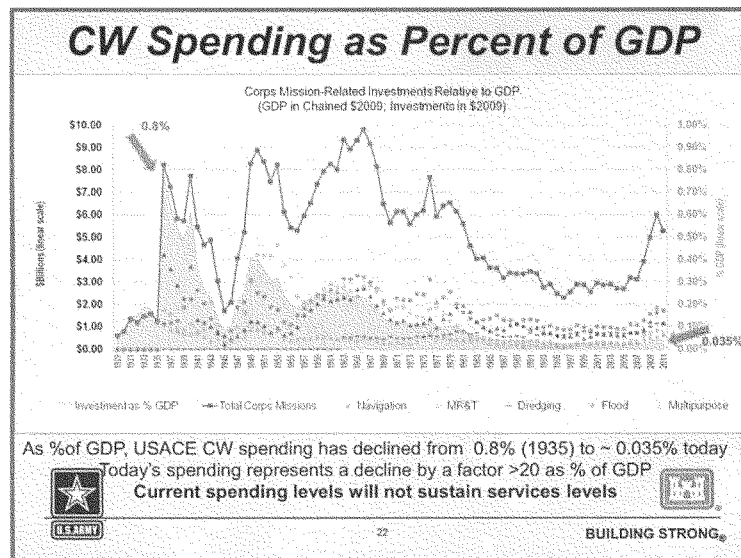


Figure 5: Civil Works spending as a percentage of GDP from 1928-2011. (Source: USACE).

The urgent need for critical flood infrastructure investment, and streamlined Federal permitting processes, is even more compelling when we consider relevant economic return on investment figures reported by federal agencies. Examining longstanding projects and programs by FEMA and the Corps, we find the following:

1. FEMA Mitigation Programs: each dollar spent on mitigation saves an average of **\$4.00**.²⁴
2. Corps Flood Control Mission: each dollar spent on flood damage reduction saves an average of **\$6.48**.²⁵
3. Corps Mississippi River & Tributaries Project: each dollar spent on flood damage reduction saves an average of **\$45.00**.²⁶

IV. Going Forward

- Please work closely with the Senate Committee on Banking as it proceeds this year to reform and reauthorize the National Flood Insurance Program. Senators Shelby and Rounds, fortunately, serve on both committees. It is vital that the NFIP be improved and that it appropriately recognizes the critical life safety benefits of well-conceived and properly maintained flood infrastructure.
- Closely engage with the Trump Administration on the existential need for increased flood and water storage infrastructure capacity.
- Continue to closely engage with States and localities to ensure that legislation and policy tied to flood control infrastructure, floodplain management and the NFIP are based on transparent, actionable data with compelling economic and public safety benefit determinations.
- Continue to closely engage outside entities, including flood control practitioners managing day-to-day flood protection system operations, permitting and budgeting.
- Finally, please shorten the process for getting critical infrastructure built and funded.

As an addendum, Mr. Chairman, on the closely related matter of Executive Order 13690, signed on January 30, 2015, to establish the "Federal Floodplain Management Standard," I provide below a sampling of publicly available comments submitted to the Federal docket by various entities.

Thank you for the opportunity to submit this testimony.

²⁴ FEMA. 2016. Mitigation's Value to Society Fact Sheet. Available at: <https://www.fema.gov/media-library/assets/documents/12305>.

²⁵ Corps IWR. 2009. Flood Risk Management: Value to the Nation. Available at: http://www.iwr.usace.army.mil/Portals/70/docs/VTN/VTNFloodRiskMgmtBro_lores.pdf.

²⁶ Corps MVD. Mississippi River and Tributaries Project. Available at: <http://www.mvd.usace.army.mil/About/Mississippi-River-Commission-MRC/Mississippi-River-Tributaries-Project-MR-T/>.

Addendum

Fed Docket Comments from Select Entities on E.O. 13690 and the Federal Flood Risk Management Standard

March 2017

EO 13690 and Federal Flood Risk Management Standard (FFRMS) was signed in Jan 2015 and reinterpreted in Oct 2015 through the issuance of interagency implementing guidelines. To this point, four Federal agencies (FEMA, HUD, USACE, and EPA) have solicited public comments on proposed or interim final rules or guidance to carry-out FFRMS directives.

The Obama Administration ordered some 30 agencies to revise their floodplain management procedures. To understand some of the concerns about government-wide implementation of FFRMS, please see the following short sample of assessments submitted to the Federal docket by various entities and members of Congress. In a line, this presidential directive, unsubstantiated by accompanying technical and economic data, threatens the existence and replacement of federal and non-federal infrastructure, economic development, and property values in ever-expanding federal flood zone areas.

