

**A REVIEW OF THE 2011 FLOODS AND THE
CONDITION OF THE NATION'S FLOOD CON-
TROL SYSTEMS**

HEARING
BEFORE THE
COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

OCTOBER 18, 2011

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ONE HUNDRED TWELFTH CONGRESS
FIRST SESSION

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A REVIEW OF THE 2011 FLOODS AND THE CONDITION OF THE NATION'S FLOOD CON- TROL SYSTEMS

TUESDAY, OCTOBER 18, 2011

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

The full committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer [chairman of the full committee] presiding.

Present: Senators Boxer, Inhofe, Baucus, Cardin, Whitehouse, Vitter, Alexander, Johanns, Boozman.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. The Committee shall come to order.

We are very pleased to have a number of colleagues from off the Committee here today. I think it shows how important our work is dealing in preventing floods.

I apologize, the Ranking Member and I are doing some work on a very important issue on public works. So if there is a little bit of diversion, please understand.

What we decided was that we would make very brief opening statements, Senator Inhofe and I, just 3 minutes each, and then we would start with the members in order of seniority, with Senator Grassley going, then Senator Conrad, Senators Roberts, if he is here, Senator Johnson, Senator Nelson. Then on Panel 2, we have Senators Thune, Blunt, Hoeven and Congressman Carnahan. So that is the plan.

Very quickly, today's hearing will examine how our Nation's flood control systems responded to the flooding events of 2011. We need to take a hard look at that response and see where we can improve our response.

I welcome all the distinguished witnesses here today who will help give out Committee a picture of what happened, what worked, what didn't worked. I appreciate Assistant Secretary of the Army, Jo Ellen Darcy, who is joining us, along with the Commanders of the three Corps divisions with jurisdiction over these events: Major General Michael Walsh, from Mississippi Valley Division; Brigadier General John McMahon, from Northwest Division; and Colonel Christopher Larsen, with the North Atlantic Division.

I also welcome all of the local witnesses who made the trip to D.C. who will bring a very important perspective to us. And of

course, I welcome our Senate colleagues. It is really unprecedented, Senator Inhofe, how many colleagues are here today. That is going to move us forward as we look at how to write a new Water Resources Development Act bill, the new WRDA bill.

As you know, because of the earmark controversy, we have to change the way we do this bill. But I want to give good news to those who are here. Senator Inhofe and I, working with our staffs, are figuring out how to move forward. We will work with all of you Senators so that you feel comfortable that we can meet the needs of your State and still manage to avoid the pitfalls of the dreaded word, earmark.

Just for the record, speaking for myself, my own view is, I believe we know what is best for our States. And I am a person who believes that we should continue doing those legislative priorities that have been given the name earmark. But we are not going to get into that today. We are going to figure out a way to fund WRDA and meet the requirements of the Senate.

So we will be moving forward. Our Nation's flood control systems require continued investment and improvement. Today's hearing will help us understand how we are better prepared for future flood events.

Again, I want to thank all the witnesses. This is a bipartisan moment for this Committee, as is the Highway Bill. So I know we can work together, and no one makes that happen better, frankly, than my very good friend, Senator Inhofe. I am happy to call on him.

**OPENING STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA**

Senator INHOFE. Thank you, Madam Chairman. I do agree with that. Although Oklahoma has not experienced the same flooding impact as some of our colleagues on the two panels that will be before us, the ripple effect of the Mississippi River flood event impacted my constituents back home.

I think one of the best kept secrets around is that we in Oklahoma actually are navigable. People don't know that. We have a navigation way that came all the way up. In fact, my father-in-law, who I might add was a strong Democrat in the State legislature, was the author of the bill that established all of that. So we have always been involved in that. And of course, anything that affects the McClellan-Kerr Arkansas River navigation system affects us.

The Corps is preparing assessment of some of the damage, as well as formulating estimates of what it will cost to repair our flood control infrastructure. Madam Chairman, I do have a lengthier statement which I just want to have as part of the record. But I want to say that we are both anxious to tackle two major events. One is the Transportation Reauthorization Bill and the other is WRDA.

I have to say this also, going back from memory, I think I was the only conservative that voted against the earmark, recognizing that when you don't do earmarks, or don't do your appropriation and your authorization, as Article I, Section 9 of the Constitution tells us to do, then automatically the President does that. And the President doesn't know what our needs are in Oklahoma. I am not sure he has ever been to Oklahoma.

And with that, thank you for having this Committee hearing.
[The prepared statement of Senator Inhofe follows:]

Statement of Senator James M. Inhofe
“A Review of the 2011 Floods and the Condition of the Nation’s
Flood Control Systems”
Environment & Public Works Committee
Tuesday, October 18, 2011

Thank you, Madam Chair, for holding today’s hearing. It is focused on the recent natural disasters – Mississippi and Missouri River flood events as well as Hurricane Irene and Tropical Storm Lee – that significantly impacted numerous communities across the country.

The breadth of this impact is evident by the number of our colleagues, both members and non-members of this Committee, here today who wish to make statements and ask questions about what took place in their home states. I would especially like to welcome and thank our colleagues seated before us for being here today.

I don’t want to spend too much time describing these natural disasters and the extent of the damage that was caused as our colleagues and witnesses are here to provide us with those details.

Although Oklahoma has not experienced the same flooding impact as some of my colleagues’ states, the ripple effect of the Mississippi River flood event impacted my constituents back home. For example, due to backwater flooding, navigation on the McClellan-Kerr Arkansas River Navigation System (MKARNS) was delayed and practically shutdown as barges could not reach the Port of Catoosa.

An important function of this Committee, is to exercise proper oversight of the federal government’s response to natural disasters like these. The Army Corps of Engineers, in partnership with other federal agencies and

state and local governments, worked to mitigate the near-term impacts and long-term consequences of these disasters.

However, questions remain. The purpose of this hearing is to delve deeper into the timeline of events and activities leading up to, during, and after these disasters. Our witnesses will share their account of what happened on the ground, what worked and what didn't. We have a lot to cover. Based on the information gathered today, this hearing may turn out to be the beginning of our oversight of these disasters.

The Corps is still preparing assessments of some of the damage as well as formulating estimates of what it will cost to repair our flood control infrastructure. We may not know the full extent of the damage and costs associated with it for a while longer.

Nevertheless, this does not mean that we can wait indefinitely to take action. We have a narrow window of time to make any necessary repairs before next spring when we could face another round of flooding.

We must understand the full scope of what happened before we can begin to determine if there is appropriate legislative action to take. A couple of our witnesses will provide some initial recommendations for the Committee's consideration.

The Chair and I agree that a WRDA bill is a priority. It would be an appropriate vehicle for any potential flood-related policy provisions.

As a conservative, I firmly believe that two areas worthy of spending taxpayer dollars are defense and infrastructure. It may not be as headline-grabbing as some other areas of government spending, but spending on infrastructure – including flood control infrastructure – not only saves lives and property, but is essential for economic growth. The

Corps flood risk management program has prevented more than \$700 billion in river and coastal damages, saving almost \$6 in damages for each dollar spent. As we have in the past, we must make our water resources infrastructure a national priority.

Senator Moran was unable to participate in today's hearing. Madam Chair, I respectfully request unanimous consent that Senator Moran's statement be entered into the record.

I look forward to hearing the witnesses' testimony.

Senator BOXER. I will let that one go.

[Laughter.]

Senator BOXER. So here is where we are. If Members could make 3 minutes openings, and that is what we are going to ask all our Senators to do.

Senator INHOFE. We had one member, Jerry Moran wanted to be here. He can't be here, so I ask that his statement be entered.

Senator BOXER. We will put it into the record at the appropriate place.

[The prepared statement of Senator Moran was not received at time of print.]

Senator BOXER. Senator Cardin, you are next. At some point, I am going to have to hand you the gavel due to my schedule. We are so thrilled that you chair the appropriate subcommittee on water, so please go ahead.

**OPENING STATEMENT OF HON. BENJAMIN L. CARDIN,
U.S. SENATOR FROM THE STATE OF MARYLAND**

Senator CARDIN. Madam Chair, thank you very much for calling this hearing. I think it is an extremely important hearing, and I want to hear from our colleagues who have experienced first-hand the incredible challenge we have had on flooding this year. I am very interested in hearing from our panel.

I will ask consent that my entire statement be made part of the record.

But I just want to do share very, very quickly with my colleagues the effectiveness of the flood control shore erosion issues in the coast of Maryland that worked very well during these two storms. We have invested a lot of resources into protecting the ocean front at Ocean City, Maryland. We have invested money, but it paid off big time. We saw that during these past two storms when we had record levels of rainfall and risk. We had to evacuate Ocean City, but the amount of damage was kept to a minimum because of the investments that we made on the sand replenishment and on the dunes.

I might also say that the Susquehanna River was in danger of severe flooding. We had to evacuate two of our towns. But once again, the management system worked well.

So Madam Chairman, I will put my entire statement into the record and I look forward to our witnesses, particularly we have Terry McGean, who is the engineer for the town of Ocean City, who will testify on a later panel as to the value we received from the precautionary work that was done to protect Ocean City.

[The prepared statement of Senator Cardin follows:]

**Environment and Public Works Committee
hearing entitled,
" A REVIEW OF THE 2011 FLOODS AND THE CONDITION
OF THE NATION'S FLOOD CONTROL SYSTEMS"**

Tuesday, October 18, 2011
10:00 AM EDT
EPW Hearing Room - 406 Dirksen

Opening Statement
Senator Benjamin L. Cardin

Madame Chairman, thank you for holding this timely hearing.

The devastating weather of 2011 brought unprecedented flooding to many parts of the country. The Columbia River became a raging torrent. The Missouri and Mississippi brought walls of water from North Dakota all the way down to Louisiana. And that was all before Hurricane Irene and Tropical Storm Lee devastated the Atlantic Coast from the Carolinas up through Vermont.

Waters that overflowed their banks from coast to coast will make 2011 among the costliest years of flooding in U.S. history.

Today's hearing will provide us with a good overview of how well the nation's system of flood protection worked... and didn't work.

As we deal with the reality of climate change, we will no doubt be seeing weather extremes like we saw in 2011 become the norm. That will put a whole new level of demands on the system that is already under tremendous pressure.

One important bright spot to note during today's hearing is the work of the Army Corps Baltimore District.

During the Atlantic coast storms, the Baltimore District was able to meet the challenge.

In a one-two punch, Hurricane Irene, which hit the eastern portion of the watershed Aug. 27-28, and Tropical Storm Lee, which hit two weeks later, dumped more than 2 feet of rain in a two-week period on some parts of the watershed.

Flows on the Susquehanna River peaked at 778,000 cubic feet per second on Sept. 9. Maryland's Conowingo Dam, which sits just 5 miles below the Pennsylvania state line, opened 43 of 53 floodgates to allow water to escape. The average September river flow is 18,800 cfs. That means the storm was pushing more than 40 times the normal amount of water down the Susquehanna. It was the second highest flow measured at the dam since flows from Tropical Storm Agnes peaked at 1.13 million cfs in 1972.

Madame Chairman, in the days before Hurricane Irene and Tropical Storm Lee struck, the Baltimore District reported to me that it controlled the levels of the reservoirs it controls on the Susquehanna River so that they were at optimum levels to contain expected heavy rains.

The town of Port Deposit had to be evacuated as did portions of Havre de Grace. These are both Maryland communities that hug the shoreline. They suffered some significant damage, but no loss of life. Given the storm's severity, they were expecting worse.

Over on the Atlantic Coast, we saw a similar phenomenon. Since 1991 the Corps of Engineers has maintained a hurricane protection project at Ocean City, Maryland.

For a stretch of over 8 miles, the Corps has raised the beach and build grass dunes. This "green infrastructure" project once again proved its worth.

In Ocean City, no injuries were reported. And property damage was minimal.

We will hear in greater detail about the effectiveness of this project when Terry McGean, the engineer for the Town of Ocean City, testifies. But I can tell you now, that this single project has protected Ocean City repeatedly. The estimated damages avoided because of the project are now over \$250 million. And that figure does NOT include the savings from Hurricane Irene and Tropical Storm Lee because the Corps doesn't have final economic estimates yet.

Madame Chairman, we know that careful management of reservoir levels can be effective and we know that green infrastructure projects such as the one in Ocean City work. These are important lessons that we learned already.

I am anxious to hear from our witnesses about the other lessons learned from the floods of 2011.

Thank you.

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Senator BOXER. Thank you, Senator.
Senator JOHANNIS.

**OPENING STATEMENT OF HON. MIKE JOHANNIS,
U.S. SENATOR FROM THE STATE OF NEBRASKA**

Senator JOHANNIS. Madam Chair, let me start out and just say also, thank you for holding this very important hearing today.

This is a day for bipartisanship. In fact, it started back in July when 14 Senators, all 14 Senators along the Missouri River, sent a letter requesting this hearing. I thank the Chair and the Ranking Member for honoring the request.

I probably won't soon forget the shock I felt this spring when it became clear to me that Nebraskans would soon be dealing with a flood of historic proportions. We had seen reports of large snow pack on the Rocky Mountains and across the Great Plains. But then in the last 2 weeks of May, several State in the Missouri River Basin experienced rainfall at 200, 300 and even 400 percent above average?

Total runoff for 2011 is project to reach almost 230 percent of the normal level and far exceed the 2007 record of 49 million acre feet. Now, no doubt about it, this presented immense challenges for the Army Corps personnel as they tried to deal with this situation.

I do want to express my gratitude to the many Federal and State employees who spent countless hours combating the flood waters. But it seems clear to me that the river management system did not work. That is why we are here today. Granted, the snow pack and rainfall that caused this year's flood was, no doubt about it, exceptional. But we must now figure out what changes should be made to protect people's farms, their livelihoods, their homes. It was only within the last few weeks, as a matter of fact, that some people even got back to their homes because they had been underwater.

We could not have expected the Corps to completely mitigate the effects of these floods. It just wasn't humanly possible. But it is appropriate to ask what data was available that could have been used to alleviate the pressure on the flood control systems earlier this year. To the extent it is feasible, we should also consider if there is a need for updates to the master manual's procedures in the annual operating plan.

I will wrap up my comments today by expressing my concern that notwithstanding the enormous problems we have had over the last year, it looks like we are headed into another very difficulty situation in the year ahead, with no changes being made. So I appreciate the hearing, Madam Chair. I look forward to the witness testimony.

Senator BOXER. Thank you, Senator.
Senator ALEXANDER.

**OPENING STATEMENT OF HON. LAMAR ALEXANDER,
U.S. SENATOR FROM THE STATE OF TENNESSEE**

Senator ALEXANDER. Thanks, Madam Chair. I also appreciate the hearing, and welcome our colleagues and those who are testifying.

My top priority is to do all I can to help the Federal Government participate in repairing President's Island near Memphis, as well as other damage near Lake County, which is the beginning of

where the Mississippi River comes down along Tennessee, because the longer we wait to do that, the more we endanger the creation of jobs in our region at a time when unemployment is more than 9 percent. That is my major goal.

Like the other States represented here, we have had some huge floods the last 2 years. The reason why so many Senators are here is the Mississippi River and tributary flood control project is the largest flood control project in the world. We have had these two phenomenal events in 2010 and 2011. In Tennessee it was a 1,000 year flood in 2010, and then in 2011 the Corps of Engineers fought this flood for 47 straight days.

Mayor A.C. Wharton is here from Memphis to talk about what happened there and the importance of our work on President's Island. But I want to compliment Mayor Wharton and the leadership of Shelby County and Memphis for their preparedness. I have not seen a more effective organization in a long time, that worked hard to avoid damage, rather than just cleanup after it.

We hope to focus in this hearing on other things we can do to prevent future damage. I would say to the Corps of Engineers that the work it did during the flooding event in 2011, insofar as what we saw in Tennessee, was a very good job. After 2010, my emphasis to the Corps of Engineers, particularly for the flooding around Nashville, was to see if we could find a way to take the Federal agencies and make our warnings about floods as effective as our warnings about tornado. You can turn on television and see the tornadoes coming down your road in 13 minutes.

Well, we can't quite do that with rising water. But the tornado warnings were greatly improved by cooperation from agencies over the last 10 or 12 years. I think we should work with the Weather Service and Army Corps and other agencies to see if we can let the cities and towns and people up and down the Mississippi River and other areas know when flood waters are coming.

I thank you, Madam Chairman, and I look forward to the hearing.

Senator BOXER. Senators, we are now ready to hear your voices and hear your perspectives. We will start with Senator Grassley. Each of you will have 3 minutes.

Go ahead, Senator.

**OPENING STATEMENT OF HON. CHARLES GRASSLEY,
U.S. SENATOR FROM THE STATE OF IOWA**

Senator GRASSLEY. Thank you, Senator Boxer, Senator Inhofe, for your leadership in this area and for holding a very important hearing because of the devastation from the Missouri River flood of 2011.

I am going to put a long statement into the record and try to summarize very quickly.

If you know the history of Pick-Sloan flood projects, they were for flood control. Now, over the course of several decades, a Corps manual has been put forward that was finally finalized in 2006 that would probably try to manage the river for several reasons beyond flood control, for recreation, irrigation, municipal water, environmental reasons and for commerce.

It took about 10 to 15 years to develop that manual that manages the river and the control structures. It seems to me that from the devastation that happened this year, you have to have a revision of the manual to put more emphasis upon flood control, the original purposes of the structures in the first place. And since it took a decade or more to develop the manual that now governs, we have to have, in just a few months, a revision of that manual that puts emphasis upon flood control.

It is pretty difficult to blame the Corps for what went wrong when they have so many things to take into consideration. Flood control is probably very much a minority of the considerations. With all the damage that has been done to farming, to homes, to small businesses and everything, it seems to me we have to start putting people first on consideration in this manual. Putting people first would be trying to mitigate the damage that was done by flooding. And not have as much concern about recreation, irrigation, municipal water, environment, environmental species, commerce. When you see all of the damage that was done by this flood, more consideration has to be given to flood control than has been done in this manual that now governs. Rewrite the manual and do it very quickly.

Thank you.

[The prepared statement of Senator Grassley]

Statement of Senator Chuck Grassley before the Senate Environment and Public Works
Committee, A Review of the 2011 Floods and the Condition of the Nation's Flood Control
Systems, October 18, 2011

Thank you Chairwoman Boxer and Ranking Member Inhofe for holding this review of the devastating flooding of the Missouri River in 2011. I appreciate the opportunity to share the concerns of Iowans with the committee.

Iowans know too well the devastation that flooding causes. This year, Iowans living along the Missouri River have faced the biggest flood in terms of total water in the last 113 years on the river. Communities, business owners, farming operations, and homeowners from Sioux City to Hamburg have valiantly fought this flood trying to protect their lands, businesses, and homes. The flooding was unlike other recent flooding disasters in Iowa because of the length of time the water has remained outside the river's banks and the long time period of the flood fight.

I have been working closely with and listening carefully to the concerns of Iowans. During my visits to Southwest Iowa, I saw firsthand the flood fight efforts and the devastation, and met with affected individuals and communities.

There are understandable frustrations and questions about how the water was managed upstream. My constituents want to get answers about the U.S. Army Corps of Engineers' operations on the Missouri River. A thorough review of the Corps' actions is warranted. The questions are not only about the water management but also about the Corps' communication in anticipation of the floods both internally and with people and communities who live along the river.

A review of the importance of flood control in the Corps' management of the river is also needed. There has been a decades-long debate about how much weight is given to recreational and other interests, compared to flood control, in the way that the Corps manages the Missouri River as dictated by the master manual. This year's damaging flood ought to prompt a meaningful reassessment of those priorities, with enhanced emphasis on flood control.

I want to make sure that flood protection is the main focus of Missouri River management. Congress needs to carefully explore if changes are needed to the Corps' Master Manual, a 432 page book that dictates how much water, and when, the Corps should release from dams during certain runoff conditions. If changes are needed, they should be made as quickly as possible. The last time changes were made to the manual it took 15 years, from 1989 to 2004, to settle things. The communities and individuals along the Missouri River cannot wait that long for changes and deserve better this time, especially as many are trying to rebuild their lives after the devastation of this year's flood.

As the Corps prepares for the 2012 runoff season, we need to ensure that the Corps is acting appropriately to reduce the threat of flooding next year. The issue of when to evacuate water being held upstream in order to make room for next year's runoff, while also allowing time this year for evaluation and repair of dams and water logged levees downstream, is vital. All of the repairs will not be able to be completed by the time that winter sets in so it is of great importance that those along the Missouri River are protected from potential flooding next year.

I admire the stamina and determination of Iowans living along the Missouri River. They deserve answers. The Corps needs to fully account for its decisions of the last year, and the actions and proposals for the future management of the Missouri River needs to be carefully examined so we are not faced with a repeat of this devastating flood in the future.

Senator BOXER. Senator, thank you. We know all of you have to speak and leave, and we thank you so much for being here.
Senator Conrad.

**OPENING STATEMENT OF HON. KENT CONRAD,
U.S. SENATOR FROM THE STATE OF NORTH DAKOTA**

Senator CONRAD. Thank you, Chairman Boxer and Ranking Member Inhofe, for holding the hearing. We very much appreciate that.

Senator Cardin, thank you for being here, and Senator Alexander, Senator Johanns. And thank you for your opening statements, because I think they reflect the concern that all of us share.

I think it is important to my constituents and certainly to me that we fully review the events of this last year. Because something went terribly wrong. The flooding was epic, there is no doubt about that. In my State of North Dakota, we were hit by record floods, records that so far exceed anything ever in recorded history, that you have to wonder what is happening.

I just say to those who are listening, two major river systems in our State, the Missouri and the Souris, were affected. This headline from the Minot Daily News really says it all: Swamped. This is our fourth largest town. In 48 hours, the level of the flood was increased, the projection, 10 feet. There is no way you can respond in 48 hours to an increase in the projection of 10 feet. That is humanly not possible to defend a town.

A wall of water was headed our way. More than 11,000 residents were evacuated. This is three and a half feet higher in terms of a flood level than the record recorded flood of 1881. So we are dealing with something that is so far outside our experience that it is hard to even talk about.

The damage to this town was dramatic. More than 4,000 homes were inundated for weeks, and many of them just completely destroyed. Rebuilding this city will take years.

Bismarck, our capital city, and Minot and Mandan, its sister city, which both straddle the Missouri, were also affected by record flooding due to historic releases from the Garrison Dam. For those along the Missouri River, one of the most frustrating aspects of the problem was the ever-changing forecast, from a forecast of a release of 110,000 CFS to ultimately 150,000 CFS, ten times what is normal. This is the highest releases ever in recorded history.

Flooding of this magnitude had not been seen since the Garrison Dam became operational. Hundreds of families were forced from their homes, including two of my own employees, one of whom will not be back into her home until some time next year. She and her family have been living in my apartment because their house is absolutely so badly damaged that they can't get back.

Here is just one example of the havoc this flood caused. As you can see, this family, like many others, had built a sandbag dike around their home. The volume of the water was so powerful and moved with such speed that it cut a new channel, and it created a scour hole that claimed this home. Focus in the near term must be clearly on repairing the damage to flood control systems. We also need additional Federal support for families and businesses, so they have some chance to recover.

Many of my constituents are concerned that they will face another flood next year, because we have record amounts of water in the system. And the forecast is for more record rainfall. I believe that requires us to review the operations of the master manual. Just sticking with what has been done is not good enough.

Finally, I want to thank very sincerely both General Walsh and General McMahon for their service, and the service of their entire team. They did wage truly heroic efforts to defend these cities and towns. And we will never forget those efforts.

At the same time, I think we would be derelict in our duty not to recognize that just following the existing master manual operating instructions is not going to cut it in these extraordinary weather conditions we confront.

I thank the Committee.

Senator BOXER. Thank you so much, Senator Conrad.

Senator Roberts, we welcome you.

**OPENING STATEMENT OF HON. PAT ROBERTS,
U.S. SENATOR FROM THE STATE OF KANSAS**

Senator ROBERTS. Thank you, Madam Chairman. And thank you for leading the effort to hold this hearing, along with my good friend, Jim Inhofe, who has been on this issue for a considerable amount of time.

Seventy-nine percent of Kansas is currently experiencing drought conditions, not flood conditions, but drought conditions earlier this year. I don't know what we did to Mother Nature, but she has not acted in a very welcome way.

Starting in May and lasting through September, however, Kansans living along the Missouri River were engaged in protecting their property due to record amounts of water. During that 5-month stretch, four Kansas counties, Donovan, Atchison, Leavenworth and Wyandott, were about one serious rainfall away from catastrophe.