National Assoc. of Home Builders on HUD Proposed FFRMS Rule (Dec 27, 2016)

"Unfortunately, HUD's proposal unnecessarily expands floodplain management requirements and fundamentally threatens access to FHA mortgage insurance programs for single family home buyers and multifamily builders." "In short, NAHB believes the proposed rule is substantially flawed and should be withdrawn. If implemented, the Proposal will severely disrupt the housing market and harm affordability for countless families living in areas designated under the expanded floodplain definition."

State of West Virginia on HUD Proposed FFRMS Rule (Dec 27, 2016)

"The consequences of implementing a rule that requires all such construction to be elevated two to three feet above base flood elevation or floodproofed without creating any thoughtful mechanism to allow the state to manage certain projects on a case-by-case basis could result in the denial of services to the citizens these funds are designed to support." "In addition to the restrictions on new construction, the proposed rule may hinder the amount of assistance West Virginia can provide to citizens impacted by the historic floods our state experienced in June 2016."

American Petroleum Institute et al on FEMA Proposed FFRMS Rule (Oct 21, 2016)

"The Associations share FEMA's goals for effective floodplain management but here, we are concerned that fundamentally, the true scope of the floodplain expansion contemplated under

this Proposed Rule has been poorly delineated for stakeholders, and it has the potential to have far-reaching implications beyond FEMA federally funded projects. When left to the discretion of individual governmental agencies, there is a potential for an assortment of floodplain definitions as each of these jurisdiction entities attempt to apply the new risk-based approaches...". "The Regulatory Evaluation associated with the Proposed Rule uses data that is limited to coastal residential communities, greatly underestimates costs associated with this Proposed Rule and Supplementary Policy, and does not quantify benefits."

FAIR, EEL, and National Waterways Conf. on FEMA Proposed Rule (Oct 21, 2016)

"Critical features of the FFRMS were established behind closed doors with no public input. The decision by the federal government to seek comment only on implementation of the FFRMS was simply an after-the-fact exercise with no opportunity for the public to weigh in on the underlying regulatory approaches. No actionable scientific information or practicable engineering approaches have been provided to explain the process for selection of the increased vertical elevations and corresponding, expanded horizontal floodplain alternatives in EO 13690 or the Standard. Moreover, there has been no disclosure within EO 13690, the Standard, the final Implementing Guidelines (Oct 8, 2015), or this proposed rulemaking, of comprehensive cost-benefit analyses to inform the public or quantify FFRMS effects on flood hazard reduction and floodplains and the distribution across stakeholders of costs and benefits in the near term and long term."

AASHTO on FEMA Proposed Rule (Oct 11, 2016)

"By requiring an expanded project scope with additional developmental processes, the proposed changes will delay the delivery of projects and significantly increase initial and long term project costs. The proposed rule's process for determining elevation will in many cases require larger structures, footprints, roadway approaches to structures, and roadways adjacent to structures. This will result in increased construction, right of way, inspection, and maintenance costs, as well as increased vulnerability to other hazards (such as wind loads and scour) and impacts to wetlands, water quality, and other hydraulic structures. In addition, it does not allow flexibility for designers to exercise professional judgement, incorporate the context of the project setting, and properly account for the unique environmental conditions within the project site."

Rep. Ralph Abraham on behalf of 21 US House Members on FEMA Proposed Rule (Oct 17, 2016)

"Increasing our nation's durability against floods is a commendable goal, but it is complicated by the uncertainty associated with flood risk determinations. According to the Technical Mapping Advisory Council (TMAC) appointed by FEMA, flood prediction uncertainties for current conditions increase significantly when coupled with the unknowns of future weather patterns and land use. Compelling FEMA and other federal agencies to further mitigate to unjustified standards against undefined threats is unacceptable and will place an undue burden on the communities that will bear the consequences of this policy. Far too many of our constituents have been

affected by flood-related loss in recent years, and any government-proposed solutions in which taxpayer dollars will be used deserve careful evaluation of the costs, benefits and scientific rationale in the spirit of EO 13563 and the President's January 21, 2009 'Memorandum on Transparency and Open Government.'"