As was explained to me, Gavin's Point acts as the spigot, and this summer, the spigot was wide open. The Corps had little or no management control, once the water was released from Gavin's Point. Thankfully, no major rain events occurred, otherwise I would be sitting in front you discussing the loss of life and significant property damage.

I say that very humbly, because many Kansans did experience major property damage, experiencing everything from a local agricultural seed business and homes and businesses to agriculture fields were damaged and destroyed, not to mention the costs endured by local and State government to sandbag and post National Guard troops on the levees to watch for sand boils and water overtoppings.

Back in July, I joined my friend and former colleague, Governor Sam Brownback, on a tour of the flooding, going from Kansas City to Elwood to Atchison. We visited the first responders and the government officials, offered assistance. Time and time again we heard of how the river has been mismanaged. Now in my view, the 432-page Missouri River master manual needs to have additional emphasis placed on the top priority, and that priority is flood control.

I have heard from more than one upset farmer who has had his field flooded multiple times in the past decade that the tail is wagging the dog, and too much emphasis has been put on recreation, fish and wildlife, specifically through a spring pulse and water quality.

Now, these purpose are congressionally approved. They should not hinder the primary purpose of flood control. The dog should not wag its tail, and Congress should ensure the Corps is putting flood control above all else. That is why earlier this summer Senator Johanns and I introduced S. 1377, a bill requiring the Corps to take into account all available hydrologic data in conducting Missouri River Basin operations.

I know that nobody knows when the next rainfall event will occur, how much rain will fall in a given amount of time. Nor will anyone be able to accurately forecast this winter's snow pack. But we now have a new precipitation record for the upper Missouri. Congress must ensure this latest data is incorporated and used in a timely fashion and any and all Army Corps of Engineer management decisions in order to limit the greatest extent possible a flood of this year's magnitude from ever occurring again.

I thank the Chair.

[Prepared statement of Senator Roberts follows:]

Senator Roberts
Senate EPW Committee hearing on Missouri River Flooding
October 18, 2011

- Chairwoman Boxer, Ranking Member Inhofe, members of the committee, thank you for allowing me to join you here today.

- While 79 percent of Kansas is currently experiencing drought conditions, earlier this year – starting in May and lasting through September – Kansans living along the Missouri River were engaged in protecting their property due to record amounts of water.

- During that five month stretch four Kansas counties – Doniphan, Atchison, Leavenworth and Wyandotte – were one significant rainfall event from catastrophe.

- As it was explained to me, Gavins Point acts as the spigot, and this summer the spigot was wide open. The Corps had little to no management control once the water was released from Gavins Point.

- Kansans living in the towns of White Cloud, Elwood, Wathena, Atchison, Leavenworth, and Kansas City Kansas were watching the weather forecast daily and praying for dry conditions all the way from the Nebraska/South Dakota state boarder down to Kansas City.

- Thankfully no major rain events occurred otherwise I would be sitting in front of you discussing loss of life and significant property damage.

- I say that very humbly because many Kansans did experience major property damage. Everything from a local agricultural seed business, to homes and business, to agricultural fields were damaged and destroyed.
- And not to mention the cost endured by local and state governments to sandbag and post National Guard troops on levees to watch for sandboils and water overtoppings.

- Back in July, I joined my friend and former colleague, Governor Sam Brownback on a tour of the flooding going from Kansas City to Elwood to Atchison.

- We visited with first responders and government officials and offered assistance. Time and time again we heard of how the river has been ‘mismanaged’ and how, in my view, the 432-page Missouri River Master Manual needs to have additional emphasis placed on the top priority – flood control.

- I have heard from more than one upset farmer who has had his field flooded multiple times in the past decade that the tail is wagging the dog and too much emphasis has been put on recreation, fish and wildlife – specifically through a “spring pulse” – and water quality.
- While these purposes are congressionally approved they should not hinder the primary purpose of flood control. The dog should wag

its' tail and Congress should ensure the Corps is putting flood control above all else.

- That is why earlier this summer Senator Johanns and I introduced S. 1377, a bill requiring the Corps of Engineers to take into account all available hydrologic data in conducting Missouri River basing operations.
- No one knows where the next rainfall event will occur, or how much rain will fall in a given

amount of time, nor will anyone be able to accurately forecast this winter's snowpack.

- But we now have new precipitation records for the upper Missouri River basin.
- Congress must ensure this latest data is incorporated and used in a timely fashion in any and all Army Corps of Engineers management decisions in order to limit to the greatest extent possible a flood of this year's magnitude from occurring again.

- To that end, I look forward to working with this committee, Brigadier General John McMahon, COL Tony Hofmann, as well local and state partners to protect the life and property of Kansans living along the Missouri River.

Senator BOXER. Thank you, Senator.
Senator Johnson, we are very happy you are here. Please proceed.

**OPENING STATEMENT OF HON. TIM JOHNSON,
U.S. SENATOR FROM THE STATE OF SOUTH DAKOTA**

Senator JOHNSON. Thank you, Chairman Boxer and Ranking Member Inhofe, for holding this important hearing to examine our flood control infrastructure in light of this year's historic flooding. I appreciate the opportunity to provide some brief remarks.

Flooding is our Nation's most common form of natural disaster, and is also the most costly. Though we can never fully eliminate the risk of flooding, it is crucial that we continually evaluate the condition of our flood control infrastructure and the effectiveness of our management practices.

In South Dakota, we are no strangers to natural disasters. But this year's Missouri River flooding has been unprecedented in scope and duration. People have been displaced from their homes and businesses for months. And they are facing long months of cleanup ahead. Both utilities and drinking water infrastructure have suffered significant damage in communities and on Indian reservations along the Missouri. The economic and emotional impacts of the flooding have been tremendous.

What has been particularly frustrating for many South Dakotans is that they are living among some of the largest and most complex flood control infrastructure in the United States. South Dakota is home to four of the six mainstream dams and reservoirs constructed by the Corps of Engineers after passage of the Flood Control Act of 1944. Built to measure up the historic flood of 1881, these dams and reservoirs were not sufficient to accommodate the runoff of 2011.

Management of this system has always created tension in the Basin. But in light of this year's flooding, concern over river management is higher than ever. In addition to our physical infrastructure, we need to consider mitigation and planning options that can limit damages when flooding occurs.

As Chairman of the Banking Committee, I have been working with my colleagues to reauthorize the National Flood Insurance Program, which is the premier means for individuals and businesses to mitigate their risks of financial loss in the event of flooding. There are no easy answers, but the issue of flood control on the Missouri River is vitally important to the economy and people of South Dakota.

I look forward to working with you to better understand the risks and improve flood control in the Missouri River Basin. Thank you, Chairman Boxer and Ranking Member Inhofe, for holding this important hearing.

Senator BOXER. Thank you, Senator.

And last but not least on this opening panel, before we hear from the rest of our colleagues, Senator Ben Nelson. Welcome.

**OPENING STATEMENT OF HON. BEN NELSON,
U.S. SENATOR FROM THE STATE OF NEBRASKA**

Senator NELSON. Thank you. Thank you, Madam Chair and Ranking Member Inhofe for holding today's hearing.

I am particularly grateful that the Committee has given us the opportunity to talk about the State's experiences. I encourage the Committee to very closely examine what led to such unprecedented flooding and help develop the necessary procedures so that future events will be less destructive.

In Nebraska, we are still working on getting a full handle on the total devastation. But FEMA has calculated \$180 million in public assistance. They also, along with the Small Business Administration, have provided \$3.86 million in assistance to the State for individual assistance.

And the cost isn't just limited to brick and mortar. So far, USDA's Risk Management Agency has paid out \$13 million in insurance for flooding in Nebraska this year. Farm land from Boyd and Knox Counties in the north to Nemaha and Richardson Counties in the southeast has been submerged for many months. Not only did it cost producers in crops they planted this year, but damage to the land could potentially keep them from planting those fields for years to come and perhaps never.

You can rebuild structures, but thousands of acres of land now silted, silted, silted and destroyed crop land, may never return to productivity. So to that end, I appreciate the Committee inviting Brian Dunnigan, Director of the Nebraska Department of Natural Resources, to discuss the unique challenges facing our State.

Given the immense long-term and costly damage this flood has caused, it is necessary for Congress to get answers as to what went wrong and what steps must we take to avoid such destruction. I will have the opportunity to visit with Brigadier General McMahon later this week. But I hope the Committee takes the opportunity to ask the Corps important question as, what has been learned from this tragedy, and what steps will it take to better respond to such record proportions.

I am deeply concerned with the Corps' 2011-2012 operating plan, and the Corps' unwillingness to adjust the amount of water the reserves can hold, in response to last year's runoff. Doing the same thing this year and hoping for a different result is not acceptable. If more capacity would have cost less than the remediation, then perhaps we ought to be talking about what adjustments we make to the structures themselves.

I also hope the Committee learns more about the Corps' post-assessment process currently underway. I am aware of your internal review and the multidisciplinary team of experts. But I hope the Committee and the staff will explore this process and this time line.

Finally, I would like to stress the need for expediting the work that is already underway along the Missouri River levees. I thank the Chair and Ranking Member for your commitment to listen to local individuals about what is required in each State. It is crucial that the Corps gives us a complete assessment of the damages, the estimated costs and the time line for repairs to be completed.

I don't want to start a whole discussion again about climate change. But what we need to consider is that there are patterns of weather that is changing that we need to be prepared for those changes in the future, not expecting just to wait for another thousand years for another epic flood.

Thank you, Madam Chair. Thank you, Senator INhofe.

Senator BOXER. Thank you, Senator, very much.

Now we are going to call up our second panel of colleagues: Senator John Thune, Senator Roy Blunt, Senator John Hoeven and Congressman Russ Carnahan. We welcome you.

Senators and Congressman, welcome to you all. We know you have busy days, we understand that. So as soon as you are complete, feel free to go to your next obligation.

We will start with Senator John Thune. We welcome you. Senator Thune.

**OPENING STATEMENT OF HON. JOHN THUNE,
U.S. SENATOR FROM THE STATE OF SOUTH DAKOTA**

Senator THUNE. Thank you, Madam Chair and Senator Inhofe, for holding this important hearing. I appreciate the examination you are giving to this important issue that has impacted so many people in my State and across the Country.

Unlike a normal disaster, such as a Hurricane Irene that occurs in a relatively brief amount of time as waters rise and then recede, and victims are able to recover and move on with their lives, the flooding in South Dakota lasted over 90 days, which displaced individuals and families from their homes and had tremendous economic impact on businesses and communities along the Missouri River.

The flood started on Memorial Day and lasted until Labor Day. Many of those who had their homes damaged or destroyed never purchased flood insurance because they were told by the Army Corps of Engineers that their homes were not at risk.

I would categorize the Missouri River flood of 2011 as something of a hybrid, between a natural disaster and a man-made disaster. I believe that human error contributed to the creation of this particular disaster.

We need to understand what human errors and existing management practices on the Missouri River occurred, so that we can learn from these mistakes and make adjustments where necessary to ensure that similar disaster do not occur in the future.

March 1st is a significant date for the Missouri River dam system. That is when the system needs to have a required amount of storage or empty space to be able to accumulate the average runoff from the winter snow pack. However, the Corps still had not created all the required amount of empty space in the system on March 1.

Then throughout the month of March, the empty space that had been created filled up with runoff that exceeded expectations. By March 31st, the storage space was erased. The Oahe reservoir above Pierre and Fort Pierre was nearly seven feet higher than expected at the end of March. Despite the rapid increase in inflow during the month of March, the Corps inexplicably did not accommodate for the additional water by increasing discharges.

In April, each of the reservoirs were well above expected elevations, but the Corps did not respond with adequate discharges to compensate for the incredible inflow during February and March. This allowed the system to be near maximum capacity on May 1 and unable to store the May runoff.

The main thing I want this Committee to take away from the testimony is that the Corps completely failed when it came to understanding the amount of risk the snow packs contained which resulted in a cascading series of events that led to a much more serious flood than would otherwise have occurred. A fundamental question, I think, that the members of this Committee need to ask the Corps today is, why didn't they release more water along the Missouri River dam system in March, April and early May when they knew they were losing storage capacity, and that snow pack and inflows were well above normal capacity?

Corps leadership frequently responds to this type of question by saying that they would have needed perfect foresight to predict the massive amount of rain in Montana during the month of May. But a lot of experts, and even informed observers, saw early on that severe flooding was likely coming in the spring and summer. Everybody saw it was coming and urged action to address the coming deluge, it seems, except for the Army Corps of Engineers, the entity charged with managing the river.

It is true that some degree of flooding was going to happen in South Dakota this summer, regardless of what the Corps did or didn't do. But the Corps basically thought that they could fill up the entire amount of empty space in the system by the beginning of May, gambling that the snow pack was gone and there would be no significant precipitation in May. Because the Corps completely miscalculated on the snow pack issue, they never fully communicated what preparation and to what level was going to be needed until it was too late.

So I would say, Madam Chair and Senator Inhofe, other members of the Committee, going forward, flood control needs to be the top priority for the Corps, particularly in wet cycles. This is something I believe needs to be modified or reflected in the master manual which governs the management of the Missouri River. I fear that the Corps is planning to move forward under the assumption that this was a one-off event. My understanding is that they are planning to have the same amount of storage space in the system next year as they did this year.

I think that is a risky proposition, as we seem to be in a wet cycle. I hope the Corps will not simply repeat the mistakes next year or in future years that occurred this year. Keep in mind, the reservoir system along the Missouri River is not as capable for the 2012 runoff season as it was this year as a result of the stress that the system witnessed.

I have said throughout this entire debacle this past summer that the Corps of Engineers needs to be held to account for their management of the Missouri River system this year. I hope that this hearing makes an accountability moment for the Corps. I have my own statement I would like to submit entirely for the record. I also would like to build on the record by submitting written statements that were provided by the mayor of Pierre, Laurie Gill, South Da-

kota Insurance Director Merle Scheiber, whose home was impacted by this, and by the Manager of Dakota Dunes Community Improvement District, Jeff Dooley, and would ask that those statements also appear in the record.

I would make one final observation, too. I also want to include a statement by Brad Lawrence, who is the Public Works Director for the city of Fort Pierre, who on February 1 predicted a flood of biblical proportions based upon the research that he had done at that time. His statement, his narrative I think is very compelling. And when you look at the arguments, the statements that he was already making at that early point in the process, it is hard to feature why we ended up where we were.

Madam Chair, I thank you for the opportunity to testify before your Committee this morning.

[The prepared statement of Senator Thune, Laurie Gill, Merle Scheiber, Jeff Dooley and Brad Lawrence follows:]

Statement for Flood Hearing at EPW
Senator John Thune
October 18, 2011

Introduction

Senator Boxer and Senator Inhofe, thank you for holding this important hearing today on the severe floods that have occurred throughout the nation over the past spring and summer.

Following the hearing request that thirteen of my colleagues and I sent a few months ago, this hearing is timely when it comes to outlining the unprecedented flooding that my state and others along the Missouri River faced this year. I hope this is just the beginning of the Committee's efforts regarding the changes that need to occur based on how the Army Corps of Engineers manages the Missouri River basin.

While you didn't see it in the national headlines and on the nightly national television news like you saw Hurricane Irene, South Dakota and our region was hit hard by a massive flood on the Missouri River this summer. Unlike a "normal natural disaster" that occurs relatively briefly as waters rise and then recede, and victims are able to recover and move on with their lives after a few days or weeks, the flooding in South Dakota lasted over 90 days which displaced individuals and families from their homes and had tremendous economic impact on businesses and communities along the Missouri River.

The flood started on Memorial Day and lasted until Labor Day. Many of those who have had their homes damaged or destroyed never purchased flood insurance because they were told by the Army Corps of Engineers that their homes were not at risk. Even the state's director of insurance, Merle Schieber, whose home was near the river, did not have flood insurance. Mr. Schieber has prepared written testimony for today's hearing, and I would ask that his statement be made a part of the record of this hearing.

The state of South Dakota has four of the six dams that control the Missouri River. At each of these dams, the flows were two times, and in one case nearly three times, the previous record. I would like to highlight and submit for the record a chart that shows the previous record releases in cubic feet per second and the new record releases that were set for each of the six dams.

I would categorize the Missouri River Flood of 2011 as something of a hybrid between a natural disaster and a man-made disaster. I believe that human error contributed to the creation of this particular disaster. I emphasize that I'm not talking about mistakes being made in the aftermath of a natural disaster that worsen the outcome. I'm talking about human beings who made misjudgments and bad decisions in the weeks and months before this disaster occurred that worsened the outcome. I'm not saying that human beings deliberately caused the disaster, but human beings make mistakes. That is why this hearing is so important. We need to understand what human errors, and existing management practices on the Missouri River, occurred so that we can learn from these mistakes and make adjustments where necessary to ensure that similar disasters do not occur in the future.

My constituents fought a 90+-day pitched battle with the Missouri River, and largely won that battle, even though emergency levees and other extraordinary measures didn't completely protect against 600 homes receiving some damage and 100 homes in South Dakota being destroyed or receiving major damage. However, it was a very near-run thing, and I'm here today to tell you that many of those who fought on the front lines of this battle believe a substantial amount of what occurred could have been avoided, but for the mismanagement and failure by the Army Corps of Engineers to heed warning signals.

Recognition of Flood Fighters

Because time is short, I unfortunately cannot recognize and thank all of those who are very worthy of recognition. But I do want to take a few moments to recognize several people.

I first want to recognize and thank Governor Dennis Daugaard, who displayed outstanding leadership in fighting this flood, especially during the darkest moments. At the time this flood began, Gov. Daugaard had been in office for five months. He stepped up and provided unparalleled energy and initiative in leading this flood fighting effort in those desperate first 30 days, when it seemed likely that entire communities would lose their fight with the flood despite all of their best efforts.

I also want to recognize and thank the thousands of South Dakotans who flocked to these flood-stricken communities to lend a helping hand, from filling sandbags to opening their homes to those who had been displaced. People from all walks of life pulled together and helped out at a very trying time. It exemplified what is best about South Dakota.

Additionally, I want to recognize the courage and sacrifice of the residents of those communities along the river, from Pierre to Dakota Dunes in the southeastern corner of our state, who in many cases had to leave their homes for the entire summer. This kind of upheaval in their lives would have been national news had it happened on either of the coasts. Instead, their suffering and loss has gone largely unnoticed by those outside the affected area, with a few articles here and there in the back pages of national newspapers.

Last, but not least, I want to recognize the members of the South Dakota National Guard. At the height of operations during the flood fight, more than 1,300 airmen and soldiers of the South Dakota National Guard were on state active duty orders. Activated on Memorial Day weekend by Governor Daugaard, Guard members worked day and night filling sandbags, constructing levees, and assisting with traffic control, among many other things. They played a crucial role in winning the fight against the flood. We can never thank them enough.

At the end of the day, while property and infrastructure damage was significant, we were fortunate that very little loss of life occurred. This is a testament to the steadfast courage, hard work, and sacrifice of many average, everyday South Dakotans.

Mismanagement of the Situation by the Corps

I want to offer the committee an example of the mismanagement of the situation by the Corps during this flood. I must add that this criticism is not leveled at the local Corps officials who live in the impacted communities, who by all accounts performed admirably in difficult circumstances after record runoff and releases were projected. Rather, this is directed at Corps leadership in Omaha who are responsible for managing and making projections regarding the entire Missouri River basin.

Early Warnings

Brad Lawrence serves as the City of Fort Pierre's Public Works Director, and was one of those on the front lines of the flood fight. I wish he could have been here as a witness today, but he has provided a written statement for this hearing, which I would also ask to have included in the official hearing record. Mr. Lawrence received phone calls from a local Pierre/Ft. Pierre Corps official as early as the 18th of May who was alarmed about the likelihood of significant flooding on the river. However, Corps leadership did not officially notify Governor Dennis Daugaard until May 23 that communities on the river needed to prepare nearly overnight for flows from dams across the state that would inundate them if swift action were not taken.

Coupled with that delay in notification, Corps leadership was providing bad information that caused severe difficulties for those making plans to fight record water levels on the Missouri River. First, the Corps informed the Pierre and Ft. Pierre communities that releases from the Oahe Dam were set to increase to 85,000 cfs, and these communities worked feverishly through Memorial Day weekend making preparations for river levels at those release rates. But then the Corps changed the release rate to 110,000 cfs, and property owners had to continue working in order to protect their properties from even higher release rates. Then, on June 12, the release rates were increased again to 150,000 cfs. As Brad Lawrence states in his testimony, the initial Corps announcement that the release rate would increase to 150,000 cfs forced those constructing the levees to increase the levees by another two feet to accommodate the discharge from the dam. Mr. Lawrence says in his testimony that this news was "a cannon ball to the mainsail" of the flood fight. I can personally attest that homeowners and business owners within the evacuation zone, responders, local leaders, and entire communities were surprised and understandably upset. Then, on June 17, the 26th day of the flood, just as the communities along the river were settling in to the 150,000 cfs releases, the Corps announced releases from Oahe and Gavins Point were increasing to 160,000 cfs. The announcement was made shortly after 5pm on Friday, and resulted in incredible shock and dismay for people living in impacted areas. Many people feared that more bad news of even higher releases would soon be coming and many others considered giving up on their flood fighting efforts altogether, not knowing if the temporary efforts to hold back the river would be strong enough.

While hindsight is always 20/20, it seems that local Corps officials were already aware of a likely flood as early as the 18th of May, but Corps leadership failed to notify the governor until May 23. While communities had just barely enough time to build emergency levees and other flood protection, any additional time would have made a big difference. Moreover, the Corps was sending mixed signals about what water levels to expect. With the analytical tools and expertise at its disposal, the Corps should have been able to provide more solid information about what to expect, in order for communities to better plan and prepare for what would be

coming. Instead, there seems to have been an unwillingness or denial on the part of Corps leadership to provide a clear picture of how bad things were going to get.

Ignored Warning Signals and Unreasonable Risk-Taking

The Corps' mismanagement of the situation when the monster flood was nearly upon South Dakota communities pales in comparison to the mismanagement and bad judgment of the Corps in the months before the flood. As I stated at the beginning of my remarks, this flood was caused by many factors, but the human error factor cannot be ignored. I think human error in those early months of 2011 made the flood worse. These human errors were basically that of ignoring warning signs and that of taking unreasonable risks. Why these human errors were made needs to be carefully examined by this committee and all of us who represent states along the river.

In the early months of this year, many experts were predicting that severe flooding would likely occur throughout the Midwest and the East Coast. As early as February 3, 2011, Brad Lawrence, whose testimony I referred to earlier, warned national officials of the increased possibility of "biblical" flooding across the entire upper plains. As Mr. Lawrence writes in his testimony, "The reason for issuing this warning was to bring attention to the extreme amount of water stored in our plains and mountain snowpacks." Yet by March 1, as Mr. Lawrence points out, the Corps had failed to remove the entire amount of water necessary to reach the multiple use flood control storage requirement—or in plain English, the empty space needed in the system of dams to absorb the snowpack.

March 1st is a significant date for the Missouri River dam system. That is when the system needs to have a required amount of storage—or empty space—to be able to accumulate the average runoff from the winter snowpack. However, as I said, the Corps still had not created all of the required amount of empty space in the system on March 1. Then, throughout the month of March, the empty space that had been created filled up with runoff that exceeded expectations. By March 31, the storage space was crased. The Oahe reservoir above Pierre/Ft. Pierre was nearly 7 feet higher than expected at the end of March. Despite the rapid increase in inflow during the month of March, the Corps inexplicably did not accommodate for the additional water by increasing discharges.

In April, each of the reservoirs were well above expected elevations, but the Corps did not respond with adequate discharges to compensate for the incredible inflow during February and March. This allowed the system to be near maximum capacity on May 1 and unable to store the May runoff.

That leads to a fundamental question I would ask members of the committee to pose to Corps officials today and really press them on it: Why didn't the Corps release more water along the Missouri dam system in March, April and early May when they knew they were losing storage capacity and that snowpack and inflows were well above normal?

Corps leadership frequently responds to this type of question by saying that they would have needed "perfect foresight" to predict the massive amount of rain in Montana during the month of May. But a lot of experts and even informed observers saw early-on that severe flooding and

above average precipitation was likely coming in the spring and summer. Everybody saw it coming and urged action to address the coming deluge, it seems, except for the Army Corps of Engineers, the single entity charged with managing the river.

Conclusion

It's true that some degree of flooding was going to happen in South Dakota this summer regardless of what the Corps did or didn't do. However, human error exacerbated the flooding that we witnessed along the Missouri River. The main thing that I want this committee to take away from my testimony is that the Corps completely failed when it came to understanding the amount of risk the snowpacks contained, which resulted in a cascading series of events that led to a much more serious flood than would otherwise have occurred. The Corps basically thought that they could fill up the entire amount of empty space in the system by the beginning of May, gambling that the snowpack was gone and that there would be no significant precipitation in May. Because the Corps completely miscalculated on the snowpack issue, they never fully communicated what preparations and to what level were needed until it was too late.

The Corps is responsible for simultaneously managing multiple purposes along the Missouri River, from recreation to navigation. Going forward, flood control should be the top priority for the Corps, particularly in wet cycles.

I fear that the Corps is planning to move forward under the assumption that this was a one-off event, and my understanding is that they are planning to have the same amount of storage space in the system next year as they did this year. I think that's a risky proposition, as we seem to be in a wet cycle, and I hope that the Corps will not simply repeat the mistakes next year, or in future years, that occurred this year. Keep in mind, the reservoir system along the Missouri River is not as capable for the 2012 runoff season as it was for this year as a result of the stress that the system witnessed.

I have said throughout this entire debacle this past summer that the Corps of Engineers must be held to account for their management of the Missouri River this year. I hope today's hearing will mark an accountability moment for the Corps.

Senator Boxer and Senator Inhofe, this concludes my statement. Thank you again for the opportunity to testify today. In order to build the record further, I would ask that additional written statements provided by the Mayor of Pierre, Laurie Gill, and by the Manager of the Dakota Dunes Community Improvement District, Jeff Dooley, also appear in the official record of today's hearing.

Questions That Need to be Answered

Why didn't the Corps release more water in March, April and early May when they knew they were losing storage capacity and that snowpack and inflows were well above normal?

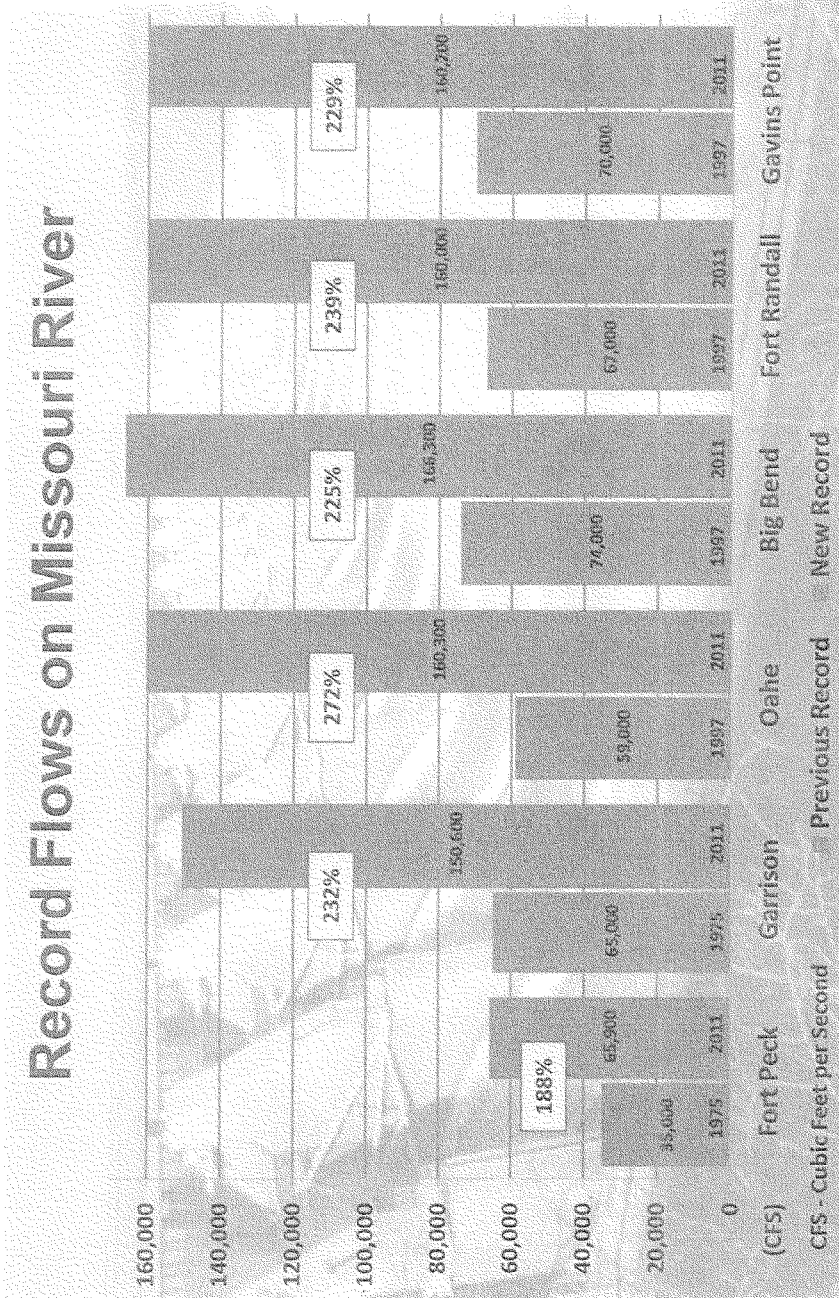
What internal discussions occurred between the Missouri River and Mississippi River divisions when it came to requests to hold back water in the Missouri River basin, when no such authority exists under existing law?

Did the Corps hold back water throughout the spring of 2011 at the request of lower Missouri River basin states to reduce the impact to flooding that was occurring in the lower basin at the time?

We seem to be in a wet cycle, but the Corps did not seem to adequately factor that into their forecast. What is the Corps doing to develop better modeling? Is there a way to do better modeling?

What impact did the Western Area Power Administration (WAPA) have on release decisions, especially in March and April, when the Corps should have been evacuating more water?

What is the Corps doing when it comes to managing the Missouri River for the 2011-2012 runoff—particularly when it comes to the Master Manual that dictates operations along the river? What will the Corps be proposing, if anything, when it comes to altering the Master Manual to build in additional protections during wet cycles to reduce the risk of flooding?



Senator BOXER. Senator, thank you very much.
Senator BLUNT.

**OPENING STATEMENT OF HON. ROY BLUNT,
U.S. SENATOR FROM THE STATE OF MISSOURI**

Senator BLUNT. Thank you, Senator Boxer. And thanks to you and Senator Inhofe for holding this hearing.

Yesterday, October the 16th, the Corps announced that the Missouri River flood was officially over. Now, we have had lots of flooding in our State over the years, and usually it is a few days or a few weeks in April or May. October the 16th, the Corps announced that the flood was officially over.

This was a flood that started in Senator Baucus' State over 5 months ago. Five months of flooding. In Missouri, we had significant amounts of the State that were underwater for three and 4 months. And while no disaster response is perfect, it is certainly important to learn from the past. I think as Senator Thune has just mentioned, failing to account for disaster events or mistakes and dismissing disasters as unlikely to occur again simply isn't good enough.

Over the past year, Missouri and the entire Country have faced a number of natural disasters that claimed many lives and devastated the livelihoods of people in our communities. As we work to rebuild, there is a lot to be done. Colonel Anthony Hoffman, the Kansas City Corps Commander, said again yesterday as he was calling an official in to the flood, that the Corps has \$27.7 million set aside for repairs. At a hearing last week, Senator Landrieu called, the Corps said they needed \$1 billion to bring the river management system back to where it was at the beginning of this year.

So we have \$27 million set aside. We need \$1 billion, not to get the system better than it was in January but just to get the system back to where it was in January. And of course, as we look at that, we see counties like Holt County, Missouri, where 165,000 acres was underwater for most of the summer. Birds Point, water went in when that floodway was open and went back out, it was 130,000 acres, not nearly as impacted as the 165,000 in Holt County.

I was there recently, they were able to get, miraculously, a crop in even though there was lots of early crop loss. But overall, we had over 400,000 acres underwater at some time this year. That is about half the size of the entire State of Rhode Island. And a lot of that 400,000 acres was underwater for three and 4 months. We haven't ever seen anything like that before.

As one county commissioner I think well said about the impact of these floods, which took out interState highways, county roads, State roads, at one time five bridges over the Missouri River, where Missouri is on e side of the bridge, were closed. And as the county commissioner talked about all the jobs impacted, he just simply said, the factory doesn't get back to work until the roads are rebuilt. The roads aren't rebuilt until the flood protection is restored. And the flood protection is not restored until Congress provides the funding.

So thanks for holding this hearing. I have a statement for the record, and I will submit it.

[The prepared statement of Senator Blunt follows:]

October 18, 2011

Opening Statement on the “A Review of the 2011 Floods and the
Condition of the Nation’s Flood Control Systems”

Senate Committee on the Environment and Public Works

Senator Roy Blunt

- Thank you Chairman Boxer and Ranking Member Inhofe for inviting me to participate in this hearing today.
- This is a great opportunity to examine the Army Corps of Engineers’ flood control management, disaster response and how best to equip the Corps on all levels to prepare for and respond to disasters.
- I look forward to the testimony of all the witnesses. Their perspectives will provide a unique glimpse into our nation’s flooding disasters, river infrastructure and the Corps’ needs. By doing so, we can gain a more accurate understanding of the system’s deficiencies, and proper levels of communication between layers of government and constituents. Their testimony will help us develop an appropriate response package to this year’s disasters, better insight into how annual and disaster dollars are best spent and will allow us to examine how we can learn from mistakes in order to provide better flood and disaster protection.
- While no disaster response is perfect, we have a responsibility to learn from past disasters to make sure we are better prepared the next time. It is this progress that gives Americans more confidence in the process. Failing to account for disaster events and mistakes in the past or dismissing disasters as unlikely to occur again will erode the confidence in our response and rebuilding efforts.
- Over the past year, Missouri and the entire country have faced numerous natural disasters that claimed too many lives and devastated the livelihoods of people in our communities. As we work to rebuild, the scope of these events has placed unusual logistical and financial pressures on our nation’s disaster response and rebuilding efforts.

- Missouri is rebuilding after flooding events in southwest Missouri and along the Missouri, Mississippi, and Black Rivers. In Holt County alone, there was an astonishing 165,000 acres under water. Birds Point saw the federal government flood 130,000 additional acres of farmland. In total, Missouri had over 400,000 acres or about 600 square miles under water. That is half the size of Rhode Island.
- The flooding event along the Missouri River wasn't a one-week flood; it was an unprecedented 3 to 4 month event. Vital transportation corridors were closed, businesses were shuttered, and people were under water from mid-June until October.
- The first imperative to getting people back on their feet is to restore flood protection. As County Commissioners have told me, the factory doesn't return to normal until the roads are rebuilt and the roads are not rebuilt until the flood protection is restored and the flood protection is not restored until Congress provides funding so the Corps can meet its obligations.
- However, the Corps' response to the flooding must go beyond the rebuilding of levees. Dredging our inland ports will be absolutely essential to recovery. Maintaining the flow of commerce on the river is vital to the economy and to so many river communities.
- In Missouri, the New Madrid County Port Authority Slack-water Harbor is struggling to stay open as their port is in desperate need of immediate dredging. Without the necessary dredging the 140 jobs that are employed by the three tenants are in jeopardy.
- Disasters in all forms present unique challenges to states, communities and families. One of the most important aspects of any federal, state or local response to those challenges is the need to provide certainty and clarity before, during and after a disaster.
- We have difficult decisions before us, but understanding the realities on the ground and the challenges ahead will help to establish a clear path forward and can help us make more informed and more effective decisions.
- Again, I thank the chair and the witnesses to follow for their input for their hard work. I look forward to working together to provide a better coordinated, well-funded response to disasters that will provide some certainty in times of great uncertainty.

Senator BOXER. Thank you for that cycle of virtue that you laid out here, because that is key. We are key to the whole thing here. So thank you very much.

Senator Hoeven.

**OPENING STATEMENT OF HON. JOHN HOEVEN,
U.S. SENATOR FROM THE STATE OF NORTH DAKOTA**

Senator HOEVEN. Thank you, Madam Chairman, for the opportunity to testify this morning. Also to Ranking Member Inhofe, appreciate it very much.

We had record flooding in North Dakota, record flooding in our State this year. We had it on the Red River, on the Cheyenne River, on the James River, on the Missouri River and on the Souris River. In Minot, for example, which is on the Souris River, and again, managed by the Corps, we had 4,00 homes that were either completely destroyed or partially destroyed. According to FEMA, it is now one of their largest housing efforts, just in the community of Minot, to get people into housing before winter comes. I think they said it is something like their third largest housing effort after Katrina and Ike. That is just one example. That is what we are facing.

In the case of Minot, clearly we are working with the Corps now, and the other agencies, to not only rebuild the defenses, but we need to see specifically from the Corps what their plan is going to be. We are working with Colonel Price, who is the Commander of the St. Paul District, on a flood protection plan for next year to make sure that we don't have a repeat in that community of the kind of flooding we had this year, if we continue to have the kind of wet conditions that we are having right now.

In Bismarck-Mandan, same thing. As Senator Thune just mentioned, as Senator Conrad mentioned earlier and as others have already commented on, we are in a wet cycle. Now, how the Corps manages the river, in this case the Missouri River, in a wet cycle has got to be different than how they manage the river in a drought cycle. What it appears they are doing is they are going back to an average year every year, saying, OK, every year is average, and we go from there.

But that is not the case. When we were in the drought cycle, at which time I was Governor in North Dakota, every year they would say, well, this is going to be an average year, and they would let out the same amount of water. But we were in a drought. They needed to conserve water. They weren't conserving enough water.

Now we are in a wet cycle. For the last 5 years, it has gotten wetter each year in our part of the Country. But they go back to an average year. We are in a wet cycle, they need to let more water out, they need to adjust based on the conditions on the ground. That needs to be reflected in the master manual when we talk about flood protection.

Specifically this year, the North Dakota State Water Commission is recommending that Lake Sakakawea, the largest reservoir we have on the lake be brought down another two and a half feet. I am submitting my written testimony and I have specific questions in that testimony. But we are asking the Corps to reduce the res-

ervoir another two and a half feet to create more storage capacity. That can be done now without downstream impacts.

Who makes that decision, when do they make it? We need this type of accountability. And if they don't let out that additional water now, we need to have them show us specifically how they will provide protection next spring with the kind of precipitation we are having now throughout the river basin.

Thank you, Madam Chairman.

[The prepared statement of Senator Hoeven follows:]

**“A Review of the 2011 Floods and the Condition of the Nation’s Flood Control Systems”
Hearing of Committee on the Environment and Public Works
October 18, 2011**

Chairman Boxer and Ranking Member Inhofe, thank you for allowing me to join you today and for holding this hearing to review the terrible flooding we have seen in 2011. Flood control has surpassed other concerns and become the top priority for several states. I am proud that my colleagues from North Dakota and Missouri were able to come together to establish a Missouri River Working Group. We unanimously agree that above all else, we need to improve flood control measures along the Missouri River.

It should be noted from the outset that we face an historic wet cycle. According to data from the Army Corps of Engineers, runoff along the Missouri River above Sioux City, IA, has increased significantly each of the past five years. Precipitation levels were so high in 2011 that even a substantial decline in 2012 levels would leave many areas vulnerable to flooding. Of course, there’s no guarantee that precipitation won’t continue to increase either.

North Dakota felt the full effect of high water in 2011 from the Red River to Devils Lake to Minot to Bismarck. This hearing to review the condition of our flood control systems is critically important because this year existing flood control measures were inadequate. North Dakotans believed that existing flood control measures could prevent major flood events. This year’s floods should lead us to review flood control options from top to bottom, question old assumptions and incorporate this year’s historically high precipitation into future flood control plans.

I want to highlight two situations in North Dakota as examples of where high water overwhelmed the dams and levees we thought would never be topped. First, the existing dam system along the Missouri River failed to prevent flooding in Bismarck-Mandan as well as several locations further downstream. Dramatic spring rains combined with elevated levels of snowmelt to saturate the ground and result in unprecedented runoff into the river, which the existing flood control system could not handle.

We need to determine whether the existing Missouri River Manual and Annual Operating Plans are sufficiently able to address flooding along the entire Missouri River system, especially during a wet cycle. Currently, the Army Corps of Engineers Annual Operating Plan for the Missouri River calls for reducing the surface elevation of Lake Sakakawea to 1,837.5 feet mean sea level, the same elevation as last year. According to the North Dakota State Engineer, a reduction of 2.5 feet would provide necessary flexibility to handle high levels of winter precipitation. The question for the Corps is whether it will choose to act on this recommendation to reduce the level to 1,835 feet mean sea level? If not, how will the Corps maintain enough storage capacity to prevent flooding next year and prevent a repeat of 2011? Who would make these decisions and by what date?

If the Corps chooses not to reduce the level of Lake Sakakawea by 2.5 feet, I also want to know what specific steps the Corps plans to take to ensure Bismarck is not flooded again. Specifically, if we have precipitation next year similar to what we experienced this year, how much water can be moved out of the reservoirs between mid-March and mid-May without causing flooding as was the case this year? Who will be responsible for final decisions about protecting the state capital and the surrounding areas and when will those decisions be made?

Second, the dams in Canada, which North Dakotans believed would prevent the Souris River from ever flooding, simply could not hold back the water that flowed from melting snow and massive spring rains. 4,000 homes in Minot were damaged or destroyed by Souris River flooding. City officials in Minot are working to reconstruct levees and protect the city in time for spring rains next year. We are working with Col. Price, commander of the St. Paul District, regarding the Army Corps' plan of action to ensure the 2011 flooding is not repeated in 2012. We need to understand specifically how the plan will protect the Minot area in the event of high precipitation next year. Who is responsible for making the final decision on how to protect Minot next spring and when will that decision be made?

As dramatic as 2011 was for so many residents of North Dakota, major floods have become an annual event in many parts of the state. This committee's review of flood control measures is important because flood control has such a direct impact on the lives of so many people. We need to improve our flood control efforts to save lives, protect property and preserve the livelihood of thousands of North Dakotans and millions of Americans, so again, I thank the committee for holding this hearing and look forward to working with my colleagues to address this vital issue.

Senator BOXER. Senator, thank you very much for your testimony. It was very compelling.

On this panel, our last speaker, and we are so delighted to see Congressman Carnahan here.

As soon as he finishes, I am going to ask Senator Baucus to make his opening statement and then we are going to have Hon. Jo Ellen Darcy, Assistant Secretary of the Army for Civil Works, come up with her Generals. We look forward to that.

Congressman, please proceed.

**STATEMENT OF HON. RUSS CARNAHAN, A REPRESENTATIVE
IN THE UNITED STATES CONGRESS FROM THE STATE OF
MISSOURI**

Mr. CARNAHAN. Thank you, Chairwoman Boxer, Ranking Member Inhofe. It is really an honor to be here with your colleagues on this critical issue, important to the folks that we represent in Missouri.

I especially appreciate your remarks about this being bipartisan, and I am certainly glad to be here with my Senator, Senator Blunt, this morning, to really show the bipartisan support for this work in Missouri.

We are very familiar with the majesty and the might of our great rivers in Missouri. But the Mississippi and Missouri River floods in April and May of this year were among the largest and most damaging on record. During just the last half of May, the upper Missouri River Basin received nearly a year's worth of rainfall.

On May 3d, the Army Corps of Engineers made the extraordinary and excruciating decision to blow up a section of the Bird's Point Levee in southeast Missouri, submerging about 130,000 acres of farmland to ease flood threats to Kentucky and Illinois river towns. The physical damages to levees and river control structures from these floods is estimated to be at \$2 million thus far, not counting the millions of dollars to lost crops, homes and lives.

Many of the agricultural fields are still in the process of drying out. The people of Missouri are still in the process of rebuilding their lives, and still, they need the help of local, State and Federal resources. Unfortunately, our House Transportation and Infrastructure Committee has yet to hold a hearing like this. We have, although, organized a briefing for our colleagues in the House back in July to review the status of these issues.

We heard from many experts at the briefing we had there. But perhaps the most illuminating was the experience of Richard Oswald from Atchison County, Missouri. His home, built by his parents, was flooded for a third time in his life because of the failure of the levee and reservoir system. Mr. Oswald could not return to his home for months. His crop was ruined, the economy of his 1,200 person town devastated. His story was repeated countless times across the State.

In southern Jefferson County, construction projects have been delayed, commerce altered, property damaged, marinas and river fronts ruined and well and sewage systems compromised. These floods are some of the largest hydrologic events since the great flood of 1927. We should take the opportunity to learn from it and rethink our priorities along the river and how we manage our res-

ervoirs and our levees. We need to reach out to our local officials and members affected in their communities to help in predicting when and where the flooding will occur, providing relief support and where possible, helping with preventive measures. We need to take this information and revisit the Missouri River master manual and see if it needs revision based on these lessons learned.

In my extended remarks, I have detailed the framework for that review. We also need to address the issue of funding. The lack of funding has stressed the Army Corps' capacity to meet our Nation's water resources needs. We must ask the tough questions so we can learn from these events. How will the Country and Corps pay for the repairs? How will we prioritize where we repair infrastructure for pre-flood conditions? And where do we have to rethink our infrastructure and change how we manage our river conditions.

I believe the Congress must find a way to ensure these repairs are done properly, expeditiously and not at the expense of other projects. I look forward to working with you on these issues in the months ahead to ensure that both sides of Congress learn from and better prepare for the future on these events.

Thank you, Madam Chair.

[The prepared statement of Mr. Carnahan follows:]

**TESTIMONY OF
THE HONORABLE RUSS CARNAHAN (MO-03)
U.S. HOUSE OF REPRESENTATIVES**

**Environment and Public Works Committee
Tuesday October 18th, 2011 10:00am
Room 406 Dirksen Senate Office Building**

**"A Review of the 2011 Floods and the Condition of the Nation's Flood Control
Systems."**

Chairwoman Boxer and Ranking Member Inhofe, thank you for giving me the time to testify today on an issue that is critical to my constituents in the third district of Missouri, and Missourians in many parts of the State.

The Mississippi and Missouri River floods in April and May of this year were among the largest and most damaging recorded along the waterway in the past century. Two major storm systems deposited record levels of rainfall on the Mississippi River and its tributaries which combined with springtime snowmelt causing water levels to rise to unprecedented levels. During the last half of May, the upper Missouri River basin received nearly a year's worth of rainfall.

The flooding caused evacuations of thousands of people, swamping river towns and as many as 3 million acres of farmland in Mississippi, Tennessee and Arkansas

alone. On May 3, the Army Corps of Engineers blew up a section of the Birds Point levee in Missouri, submerging about 130,000 acres of farmland to ease the flood threat to Kentucky and Illinois River towns.

The physical damages to levees and river control structures from these floods is estimated at \$2 billion thus far, not counting the millions of dollars in lost crops, homes, and lives. Many of the agricultural fields are still in the process of drying out. The people of Missouri are still in the process of rebuilding their lives, with the help of local, State, and Federal Resources.

I have been a member of the House Transportation and Infrastructure committee my entire tenure in Congress. Despite my several request for a hearing, that committee chose not to move forward as decisively as you have here today to pursue answers to the questions raised by the flooding of 2011.

However, I organized a briefing for my House colleagues in July to educate them on the conditions along the Missouri and Mississippi river systems. During this briefing we heard from many experts, but perhaps most illuminating was the experience of Richard Oswald from Atchison County, Missouri.

Mr. Oswald's home, the one built by his parents, has flooded for the third time in his life because of the failure of our levee and reservoir system. This year Mr. Oswald could not return to his farm for months and his crop was ruined, and the economy of his 1200 person town is devastated. And his story is repeated countless times across the State.

In St. Genevieve County, the oldest, continuously operating ferry based on the Mississippi river, established in 1798, is an essential part of the daily lives of the people of the county. Due to the flooding the ferry was out of operation for months. This added 50 miles onto many people's commute and cost the Country dearly, the affects of which will be felt for years.

In Southern Jefferson Country construction projects have been delayed, commerce altered, property damaged, marinas and riverfronts ruined, and well and sewage water systems compromised.

From Joplin to Tuscaloosa, our nation has experienced its share of natural disasters in the past few months. While we can't predict a tornado, we can predict a flood. We need to reach out to local officials to offer any help we can in predicting when and where the flooding will occur, providing relief support, and where possible helping with preventative measures.

These floods are some of the largest hydrologic events since 1937 and we should take the opportunity to learn from it. We need to rethink our priorities along the river and how we manage our reservoirs and our levees. We have to learn from these floods and understand whether it was the perfect storm of events or whether it is the precursor of how the Mississippi and Missouri system will be responding in a different climate and hydrologic regime.