Dr. Sam Hunter (President, The Little River Drainage Dist., Cape Girardeau, MO) on FFRMS Guidelines (May 6, 2015)

"The standard was issued without providing an opportunity for transparent and meaningful public input to consider whether the standard provides an effective basis by which to achieve the stated goals of improving Nation's preparedness and resilience against flooding. Assertions of flexibility offered in the implementation of the standard do not provide an in-depth analysis of the standard itself. The standard was issued with neither consideration of a complete understanding of the widespread impact of such changes, nor an assessment on the impact on local communities who will bear the burden of the standard. We request the implementation efforts be halted until such time meaningful public comment has been considered, a peer-reviewed scientific assessment of the impacts, and a thorough cost-benefit analysis of the alternatives. We have been told numerous times this new standard is not intended to affect the National Flood Insurance Program (NFIP) or PL84-99. However, from our review of the subject matter we have a different conclusion."

Scott Brown (President, Kansas City Industrial Council) on FFRMS Guidelines (May 6, 2015)

"We have reviewed the proposed comments submitted by the National Waterways Conference and support the need to further revise the Guidelines for Implementation to allow open and transparent dialogue to address concerns associated with the absence of a cost-benefit analysis and the breadth of coverage of FFRMS. In analyzing the alternatives and revising the guidelines, emphasis should be made to promote practicability and reduce uncertainty which the new FFRMS currently lacks."

Senator BARRASSO. I do also want to note that this record will stay open for the next 2 weeks, and there may be other members of the Committee, because of the votes, who had to leave who may submit written questions, and we would hope that you could get back to us quickly with those.

But, otherwise, thank you to each and every one of you for being here. I am very grateful for your time.

This hearing is adjourned.

[Whereupon, at 12:18 p.m. the committee was adjourned.]

TESTIMONY**Michael D. Klingner, P.E.****Chairman of the Upper Mississippi, Illinois and Missouri Rivers Association (UMIMRA)****Regarding "Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408"****U.S. Senate Committee on Environment & Public Works****February 28, 2017**

My name is Michael D. Klingner, P.E. and I currently serve as Chairman of the Upper Mississippi, Illinois and Missouri Rivers Association (UMIMRA). I am also in private practice and have been involved in numerous 408 requests. The 408 process is not working in the Upper Mississippi River. Three primary problems exist: First, some Corps Districts, specifically Rock Island, does not recognized work completed by the Corps during the original construction, or prior improvements under the 208.10 process, or as repair under PL84-99. The majority of levee districts north of St. Louis were never at what Rock Island refers to as the authorized height. As the 1954 flood control act was not a systemic flood control plan and the construction varied by District Engineer, Contractor, and local conditions. Some districts were offered to build at higher elevations, if paid for locally. For the Upper Mississippi, the authorized elevation was more of a minimum elevation, and typically, most levees were built approximately one (1) higher than authorized. Numerous districts did uniform levee improvements to obtain FEMA certification, with USACE reviews. However, although a 208.10 process was outlined in the O&M manuals, the Corps seldom actually issued formal letters regarding the modification once the improvements were complete. During major floods of 1993 and 2008, PL84-99 projects often also overbuilt sections for settlement and/or safety considerations. The First official notice to the local sponsors on the change from 208.10 to 408 was in 2014. According to Guidance, Previously Approved Alterations under the 208.10 process was to be approved. This has not been case.

Second: Modeling should represent real world conditions. When the 2004 flow frequency profiles were developed, USACE, FEMA and all the Upper States decided to use existing levee heights, not authorized. In most cases, these elevations had a long history, and so the probabilities are based on actual historical conditions. It makes no sense to use an authorized elevation, if that elevation never existed, and was not used in the development of probability profiles. However, Rock Island has decided to use the authorized condition as the base condition. This makes any improvement or retroactive permission on levee heights extremely difficult to obtain. In essence, you first have to mitigate work done by USACE before even starting on the local sponsor request for improvement. This is not reasonable.

Third: The 2004 Flow Frequency Profiles, as approved and in place for USACE, FEMA and the States has the 500 year as the least probable condition. Rock Island has required some levee districts to evaluate conditions less than 1/1000 as part of the permission process. These extremely rare events make modeling unstable as levee overtopping timing, without a Comprehensive Plan in place, are indeterminate. The Rock Island district is requiring storage impact. However, with no storage agreement in place with the local sponsor, this calculation is without basis, and should not be used in the decision process. The worst case should be either the 100 year or 500 year, as these profiles and probabilities are available to the public, and have gone through peer review.

A more complete summary of 408 issues is attached. We appreciate the opportunity to provide testimony on this important matter. We are making the Upper Mississippi less safe with the bureaucratic process in place now under the name of 408. UMIMRA works to speak with one voice for those living, working and investing in the Upper Mississippi River Basin.

Michael D. Klingner, P.E.