We must take time to look at the information, do the interviews with the people who were impacted, and determine if there is a better way to manage the river system. We need to take this information and revisit the Missouri River Master Manual and see if it needs revision. And in the case of revision, we must ensure that this is a science and peer reviewed approach.

When conducting the review we should ask:

- Are the target elevations that the ACOE uses to determine the reservoir releases still appropriate based on what we learned in 2011?
- Did the river channel respond to the flood flows as predicted?
- Is there a need to look for the acquisition and development of flood ways and flood plain expansion based on information gained in 2011?

Understandably in today's budget climate, funding the recovery is an issue we must address. The Army Corp is being forced to come up with the funds to fix the levees from existing appropriations. Therefore very important construction and maintenance programs are going to be deferred or cancelled.

This is stressing the Army Corp capacity for meeting our nation's water resource needs. We must determine, if this trend in flooding continues, how will the country and Army Corp pay for the repairs? How will we prioritize where we repair our infrastructure to pre-flood conditions, and where do we have to rethink our infrastructure and change how we manage river conditions. I believe Congress must find a way to ensure these repairs are done properly, expediently, and not at the expense of other projects.

I would like to thank you again for inviting me to speak today and I look forward to working with you on these issues in the months ahead.

Senator BOXER. Thank you, Congressman.

Senator Baucus, we are delighted that you could be here. We know heavy is the head that wears the crown of the Super Committee and the Finance Committee and the Subcommittee here. So we welcome you. Thank you for being here.

**OPENING STATEMENT OF HON. MAX BAUCUS,
U.S. SENATOR FROM THE STATE OF MONTANA**

Senator BAUCUS. Thank you very much, Chairman Boxer, for holding this hearing.

I would also like to welcome Buzz Mattelin from northeastern Montana. Buzz is going to be on the second panel. He is exactly the kind of person that we need, he has been around for a good number of years, several generations, lots of common sense and experience, a lot of rises and ebbs and flows of the rivers in Montana.

Let me just say a couple of things about this subject. I will open by saying, Madam Chairman and others, I have for years, years, worked very hard, tried very hard to convince the Army Corps of Engineers that they should change their master manual in the other direction. Army Corps of Engineers studies show, and have shown for a long time, that the economic value of the upstream States, Montana especially, is about ten times the economic value of the river downstream. Downstream is barge traffic. Downstream States, especially the State of Missouri, pushed, pushed, pushed, to keep more water, get more water out of the Fort Peck Reservoir and upstream reservoirs for the barge industry downstream. You have no idea how hard they pushed, and you have no idea how hard it was for us in upstream States to save, save some of the water in the Missouri River, Fort Peck Reservoir and other upstream reservoirs.

I have a photograph that shows a dock on Fort Peck Reservoir is a mile from shore, because there is no water. There is no water. It has hurt irrigation because there is no water. I almost gave up the ghost, just gave up. I have been trying for 20 years, 30 years, along with other Senators in North Dakota and South Dakota, Senator Conrad especially and Senator Dorgan, to try to get the Corps of Engineers to not force us upstream to let so much water out. That has been going on for years.

Now, we have a flood. It is terrible. There is a flood downstream, it is terrible. But my main point here is, let's be careful. The Army Corps of Engineers studies all this stuff and tries to figure out what the proper balance should be and how much water should be kept and how much water not kept and so forth. I find it a little strange that suddenly, I know the reason because the floods are devastating, it is terrible, but now they come at exactly the opposite message, earlier they want water, want water, want water. This year, no water, no water, no water.

I mean, it is just the opposite. They don't tell you that. They don't tell you what the last 3 year history has been as they asked for more and more and more water.

And frankly, this is a difficult subject. To the degree one believes in climate change, and I do, scientists will say that with increased climate change in this world, there is greater volatility in weather and the cycles are shorter. I remember Dr. Hanson 20 years ago

predicted that in a hearing over in the Interior Committee. It was very, very compelling testimony he gave. That I think is what is happening now. You have years, sometimes you get wet years, sometimes you get dry years. Look at Texas, it is in drought, and Oklahoma in drought. Eastern Montana, drought. It is just very spotty, it changes.

I believe there is going to be increased volatility in weather cycles. I think that the compression is going to be shorter, and we are going to have years where it rains a lot, and where there is a lot of snow pack. But we can't willy nilly just turn off the dams and turn them on, just to try to control it. A lot of these floods are not in the Missouri River, a lot of these floods that we have mentioned today. The Souris River, for example, in Minot, has devastated Minot, North Dakota. It has nothing to do with Missouri.

But there are Missouri floods, no doubt. One might say, Madam Chairman, I have one book on my bed stand I want to read, never read it, it is the 1927 flood. I am told it is a great book and I want to read that book. But it just gives one a sense, too, what the floods were back in that era.

Now, the Corps of Engineers has told my office, I don't know if this is in print, they told my office that a recurrence of a flood of this magnitude is about .2 percent. This is a 500 year flood. Now, we haven't kept records for 500 years, so it is kind of hard to predict whether it is a 500 year flood or not. But they have told us privately, maybe it is in print, I don't know, that it has .2 percent chance of recurrence.

So I hear it said here, clearly, the Corps should manage the dams. It is in the Corps' jurisdiction appropriately and fairly and so on and so forth. But in the master manual, recreation has been listed as a priority, as has environmental protection and so on and so forth. Then just suddenly, somebody is, oh, no, have to change the master manual today, I think would probably in the long period of history, result in Fort Peck Lake being back down to this low, low, low levels again because the water is out again.

You have to look at fisheries, you have to look at the Endangered Species Act. There are so many factors here. I just urge the Corps to be very careful and not react to the exigency of the moment, when actually this stuff changes.

Senator BOXER. Senator, thank you. That was sobering testimony and reality. I thought you summed it up really well, and thank you for being here.

Senator Boozman, would you like to make an opening statement before we call the Assistant Secretary?

Senator BOOZMAN. If it is appropriate. I promise I will be brief.

Senator BOXER. It surely is.

**OPENING STATEMENT OF HON. JOHN BOOZMAN,
U.S. SENATOR FROM THE STATE OF ARKANSAS**

Senator BOOZMAN. Thank you, Madam Chairman. I do appreciate your holding the hearing today.

Throughout our history, the mighty Mississippi and her tributaries have brought commerce and opportunity to Arkansas. But sometimes the river brings great challenges to our delta as well. This year's flood provided a great test.

Let me start by thanking the many people in Arkansas and throughout the Mississippi River Valley who worked night and day to fight the flood. These included private individuals as well as State, local and Federal officials, personnel from throughout the Corps, including from the Little Rock, Memphis and Vicksburg districts, showed tremendous dedication and professionalism under very challenging circumstances.

The conditions that led to this year's events were very similar to the major Mississippi floods of the 20th century, including the great flood of 1927. Our Country should be very proud that the investment made over the decades led to a far different outcome. While there was a great suffering this year, we should be proud of the progress that has been made.

For decades, we have been building, operating and maintaining the Mississippi River and Tributaries project. This project is made up of levees, floodways, channel improvements and stabilization of other structures, such as dams. This year alone, the MR&T project helped to protect more than 10 million acres and nearly 1 million structures, while preventing more than \$110 billion in damages.

Over the decades, our Country has invested approximately \$13.9 billion and yet the project has directly prevented \$350 billion in flood damages. In total the return on investment is a tremendous 34 to 1.

I recognize that today's hearing is broad and that we will hear from witnesses impacted by the floods as well as witnesses from the Mississippi River Valley. I see this as an opportunity to learn what went right and what went wrong and how to improve our system and our plans for the next time.

With that I yield back. Thank you, Madam Chair.

Senator BOXER. Thank you so much, Senator.

We are going to call our next panel up. The Assistant Secretary of the Army for Civil Works, Jo Ellen Darcy, accompanied by Major General Walsh, Brigadier General McMahon, Colonel Larsen. While you are getting seated, Senator Inhofe has asked to respond to some comments of Senator Baucus, and I have urged Senator Baucus to stay here just in case we want to have a little back and forth on this before we turn to Jo Ellen Darcy.

Senator INHOFE. Thank you, Madam Chairman.

I know it is difficult for people to resist the temptation to try to draw events in the weather that are taking place, maybe in this year or this week, to the global warming argument. So what I have is three short statements, a sentence on each one, from three alarmists that you know very well and have been on your side of this issue, Madam Chairman.

Senator BOXER. Alarmists from your side or my side?

Senator INHOFE. Your side.

Senator BOXER. My alarmists.

Senator INHOFE. Judith Curry, the Chair of Georgia Institute of Technology's School of Earth and Atmospheric Sciences, keep in mind, an alarmist, said "I have been completely unconvinced by any of the arguments that I have seen that attributes a single extreme weather event, a cluster of extreme weather events or statistics of extreme weather events, to anthropogenic forcing."

Second is Myles Allen, head of the Climate and Dynamics Group, the University of Oxford. That was the one that got a lot of publicity back during the Climate Gate. He said “When Al Gore said last week that scientists now have clear proof that climate change is directly responsible for the extreme in devastating floods, storms and droughts that displaced millions of people this year, my heart sank.’

And last, Roger Pielke, Jr., Professor of Environmental Studies, University of Colorado, said “To suggest that particular extreme weather events are evidence of climate change is not just wrong, but wrong-headed.’ Now, he goes on, and I would ask unanimous consent to submit the rest of his statement, because it emphasizes that.

Senator BOXER. Sure.

[The referenced information was not received at time of print.]

Senator INHOFE. Thank you, Madam Chairman.

Senator BOXER. Thank you.

Well, I am going to respond in this way. We have worked closely together on infrastructure, and we don’t work closely together on climate change. So for the record, let me say, I don’t know anyone who is blaming what happened on climate change. I do know this, that that is exactly what the climate scientists warned us about. We do have eyes. We do see what we see.

So here is the thing. Of course we don’t know whether this is climate change. It takes a decade. It is not about the weather. It is not about day to day. One day we are going to see it very warm in the winter, I assure you, and 1 day we are going to see it very cold.

The last time it was cold, it was cold somewhere here, I remember, I think you built an igloo outside and invited Al Gore to come there. In the meantime, we were supposed to have the Olympics, the Winter Olympics. It was so hot up there, that they had to import snow.

The bottom line is, we don’t know now. We will only know looking back on the decade. So I do agree with what they are saying and I do agree with what you are saying. Because I don’t think that on our side, we are alarmists. I think what we are saying is, keep an eye on this. This is what it looks like is happening. But you can’t really tell until you get a decade out.

I hope that this, we are not going to ask any of our panelists to respond to the issue of climate change. This was my colleague giving his opinion, which I value greatly. Because Max Baucus doesn’t say things without a lot of thought.

But so be it. We are divided on the panel. We have to accept that.

Senator INHOFE. I would also comment that two of Al Gore’s speeches in New York were canceled because of snow storms up there, too. I think we are pretty much in agreement on that.

Senator BOXER. Yes. Extreme weather is what was predicted.

We will now turn to our non-controversial panel. We are very happy to see Jo Ellen Darcy here, we have known so long and well. She worked for Senator Baucus for a long time. Now she is the Assistant Secretary of the Army for Civil Works. And she has an excellent team with her. Would you proceed?

STATEMENT OF HON. JO ELLEN DARCY, ASSISTANT SECRETARY OF THE ARMY, CIVIL WORKS; ACCOMPANIED BY: MAJOR GENERAL MICHAEL WALSH, COMMANDER, MISSISSIPPI VALLEY DIVISION, BRIGADIER GENERAL JOHN McMAHON, COMMANDER, NORTHWEST DIVISION, COLONEL CHRISTOPHER LARSEN, ACTING COMMANDER, NORTH ATLANTIC DIVISION

Ms. DARCY. Thank you, Senator Boxer.

Senator Boxer, Senator Inhofe, Senator Baucus, members of the Committee, I am pleased to be here today to testify on the 2011 flood events and to discuss the condition of the Nation's flood control systems.

I am joined today by Major General Mike Walsh, who is the Commander of our Mississippi Valley Division and also the President of the Mississippi River Commission; Brigadier General John McMahon, who is the Commander of the Northwest Division; and Colonel Christopher Larsen, who is the Acting Commander for the North Atlantic Division.

Two thousand and 11 has been extremely challenging for the Nation in terms of natural disasters across multi-State areas. My testimony today will cover three events in which the Corps was greatly involved: the flooding on the Mississippi River, the flooding on the Missouri River and the flooding caused by Hurricane Irene and Tropical Storm Lee. These are not the only events in which the Corps responded and assisted. Others include tornadoes in Alabama and Missouri and flooding on the Souris River.

This year the Corps supplemented State, local and tribal efforts with over 37 million sandbags, 342 pumps, 5,500 rolls of poly sheeting, 275 linear feet of HESCO barriers and 1,280 linear feet of rapid deployment flood wall, and issued 176 emergency contracts to protect critical infrastructure from flood threats.

During the 1927 flood, the Mississippi River Valley region had a haphazard system of public and private levees, trying to confine the river within a levee system. The result was 72 percent of the lower valley was underwater. More than 26,000 square miles were flooded, 500 people were dead, and another 700,000 were left homeless.

After the 1927 flood, the Nation authorized and funded the Mississippi River and Tributary System that includes levees, supplemented by reservoirs, floodways, backwater areas and channel improvements. During this year's 2011 flood event, flood flows were greater than those experienced during the 1927 flood. But because of the MR&T project, only 38 percent of the area that flooded in 1927 flooded in 2011. Not a single life was lost in this historic flood event.

The Bird's Point New Madrid Floodway was operated on May 2d, 2011, and opening the two additional floodways was synchronized to manage the flows in the Mississippi River Basin, preventing flooding of over 9.9 million acres and preventing damages in excess of \$60 billion. For the first time, three of the system's floodways were placed in simultaneous operation to help relieve the enormous stress on the levee system and to reduce the danger to people, their homes and businesses. Over 800 personnel were engaged with more than \$76 million of funds allocated and over \$59 million in FEMA

money for missions that they assigned to the Corps under the Stafford Act.

The watershed approach was used to keep the system intact, and a watershed approach will be needed to repair and restore it as well. The Corps invited seven States and ten Federal agencies to help set priorities and plan a comprehensive approach to restoring the flood protection system. All of us share responsibility in the recovery efforts. By pooling our resource, our talents and our expertise, we will focus on key elements that protect the lives and the livelihoods of million of Americans.

The flooding along the Missouri River this year approximately doubled the historic record for waterflows. The combined May through July runoff of 34.3 million acre feet made 2011 an historic year of record for reservoir water storage along the Missouri River. Flood response efforts engaged over 400 personnel and cost \$83 million.

Actions by the Omaha and the Kansas City Districts during the Missouri River flooding this summer were extremely effective in reducing flood damages. The Corps fortified levees, built temporary levees, monitored dam and levee safety and other activities such as providing flood fight supplies to State emergency offices. For example, in South Dakota, the Corps constructed approximately four miles of temporary levees at Pierre and Fort Pierre and approximately 1.5 miles of temporary levees in the community of Dakota Dunes.

Now that the river has receded, the Northwest Division is initiating post-flood actions including inspecting, assessing and repairing damaged levees and dams, assessing the operation of the Missouri River dams and reservoirs during the flood, including an independent external review now underway in completing technical review of the flood fight response.

In late August and early September, extreme weather conditions continued, this time centered in the northeastern section of the Nation. Hurricane Irene traveled along the Atlantic Coast, impacting the entire area from coastal North Carolina to Maine. Just a week later, the remnants of Tropical Storm Lee tracked up from the Gulf and severely flooded northeastern Pennsylvania and the lower southern tier of New York State.

Although flood damages in the area were devastating, in many areas where Corps projects exist, their operation by the Corps effectively reduced an additional estimated \$6 billion of damage to the residents of the northeast. The Corps continues to assess the extent of the damages to civil works projects and non-Federal projects that are eligible for assistance under what is called our Public Law 84-99 program.

The Corps first used \$46.6 million of our available funds within our flood control and coastal emergencies account for immediate flood-fighting and response to the spring flooding. As the flood events continued, the Corps was unable to respond to the requirements from our available flood control funds.

Since May 2011, I have exercised my emergency authority provided under Public Law 84-99 to transfer funds from other appropriations accounts to the Flood Control and Coastal Emergencies Appropriations account, in order to respond to the flooding and to

begin addressing repairs from the ongoing disasters. To date, I have authorized four transfers totaling \$212 million. The last transfer of \$137 million allowed the Corps to begin addressing a portion of the highest priority life and safety repair requirements.

The Corps has set up a rigorous process of headquarters-level for technical experts to examine the requirements and to prioritize those requirements based on risks to life and safety, among other parameters, in order to make the best use of available funds. I expect to have to authorize additional transfers of funds from other Corps accounts to the Flood Control and Coastal Emergency account in order to address the ongoing emergency needs.

In conclusion, the Corps stands ready to respond to and assist in any recovery effort disaster as they occur.

Thank you.

[The prepared statement of Ms. Darcy follows:]

DEPARTMENT OF THE ARMY

COMPLETE STATEMENT OF

**HONORABLE JO ELLEN DARCY
ASSISTANT SECRETARY OF THE ARMY
(CIVIL WORKS)**

BEFORE

THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

ON

**A REVIEW OF THE 2011 FLOODS AND THE CONDITION OF THE
NATION'S FLOOD CONTROL SYSTEMS**

OCTOBER 18, 2011

INTRODUCTION

Madam Chairman and Members of the Committee, I am Jo-Ellen Darcy, Assistant Secretary of the Army (Civil Works). I am pleased to be here today to testify on the 2011 floods events and to discuss the condition of the Nation's flood control systems. I am joined today by Major General Michael Walsh, Commander of the Mississippi Valley Division and President of the Mississippi River Commission, Brigadier General John McMahon, Commander of the Northwestern Division and Colonel Christopher Larsen, Acting Commander of the North Atlantic Division. The year 2011 has been extremely challenging for the nation, in terms of natural disasters across multi-state areas. Along with other federal agencies, Tribes, States and numerous local entities, the Corps has a multitude of response activities underway in an effort to mitigate the public risk and recovery from these severe weather events.

The Corps has authority under Public Law (PL) 84-99, Flood Control and Coastal Emergencies (FCCE) (33 U.S.C. § 701n), for emergency management activities in response to natural disasters. Under PL 84-99, the Chief of Engineers, acting for the Secretary of the Army, is authorized to undertake activities including natural disaster preparedness, advance measures, emergency operations (flood response and post flood response), rehabilitation of eligible flood control works threatened or destroyed by flood, repair of federally authorized shore protective works threatened or damaged by coastal storms, and provision of emergency water assistance due to drought or contaminated source. The Corps also responds to disasters at the direction of FEMA under the Robert T. Stafford Act (42 USC 5121, *et seq.*). Under the National Response Framework, the Corps is assigned as the Coordinator for Emergency Support Function (ESF) #3, "Public Works and Engineering" and, during disasters the Corps is the primary agency for response activities, such as ice, water and temporary power. FEMA is the primary agency for ESF#3 recovery activities and can assign Corps missions to assist in the execution of these and other recovery missions, to include debris management. Disaster response activities authorized by the Stafford Act, and prescribed by Mission Assignments by FEMA, are funded by FEMA's Disaster Relief Fund.

PREPAREDNESS and TRAINING

The Flood Control and Coastal Emergencies appropriation account provides funds for preparedness with regard to emergency response to natural disasters, flood fighting and search-and-rescue operations, and rehabilitation of flood control and hurricane protection structures. Disaster preparedness activities include coordination, planning, training, and conducting response exercises with local, state, and federal agencies. District commanders, Tribal liaisons, and emergency management staff meet with federal, state, and local officials and other interested parties to discuss Corps authorities under PL 84-99, share lessons learned from previous flood events, conduct tabletop

exercises, review sandbagging techniques, and strengthen the relationship among the Corps, State and local governments and tribal entities.

RESPONSE ACTIVITIES

Under PL 84-99, Corps emergency assistance prior to and during a flood event is temporary in nature to meet an immediate threat and may only be undertaken to supplement non-federal efforts. The assistance is undertaken to mitigate risk to life and public safety by providing protection to critical public infrastructure against flood waters. Therefore, PL 84-99 is not used to protect private residences or other developments unless such protection is incidental to protect critical public facilities and infrastructure within the area. Tribes and States must commit all available resources such as supplies, equipment, funds and labor as a general condition to receiving Corps assistance. Furthermore, Corps emergency efforts are not intended to provide permanent solutions to flood risks. Therefore, the removal of all flood fight material at the conclusion of a flood event is the responsibility of the respective Tribe or State.

COORDINATION

The Corps coordinates with federal, Tribal, and state partners and close coordination occurs with appropriate state emergency management offices. This year, the Corps used a joint information center to coordinate activities among all response agencies and transparently communicate to all affected parties. The Corps has also participated in national and regional exercises held by the Department of Homeland Security/FEMA. These exercises provide federal and non-federal agencies an opportunity to plan for natural disasters, and to learn about partner agency capabilities, resources, and responsibilities. The Corps works closely with other federal emergency response partners to include: the Department of Transportation, the United States Coast Guard, the National Guard Bureau, the Department of Energy, the Department of Agriculture, the Department of Commerce (NOAA) and state and local agencies. The Corps also works closely with the Interior Department's Bureau of Reclamation, which has been an exceptional partner, providing vital resources to support the Corps' surge requirements for quality assurance personnel.

2011 OPERATIONS

This year, the Corps supplemented state, local and tribal efforts with over 37 million sandbags, 342 pumps, 5,500 rolls of poly sheeting, 275,000 linear feet of HESCO barriers, and 1,280 linear feet of Rapid Deployment Flood Wall and the Corps also issued 176 emergency contracts to protect critical infrastructure from flood threats. The Corps also was engaged with numerous federal agencies and provided technical assistance to state governments and Tribal organizations for flood response. This

experience improved multiple partners understanding the Corps' capabilities and PL 84-99 authorities.

- In March, the winter flooding from rain and snowmelt began with over 120 personnel engaged in the flood response effort from Illinois to Alabama. \$5 million of FCCE funds were allocated for this event, during which Corps projects in the Great Lakes and Ohio River Valley Division reached the 4th highest average flood control reservoir storage level recorded.
- Beginning in April 2011, the Nation witnessed historic flooding along the Mississippi, Missouri, and Souris River basins. During these events, the flood stages exceeded the historical Mississippi River flood stage records set in 1937 and 1927. The Birds Point-New Madrid Floodway was operated on May 2, 2011 and opening of two additional floodways was synchronized to best manage the flows in the Mississippi River Basin, preventing flooding of over 9.8 million acres and preventing damages in excess of \$60 billion. Over 800 personnel were engaged, with more than \$76 million of FCCE funds allocated and over \$59 million in FEMA mission assignments under the Stafford Act. The Mississippi River and Tributaries project safely passed a record 2.3 million cubic feet per second (cfs).
- Flooding along the Missouri River approximately doubled the historic record for water flows. The combined May through July runoff of 34.3 million acre-feet made 2011 an historic year of record for reservoir water storage along the Missouri River. Flood response efforts engaged over 400 personnel and \$83 million of FCCE funds were allocated.
- On June 24, 2011 more water passed along the Souris River at the Sherwood gage in one day than had been recorded in entire year for 45 out of 82 years. During the recovery phase for this event, the Corps received seven FEMA mission assignments focusing on debris removal and temporary housing and worked closely with the Department of Agriculture.
- In late April, tornados caused significant destruction in both Alabama and Mississippi. The Corps received 27 FEMA mission assignments focusing on debris removal, power, and critical facilities involving more than 460 personnel, including retired personnel, and activated reserve soldiers for a total of \$262 million.
- On May 22, 2011, an EF5 tornado (worst damage category) devastated Joplin, Missouri, destroying homes, schools, fire stations, and hospitals. Debris and temporary housing teams as well as subject matter experts for debris, infrastructure assessment and critical public facilities required deployment of over 270 Corps personnel for 9 FEMA mission assignments totaling \$239 million.

- The severe weather continued with Hurricane Irene's path from North Carolina to Vermont, compounded by Tropical Storm Lee. Over 260 personnel were engaged in the Corps support to FEMA in 11 states and Puerto Rico with 83 FEMA mission assignments for over \$33 million (technical assistance, dam safety, commodities, water, power, debris, infrastructure assessment, government liaison, ESF#3 support). The Corps worked closely with the U.S. Coast Guard to determine threats to navigation and navigation closures.