616, North 24th Street, Quincy, Illinois, 62301 mdk@klingner.com 217-223-3670

SEC. 408 PERMIT REVIEW

Section 408 permits should not be required of improvement projects conducted before July 31, 2014

All modifications reviewed/accepted by USACE prior to July 31, 2014 should not require approval under 33 U.S.C. 408. Guidance for the review of modifications and alterations to Corps of Engineers did not exist prior to 2006 and was under refinement with USACE internal training and clarification between 2006 and July 2014. Therefore, the ability of USACE to review proposed modifications and alterations would have been limited to other approvals such as Section 404 of the Clean Water Act and 33 CFR 208.10- Local flood Protection Works; Maintenance and Operation of Structures and Facilities. Considering the inability for a review to be performed and no formal notification to local sponsors for a 408 submittal prior to July 31, 2014, it should not be acceptable for USACE to request after-the-fact 408 permits.

Bridge and Levee improvements must be held to the same 408 Hydrology & Hydraulic standards.

The applicable state regulations on levees and bridge regulations should govern what is deemed "substantial adverse changes in water surface profiles". This procedure should be in place until such time that USACE can determine what, if any, additional measures may be required in sensitive areas above St. Louis or above the Mississippi River & Tributaries Levee System (MR&T) (Lock & Dam #24, River Mile 273.4 to Cairo, IL River Mile 0)

A systemic Hydrologic Engineering Centers River Analysis System (HEC-RAS) model should be made available by the USACE- hydrologic model calibration should not be at the cost of the local sponsor and taxpayer.

The USACE shall produce base models for locations of proposed modifications. It shall not be tasked upon the Sponsor to fund the collection of modeling data being requested by USACE. One model benefits all stakeholders by creating systemic, rather than piecemeal, flood risk management. The development of these base models, if not already completed, shall be accomplished as a part of the federal funding to update the Flow Frequency Profiles, as being requested by UMIMRA and other NGOs. Until the federal funding is available, the local sponsor retains the option to fund the requested impacted model area.

Local Sponsors have the right to accept additional levels of risk on their freeboard.

A Local Sponsor, as a political subdivision of its respective State, is comprised of a Board of Commissioners or Supervisors that retain the legal right to accept additional levels of risk on behalf of their landowners. This is already the case when a pipeline requests access to the levee, it should be the same when a neighboring levee district makes the same request in the name of flood control.

Local Sponsors must be allowed to maintain flood protection based on up-to-date science.

As flow frequency profiles are updated, local sponsors should be allowed, under general operation and maintenance responsibilities, to make changes in order to maintain their current frequency-based level of protection and/or Federal Emergency Management Agency (FEMA) certifications. This simply would allow the local sponsor to stay up to date with the latest information that changes due to climate, land use, river channel changes or improved modeling technology. Local Sponsors should not be held hostage to outdated science when improvements are in the interest of public health and safety, and the improvements help reduce State and Federal flood damage recovery costs.

Levees should be evaluated for the top of the levee height as they stand today when calculating impacts during modeling.

It is improper for the USACE to focus on levee heights as they were authorized while the USACE is fully aware that those levees have been improved over the last 60 years. Using outdated levee heights is a disservice to the public and a waste of time and taxpayer money.

The USACE should not calculate flood storage areas if there is no flood easement in place.

Modeling directly tied to the calculation of water surface profile changes resulting from loss of storage are unjustifiable in the Upper Mississippi River Basin unless some type of formal agreement or easement has been consented to by the Local Sponsor to take on flood waters.

Mitigation calculations should be based on modeling impacts measured at worst case 500 year events and using the FEMA allowance of one-foot increased water profile.

UMIMRA advocates that mitigation calculations should be consistent with the Upper Mississippi River Comprehensive Plan design criteria, as originally developed by all three U.S. Army Corps of Engineer Districts (St. Paul, Rock Island, and St. Louis) which used the FEMA 1.0 foot induced head allowance for systemic planning and implementation.

Permit review should be conducted in months, not years.

UMIMRA recommends that Section 408 Review time be limited to a maximum of 90 days at the District level, maximum 60 days at the Division level, and maximum 30 days at the Headquarters level. This would ensure that review time is limited to 6 months, rather than the multi-year review that local sponsors are currently experiencing.



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**Testimony of the
 Association of State Dam Safety Officials
 to the
 Environment and Public Works Committee
 U.S. Senate
 March 1, 2017**

Dear Chairman Barrasso and Members of the Committee:

The Association of State Dam Safety Officials (ASDSO) is pleased to offer this testimony to support your work toward understanding and improving our nation's flood control infrastructure. In the wake of California's ongoing extreme storm events, flooding and concerns over the strength of its state-owned dam infrastructure, now is the time to support and fund all federal programs that are already in place to mitigate the risks associated with flooding and our aging infrastructure. **ASDSO commends the Committee for supporting infrastructure improvements and asks that the Committee support full funding for the National Dam Safety Program and its new companion legislation, the National Dam Rehabilitation Program; and full funding for the National Levee Safety Initiative.**

The Association of State Dam Safety Officials is a national non-profit organization of more than 3,000 state, federal and local dam safety professionals and private sector experts dedicated to improving dam safety through research, education and communications. Our goal simply is to save lives, prevent damage to property and to maintain the benefits of dams by preventing dam failures. Several dramatic dam failures in the United States called attention to the catastrophic consequences of failures. The failure of the federally-owned Teton Dam in 1976 caused 14 deaths and over \$1 billion in damages, and is a constant reminder of the potential consequences associated with dams and the obligations to assure that dams are properly constructed, operated and maintained.

Dams serve many purposes. Not all dams were built or used for flood control. Most dams in the U.S. are privately owned and the states regulate about 70% of the dams in this country. These are a few facts that can inform the discussion about how dams fit into the discussions of challenges that accompany flood risk management. The accompanying fact sheet explains in more detail the need for strong dam safety programs.

Small, well-planned and important federal programs are in place to mitigate flood risk from dam incidents and failures, and from levee failures. They need to be fully funded. The National Dam Safety Program (Water Resources Development Act of 2014) is authorized at \$13.9 million and has never been fully funded. The new and much-needed National Dam Rehabilitation Act (Water Infrastructure Improvement for the Nation Act of 2016) is authorized at \$445 million over 10 years. The Levee Safety Initiative (Water Resources Development Act of 2014) should be fully funded and implemented.

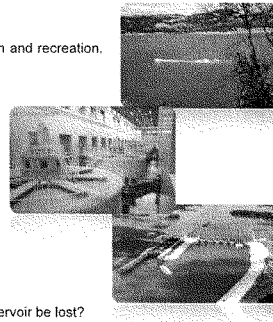


State and Federal Oversight of Dam Safety Must Be Improved

Dams are an essential component of our nation's infrastructure.

Dams provide vital benefits including flood protection, water supply, hydropower, irrigation and recreation. Imagine the impact of losing a major reservoir or flood control dam:

- Would there be catastrophic flooding? How many homes and businesses might be flooded? How many people displaced?
- Would there be adequate water for domestic use? Irrigating crops? Caring for livestock? Fighting fires?
- Are local utilities dependent on hydropower? How many lives and jobs could be affected by temporary shutdown or closure of an industry dependent on hydropower?
- How would transportation systems—roads, railroads, navigable waterways—be affected?
- How would economies and areas dependent on recreation be affected should the reservoir be lost?



But, dam failures have caused loss of life and extreme property and economic damages throughout the United States.

No one knows precisely how many lives have been lost because of dam failures, but between the catastrophic Mill River dam collapse in Massachusetts in 1874 to the fatal Ka Loko dam failure in Hawaii in 2006, at least 4,800 people in the U.S. have perished in dam break floods. A string of fatal dam failures during the 1970s killed roughly 300 people. This high human toll forced the issue of dam safety into the public eye, and resulted in immediate full funding for the National Dam Inspection Program and passage of the National Dam Safety Act in 1986.



Similarly, a firm price cannot be placed on property damages caused by dam failures, but the total is well into the billions of dollars, as evidenced by only a handful of examples:

<i>Buffalo Creek (1972)</i>	\$400 million
<i>Teton (1976)</i>	>\$1 billion
<i>Toccoa Falls (1977)</i>	\$30 million
<i>Lawn Lake (1982)</i>	\$25 million
<i>Silver Lake (2003)</i>	\$102 million

<i>Hope Mills (2003)</i>	\$8.1 million
<i>Big Bay (2004)</i>	\$4.75 million
<i>21 dams in NJ (2004)</i>	\$30 million
<i>Kingston (2008)</i>	>\$1 billion

When a dam is not properly maintained or upgraded, it becomes more susceptible to failure, and eventual repairs cost more.

Timely maintenance is the key to avoiding insurmountable repair costs and potential disaster. At best, putting off repairs will likely cost the dam owner five to ten times as much, fifteen years down the road; at worst, it kills people. Nearly half of our nation's dams are already fifty years old; in another ten years, nearly 70% of dams in the U.S. will have reached the half-century mark.

Dams in the United States

States regulate the vast majority of US dams.