FLOODING AND RESPONSE IN THE MISSISSIPPI RIVER BASIN

During the 1927 flood, the Mississippi Valley region only employed a haphazard system of public and private levees as a flood control measure, trying to confine the river within the levee system. The result was 72% of the lower valley was under water. More than 26,000-square-miles or 16.8 million acres were flooded, 500 people dead and another 700,000 left homeless.

After the 1927 flood, the nation authorized and funded the Mississippi River and Tributaries (MR&T) system that includes levees supplemented by reservoirs, floodways, backwater areas and channel improvements. During the 2011 event, flood flows were greater than those experienced during the 1927 flood, but because of the MR&T project, only 38% of the area that flooded in 1927 flooded during the 2011 event. In other words, only 6.35 million acres flooded, with most of that being the land between the levees. The MR&T system had room to handle more floodwaters. There were an additional 1.8 million acres designed to "make room for the river" between the unused floodway and the backwater areas that were not used as flood storage during the 2011 event. It is important to note that not a single life was lost in this historic flood event.

In early May, concerned with the rapidly increasing flood waters on the Mississippi and Ohio rivers, Major General Michael Walsh, established Operation Watershed. During the flood event, Operation Watershed concentrated efforts on current, future and recovery operations. Current and future operations focused on planning, preparing and executing safety plans that protected the lives and livelihoods of nearly 4.5 million citizens and infrastructure. Recovery operations were tracking the damages, documenting the event and projecting the recovery needs.

While the flood waters have now receded, recovery efforts are broken down into three critical components: Damage Assessments, System Performance Evaluation and Constructing Repair/Restore projects. For the first time, three of the system's floodways were placed in simultaneous operation to help relieve the enormous stress on the levee system and to reduce the danger to people, their homes and the businesses that bolster our economy. A watershed approach was used to keep the system intact, and a watershed approach will be needed to repair and restore it, as well. The creation of an Interagency Recovery Task force was meant to do just that. The Corps invited seven states and ten federal agencies to help set priorities and plan a comprehensive approach to restoring the flood protection system. All share a responsibility in the

recovery efforts and by pooling resources, talents and expertise, the task force will focus on key elements that protect the lives and livelihoods of millions of Americans, while preparing for spring floods. The Mississippi River is a major artery in America's heartland, and as such is a key element of state and local government economic development and job-creation efforts, which is essential in maintaining economic competitiveness and national security.

Since the beginning of the flood, the Corps and its partners have been assessing and documenting flood effects. With recession of flood waters, multidisciplinary teams were deployed to inspect, investigate and record damages to project areas. These teams have now largely completed this effort with careful documentation that characterize the location, nature, extent, and repair alternatives for hundreds of damaged areas.

System performance evaluation is a look at how the system performed and what flood risk managerial or operational improvements should be made. Though the system performed as designed, the purpose of this evaluation would be to assess the MR&T system performance, identify and prioritize funding requirements for system components necessary to repair/restore the system for future flood events, and assess areas of improvement for water control communication and coordination across the watershed. The resulting document would be a valuable resource for system management, operation and improvements. It would also serve as a reference guide for future flood risk management.

As the Mississippi River Valley rebounds from the 2011 flood, the Corps will continue the work that is crucial to the protection and restoration of the watershed.

FLOODING AND RESPONSE IN THE MISSOURI RIVER BASIN

Actions by the Omaha and Kansas City Districts during the Missouri River flooding this summer were extremely effective in reducing flood damages. The Corps expended approximately \$83 million on fortifying existing levees, building temporary levees, monitoring dam and levee safety and other activities, such as providing flood fight supplies to state emergency offices, within Corps authorities under Public Law 84-99. For example, in South Dakota, the Corps constructed approximately four miles of temporary levees at Pierre and Ft. Pierre, and approximately 1.5 miles of temporary levees in the community of Dakota Dunes. Temporary measures were also constructed for the Standing Rock Sioux Tribe to mitigate risk to the causeway and the water intake.

Now that the river has receded, the Northwestern Division is initiating post-flood actions. These include: 1) a concerted effort to inspect, assess and repair damaged levees and dams; 2) an assessment of operation of the Missouri River dams and reservoirs during the flood – this includes an independent external review now underway; and 3) a technical review of the flood fight response. Repair work will begin soon on seven of the highest priority levees that breached or were overtopped with significant damage during the flooding.

Concurrent with these actions, the Corps, FEMA, and the U.S. Department of Agriculture are co-chairing the Missouri River Flood Task Force (MRFTF). The Task Force provides a forum for coordination among the federal, tribal, state, stakeholder and local governmental partners within the States of Nebraska, Montana, Iowa, South Dakota, North Dakota, Wyoming, Kansas, and Missouri on flood recovery and related flood risk management actions and initiatives. The Task Force will streamline governmental processes and decision making, accelerate necessary assessments, coordinate permitting requirements, and apply agile and critical thinking to the problem set. While coordination is ongoing, the task force has its initial face-to-face meeting this week.

FLOODING AND RESPONSE TO HURRICANE IRENE AND TROPICAL STORM LEE

In late August and early September, extreme weather conditions continued, this time centered in the Northeastern section of the Nation. Hurricane Irene traveled along the Atlantic coast impacting the entire area from coastal North Carolina to Maine. Just a week later, the remnants of Tropical Storm Lee tracked up from the Gulf along the Appalachian chain and severely flooded northeastern Pennsylvania and the lower southern Tier of New York State. Rainfall from that 10 day period closely matched yearly amounts for the region. Record flood stages were set at over 90 USGS stream gages within the region. Although flood damages in the area were devastating, in many areas where Corps projects exist, their operation by the Corps effectively reduced an additional estimated \$6 billion of damages to the residents in the Northeast.

During Irene and Tropical Storm Lee, the Corps assisted FEMA and also provided over 260 highly trained technical personnel in 11 states and Puerto Rico. Ultimately the Corps response to the northeast included 83 FEMA mission assignments for over \$33 million. These missions included; ESF#3 Management support for each state, Technical Assistance (in one instance this included assisting in the performance of post-event locally-owned dam safety visual inspections), Temporary Housing, Commodities Distribution planning, Temporary Power, Debris Management assistance and Infrastructure assessment (Assessing Bridges, Structures, Roads and locks and Dams). The Corps worked closely with the U.S. Coast Guard to determine threats to navigation and navigation closures.

DAMAGES TO CORPS OF ENGINEERS PROJECTS FROM RECENT FLOODING

The Corps of Engineers continues to assess the extent of damages to Civil Works projects and non-Federal projects that are eligible for assistance from the Corps under PL 84-99 as a result of the major flood events this past year. The Corps first used \$46.6 million of available funds within the FCCE appropriation account for immediate floodfighting and response to the Spring flooding. As the flood events continued, the Corps was unable to respond to the requirements from available FCCE funds alone.

Since May, 2011, I have exercised my emergency authority provided in PL 84-99 to transfer funds from other appropriation accounts to the FCCE appropriation account to respond to the flooding and to begin addressing repairs from the ongoing disasters. To date, I have authorized four transfers totaling \$212 million. The last transfer, \$137 million, allowed the Corps to begin addressing a portion of the highest priority life and safety repair requirements.

In order to develop the best estimates of repair requirements nationwide, local Corps districts, working with non-Federal sponsors, are inspecting damaged projects and preparing assessments reports. The Corps has set up a rigorous process at the Headquarters level for technical experts to examine the requirements and to prioritize those requirements based on risk to life and safety, among other parameters in order to make the best use of available funds. I may have to authorize the additional transfer of funds from other Corps accounts to the FCCE account to address ongoing emergency needs.

CONCLUSION

In conclusion, the Corps of Engineers stands ready to respond to, and to assist in recovery from, disasters as they occur, both relying on its own authority and funding and under the Stafford Act in support of FEMA as missions are assigned. Madam Chairman, this concludes my testimony. I would be happy to answer any questions you or other Members of the Committee may have.

**Environment and Public Works Committee Hearing
October 18, 2011
Follow-Up Questions for Written Submission**

Questions for Darcy

Questions from:

Senator Barbara Boxer

1. As I stated in my opening statement, the floods of 2011 remind us of the flood risk faced by many communities nation-wide, including many in California. The Chief's Report for the Natomas Levee Improvement Project in the city of Sacramento has been recommended to the Congress by you and now requires Congressional authorization to proceed.
 - (a) In your view, is it important that we continue to authorize and invest in new projects, like the Natomas project, to help reduce flood risk in communities across the country?

Senator Frank Lautenberg

1. The Corps has agreed to initiate a study with the State of New Jersey to examine potential solutions to flooding in the Passaic River Basin, which was severely flooded by Hurricane Irene. The study may take as long as five years.

Assuming continued cooperation from the State, can you provide a detailed funding schedule that includes the maximum capability funding level the Corps could use each year so the study is completed as quickly as possible?

2. As the Corps and the State of New Jersey work on the Passaic River Basin reevaluation study, what additional flood prevention methods can the Corps undertake to mitigate flooding while the study is being conducted?
3. The Senate FY 2012 Energy and Water Appropriations that passed out of the Appropriations Committee on September 7, 2011 includes a language fix to an authorization that would allow the Corps to move ahead with the buyout of homes in the Passaic River Basin. If this language becomes law, will the Corps consider including funding for the buyout of homes from willing homeowners in a potential FY 2012 work plan and the FY 2013 budget request?
4. In addition to the Passaic River Basin, the Rahway River Basin and the Raritan River Basin caused extensive damage to surrounding communities, residents and businesses. Will the Corps prioritize funding in its FY 2013 budget request and the FY 2012 work plan so that Corps projects that protect the communities most severely impacted by Hurricane Irene will receive funding?
5. While the numbers vary, estimates show that there is a significant backlog of projects that have either not yet been funded or have been funded but not completed. What is the Corps of Engineers' plan to address the project backlog?
6. Corps of Engineers construction projects and studies lose their authorization if they do not receive funding in 5 consecutive years. However, funding levels for the Corps have been decreased recently and many worthwhile projects go unfunded. Are there cases in which Corps of Engineers projects could have continued but were deauthorized because funding was not appropriated over a 5 year period?
7. Reports indicate that sand dunes, beaches and other coastal infrastructure previously constructed by the Corps of Engineers mitigated storm damage from Hurricane Irene along the coast of New Jersey. However, there are some areas along the coast in New Jersey that are still vulnerable to future storms because coastal infrastructure has not yet been built. How will the Corps address the need for additional coastal storm damage protection projects in New Jersey?

Senator Benjamin Cardin

1. One common thread I see in the ways that the Corps managed the natural disasters is the use of natural systems. The Corps managed the water levels behind dams by releasing waters down through natural river systems. When reservoirs were filling during storm events, they were expanding into the flood plains behind the dams. Similarly, much of the water that was contained was in the natural flood plains between the rivers and the levee systems. And on the Atlantic Coast, the Corps successfully used a natural beach and dune system to protect the town of Ocean City, Maryland.
 - (a) To what degree did the Corps take advantage of natural systems to manage the natural disasters?
 - (b) How effective would you say these efforts to use existing flood plains and beaches were in protecting human health and property?
 - (c) Should the Corps be investing greater investments in protecting flood plains, routine re-nourishment of beach systems, and other so-called "green" systems to manage risks in the future?
2. Let me focus briefly on the Ocean City, Maryland experience. As you know, the Corps partners with the town of Ocean City to re-nourish the 8 mile stretch of beach that goes from the Ocean City inlet up into Delaware.
 - (a) What costs has the Corps incurred in federal construction of the project over its 20 year history?
 - (b) How many lives have been lost during storms at Ocean City since the project's inception?
 - (c) What is the estimated value of the damages avoided by the project?
 - (d) Given the performance of the project, would you say that it has been a good use of federal funds?

Senator Sheldon Whitehouse

1. In March, I inquired about funding levels for the Section 205 Continuing Authorities Program (CAP) for flood damage reduction for Fiscal Year 2012. The Army Corps answered that approximately \$19 million is available for Section 205 projects, which will all be allocated to ongoing projects throughout the country. Therefore, no funds are currently available for new Section 205 projects.

As a follow up to the Army Corps' response, please provide answers to the following questions:

- (a) Does the Army Corps anticipate an influx of Section 205 project requests as a result of the numerous recently declared disasters? If so, have you requested emergency funding for those projects?
 - (b) Does the Army Corps have the statutory authority to transfer funding from other accounts into the Section 205 program to respond to an increased number of requests?
2. According to the National Oceanic and Atmospheric Administration, the United States has experienced a record 10 weather-related catastrophes in 2011, including both flooding and drought, costing more than \$1 billion each.
 - (a) Has the Army Corps documented storm activity and flooding outside of the historical norm in recent years?
 - (b) Is the Army Corps anticipating and preparing for storm activity and flooding outside of the historical norm in the coming years?
 - (c) If so, is part of the reason for the Army Corps' preparation that it agrees with the scientific consensus that we will continue to see more extreme weather events as our climate warms?

Senator James Inhofe

1. I appreciate that the Corps provided my staff with updates throughout these flood fights. I respectfully request that the Corps provide this Committee with documentation of the damage and repair estimates and evaluations of system or infrastructure performance as well as any other pertinent findings or reports that are generated as a result of these disasters.
2. Your testimony states that you have authorized four transfers from other Corps accounts to respond to the flooding and begin addressing repairs from the ongoing disasters and that you may have to authorize additional transfers. Why hasn't the Administration sent Congress a funding request for the Corps instead?
3. How many levees were damaged as a result of these two flood events?
 - (a) Of these damaged levees, how many are in the federal program?
 - i. What is the status of repairing these levees?
 - ii. Will these be repaired before next spring's flood season?
 - iii. If not, what is the reason for this?

For the entire Federal Panel

1. I would like to ask each of you: What lessons were learned from this year's flooding disasters and how will these lessons be taken into account in the future?
2. What mechanisms and procedures did the Corps have in place to communicate with local and state governments and other federal agencies during the flood events?
 - (a) Do you believe these were adequate?
 - (b) If not, how will the Corps improve upon them?

**Environment and Public Works Committee Hearing
October 18, 2011
Follow-Up Questions for Written Submission**

Questions for Darcy and McMahon

Questions from:

Senator James Inhofe

1. Why didn't the Corps release more water in March, April and early May when they knew they were losing storage capacity and that snowpack and inflows were well above normal?
2. What internal discussions occurred between the Missouri River and Mississippi River divisions when it came to requests to hold back water in the Missouri River basin, when no such authority exists?
3. Did the Corps hold back water throughout the spring of 2011 at the request of lower Missouri River basin states to reduce the impact to flooding that was occurring in the lower basin at the time?
4. We seem to be in a wet cycle, but the Corps did not seem to adequately factor that into their forecast. What is the Corps doing to develop better modeling? Is there a way to do better modeling?
5. What impact did the Western Area Power Administration (WAPA) have on release decisions, especially in March and April, when the Corps should have been evacuating more water?
6. What is the Corps doing when it comes to managing the Missouri River for the 2011-2012 runoff—particularly when it comes to the Master Manual that dictates operations along the river? What will the Corps be proposing, if anything, when it comes to altering the Master Manual to build in additional protections during wet cycles to reduce the risk of flooding?
7. What actions are needed to lessen the likelihood and limit the damages of another flood of this magnitude in the future?

**Environment and Public Works Committee Hearing
October 18, 2011
Follow-Up Questions for Written Submission**

Questions for McMahon

Questions from:

Senator James Inhofe

1. Currently, the Army Corps of Engineers Annual Operating Plan for the Missouri River calls for reducing the surface elevation of Lake Sakakawea to 1,837.5 feet mean sea level, the same elevation as last year. According to the North Dakota State Engineer, a reduction of 2.5 feet would create enough storage capacity to handle winter precipitation. Will the Corps reduce the level to 1,835 feet mean sea level? If not, how will the Corps maintain enough storage capacity to prevent flooding next year? How will the Corps move enough water in the early spring to prevent a disaster like we had in 2011? Who would make these decisions and by what date?
2. If the Corps chooses not to reduce Lake Sakakawea to 1,835 mean sea level now, I want to know what specific steps the Corps plans to take to ensure Bismarck is not flooded again. Specifically, if we have precipitation next year similar to what we experienced this year, how much water can be moved out of the reservoirs between mid-March and mid-May without causing flooding, as was the case this year? Who will be responsible for final decisions about protecting the state capital and the surrounding areas and when will those decisions be made?
3. How will the Corps manage the Souris River to prevent another disaster in the Minot area? Who is responsible for making the final decision on how to protect Minot next spring and when will those decisions be made?

Senator BOXER. Thank you very much.

Just so everyone knows, I will take my 5 minutes. Then I am going to hand the gavel over to Senator Cardin, who is going to conclude this hearing. Senator Inhofe will speak after I do. We will go back and forth in order of arrival.

So Secretary Darcy, the Corps is now facing the daunting task of evaluating the condition of infrastructure after these dramatic 2011 flood events. Does the Corps have adequate authority to undertake all of the work it believes will need to be done, or will added authority be needed through a WRDA bill to facilitate some of the post-event work that will be needed?

Ms. DARCY. At this time, Senator, I don't believe we need additional authority. We are challenged by funding.

Senator BOXER. All right. So would you let us know, after you discuss this with your Generals and your Colonel, if we do in fact have to change any of the laws through the WRDA process? And obviously the problem of funding is there.

Our hearing today focuses on three historic flood events in 2011. Each of these events was unique, and the Federal response to each event was different. I have spoken to people in the Corps and I will tell you, some of those challenges were extraordinary, and some of the responses were very, very, very tough, particularly Major General Walsh, we watched what you had to do. It was really tough to tell people who had had these farms for a long time, you are just going to have to work with us here, because we need some place for this water to go. I know how hard that was on you and your team. I am sure others were facing very similar conflicts.

So it is so important that we learn from the successes and the failures. So I would say, Ms. Darcy, in your analysis, what are the most important lessons that we have learned from the 2011 floods?

Ms. DARCY. I think one of the most important lessons we learned was the coordination and communication that we had, not only within the Federal agencies, but with the local governments. We also had a joint command center, one for the Mississippi floods and one for the Missouri floods, that we had daily updates not only from NOAA and the Weather Service but also the local communities as far as what we could expect that day. I think the communication was great.

And also, General Walsh and General McMahon have now, as a result of the floods, set up task forces for response as to how we will work with our stakeholders to determine what we can do to repair what damage has been done.

Senator BOXER. Did anything go wrong that you want to work on?

Ms. DARCY. I don't want to every say we didn't do anything wrong, but I think what we did do was operate the system as it was designed to work. And by going with the design of the MR&T system, as well as operating the Missouri River as designed, with our flood control dams, that they did work as designed.

Senator BOXER. I am going to leave it to others to ask about the manual. Thank you all so much for your heroic efforts. Obviously, we have to, I hope, find the Resources. Because just like the roads, we can't have a strong economy if people are stuck, without homes, without businesses. It is a nightmare. So we have to work on this.

Senator Inhofe.

Senator INHOFE. Thank you. I will do the same thing as the Chairman and I have had a chance to visit with Secretary Darcy.

Let me first of all compliment you and thank you for the time that you spent helping us out of a situation, and I do appreciate it very much.

The rest of you, you heard the question the Chairman asked, what lessons were learned. Do the other three of you want to make any comments in terms of lessons learned as a result of this?

General WALSH. Yes, Senator. As the President of the Mississippi River Commission, I think one of the key items that we learned is systems thinking works, systems investment works and systems leadership works. As Senator Boozman had mentioned, the Mississippi River Tributaries project, the Nation has invested \$13.9 billion putting that system together. And while it was only 89 percent complete, the system did work. As you heard, in 1927, 500 people were killed. And in this flood, which was much larger, there were zero fatalities.

So I think systems thinking, systems investment, and systems leadership was very key in fighting the flood on the Mississippi River. I do have a statement from the Mississippi River Commission.

Senator INHOFE. OK, the other two pretty much agree with what he said there.

I was asked to ask some questions, actually there are seven, there won't be time for that. I will ask two of the seven that were requested by Senator Thune. First of all, why didn't the Corps release more water in March, April and early May, when they knew they were losing storage capacity and the snow pack and inflows were well above normal?

General MCMAHON. Senator, thank you for the question.

We watched the snow pack accumulate very closely. As we did that, the snow pack in the Plains was melting. That is a restriction that we have to contend with on the Missouri, because through the months of January through about the middle of April, there is ice on the river. So while the snow pack in the Plains is melting, the ice on the river restricts the amount of water we can release from the reservoirs. So that is a compounding fact that we have to deal with each and every year.

We did watch the snow in the mountains accumulate, and we were increasing releases each month accordingly to accommodate and make the space for the growing snow pack in the mountains. What we did not anticipate, of course, is the rain that has been alluded to, that began in the middle of May. May was the third highest month on record for runoff in the upper basin. June was the first, and July was the fifth highest.

So three consecutive months of rain just was the wild card that we did not anticipate, nobody could have anticipated. That is what caused us to increase releases, up to 160,000 cubic feet per second out of Gavin's Point and subsequently, the damage that has accrued since then. It has been a 5-month long event, as has been mentioned.

But we were doing, I think, taking prudent actions on the basis of the information we had at the time. And I think the independent

external panel that has been formed will look into all these matters, and either validate or challenge the decisions that we have made. I look forward to the outcome of that report in December, sir.

Senator INHOFE. All right. The other six of the questions that would be asked by Senator Thune, Mr. Chairman, I am going to submit for answers in the record.

[The referenced information follows:]

Senator INHOFE. Thank you.

Senator CARDIN.

[Presiding] Senator Baucus.

Senator BAUCUS. Thank you, Mr. Chairman.

Secretary Darcy, when you last appeared here, I asked you if the Corps had reassessed its decision not to pay for certification of levees. You said you would take that under consideration. You would consider reassessing that decision not to pay.

Can you tell me now the results of that reassessment?

Ms. DARCY. The reassessment, the results are that we will continue to not be able to pay for the assessments or the certifications of the levees. As everyone knows, we have incredible budget constraints. It is just one of the mission areas that we will not be able to fulfill.

Senator BAUCUS. Do you have a sense of the hardship that causes these communities, Miles City, Glendive, Great Falls? Many communities that have to have floodplain maps, and to get the maps they have to have the levees certified. Earlier, I think it was prior to 2008, the Corps did pay for certification. Then suddenly, the Corps withdrew the certification, leaving these communities—no pun—high and dry in their inability to have the Resources to make sure they get certification of the levees so that maps can delineate and so that people can know they can live in an area that has a certified levee.

Ms. DARCY. Senator, what we are doing is working with FEMA to try to better coordinate the timing of when their maps are redone and when the certification for their flood insurance program would be required. We also are providing information from our inspections. We do an annual inspection and an inspection every 5 years of levees that are in the Corps program. We provide that information to the local levee board or the local sponsor for that levee.

We also have developed a national levee data base. That is now up and running, so that anyone can plug in their zip code and find out where a levee is and what its condition is. So we are providing more information to the locals.

Senator BAUCUS. I appreciate that. But I urge you to go back and reconsider. Because prior to 2008, the Corps did pay for certification. And as these levees were built, communities relied on them and the Corps pulled the plug. I just urge you to go back and try to find some accommodation, here, at the very least, in financing certification. It is getting expensive, and these small communities just can't afford it.

Ms. DARCY. We will look at it again, Senator.

Senator BAUCUS. I am serious, both of us, you can't beat something with nothing. So try to find some compromise, some some-

thing. Maybe you can draw the line somewhere that makes some sense, that helps out to some degree. And I will do the same.

I have introduced legislation, as you know, giving the Corps authority and directing the Corps to pay for the certification. We just have to find some—we can't stonewall. All these levees, stonewalls and pulling the plug and so forth, but you know what I am getting at. We have to go back. I appreciate that.

I would just like to ask a general question about these floods. I don't mean to be too provocative here, but it struck me that one of the reasons there is so much flooding, it is not just rainfall and snow pack. All the dams and levees that have been built along the Missouri and Mississippi have caused channeling, which has caused the river to not flow out into wetlands, caused the river to be faster, more violent, more force. And it raises many, many questions about floodplain insurance and where people should live and not live, and whether we keep wetlands or not. The wetlands in the delta, I am told, are very important to wildlife and fisheries and so forth. Then the delta gets flooded out, and I have a hunch, I don't know, I could be dead wrong, that some of this channeling reduces some of the wetlands in the Mississippi Delta as well.

Could you or any of your experts comment on the degree to which channeling does exacerbate the problem here of flooding?

Ms. DARCY. Senator, I will take a stab and then I think General Walsh would like to respond as well.

We are currently looking at some of the impacts of the projects on wetlands. In particular, in Louisiana, we are looking at some possible diversion projects that could take some of the sand and the sediments out of the river for wetlands restoration. So it is, there is some impact from when you try to tame a river. There is going to be impacts from what it is you are doing, from that channelization.