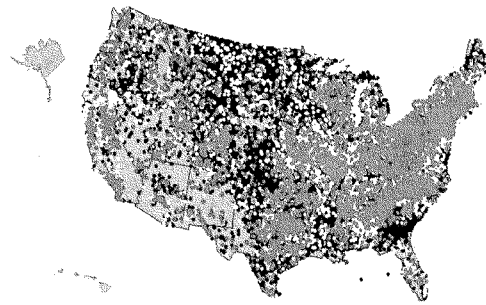
Number of Dams in the
National Inventory of Dams (2016) 90,580

Number of NID-Size Dams under
State Regulation (2016)..... 63,047

Number of NID-Size High-Hazard Potential
Dams reported to be State-Regulated (2016)..... 11,936

Number of Deficient State-Regulated
High-Hazard Potential Dams reported in 2016*..... 1,780

*2016 data from NID condition assessment with only 85% of State-Regulated HHP dams being reported



Red Dots = High-hazard potential dam,
typically defined as a dam whose failure or
mis-operation will cause loss of human life
and significant property destruction.

**Yellow Dots = Significant-hazard
potential dam,** typically defined as a dam
whose failure or mis-operation will cause
significant property destruction.

Black Dots = Low-hazard potential dam,
typically defined as a dam whose failure or
mis-operation will cause minimal property
destruction.

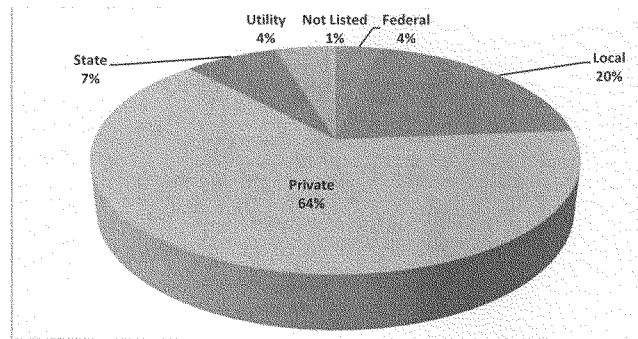
Source: The National Inventory of Dams
(NID). NID data is submitted by each state
& federal dam safety agency to the NID,
administered by the US Army Corps of
Engineering Topographic Engineering
Center.

The National Inventory of Dams (NID) - nid.usace.army.mil

The NID is administered by the US Army Corps of Engineers Topographic Engineering Center and is updated every other year. It includes both state and federally regulated dams that:

- Are classified as having High or Significant hazard potential or,
- Are classified as having Low Hazard potential but equal or exceed 25 feet in height AND 15 acre-feet storage or,
- Are classified as having Low Hazard potential but equal or exceed 50 acre-feet storage AND 6 feet height.

Dam Ownership in the U.S.



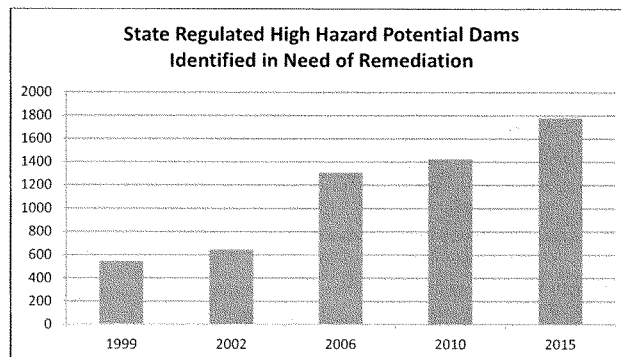
States-Regulate the Majority of Dams in the U.S.

States have the enormous challenge of regulating about 70% of the dams in the US. The federal agencies own or regulate about 6% of the dams and 26% of the dams in the NID list no regulatory agency. State dam safety programs submit biennial statistics on dams that they regulate to the NID. Other state program performance statistics are submitted annually to ASDSO.

The Potential for Catastrophic Dam Failures Is Increasing.

In the last 15 years, the recorded number of state-regulated deficient dams (those with structural or hydraulic deficiencies leaving them susceptible to failure) more than quadrupled. Eliminating this backlog requires that the number of repairs consistently outstrips the number of identified deficient dams, but for the past several years statistics show that for every high-hazard-potential dam repaired, nearly two more dams have been declared deficient.