Senator BAUCUS. Could you comment on the master manual? It is a subject of huge controversy. Senators from various States have looked at it and talked to the Corps about it many times, including myself.

Ms. DARCY. Right.

Senator BAUCUS. And over many years. My sense is that we should be careful here, before changing the provisions of the master manual.

As I listen to you, it sounds like you have considerable discretionary authority, the Corps does, to account for emergencies as we experienced this year.

Ms. DARCY. We do, in the Missouri River master manual, there is some provision for emergency. However, revisions of the master manual need to go through a public process. As you may recall, Senator, the last time we revised the Missouri River master manual, it took 14 years and \$33 million.

Senator BAUCUS. I recall that. It was very frustrating. Because just as the panel ahead of you wants to change the manual for their reasons, I back then during that period, would like to see the manual changed to protect upstream recreation. Again, the Corps had a study back then that showed that the economic value of the upstream recreation far outweighed the economic value of managing the dams and the river for barge traffic downstream. Far

outweighed it, I guess ten-fold, something like that. And we have been working on this for years and years and years.

I don't know, 14 years sounds like a long time to change a master manual. But I do agree with an implication in your response, namely that the master manual cannot be changed willy nilly. It takes time and thought to look at lots of different factors to decide what the proper balance should be.

Ms. DARCY. That is correct. As I said, the public process needs to be involved in any changes to it. As I said earlier, and General McMahon alluded to the fact that this external panel is currently looking at how the operations were doing during this flood event. Whatever recommendations they have, we will consider.

Senator BAUCUS. I appreciate that. Thank you very much.

Senator CARDIN. Senator Johanns?

Senator JOHANNNS. Let me just thank all of you for being here today.

Let me, if I might, in my questions, focus on kind of what we are anticipating as we think about this winter and going into next spring. Correct me if I am wrong, but it seems to me that the conditions are, No. 1, the capacity in the system is about where it was a year ago. Second, it appears to me that throughout the whole stretch of the system, we have had some unusually wet weather. The third thing that occurs to me is that current, it is anticipated currently that the releases will not significantly increase. In fact, they are going to be held level for the foreseeable future, at least into next year.

All of this leads me to believe, and there are probably some things that I am not mentioning, but all of this leads me to believe that we are kind of working our way right back to where we were a year ago, and any circumstance, heavier snow melt, heavy rain, will put us right back to where we were.

Maybe General McMahon, we will start with you. Where am I wrong about this?

General MCMAHON. Senator, thank you for the question. It is packed full of information, background information that is relevant here to understand it, as you are alluding to.

First of all, looking at the way ahead, the system is more vulnerable next year now than it was last year. So we have to be very careful, to use Senator Baucus' words, insofar as how we take advantage of the time between now and when the runoff season begins on the first of March, 2012.

We made a conscious decision at the end of July, and I made the rounds on the Hill here, and touched based with you and many of your colleagues on this very critical decision point, which was we decided we needed to evacuate the 16.3 million acre feet of water that has been the system design since the system was built, because to do more, to evacuate more water, would take away the time that we needed to get the water out of the floodplain, out of farms, out of homes, out of businesses, for people to get back in there and begin the repair and the reconstitution, if you will, as well as for the Corps, for Federal highways, for States, counties and cities to do the very same thing, to get into their infrastructure and inspect and begin the repair process.

If we were to evacuate more water and create more space in the reservoir this year, we would not have given ourselves even that opportunity for the water to drain and for the inspection and repair process to begin. That was a very hard decision, a delicate decision that had to be made because of the huge volumes of water that needed to be evacuated, and only evacuated because of the release rates and the time available.

We are now past that point. Now we have seen, finally, the declaration of the end of flood has occurred just yesterday, that was mentioned. So now, we are at the point where inspections are beginning in earnest, and the repairs can begin. All contingent on the funding. And as has been alluded, we have moved money inside the Corps to get that repair process jump started and the inspection process jump started. That is going well.

But we are going to quickly come to a point in time where the funding is going to be the big constraint, in addition to the time available. But given the vulnerabilities that we have in the system next year, we have to get on with the repairs. That was the trade-off that we made. We decided that we needed to evacuate back to the amount of water that we normally have.

Now with respect to other evidence of why that is a prudent decision. We look at the climatological prediction center, the National Oceanographic and Atmospheric Administration's center of expertise for predicting weather, both near and long-term. They tell us that this next, the remainder of 2011 and 2012, there are equal chances of normal, above and below normal weather patterns. We have a La Nina effect, which for the Missouri River Basin means cooler temperatures but it is very hard to correlate precipitation, both snow pack and rain, on the basis of a La Nina phenomena.

So all that evidence points to, and the fact that this is approximately a one in 500 year event, very low likelihood of occurring again. And again, it is not an improbability, but it is a low probability. That is the world that we are in. Nobody can see the future here, as you well know. So given all that evidence, it made sense to us to evacuate the water to 6.3 million acre feet of space, and to take advantage of the time available, pending funding, to get on with the repairs and reduce the vulnerabilities that exist in the system, as much as we can between now and the first of March.

Senator CARDIN. Thank you.

Senator Whitehouse will inquire.

Senator WHITEHOUSE. Thank you, Chairman Cardin.

Ms. Darcy, you were last here in March. After you came, I asked questions for the record. And we never got an answer to them. I don't know why. It has been quite a while and they were quite simple questions.

One was, how much funding is currently available for Section 205 projects. I assume somebody in the Corps actually knows that number and it is just a question of sending an email over to us.

The other is whether this funding will allow for any new projects to be initiated, or whether it is fully subscribed. Again, I assume somebody actually knows that information. So I don't think I am asking for exhaustive research or complicated analysis to be done. I just need to have my questions answered.

The third is, whether the Army Corps is planning for any increase in the Section 205 projected requests, and what are you doing to prepare for that.

So can I have your firm pledge right now as to when I will get answers to those questions from April?

Ms. DARCY. Yes, Senator.

Senator WHITEHOUSE. When?

Ms. DARCY. We will have them before the week is out.

Senator WHITEHOUSE. Perfect. That is a big help. I appreciate it.

And let me add a new one. And that is, the transfers that you referred to in your testimony and that Brigadier General McMahon just alluded to, do they affect the Section 205 account?

Ms. DARCY. The transfers that we are looking at, we are looking at all available funding. Because we have to look at everything nationwide across all of our business lines. But in the 205 program specifically, I don't know if we have taken any from there. But I will provide that for the record as well.

One thing that I do know is when, I was here last March, but after that we had our continuing resolution and work plan was after that. And part of the re-instruction from the Congress was to take \$100 million of our carryover from our continuing authorities program, and that was rescinded.

Senator WHITEHOUSE. It is interesting to me, as a Senator from a small New England State, to hear some of the discussion from my western colleagues where it is clear that the Army Corps has a very large footprint and controls an enormous amount of what goes on in terms of flooding and flood control. We have dams that probably predate the Army Corps of Engineers in Rhode Island. We are packed with little municipalities that are hundreds of years old. It is a complex situation, to work your way through all of that. Some of the dams, I don't think it is clear even who owns or controls them. They just are there, and they have been there for how-ever long.

So my question is, we just had flooding March a year ago in Rhode Island, it was pretty extreme, 500 year flood conditions reached in certain areas. And we don't seem to have a plan for how the different upstream dams can work with one another to perform the kind of rain collection function, particularly if rain is anticipated, so that we can minimize the flooding, that they can become catchment areas for an anticipated flood.

What authorities do you have or do you need? You will end up with the mess. When the Patuxent Cove got filled with dirt and silt because of the flooding, you had to go in and clear it out, to clear the navigable waterways. So you will own this problem at the back end. What can you be doing with us at the front end to help the Providence Water Supply Board, the State Department of Environmental Management, the various interested agencies work together so that we are doing our dam release control in an integrated way that helps with flood control protection?

Ms. DARCY. You used the word that I was going to use, the integrative, it is clear that these dams were built years ago and not in a way that is a system design. The integrative water Resources Management is what needs to take place in order for those dams

not only to perform for flood control purposes, but also whatever impacts that will have on navigation downstream.

So I think an integrated water management plan for that either stretch of river that you are referring to for those dams is probably what is needed. The Corps of Engineers has some technical expertise in that area. So I think working with a State or local sponsor, we could provide some technical assistance.

Senator WHITEHOUSE. We look forward to working with you. The clock is saying that I am more than 5 minutes over.

Senator CARDIN. The Senator is directly on time. Time has just expired.

Senator WHITEHOUSE. OK, good.

Senator CARDIN. Thank you for your cooperation.

Senator Alexander.

Senator ALEXANDER. Thank you, Mr. Chairman. Thank you all for coming.

General Walsh, the Mississippi River literally tried to cut a new channel across President's Island in Memphis. It did the same in Lake County, north of there. This is the type of damage that threatens navigation along the entire Mississippi River and could shut down our inland waterways if we don't repair it.

In Memphis, the damage to President's Island, the Port of Memphis, which is home to a TVA power plant, the State's only refinery, and industries that support 3,500 jobs is extensive. The repair of the shoreline is expected to cost \$35 million and that is just for the top bank. Millions more for other repairs, including dredging to keep McKellar Harbor open for business. And in Lake County, north of there, the Corps estimates \$32 million will be needed to repair the top bank to keep the Mississippi from trying to change course during the next flood.

My question is, what would happen if the Mississippi River did cut a new channel through President's Island at Memphis? How would that affect navigation on the Mississippi River? And what is the priority that the Corps has for completing those repairs?

General WALSH. Sir, thank you for the question, Senator. The impacts would be very significant to the Mississippi River. This is not the only top bank erosion that we have on the Mississippi. And if we lose the direction and flow of the Mississippi because of it, it goes into this over-bank erosion, it is about \$60 million worth of infrastructure around the river that would be bypassed.

So this is a very significant problem that we need to work on. It is a priority 2 item. Priority 1 items are life safety. And right below that is priority 2. I believe this project is the second one in the priority 2 efforts that we need to get accomplished.

Senator ALEXANDER. Thank you, General.

Secretary Darcy, going back a year to the 1,000 year flood we had in Tennessee that affected everything from Opryland around Nashville to Memphis, I urged the Corps to work with the National Weather Service to create a warning system for floods that was as good as our tornado warning system.

I know that it is harder, that predicting rising water is not the same as predicting the arrival of a tornado. But the fact is that over the last 10 years or so, the Weather Service, the Corps and others have taken the tornado warning system and really made mi-

raculous improvements in it. People can actually turn on their television sets and see that within 13 and a half minutes a tornado is coming down their street. That is pretty precise.

We had some problems in 2010, which the Corps admitted in dealing with adequate communication about rising water to businesses and individuals in Nashville, all the way down to Memphis. Many Tennesseans felt that had they had better information, they could have avoided a lot of damage.

Now, we have gone more than a year now since I asked the Corps to work with the Weather Service to create a warning system for floods that was more like the tornado warning system. What has been the progress on that? What successes have you had with it?

Ms. DARCY. Senator, I know that we are working on it. I don't know exactly what I can report to you today, but I will most definitely get back to you as soon as possible. I just don't know in enough detail.

Senator ALEXANDER. Well, following Senator Whitehouse's example, can I ask for a reasonable date when you might get back to me about that?

Ms. DARCY. By the end of the week.

Senator ALEXANDER. Two weeks will be fine. You can do his first and mine next week. How would that be?

Ms. DARCY. That is fine.

Senator ALEXANDER. But I am quite serious about it. It is building on the success that the Corps had. And then even as a result of those discussions that we had, when we had the next rising water circumstance in Nashville, there was a lot better communication, because the Corps and the Nashville Mayor and others put themselves in the same room, basically, and communicated with one another.

And so I am now more interested, not just in that, but how do you take that same information and get it out to businesses and people who might be in the way of the rising water? I hope we can have the same kind of success with flood warnings, which are, as others have said, a larger part of our damage than any other kind of disasters. More success with that just as you did with the tornado warnings.

Thank you, Mr. Chairman.

Senator CARDIN. Secretary Darcy, in response to Senator Boxer, you indicated the Corps doesn't need new WRDA authority to respond to the 2011 flood repairs. Although you don't need new authority for repairs, does the Corps need a WRDA reauthorization to deal with other emerging issues?

Ms. DARCY. Senator, there are emerging issues all the time. Just some things that I think we are going to need to deal with in the future that are not particularly the subject of this hearing, are the way we finance a lot of our projects is it is going to have to be looked at. We currently are not, and don't have enough money in some of our trust funds. So we are going to have to look at new ways to recapitalize, I think, some of those. Those are the kind of things we would need WRDA reauthorization to do.

Senator CARDIN. And I think our Committee supports a WRDA bill. So we will obviously be working closely with you as to how these emerging issues require congressional participation.

The Corps manages the water levels beyond dams by using the, down through natural river systems by using the terrain, et cetera. On the Atlantic coast, of course, successfully use natural beach and dune systems to protect the town of Ocean City. As I said in my opening statement, the replenishment work that was done there, the dune work that was done there, saved significant property damage from Irene and Lee.

It has been estimated, not counting the damage that was saved as a result of the recent storms, but \$250 million has been saved in property damage, because of what we call the green infrastructure that has been used along the Atlantic.

My question to you is, should the Corps be investing greater investments in protecting floodplains, routine renourishment of beach systems and other so-called green systems to manage risks in the future?

Ms. DARCY. Senator, I think that your examples are good ones, because they show that yes, indeed, the beach renourishment projects have been effective in replenishing the beaches, as well as being a storm reduction way of preventing some future damages.

Senator CARDIN. I would just point out, the budgeting here become challenging. I know that you are really being stretched as far as your budget is concerned. But on these green infrastructures, it is demonstrated that it saves money, it saves property damage for the people in the region. I think the more that we can use some of these natural areas, the better off it is going to be for saving the loss of life and property. I know it is challenging, but we would urge you to find creative ways to do this.

Let me ask just one final question. The Corps has multiple responsibilities, saving life, saving property and supporting the commercial waterway traffic. Do these missions conflict? Do we need to reflect again as to how you can carry out your missions simultaneously?

Ms. DARCY. Senator, I would say that they don't conflict. But they do compete for resources. As pointed out in the instance of the floods, we need to prioritize our resources for life and safety in this instance. As I say, they compete for resources and limited Resources.

Senator CARDIN. Well, it seems like money seems to be your problem right now. Clearly, we have challenges in trying to manage the demand for commerce as well as to protect life and property. I was listening to Senator Baucus' comments, not only about the river diversions, but about the priorities. It seems to me that we may need to reflect as to what our priorities are and to allocate Resources consistent with that. There are going to be limited resources for the foreseeable future.

With that, let me turn it over to Senator Boozman.

Senator BOOZMAN. Thank you, Senator Cardin. I would like to followup on his essentially talking about resources. Again, Secretary Darcy and then General Walsh, I understand, Secretary Darcy, that you have exercised your emergency authority to trans-

fer funds from other appropriations accounts to respond to the flood and begin doing the repairs, which again is quite appropriate.

I guess what I would like to know is some examples of the kind of projects that may suffer as a result of the transfers, and then also, really some specifics about what resources we actually need, so that the Corps can repair the damage to, for instance, the Mississippi River and Tributaries project and have it ready for the next flood season, so that we don't have you here then after that is all over, complaining bitterly that it didn't work.

So if you would respond. And before you do respond, I want to thank all of you. I know that you worked very, very hard, and this has really been a great trial, and the system held up very, very well. Again, those things don't just happen, like you say. That is a lot of hard work.

Secretary Darcy.

Ms. DARCY. Senator, we are currently assessing what the ultimate damages have been from the floods, both the Mississippi and Missouri, as well as the damages from Tropical Storm Lee and Hurricane Irene. We are looking at \$2 billion that we need in order to repair and restore the system to the pre-flood conditions. Your question about the transfers, so far we have transferred \$212 million from other accounts into the flood control and coastal emergencies account. We will continue to look at other ways to transfer money. We have monthly requirements that we have to fulfill, because it is emergency response.

However, we are evaluating those dollars individually, so that we don't create a situation where we are taking it away from another life safety project. We are looking in the out years, sort of the end of 2012, to take money that won't be spent until then and moving that up into transferring it now for this immediate need.

General WALSH. Thank you very much for the question, Senator.

While we were working through the flood, we had already put together our damage survey assessment teams, so that as the water was going down, we were able to look at those parts that needed repair of the Mississippi River and Tributaries project. From that we put together a list of 93 prioritized portions of the Mississippi River and Tributaries project that needs repair. And that comes to about \$800 million just for those repairs. And I put another team together to look at the system's performance. And that systems performance team is also looking at the funds needed to bring that together.

As well as putting together an inter-agency recovery task force with the 7 States and 14 Federal agencies gathering together to see what resources that we have to put the system back together and make sure everybody understands where we are going to work with that. To date, there are \$73 million came to the Mississippi River and Tributaries project, or my division, out of that \$800 million required.

So there is a concern of a flood of a lesser magnitude having significant impact through next year.

Senator BOOZMAN. Thank you. And again, that type of work is so important as you go forward. I think you have heard a lot of interest in really trying to get that information so we can be of help, through WRDA bill or whatever. I do think, Mr. Chairman, that

the communication back and forth will be so important, so that we can move forward and get this stuff accomplished.

Thank you very much. I yield back.

Senator WHITEHOUSE.

[Presiding] Senator Vitter.

Senator VITTER. Thank you, Mr. Chairman, and thanks to all of you for your work and service, particularly in this extraordinary flood event and this disaster.

I just want to step back and make sure we have the big picture. Madam Secretary, what is the total estimate of damage from this year's flooding events from the Corps' perspective, in terms of all repair work that is necessary because of all the extraordinary dredging, et cetera? What would that total dollar figure be?

Ms. DARCY. That is the \$2 billion figure, Senator, and that includes the impacts from dredging as well.

Senator VITTER. OK. And what amount of money is the Administration asking in terms of extraordinary appropriations in light of that?

Ms. DARCY. At the moment, there is no request for a supplemental appropriation.

Senator VITTER. I thought some Corps funding was already built into an appropriation request we have, to the tune of about \$800 million now?

Ms. DARCY. I don't believe so, Senator, but I will check.

Senator VITTER. OK. What is the Administration's plan in terms of any extraordinary funding request?

Ms. DARCY. At this time, there is not a plan for one. But it is hopefully still going to be under consideration.

Senator VITTER. So as of now, \$2 billion just has to come out of your hide in terms of ongoing projects, ongoing operations?

Ms. DARCY. That is correct.

Senator VITTER. Is that sustainable?

Ms. DARCY. It is going to have to, we have to do these repairs, so we have to find the money somewhere. We are going to have look at out years, everything has to be on the table. And as I said, we are looking to the out year projects, things that aren't scheduled to be funded until later next year. But we are running out of those kinds of projects, and it is going to come from some other existing balances that we have.

So we are trying to be creative and looking at that. We are also looking at what we currently are operating under the continuing resolution to see if there is any money in that from now until November that we can use.

Senator VITTER. So if no supplemental request is made, what would be the top priority items that will be stolen from and that will be sacrificed? What sorts of things at the top end of the list in terms of priority needs and projects?

Ms. DARCY. They would be projects that, as I said, the funding is not scheduled until the end of next year, so we would take that money and use it now.

The types of projects, all projects are under consideration. But of course, the one that we will probably look to last are those that are life safety.

Senator VITTER. In your testimony, Madam Secretary, you also refer to a document that “would serve as a reference guide for future flood risk management.’ When do expect that to be completed?

Ms. DARCY. The document that you are referring to I think is the one we hope to have by the end of December. I would need to confirm that for you.

Senator VITTER. OK, if you can confirm that for me. Will that document incorporate this past year’s experience? Obviously you have a wealth of brand new data, particularly in terms of the Mississippi River system that by definition is as up to date as possible in terms of an extraordinary event this past year. So will that new information and new data be incorporated into this document by the end of the year?

Ms. DARCY. Yes.

Senator VITTER. And will that be the new operating manual moving forward?

Ms. DARCY. No, Senator, it won’t be the new operating manual for the Missouri, if that is what you are referring to. Or the operating manual for the MR&T.

Senator VITTER. What is the process to update the operating manual in both cases? What is the time table for that?

Ms. DARCY. I am going to defer to General McMahon from Missouri and General Walsh from Mississippi.

General MCMAHON. Thank you, Senator, ma’am. There are several means, Senator Vitter, to make adjustment to how we manage the system. Annually we go through what we call the annual operating process, and that is a public process that begins next Monday in Omaha. We will conduct a series of eight public meetings in each of the eight Basin States. That will feed our immediate plans for how we anticipate operating the system through calendar year 2012.

The master manual that was alluded to earlier is the document that backstops the annual operating plan, and it is the document that fundamentally allocates across eight authorized purposes how water is allocated to meet those eight authorized purposes. And that is a public process. We have discretionary authority to adjust that on a short-term, I mean 1-year basis.

But longer term, we need to go through a public process that is—

Senator VITTER. I don’t want to cut you off, but my time is basically up. In general, what is the time table for updating that big manual?

General MCMAHON. Well, it will fundamentally depend, but the independent external review of the water management operations will help us decide whether or not to undertake that revision and to what scope and scale, based on the recommendations that come from that panel.

Senator VITTER. Isn’t the preliminary evidence pretty strong that given this extraordinary event and given very new data that this is the moment in time you would want to update the manual?

General MCMAHON. Yes, sir, I would say that we have a new hydrological data point that makes us take that into consideration very seriously.

Senator VITTER. And again, real broad brush, what is a realistic timeframe for updating that long term manual?

General MCMAHON. It is hard to say, but I would say anywhere from one to X years.

Senator VITTER. X is pretty open-ended.

[Laughter.]

Senator VITTER. I just want to point out that that gives us the possibility of many additional flood seasons with an arguably outdated manual, and given the extraordinary nature of this recent event, I would encourage a real focus on updating the long term manual relatively quickly.

General MCMAHON. Yes, sir.

Senator CARDIN.

[Presiding] Let me thank you for not only your testimony and appearance here today, but for your service to our Country. We know these are very trying times and we very much appreciate the professionalism in which you operate these very stressful issues. So thank you again, and that will complete this panel.

We now turn to our next panel. We have a number of interests represented, including broad national perspectives as well as representatives from across the impacted region. We welcome Dr. Gerald Galloway, with the Department of Civil and Environmental Engineering at the University of Maryland. Very proud to have a person from the University of Maryland here.

Mr. Larry Larson, the Executive Director of the Association of State Floodplain Managers. Mr. Buzz Mattelin, the President of the Lower Missouri Coordinated Resource Management Council, and the President of the Montana Association of Conservation Districts. Mr. Terry McGean, the Civil Engineer for Ocean City, Maryland, who I referred to in my opening comments. Captain Mike Lorino, President of the Associated Branch Pilots. Mr. Brian Dunnigan, the Director of the Nebraska Department of Natural Resources. And Mayor A.C. Wharton, Jr., the Mayor of Memphis, Tennessee.

I thank you all very much for your patience, and I am going to ask that you try to condense your opening comments to three to 4 minutes. We will let you go a minute over if you need to. The reason is that we do need to adjourn the hearing by a quarter of 1. So with that in mind, we will start first with Dr. Galloway.

STATEMENT OF GERALD E. GALLOWAY, PE., PH.D., GLENN L. MARTIN INSTITUTE PROFESSOR OF ENGINEERING, UNIVERSITY OF MARYLAND

Mr. GALLOWAY. Thank you very much, Mr. Chairman. It is a privilege to be here. I will try and go very quickly.

The disastrous floods of 2011 impacted many parts of the Country. While that is a critical focus of this meeting today, I would like to talk about the future and where we are going to go with floods that might hit us as we move forward.

I would make two comments about the testimony we have just heard from Secretary Darcy and the Corps leaders. It is interesting that on the Missouri River, the issue of how it is to be operated, as Senator Baucus pointed out, has been the subject of much discussion. One National Academy report that said the answer lies

here on the Hill with a resolution of conflicting laws and regulations and guidance on how to operate it.

The second part of that is the court case in 1994, or 2004, where a Federal judge looked at the competition for the uses and made the decision that the Congress needed to do something about that. So I think there are two issues with management of the Missouri that require some work up here.

I would note that, other than the Mississippi River and Tributaries Project, and the TVA, Miami of Ohio Conservation District, the Nation essentially does not have a flood control system. We have talked about that, we have used that term. There is no national plan. We don't have a national goal or objective for flood risk management. And climate change, sea level rise and population growth are going to make that even worse.

I would like to give you a few thoughts on where we should go. I use the term flood risk management instead of flood control, because across the globe, everywhere in the world, there is a shift from focusing on reducing flood damages by trying to control where floodwaters go, to accepting the premise that floods are natural events and that in the long run, only through a portfolio, as you just mentioned, of green and non-structural infrastructure, plus the normal structure infrastructure, can we minimize or reduce the damages.

Flood risk management also accepts the proposition that absolute protection is not possible. And even the Dutch have come to this realization. Let me highlight a few reasons why the current approach we are taking is not up to the task at face. I have four major points that I will quickly go through.

First, in a 1994 White House study after the Great Mississippi flood, I happened to lead that study and reported it to this same Committee. We pointed out that we have no goals and objectives in our efforts to deal with flood and that the responsibility for how we manage floods is scattered between the Federal, State and local governments, and it is not well defined. Clearly, we need to address this issue and come up with some sort of a solution as to who is responsible for what.

In WRDA 2007, you directed the Secretary of the Army to within 2 years revise principles and guidelines to reflect new flood-related policies that you included in that WRDA. Nearly 4 years later, that hasn't reached the Hill. State and local governments have responsibility for land use management, and in many cases do little to stem development. That continues in high-risk areas.

In most cases, until recently, States have been singularly absent from the management and oversight of levees, it has been left to the Federal Government, and have varied involvement in oversight of dam safety. Individual property owners don't share in the responsibility as much as they should. The abysmal participation of people who live in the floodplain and the National Flood Insurance program, even when it is mandatory, is somewhere near 25 percent penetration, indicates that floodplain residents don't see a need for them to carry part of the responsibility.

The second issue: we face significant flood risks in this Country and many people who live in the floodplain do not understand or appreciate the risk they face. We do not know or don't seem to be

wiling to find out the national exposure to the risk of flooding. Technology would permit us to do this if it was resourced.

Third, much of the populated flood-prone areas across the Nation sit behind or below uncoordinated amalgam of Federal, State and local levees and dams, the condition and integrity of which may not be known. Estimates indicate there are 100,000 miles of levees in this Country, only 14,000 of which fall under the Corps of Engineers and some other form of Federal oversight.

American Society of Civil Engineers in its 2009 report card assigned grades of D minus to levees and D to dams, and there is no indication the picture is getting any better. Four years ago, in WRDA 2007, you, recognizing the urgency of the situation, established a levee safety program and directed the National Committee on Levee Safety to look after the situation and make recommendations to the Congress in 180 days.

In January 2009, they turned in their report to the Administration. But it has not yet been officially sent to you. You have not acted on it, even though the report is available to you. In essence, nothing has been done at the national level to move ahead on the well thought-out recommendations of this Committee that do require active State and local involvement.

The third part of the levee and dam challenge is funding. The Congress and the Administration must come to grips with funding for this infrastructure. ASCE suggests that it would be a 5-year, \$50 billion burden to deal with the levees, and we have heard some of that this morning, or a \$5 billion, 5-year program for dam safety.

Doing nothing increases the problem and puts more people at risk every day. If levees, dams and flood walls and other related structures remain part of the national approach to deal with flooding, and they have to be, then Resources must be identified and provided within a Federal, State, local, private partnership to ensure that what is in place will in fact do its job. Every day that funding is postponed, the problems grows larger.

Fourth, we are not dealing with flood issues on a watershed basis. We talk about watersheds, we talk about integrated management but do not act that way. A flood-related project in one community can cause problems upstream and downstream. Congress continues to authorize individual projects without fully understanding their watershed context. That is not the right way to go.

Senator CARDIN. We have to ask you to complete your statement.

Mr. GALLOWAY. I will conclude by just saying, managing flood risks presents a serious challenge, a challenge we have known about for two decades. It is time to do something about it.

[The prepared statement of Mr. Galloway follows:]

Statement of
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to the
US Senate Committee on Environment and Public Works
October 18, 2011

2011 Floods and the Condition of the Nation's Flood Control Systems

Senator Boxer, Members of the Committee. It is a distinct privilege to participate in this important and timely hearing and I want to thank the Committee for the opportunity.

I am Gerald E. Galloway, a Glenn L. Martin Institute Professor of Engineering and Affiliate Professor of Public Policy at the University of Maryland where I teach and do research in water resources and natural disaster management. I came to that position following a 38 year career in the US Army and eight years service in the federal government, most of which was associated with water resources management. I served for three years as District Engineer for the Corps of Engineers in Vicksburg, MS and later, for seven years as a member of the Mississippi River Commission. I also serve as a consultant to a number of national and international government organizations. I am currently a member of the Governor of Louisiana's Advisory Commission on Coastal Protection, Restoration and Conservation. I am also a member of a WWF (UK) - China Ministry of Water Resources team that is reviewing flood risk management worldwide. In 1993 and 1994, I was privileged to be assigned to the White House to lead an interagency study of the causes of the Great Mississippi River Flood of 1993 and to make recommendations concerning the nation's floodplain management program.¹

The disastrous floods of 2011 severely impacted many parts of the country and once again brought into question the efficacy of our nation's efforts to reduce ever growing flood damages and to ensure the sustainability of our riverine and coastal natural resources. I would like to briefly comment on the flood experience of 2011 and then discuss the systemic issues that face the nation in dealing with the threat of floods, hurricanes and significant storm events.

The Floods of 2011

The floods of 2011 on the Mississippi and Missouri Rivers resulted in damage to people and property, but this damage was substantially less than it would have been had we not invested over the years in a robust flood damage reduction infrastructure.

The successful operation of the Mississippi River and Tributaries (MR&T) project in the Lower Mississippi Valley prevented substantial loss of life, billions of dollars in damages, and the disruption of critical components of our nation's energy production and international commerce. The MR&T was designed to handle a flood such as the one that occurred and performed well. The project represents an integration of multiple approaches to flood damage reduction and has been developed with a holistic, basin level approach and unity of command of its execution. In

its use, since its initiation in 1928, of setback levees and backwater storage, it also reflects the concept of providing “Room for the River” that was only recently adopted by the Dutch government.

The operation of the Missouri River dams also reflected the successful execution of a well designed plan to pass enormous volumes of water down this major river. Had the dams not been there, the losses in the Missouri basin would have been catastrophic. However, the difference between the MR&T project and the Missouri River dams is the difference between a comprehensive project and a series of dams sitting in the middle of a basin where there is no integration and where, over the years, the development of a systemic approach to dealing with floods and other water uses has been hampered by an inability of the states and the Congress to agree on what needs to be done and, as indicated in the previously mentioned 1994 report on the 1993 Midwest flood, a failure to develop a comprehensive approach to the water management of the Missouri basin as a whole.

The major flooding of most areas along East Coast should not have been a surprise to anyone familiar with the long-term flood histories of those regions. Most areas had seen the impact of major floods before or were known to be at risk to flooding from major events. New Jersey and the Federal government have been struggling with the Passaic Basin for over five decades, but have been hampered by unwillingness on the part of the many communities in the basin to agree on land use controls and project alignments that could have dramatically limited flood exposure.

The Nation’s Flood Control System - *There Is No Flood Control System*

Let me move to discussion of the nation's flood control system. What I am going to say is not new. In fact, these conclusions and recommendations have been part of study after study over the last half century.²

Other than the MR&T, the TVA, and the Miami (Ohio) Conservancy District, the nation essentially does not have flood control systems or flood damage reduction systems or flood risk management systems. There is no national plan, national goal or national objective for flood risk management.

I use the term flood risk management instead of flood control because a major transition in how to deal with floods is taking place across the globe and represents an international shift from a focus on reducing flood damages by controlling where floodwaters go to accepting the premise that floods are natural events and that, in the long run, only through use of a portfolio of both structural and nonstructural measures can flood damages be reduced or mitigated and the natural and beneficial functions of the floodplain maintained. Flood risk management also accepts that absolute protection from floods is not possible and that there always will be a residual risk, the possibility, no matter how remote, that one or more of the elements of the flood system may fail and cause losses.

Flood risk management does not set a universal standard for protection e.g. 100-year flood protection, but identifies and assesses the spectrum of hazards and their potential consequences, faced by a given region or community and develops a strategy that, within the resources

available, maximizes flood risk reduction. The national flood insurance program, intended as a mitigation option only, has become our de facto policy tool. While it has provided mitigation for many, it has had the unintended consequence of focusing our resources and energies on a single and minimal standard that in fact has increased risk rather than reducing it. It has also placed a glass ceiling on our thinking about the full spectrum of hazards society faces and a systems approach to dealing with them as a totality.

Since the early part of the 20th century, the federal government has been deeply involved in structural efforts to control floods but has been doing so on an individual project basis or within the context of protection of small watersheds. Over the last 50 years it has also encouraged, in its flood mitigation efforts, such nonstructural measures as land use planning, flood insurance, and flood-proofing to reduce the impact of floods on affected parties. If flood losses are an indicator of success, I would suggest that we are less than successful and that the picture ahead is grim unless we take steps to address the problems we now face. In spite of all of our efforts, the average losses per year continue to climb.

If you are willing to accept the information about climate change provided to you by the National Research Council in its Congressionally requested study (PL 110-161), *America's Climate Choices*³, and I am, then you will agree that the potential for flooding is increasing and that when coupled with population and infrastructure growth, the probability of significant increases in loss of life and economic and social coastal and riverine flood damages is quite real. A national level strategy is essential to marshal intellectual, economic and social resources to address these compelling issues.

Flood Challenges of Today

Let me highlight a few reasons why our current approach to flood risk management may not be up to the task it faces.

Exposure to Flooding

The United States faces significant flood risks and most people don't recognize this risk.

- The nation does not know its exposure to the risk of flooding. We have some idea of the number of structures in the 100-year floodplain but little information about the numbers within the remainder of the floodplain and although estimates place the figure between 4 and 7 million in the 500-year floodplain alone. We do not know accurately the exposure of federal facilities to flooding.
 - While technology would permit the development of such information - what properties are in the floodplain and at what elevation and subject to what level of flooding- little support is given to identification of property at risk and communication of this information to those who are at risk and to those who are responsible within the government for dealing with these risks.

- Three reasons are usually given for this failure to identify the exposure. First, such work requires resources and resources are not available. Second, development of exposure information would identify problems that cannot be easily solved and that would require resources that are not available. Third, bad news is not popular, so why create it. It would only slow development.
- The state of North Carolina, as part of the FEMA Map Modernization Program undertook to obtain LIDAR (high resolution topographic) data for the state so that when its flood insurance rate maps were developed they would be as accurate as possible. In parallel with flood insurance rate map modernization, North Carolina has also begun an effort to obtain locational data including first-floor elevation of all structures in the floodplain. By identifying this exposure, the state expects to substantially reduce potential losses and stave off development that would put people and property at risk. It can be done.
- Flooding is a problem in almost all parts of the nation. There are over 21,000 communities enrolled in the National Flood Insurance Program. Community leaders don't enroll the community in the program unless they recognize a flood risk. There are many areas outside of the enrolled communities that are also at risk to flooding and the pressures of development simply will increase these numbers.
- Many people who live in the floodplain do not understand or appreciate the risk they face until the water is on their property. The decision people make to move into a risk area is a function of the information they have available about the risk and how they individually perceive and understand that risk.
- We are not succeeding in communicating the information those in at-risk communities need to make management and personal decisions. Most floodplain residents and many public officials do not understand the language that is used to identify risk and the extent of the risk.
 - A 100-year flood is seen as a flood event that will occur only once in 100-year period instead of a flood that has a 1% chance of occurrence in any given year and for which there is a 26% chance of occurrence during the life of a 30 year mortgage.
 - Many floodplain residents do not understand that a major flood could occupy the entire floodplain, not just the 100-year floodplain. Where the river has once gone, it can also return. Confusion over what was subject to flooding during the 2011 events on the Missouri and Mississippi well illustrates this point
 - Because they are behind a local levee or a "certified" levee they believe they have no risk-they are protected. They do not understand that levees can overtop or fail. I am somewhat amazed to see objections by members of Congress to placing cautionary notes on flood maps that warn of the potential for levees to overtop or fail.

- Some communities try to educate those at risk; others do not and discourage such obvious tools as delineation of the extent and height of historic floods or disclosure of a property's location in the floodplain. It is not good for the real estate market or development to highlight potential areas of flooding.
- The quality of the information provided to floodplain residents and public officials varies considerably by location. Most current flood insurance rate maps only identify the 100-year floodplain, although new maps will include the 500-year floodplain. FEMA, in its RiskMAP program, is working to provide indicators of actual risk but resource constraints will limit their ability to make these tools universal products.⁴

The Levee and Dam Challenge

Much of populated flood prone area across the nation sits behind an uncoordinated amalgam of federal, state and local levees, the conditions and integrity of which may not be known. The National Committee on Levee Safety estimates that there may be 100,000 miles of levees in the United States, only 14,000 miles of which are under some form of federal oversight.

As all of you know, the nation faces significant problems with maintenance and modernization of its aging infrastructure. The American Society of Civil Engineers, in its 2009 Report Card on American Infrastructure, assigned grades of "D-" to levees and "D" to dams and there is no indication that the picture is getting better.

The 1994 report on the Mississippi River floods of 1993 highlighted the lack of information about levee location and condition in the Missouri-Mississippi basin and the paucity of state involvement in the monitoring of levee construction and operation, but little has been done to deal with these issues. A 2006 study of levees and the national flood insurance program pointed out that there was limited knowledge of the condition and location of many of the levees that protect people and property. Following Hurricane Katrina, the Office of Management and Budget directed the Corps of Engineers to begin an inventory of levees and their condition, an effort which the Corps has initiated but largely confined to federal and federal related levees, which, as indicated earlier, represent only a small percentage of national levees. Title IX of the Water Resource Development Act of 2007 established the National Levee Safety Program and a Committee on Levee Safety and directed the submission of a report to the Congress within 180 days the passage of the act. A draft report of the National Levee Safety Committee was submitted to the Administration in January 2009 and has yet to be sent officially to the Congress. Since the report is on the Web, I am sure that members have had an opportunity to review it.

Since the 2006 report on levee policy, FEMA's flood map modernization program, the Corps levee inventory and other individual efforts have borne out the initial conclusion that there is a significant levee problem in the nation and that it is probably far worse than originally anticipated. The costs of inspection of levees are high and the costs of rehabilitation and bringing the levees to standards are even higher both at the federal state and local level. ASCE estimates the 5 year need is in excess of \$5 billion. So today hundreds of levees, whose integrity is in

question, are in place in front of communities and properties with little realistic hope of funding for inspection, repair or upgrade.

I would note that the impacts of the 2011 floods on the MR&T project levees and related structures and on the dam systems on the Missouri were high and will require significant resources to bring them back to the condition required to deal with future flooding.

ASCEs report card for dams indicates that over 1800 high hazard dams, dams whose failure would constitute a threat of loss of life, have been deemed unsafe and that hundreds more remain uninspected as a result of funding shortfalls. Dam failures can affect not only those immediately below the dams, but also can cause significant problems for those behind downstream levees whose design did not include passage of waters from a dam break.

Sharing Responsibility for Flood Risk Management

We are not treating flood risk management as a responsibility to be shared among federal state and local governments and individuals who are at risk. Over the years the federal government, with programs of the Corps of Engineers, FEMA and NRCS, has clearly taken a lead in dealing with flooding, not only in pre-flood activity but also in flood response and recovery.

- The biggest challenge is wise use of the floodplain -land use. State and local governments have responsibility for land use management yet, in many cases, do little to stem development in high risk areas. They would rather seek federal aid for flood infrastructure development when there is a problem than limit unwise development. Communities see development as increased revenue rather than increased risk. I compliment the State of California for the passage of Assembly Bill 70 in 2007. This bill indicates that when a community makes an unwise decision to allow development in a flood risk area, it must also be ready to assume some of the liability that would result if the flood system were to fail.
- As indicated earlier, in most cases until recently, states have been absent from the management and oversight of levees and have varied involvement in oversight of dam safety.
- Individual land owners must also share in responsibility for flood risk management. Although purchase of flood insurance is *mandatory* for essentially all federally backed mortgages for property in the 100-year floodplain, the abysmal participation in the program-somewhere near 25%-indicates that floodplain residents don't see a need to carry their share of the responsibility. The same could be said for those that live in the floodplain but outside the 100-year area even though they can participate in the program at preferred, lower rates. Their participation is equally low.

Watershed Planning

We are not dealing with flood issues on a watershed basis. A flood related project in one community can cause problems upstream if the river is constricted by the project and/or can cause damages downstream by increasing the volume of water in the river. While engineers are capable of determining the impacts of such projects on upstream and downstream regions these studies must be undertaken within the context of the watershed as a whole so that interrelationships are clearly defined. Unfortunately, even though watershed studies are frequently authorized by the Congress, it is rare to see appropriations follow to ensure that decisions on individual projects are taken within this watershed context. Funding for comprehensive planning for the Red River Basin of the North and the area around the junction of the Missouri, Illinois and Missouri rivers has been limited in spite of the demand for and funding of projects in those areas.

In 2009, former Congressman James Oberstar, chairman of the House Transportation and Infrastructure Committee, noted that:

Today, the diverse water resources challenges throughout the United States are often studied, planned and managed in individual silos, independently of other water areas and projects. Generally, this has resulted in local and narrowly focused project objectives with little consideration of the broader watersheds that surround the project. There are 24 Federal agencies with water responsibilities and this does not count the land management agencies with related responsibilities. Policy is ad hoc, implementation is decentralized, coordination is fragmented, and communication is non-existent or fails to connect.

National Objectives

Since 1983, federal water resource studies have been guided by Principles and Guidelines (P&G), a document prepared by the US Water Resources Council and signed by President Reagan that established that the Federal objective of water and related land resources project planning would be to “contribute to national economic development consistent with protecting the Nation's environment...” Almost since their publication, the P&G have been under criticism for their failure to consider public safety, social costs and environmental impacts and an apparent bias against nonstructural approaches. As you know, the Water Resources Development Act of 2007 directed the Secretary of the Army, not later than 2 years after the date of enactment of the Act, to issue revisions to the P&G for use by the Secretary in the formulation, evaluation, and implementation of water resources projects. The Act instructed the Secretary to ensure that the revision addressed the use of best available economic principles and analytical techniques, including techniques in risk and uncertainty analysis, the assessment and incorporation of public safety, assessment methods that reflected the value of projects for low-income communities and projects that use nonstructural approaches to water resources development and management, the assessment and evaluation of the interaction of a project with other water resources projects and programs within a region or watershed, the use of contemporary water resources paradigms, including integrated water resources management and adaptive management, and evaluation methods that ensure that water resources projects are justified by public benefits.

We are approaching four years since enactment of WRDA 2007. The Administration has indicated that it is working on the revisions and that it is broadening the applicability of the proposed revisions to include all federal agencies, not just the Corps of Engineers, but no revision has been forthcoming. Revision of the P&G is important step in coming to grips with the national flooding challenge.

Federal Leadership.

Executive Order 11988, Floodplain Management and EO 11990, Protection of Wetlands, were issued by President Carter in 1977 and defined the responsibilities of federal agencies with respect to support of federal activities in the floodplain and the protection and preservation of wetlands. EO 11988, in its implementation guidance, includes language that restricts the development of critical facilities -hospitals, public safety activities, water treatment facilities, etc. in the floodplain - requiring that they either locate outside of the 500-year floodplain or be protected against a 500-year flood. The executive orders also call on the federal agencies to ensure that the programs they support and/or that they carry out themselves are in consonance with wise use of the floodplains and protection of wetlands. It is important that federally supported activities in the floodplain reflect an understanding of the risks in the floodplain, the benefits of ecosystem goods and services provided within the floodplain and coastal areas and do not create exposure that would add to growing flood losses.

Federal Coordination of Floodplain Management Activities

Many of the previously mentioned studies on previous floods and floodplain management have addressed a seeming lack of coordination among federal activities in dealing with flood issues and recommendations have been made for various mechanisms to affect the coordination that was once provided by the US Water Resources Council.

I am most pleased to note that federal agencies have recently reinstated a Federal Interagency Floodplain Management Committee comprised of senior Administration officials from those departments having responsibility for flood related activities and that the committee has been actively seeking to address many of the challenges mentioned above.

Actions That Need To Be Taken

What then needs to be done to reduce the risk to the nation from flooding? I would offer several recommendations:

- The Congress and the Administration need to recognize and fully implement the risk-based approach to dealing with floods. It is very clear that the nation cannot afford to do everything for everybody and that the resources at federal state and local level should be applied where the risk is greatest. I compliment the State of Louisiana for its determination in its recent plan for coastal protection and restoration that the same level of protection could not be provided to all areas within the coastal threat area. The plan

does not abandon those who may not receive the highest level of protection but indicates that the support may be in a different form than structures.

- Congress and the Administration, in collaboration with the states, need to develop a National Floodplain Management Act that defines the goals and objectives for flood risk management and the responsibilities that should be carried out at federal, state, and local level and by individuals in dealing with the flood challenge.
- Immediately following Katrina, everyone was behind development of a national levee safety program, yet today, over six years since that event and nearly three years since the completion of the report of the National Committee on Levee Safety, nothing has been done at the national level to address these levee safety problems or to deal with the recommendations of the Committee. Congress needs to act, with or without Administration support, on the recommendations of the National Committee on Levee Safety. There are actions that need to be taken now
- The Congress and the Administration must come to grips with the infrastructure challenge. Doing nothing increases the problem and puts more people at risk each day. If levees, dams and floodwalls and other related structures are to remain part of the national approach to dealing with flooding, then resources must be identified and provided to ensure that what is in place will in fact do the job that is intended. This may well mean that the choice becomes one between repair or removal of some structures that currently exist. Any efforts should include definition of the long-term resource responsibilities of those who own, operate, and maintain existing and proposed flood risk reduction infrastructure. Every day that funding is postponed the problem grows larger and transfers more of the resource burden to those who will come after us.
- In authorizing and funding future flood risk reduction measures, the Congress must take these actions within the context of watershed development so that the full implications of any new projects on its watershed as a whole and on existing or proposed infrastructure will be fully recognized and addressed. Authorizing funds for watershed studies but not appropriating funds for their execution is of little value
- The Congress should seek Administration completion of the revisions to the existing Principles and Guidelines.
- Given the significance of the continuing growth in flood damages and the potential future increases in these damages, it is imperative that the Administration and Congress and the states work together to address the many challenges that I have mentioned. The shift from flood control to flood risk management is a reality as is the absence of resources to properly address the infrastructure problems the nation now faces. Unless action is taken, we are ignoring the risk to those who live in the floodplain and allowing them to believe that they are safe when they are not.

Thank you again for the opportunity to participate in this hearing.

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**Response to US Senate Committee on Environment and Public Works Questions
Hearing, 18 October 2011**

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Senator Barbara Boxer

1. Our October 18, 2011 hearing focused on three historic flood events in 2011. Each of these events was unique and the Federal response to each event was different. However, it is important that we learn from the successes and failures so that we can be better prepared for future floods.

(a) In your analysis to date, what are the most important lessons learned from the 2011 floods?

The 2011 floods clearly pointed out that much of the population in areas potentially affected by flooding does not understand the nature of the risks it faces. Those at risk typically believe that if there is some sort of protection (levees, floodwalls, dams) in the area and that, if no one has told them otherwise, they must be protected from flooding. In those cases where there is no protection, the assumption is no threat. Few people who are at risk understand that, even with some level of protection, an event can occur that will far exceed the capacity of the measures that are giving them a degree of protection. Some local officials and members of Congress are opposed to notations on flood maps that clearly identify the residual risks brought about by extreme events.

Local officials, in making land use decisions, are either not aware of or are indifferent to the flood risks that exist in floodplain and coastal areas and are reluctant to publicize information about flood risks when that information is readily available. Only when a disaster occurs, do we see large-scale attention to management of flood prone lands. Areas that flooded in 2011 in the Mississippi River and Missouri River basins and in New England were, in many cases, areas that had previously flooded or where knowledge of the flood hazard existed and was available to those who chose to look for it.

Responsibility for wise land use decisions rests with the local level and federal programs must be structured to reward communities where wise decisions are made and penalize those where they are not. The state of California 2007 Assembly Bill 70 addressed this issue directly, placing liability on communities that made imprudent decisions about floodplain development. The local share of project costs for federal flood projects should take into account local efforts to deal appropriately with floodplain use. A rating system similar to the NFIP Community Rating System (CRS) could be used to incentivize high performing communities (and even penalize those where there is no effort to locally deal with flood issues.)