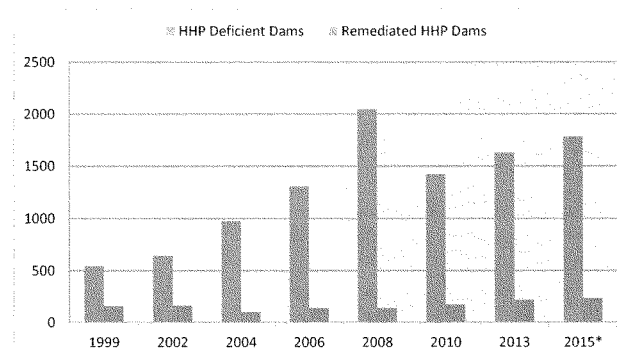
State-Regulated High-Hazard Potential Dams Identified to be in Need of Remediation



STATE-REPORTED DATA	1999	2002	2006	2008	2015*
Total Deficient Dams	1427	1536	3349	4404	NR
HH-Potential Deficient Dams	546	646	1308	2047	1780
HH-Potential Dams- Remediation Completed in the Identified Year	159	163	139	140	235

*2015 data from 2016 NID condition assessment with only 85% of State Regulated HHP dams being reported

Remediation Needs: High-Hazard-Potential Dams



*2015 data from NID condition assessment with only 85% of State Regulated HHP dams being reported.

*In 2009 the NID began collecting condition rating data on high hazard potential dams and this information will be used to record state-regulated deficient dams in the future. For the 2016 NID update 85% of state-regulated high hazard potential dams were rated and 1780 were rated Poor or Unsatisfactory, those considered in need of remediation. States voluntarily submit this data and the number of dams not rated continues to decrease.

"Remediation" is defined as a solution to remove the dam safety problem. This can include solutions such as the addition of a larger spillway, repair of the structure, or removal of the dam.

"Deficient" is defined as a dam that is not capable of performing safely under all required design pool and loading conditions. Note: Each state may have different definitions and standards.

While the estimated cost of rehabilitating our nation's dams is high—well over \$60 billion, including more than \$18.7 billion for high-hazard potential non-federal dams—the collective cost of deferring maintenance on these structures is staggering.

The Number of High-Hazard Potential Dams Is Increasing

The number of high-hazard-potential dams (dams whose failure would cause loss of human life) is increasing. Since 1998, the number of state-regulated high-hazard-potential dams has increased from 9,300 to nearly 12,000 now. The cause of this increase is due to a combination of new dam construction and reclassification of existing dams from lower hazard-potential classifications to high-hazard-potential as a result of population encroachment.

State-Regulated High-Hazard-Potential Dams, 1998-2015*

1998	2001	2004	2006	2008	2010	2012	2014	2015
9,057	8,316	8,544	9,806	10,993	11,202	11,405	11,721	11,949

**As reported by state dam safety programs. Regulators determine a dam's hazard potential classification based on the downstream consequences of a dam failure or incident, such as overtopping or mis-operation.*

Hazard potential classification has absolutely nothing to do with a dam's condition or safety. A high-hazard potential classification does NOT mean the dam is deficient.

Dams that have a high hazard rating are supposed to meet very stringent standards so that they can withstand all credible extreme events such as floods and earthquakes; yet states have determined that many high-hazard potential dams are deficient, proving that—in many instances—the stringent standards are not being met.

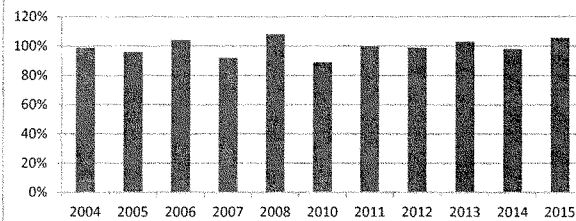
The Good News

Although much remains to be done, efforts are underway to improve dam safety in the US. Organizations such as ASDSO and the American Society of Civil Engineers (ASCE), with the National Dam Safety Program at FEMA, advocate strong state and federal programs, promote awareness of the need for improvement of the nation's infrastructure, and support federal legislation to launch a dam rehabilitation financing program (a measure just passed in the last Congress).

State inspection of high hazard potential dams remains strong. The national average for the inspection of high hazard potential dams has remained relatively steady over the reporting period of 1998 to 2015.

Percentage of Scheduled High Hazard Potential Inspections Completed*

National Inspection Percentage of State-Regulated High Hazard Potential Dams

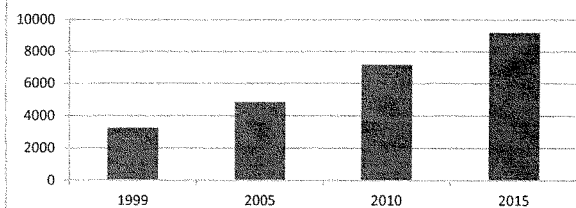


*Inspection percentages vary above and below 100% for any given year based on a state's inspection frequency and scheduling.

States are reducing the risk to the public by increasing the number of current emergency action plans (EAPs) on high-hazard potential dams.

State-Regulated High-Hazard-Potential Dams with EAPs

State-Regulated High Hazard Potential Dams with an EAP



2016 Statistics on State Dam Safety Regulation
Association of State Dam Safety Officials – www.damsafety.org
 October 2016

State	NID Dams <small>(includes all NID-sized dams regulated by state or federal agencies)</small>	State Regulated Dams		Budget	Staff		
		Total	HH		FTEs	Dams/FTE	HH Dams/FTE
Alabama	2271	N/A	N/A	N/A	N/A	N/A	N/A
Alaska	107	76	17	\$325,250	2	38.0	8.5
Arizona	384	258	108	\$767,800	4.5	57.3	24.0
Arkansas	1257	409	114	\$318,269	4.3	95.1	26.5
California	1585	1250	678	\$13,225,000	61	20.5	11.1
Colorado	1737	1757	407	\$1,795,433	13	135.2	31.3
Conn.	746	3111	273	\$750,000	6	518.5	45.5
Delaware	83	47	43	\$1,041,500	1.2	39.2	35.8
Florida	1203	1201	79	\$1,012,088	13.9	86.4	5.7
Georgia	5420	4110	472	\$673,361	10	411.0	47.2
Hawaii	133	132	123	\$1,052,000	4.5	29.3	27.3
Idaho	473	490	93	\$328,670	2.95	166.1	31.5
Illinois	1607	1777	224	\$320,000	3	592.3	74.7
Indiana	916	1085	240	\$505,000	6	180.8	40.0
Iowa	3976	3890	91	\$140,000	3	1296.7	30.3
Kansas	6403	2447	235	\$308,823	3.33	734.8	70.6
Kentucky	1107	962	182	\$515,283	4	240.5	45.5
Louisiana	557	494	43	\$660,367	5	98.8	8.6
Maine	597	598	30	\$77,668	2.25	265.8	13.3
Maryland	346	487	82	\$865,173	6.75	72.1	12.1
Mass.	1452	1465	292	\$1,195,868	4.7	311.7	62.1
Michigan	1005	1049	88	\$392,000	3.2	327.8	27.5
Minnesota	1097	1015	25	\$420,000	5.8	175.0	4.3
Mississippi	5114	5679	305	\$476,654	7.5	757.2	40.7
Missouri	5356	687	465	\$450,375	6	114.5	77.5
Montana	2960	2909	110	\$690,554	6.85	424.7	16.1
Nebraska	2970	2873	141	\$395,544	7.4	388.2	19.1
Nevada	547	685	153	\$277,406	3	228.3	51.0
New Hamp	645	834	146	\$975,925	7.5	111.2	19.5
New Jersey	825	1702	221	\$1,254,000	13	130.9	17.0
New Mexico	492	298	167	\$581,535	7	42.6	23.9
New York	1951	5806	404	\$1,583,148	8.5	683.1	47.5
N Carolina	3444	2561	1235	\$2,064,352	20.85	122.8	59.2
N. Dakota	898	1223	48	\$330,000	4.25	287.8	11.3
Ohio	1495	1498	362	\$1,309,746	12.5	119.8	29.0
Oklahoma	4891	4601	359	\$109,163	4.05	1136.0	88.6
Oregon	869	967	77	\$352,490	2.25	429.8	34.2
Penn.	1525	3373	756	\$2,607,154	27	124.9	28.0
Puerto Rico	38	36	35	\$435,095	2	18.0	17.5
Rhode Isl.	227	667	96	\$270,581	2.15	310.2	44.7
S Carolina	2444	2373	178	\$261,458	6.15	385.9	28.9
S Dakota	2565	2360	46	\$200,000	2.1	1123.8	21.9
Tennessee	1237	658	149	\$320,000	7.1	92.7	21.0
Texas	7395	4049	1212	\$1,685,933	26	155.7	46.6
Utah	833	692	208	\$823,257	7	98.9	29.7
Vermont	357	429	40	\$383,792	2.25	190.7	17.8
Virginia	2919	2121	382	\$1,275,284	7	303.0	54.6
Wash.	784	1040	186	\$1,751,966	9	115.6	20.7
W. Virginia	614	364	285	\$820,773	5	72.8	57.0
Wisconsin	1106	916	157	\$752,000	6.75	135.7	23.3
Wyoming	1617	1540	87	\$316,692	4.73	325.6	18.4
Total	90,580	81,051	11,949	\$49,444,431	395.26	National 205	National 30

NID Data is from the 2016 Update
 FTE = Full Time Equivalent Staff HH = High-Hazard Potential Dam