Members of Congress and federal, state, and local officials must work, prior to flood events, to understand how flood damage reduction efforts operate in their areas of responsibility. During the 2011 Mississippi River Flood, the first response by many national and local elected officials was to try to place the blame for flooding (a natural event) on someone without taking the time to gather the facts. Intense rhetoric over use of the Birds Point-New Madrid Floodway and operation of the Missouri River dams reflected either an unfortunate lack of knowledge on the part of those whose constituents lived in the floodway or below the dams, or an attempt to address, at the point of decision, issues that have been debated for over a half-century. The time to engage in such discussions for the benefit of the affected parties is long before the flood events occur.

2. Your testimony highlights a number of recommendations for next steps to help with flood risk management.

(a) What would you prioritize as the top three steps that need to be taken in the near term?

First priority in the near-term would be acceptance by the Congress or the Committee of the move by federal agencies to a flood risk management framework and support of this approach in legislation and committee language. This flood risk management philosophy is reflected in the following nine principles:

1. **Accept that absolute protection is not possible and plan for exceedence.** There will always be a bigger flood. Engineering design standards, however high they are set, will be exceeded. Engineered structures may also fail (breach, fail to close, etc). Non-structural measures such as early warning systems or evacuation plans taken to mitigate flood consequences also are susceptible to failure. Through an acceptance that some degree of failure is almost inevitable, a focus is placed upon building resilience into all aspects of the planning process (urban development planning, flood control structures, warning systems, building codes, etc.).
2. **Promote some flooding as desirable.** Floodplains provide a fertile area for agriculture and a variety of ecosystem goods and services to society, including natural flood storage. Making room for the river and the sea, using the natural ability of this space to accommodate flood waters and dissipate energy, maintains vital ecosystems and reduces the chance of a flood elsewhere.
3. **Recognise that decisions must be made on imperfect knowledge.** The search for perfect knowledge (data, information and models with which to conduct analyses) should not be a reason to delay moving to the development of options and implementation of initial flood risk management activities. The flood risk management process is iterative and adaptive, taking in account better information as it is developed but not waiting for conceivably unattainable information before proceeding to the next step. The uncertainty in the information should be explicit and choices made that are robust to that uncertainty.
4. **Recognise that the future will be different from the past.** The world is changing. Climate change, demographic change through to change in the condition of structures means that planning processes that focus on a future that resembles the present are no longer acceptable.
5. **Do not rely on a single measure, but implement a portfolio of responses.** Integrated management of flood risk involves consideration of the widest possible set of management actions. This includes measures to reduce the probability and measures to reduce consequences (exposure and vulnerability). These are implemented in such a way to assist in promoting social justice, and socio-economic and environmental gain.

6. Use limited resources efficiently and fairly to reduce risk. The level of effort used in managing floods and their consequences must be related to the nature of risks and not universal or generalised engineering standards of protection. Management strategies are developed following consideration of the efficiency of mitigation measures, not only in terms of the risk reduction achieved and resources required, but also their fairness and ability to maximise ecosystem opportunities.

7. Be clear on responsibilities for governance and action. The role of governments, businesses, and other organizations including the affected communities and individuals must be clearly defined. Each level of government, from national through provincial and local, has a specific role to play in risk management. Sharing of both responsibility for and fiscal support of flood risk management activities ensures the full participation of leadership at all levels in the development of a common understanding of the processes being followed in the floodplain management activity. Effective flood risk management also requires that flood risk management activities be carried out on a watershed basis so that upstream-downstream, cross-river conflicts may be avoided and/or mitigated. Procedures must be developed to provide continuous collaboration among agencies with parallel or interlocking responsibilities.

8. Communicate risk and uncertainty effectively and widely. Decision-makers and the public alike must understand the risks that they face; frequently they do not. Too often, after a flood, those affected claim that no one had told them of the risk they faced. Tools, such as risk maps, social networking, and educational processes are utilised to facilitate an appropriate understanding. Effective communication of risk enables both communities and individuals to understand the mitigation measures for which they will be responsible and why such measures are necessary. Communicating the risk after a catastrophe is too late.

9. Reflect local context and integrate with other planning processes. The strategy for each location will be different, reflecting the specific risks that must be faced and not arbitrary levels of protection that should be achieved. While the development of strategies should be location specific, the framework of risk analysis and evaluation should be adaptable to all situations.

(From Sayers, PB, GE Galloway, et al. 2012. *Flood Risk Management*. UNESCO/WWF (in Press))

Second priority would be the identification and assessment of the actual flood risk faced by the nation. You cannot deal with a problem unless you know what it is. This requires determination of the location within the floodplain of people and property and the quantification of the consequences that would result from a significant flood event. Today's technology certainly makes this risk identification and assessment possible. As indicated in my testimony, the state of North Carolina is currently carrying out for FEMA a pilot study of multi-hazard risk analysis and as part of this has developed information about hundreds of thousands of structures within the state that lie within the natural floodplain (outside of the 100 year floodplain). Since 1986, federal reports concerning use of the floodplain have strongly recommended that the federal government undertake to determine the exposure to flooding of its properties and those that it funds or supports through, at a minimum, a sampling of such facilities across the country. A good place to start might be downtown Washington DC where a significant flood risk currently exists. Once the national exposure is determined, it should become obvious to all involved that action is necessary to immediately deal with the flooding challenge.

The third priority would be the delineation by the Congress of the responsibilities for flood risk management at the various levels of government and by the public. There continues to be a national assumption that the responsibility for dealing with floods rests solely with the federal government. Risk management begins with effective land use which is the responsibility of state and local governments.

Much of the need for structural and nonstructural risk reduction measures and many future losses could be obviated by the assumption of responsibilities at the local level for floodplain management. Beyond land use decisions, communities can reduce the potential consequences of flooding through use of appropriate building codes, early warning systems, and evacuation planning. Individual citizens living in the floodplain also must be responsible for taking appropriate steps to mitigate damages should a flood occur through purchase of insurance and taking steps to isolate high-value equipment and goods from flooding. States must also assume their oversight responsibility for management, and operations and maintenance of local flood protection works such as levees.

(b) How many of these recommendations would require Congressional action?

Acceptance of the concept of flood risk management requires a philosophic shift within the Congress but no specific congressional action.

The second priority action, identification and assessment of flood risk, could require additional Congressional funding support but would not require any new authorities for the agencies. Most logically, the assessments should be carried out by the states; however, such actions would be far more likely to be undertaken if there was federal funding support for such efforts.

Explicit establishment of federal, state and local responsibilities for flood risk management would require legislative action. However, the committee, in carrying out its responsibilities, and in providing commentary on legislation, is in a position to make clear what it believes to be the appropriate distribution of roles and responsibilities for flood risk management among the levels of government.

3. Your testimony highlights that aside from the MR&T project, the TVA, and the Miami (Ohio) Conservancy District the nation does not have any flood risk management systems.

(a) Do you believe that these examples are good models for what a National flood risk management system should look like?

The MR&T, TVA and Miami Conservancy District serve as models of effective systems management of the floodplain. All three have authorities to deal across political boundaries with upstream-downstream issues, environmental needs, and funding challenges. Each has been given authority to manage the system as a whole rather than in piece parts. All three are just beginning to adopt and implement the tenets of flood risk management. Because they have the current authority to operate in a systems manner, they likely will be successful in carrying out flood risk management activities and would serve as models as they progress.

(b) How could we move from our current collection of flood risk reduction projects to a National flood risk management system?

No project should be authorized unless it has been considered within the context of its watershed. The Congress continues to authorize and fund individual projects without consideration of their impact on watersheds or basins as a whole. Where comprehensive studies on a watershed scale have been authorized, they have rarely been funded so that knowledge about upstream-downstream issues and interactions among projects are not determined. In 1927, Congress directed the conduct of watershed level surveys across the nation that resulted in the so-called "308 Reports." These reports were completed in a relatively short period of time, at modest cost, and became the basis for water resource development activities during the depression and subsequent years. Initiation of similar reports for watersheds/basins of interest would identify critical issues within the basins and permit projects to be considered within the larger context of the watershed.

4. The National Committee on Levee Safety released its draft report in 2009, but the final report has not been forwarded to Congress yet.

(a) What are the most important items in the report that you think need to be authorized by Congress in the near term to begin development of a national levee safety program?

Before it goes anywhere else, the Congress must determine the management approach it will use for national levee safety and then act on this approach. The type of governance structure to be used is critical. Will a program similar to the National Dam Safety Program do the job or is an independent commission needed? How will the effort be funded? Some entity/agency needs to be in charge and accept the responsibility to execute a program. The decision will be difficult but needs to be made. Until Congress addresses the governance issue, efforts to deal with most of the other 19 recommendations will be in limbo.

One exception to the need to wait for determination of a governance structure is the recommendation for a one-time national inventory and inspection of all levees by the Corps of Engineers. As with the earlier mentioned need for identification of national exposure to risk, there is a clear need for national identification of levee risk. At present all of the national effort is going into a detailed examination of Corps of Engineers levees (approximately 14,000 miles) and a lesser examination of levees within the NFIP (approximately 35,00 miles, which includes most Corps levees). The National Committee on Levee Safety reports that there may be as many as 100,000 miles of levees in the United States. It is imperative that more information be obtained about the non-Corps, non-NFIP levees as they pose a future flood risk for those that may develop or have already developed behind them. While every effort should be made to involve the states in this process, it is critical that the effort be conducted in an accelerated manner.

Sen. Inhofe

I. In your opinion, were the mechanisms and procedures that Corps had in place to communicate with local and state governments and other stakeholders during the flood events adequate?

(a) If not, please explain and include any recommendations for improvement.

In general, the mechanisms and procedures that the Corps of Engineers had in place during the 2011 floods were adequate. Appropriate bulletins were issued; coordination with other federal agencies was affected; and, comprehensive warning messages were available. Where information was not seen to be available, the lack of this information most likely was the result of an inability on the part of those receiving the messages to understand what was happening, why it was happening and what they could do to minimize and mitigate damages.

The challenge is not communication at the time of the event but communication of information prior to the event and the willing acceptance of that information by those at risk. There appears to be a decided reluctance on the part of many elected officials to determine the flood risks that communities actually face and to transmit the information to those at risk. Information about flood hazard is probably more available to United States citizens than to residents of any other country in the world. For a variety of social and behavioral reasons, many floodplain residents are not receptive to this information and as a result do not take action prior to floods to reduce the potential consequences of flooding to their property or to avoid acquisition of property in areas that may be at risk. Efforts must be made to educate those in the natural floodplain (far beyond the 100- year floodplain) about the risks they will continue to face and the actions they should be taking now to deal with the potential threats to their lives and property.

2. With limited time before the next potential flood event, what actions would you recommend the Corps and Congress take in order to prepare? Please also include any recommendations that are better suited for the long term

(a) How would you prioritize these recommendations?

As a first priority, every effort must be made to inform people in potentially 'at risk' areas of the nature of the risks they face and what actions they can take individually and as part of the community to reduce the potential for flooding and to mitigate the consequences should flooding occur. Federal and state agencies must be aggressive in getting the word out of the potential threat of flooding and providing clear information on the level of protection that those in the flood prone areas can reasonably expect. Congress must avoid the temptation to demand that all resources be put into full restoration of structural protection measures to the detriment of efforts to communicate what other steps can and should be taken by those in the floodplain.

Second priority should go to restoration of damaged flood protection works in areas where the consequences of future failure would be the greatest. The Corp's levee inventory is identifying areas most at risk and these areas should receive the highest level of effort. Where funds are not available to fully restore protection works in other locations, support must be provided to the local community to improve their nonstructural approaches such as floodproofing, early warning, and evacuation.

(b) How can we maximize the use of federal funds?

Federal funds should be allocated on the basis of identified risk. Given the difficult funding situation that now exists, Congress should inform states that resources will be applied to areas where the risk is greatest and encourage states, to the extent possible, to assist local levee boards and similar organizations in the self repair of critical structures.

3. What actions are needed to lessen the likelihood and limit the damages of another flood of this magnitude in the future?

There is little that can be done to lessen the likelihood of floods of the magnitude of the 2011 events. Every indicator points toward increases in flood potential. The impacts of climate change are real. Across the globe, nations face dramatic increases in intensity of storm events. Population growth and concurrent development is putting more floodwaters into streams and rivers and increasing downstream hazards. It is imperative that public officials recognize the challenge of extreme events and the flood risk management principle that there is no such thing as absolute protection from every flood event.

Damages can be significantly reduced by use of a combination of flood risk reduction measures to include sound structural systems and the wide variety of nonstructural means ranging from zoning that keeps people from high hazard areas, control of development in areas subject to frequent flooding, effective building codes, modern early warning systems, evacuation planning, and use of flood insurance. Flood risk management places great importance on the development of portfolios of flood risk reduction measures rather than a focus on a single structural approach.

Senator CARDIN. All of your statements will be included in its entirety for the record. Without objection. Thank you.

Mr. Larson.

STATEMENT OF LARRY A. LARSON, P.E., CFM, EXECUTIVE DIRECTOR, ASSOCIATION OF FLOODPLAIN MANAGERS

Mr. LARSON. Thank you, Mr. Chair, and the Committee, for holding this hearing. I will truncate my remarks.

First, I want to hope that the Committee recognizes as Gerry says that our flood control system really is an amalgamation of various things. It is dams and levees, but it is programs and various Federal agencies, we talk about, the Corps and FEMA, we have the NRCS watershed programs, NOAA, on and on and on. And then you throw in 2,000 flood-prone communities in 50 States who are the ones who really have prime responsibility for reducing flood losses and protecting public safety. So we have a mish-mash of activities that is going on in the Nation that comprises what we think of as our system.

In 2008, in my view, we dodged the bullet. You can look at it two ways. We have talked a lot today about what worked. But I think it is important to recognize there was a lot of the systems, the so-called systems, that were really on the edge. We were very close to catastrophe. We had very close to Katrinas in many instances.

Some of the reasons for that Senator Baucus talked about. Take the Mississippi River. We took away two-thirds of nature's floodplains. And then we wonder how we can constrain these maximum extreme flood events during those times of heavy flooding when she tries to reclaim that floodplain.

In the northeast, as we have talked about, there are many different systems. There are really not as many systems as there are individual projects, most of these State and locally operated and not coordinated. And I am not sure that is all bad. That is just the way it is, and we need to recognize that.

The question for 2011 is whether these floods were epic. The answer is, no, they weren't. I hate to tell you that, but they weren't. We need to recognize that they weren't, and that we are going to see more and more of these kinds of events. What is called a 1,000 year event in Nashville over the next 40 years, with a couple more of those events, it is all based on statistics in the past, will now become a 100 year flood. So these things change over time. We need to recognize that.

Our current systems and programs and policies and practices are inadequate. We need to recognize that. I think this year we really had a polo event; 2011 was a polo event.

Let me mention four things quickly that I think you can address as overarching objectives. First, a comprehensive review of where we are with our policies in 20 and 50 years from now; two, assessing the Nation's infrastructure, as Gerry talked about, where we are, how many people are at risk and the rest; three, finishing up the P&G you asked the Administration to do; four, establish a national policy framework for flood risk management.

Ms. Darcy was asked about that, and I think that is an important element we need to all talk about. How we manage dams and levees and coasts and rivers, it all happened under this rubric of

a flood risk management approach. It is not flood control, it is flood risk management. And we need to think about how we do that.

We have many other recommendations in our testimony and we would be pleased to work with the Committee to help make the Nation more sustainable and recognize the cost and benefits from flooding.

[The prepared statement of Mr. Larson follows:]



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TESTIMONY OF

ASSOCIATION OF STATE FLOODPLAIN MANAGERS, INC.

BEFORE THE

Committee on Environment and Public Works
UNITED STATES SENATE

A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems

Presented by

LARRY A. LARSON, P.E., CFM
EXECUTIVE DIRECTOR
ASSOCIATION OF STATE FLOODPLAIN MANAGERS

October 18, 2011

October 18, 2011

Madam Chairman, Ranking Member Inhofe and Members of the Committee, the Association of State Floodplain Managers is pleased to offer our observations on the flooding that has taken place in the United States this spring and summer. We are pleased also to join you in examining lessons to be learned from the floods of 2011 as well as prior floods and to make some recommendations for improved flood risk management.

The Association of State Floodplain Managers and its 31 Chapters represent more than 14,000 state and local officials and other professionals who are engaged in all aspects of managing and mitigating flood risk addressing the loss of life and property from natural hazards. These aspects include land management, mapping, engineering, planning, building codes and permits, community development, hydrology, forecasting, emergency response, water resources, and insurance. Most of our members work with the nation's 21,000 flood-prone communities struggling to reduce their losses from all flood related hazards. All ASFPM members are concerned with working to reduce our nation's flood-related losses to lives and property. Our state and local officials are the federal government's partners in implementing federal programs and working to achieve effectiveness in meeting our shared objectives.

The 2011 Floods

The 2011 flood events that affected the Lower Mississippi, Missouri, and Eastern Seaboard, especially the Northeast, like the 2008 Midwest Floods, 2009 sandbagging of levees on the Red River, remind us all that, as we consider the problem and move toward solutions, flooding is an ever present and changing risk and the nation's flood control infrastructure continues to age. At the same time, levees and other flood control infrastructure are being relied on to provide total safety, even for events larger than those they were designed for, thus these factors combine to threaten the safety, economic vitality, and long-term sustainability of our communities.

The reality is that the nation dodged a bullet in 2011. Record snowpack in the intermountain west and significant spring rains in the upper plains led to significant, but not devastating flooding on the Missouri. On the lower Mississippi River, management measures combining structures and use of overflow areas that utilize natural storage and conveyance, conceived of decades ago prevented catastrophic failure of the system. The actual extent of flooding in the northeast could be classified as being somewhat concentrated in riverine areas, as compared to the potential area of impact that was expected to include the coast.

While much of the nation's flood protection structures did perform their intended functions, losses due to flooding were still significant. Importantly, many flood protection structures and systems were damaged and compromised and are now in need of very costly repairs. The U.S. Army Corps of Engineers (USACE) is anticipating \$2 billion in repairs to federal flood control structures alone. One of the key lessons of this year's flooding is that even with tremendous federal investment and best-case outcomes, the costs to the nation continue to mount in damage and economic disruption.

Lessons from Prior Floods

Extensive flooding has always plagued the nation, but especially so since the Great Midwest Floods of 1993, which saw the failure and overtopping of many flood control structures. Following that event General Galloway led an extensive review of the event and the Nation's approaches to reducing flood losses. In the years following the 2005 hurricane season, which dramatically demonstrated the devastating consequences that can result from over-reliance on levees, numerous policy summits

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gathered experts to craft recommendations for the future of the nation's flood control infrastructure including levees and levee systems, flood control reservoirs, urban stormwater management systems, and drainage projects. Since then, floods have continued to impact the nation, disrupting economic recovery efforts and amplifying the need to reform how the nation addresses flood risk.

It is important to recognize that the nation's approaches to reducing the loss of life and property damage from flooding consists of a mixture of flood control structures, policies, programs and practices scattered throughout numerous federal agencies (USACE, FEMA, DOI, USDA, HUD, USGS, NOAA, DOT, EPA and a number of others) that are designed to assist those entities that have the real authority and responsibility to address the problem, the nation's communities and states. The unsettling reality is that despite all our many efforts, flood damages are not decreasing, but are increasing. Even more disturbing, flood risk (the potential for damage) is increasing even faster. Flood risk associated with our flood control structures (levees and dams) has increased dramatically, because development in the lands "protected" by those structures (the residual risk areas) has greatly increased. This sets the scene for catastrophic damages, such as we saw in Katrina, Allison, a number of the Midwest floods and elsewhere. Structures become overwhelmed by large events, which are occurring and will occur more frequently as development in high risk areas, storm intensity and watershed development increases.

Summary & Recommendations

In short the nation's flood control systems (structures, policies and practices) operated on the edge these past few years, and are woefully inadequate to address the ever increasing flood risk the nation continues to face. As a society we continue to promise that when we construct a flood control facility that we will maintain it, and we do not. We delude ourselves to think that we have controlled nature but with ever increasing volumes of floodwater and sea level rise, we have not. And we continue to encourage or promote projects and policies that encourage individuals to invest in areas of flood risk, and then leave these very individuals and subsequent inhabitants blissfully ignorant of the peril they face.

Piece meal attempts to fix this problem have been attempted over the years and while some progress has been made it is clear that the nation's flood risk continues to grow. Much of the nation's flood control infrastructure is in far worse shape than those in New Orleans in 2005 (due to stress from recent events, age, inadequate design, more intense storm events and deferred maintenance), and the clock is ticking largely unknown to the families and businesses at risk, or even to many community officials.

The nation remains in need of robust flood risk management policies, programs and institutions, of which flood control structures can be a part, to reduce flood losses, make efficient use of tax dollars, and assure a more sustainable future for our communities. Nothing less than our nation's security, stability, and prosperity are at stake. We appreciate your leadership in meeting this challenge, and welcome this opportunity to share our views with you. We look forward to working with you and others to identify innovative, efficient and comprehensive ways to address the nation's aging flood control infrastructure and manage overall flood risk in a sustainable manner.

The ASFPM urges the following (which are covered in more detail in this testimony):

1. A comprehensive review of the nation's flood control systems (structures, policies, programs and practices) including a national assessment of flood risk today, 20 and 50 years into the future including recommendations on measures to effectively manage flood risk

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2. An assessment of the nation's infrastructure, including completing essential inventories, producing a report card on condition, and producing a count of the number of people and buildings in the residual risk areas associated with that infrastructure.
3. Following through with Congressional Direction to the administration to update and publish a revised P&G to ensure federal taxpayer funds are used wisely and support sustainable communities.

Today, our testimony addresses the following:

- A. 2011 Floods to Date and the Condition of the Nation's Flood Control Systems**
- B. Flood Risk Management: The Limited Role of Structural Flood Control**
- C. The Need for a National Flood Risk Management Policy and Framework**
- D. Recommended Next Steps to Address the Problem in Advance of the Next Big Flood**

A. 2011 FLOODS TO DATE AND THE CONDITION OF THE NATION'S FLOOD CONTROL SYSTEMS

The major events of 2011 demonstrated that we do not have similar systems throughout the nation. On the Lower Mississippi River, we have a large system that has functioned as designed for large events, where use of natural storage and conveyance, in combination with thousands of miles of levees contained the events of 1937, 1973 and 2011 with limited damages and loss of life. On the Missouri River, a series of dams and levees were overstressed by a large, but not unforeseen event that resulted in significant, but not catastrophic damage to the built environment, with agricultural lands suffering significant damage. This system has conflicting purposes, which appears to have contributed to events that again, skated on the edge of catastrophic. In the Northeast, there is no "system" in riverine areas, but instead a hodgepodge of levees, dams, floodplain management and other measures that were stressed by long periods of rainfall when the remnants of Hurricane Irene and Tropical storm Lee stalled for days and dumped rain. Many of the flood control structures are owned and operated by non-federal entities, and many were not adequately designed or maintained. Even some that were, experienced overtopping of walls and levees by flows, that while large, were not epic.

Lessons from 2011

Many of these lessons are the same we have learned since the 1930's: flood risk reduction cannot be achieved using a single measure. Reducing flood risk should incorporate as many measures as possible: and use practices to ensure development occurs in low flood risk areas; non-structural and structural measures to insurance for homes and businesses; and stronger measures to protect critical facilities like hospitals and evacuation routes to reduce loss of life. These are some of the measures:

Measures to reduce consequences:

- Land use planning, zoning and building codes
- Using natural storage
- Structural measures
- Insurance to cover residual risk

Measures to reduce financial risk:

- Warning and evacuation plans and actions to move valuable assets
- Outreach to inform citizens and businesses of risk
- Insurance to protect assets and residual risk

Measures to protect public safety

- Warning and evacuation to save lives
- Outreach so individuals know of risk and how to evacuate
- Protect critical facilities for extreme events, not just the smaller 100-year event

STATE OF OUR FLOOD CONTROL SYSTEMS—do we have the data?

We need data to know the size of the problem—how many levees, dams and channels are there in the nation? What is the condition of this infrastructure? Have those responsible for Operation and Maintenance (O&M) performed it well, or ignored their responsibility? Which parts of the system should be strengthened and which parts left to serve whatever measures they currently provide? What

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is the cost of strengthening the parts of the system that could be useful? What will it cost to protect urbanized areas to an adequate level of protection, the 500-year flood?

What we do know is that we do not have the data to help you in Congress, or federal, state and local governments understand the scope of the problem. We do not know how many miles of levees exist or their condition. While we have a handle on number of dams, the data may not be adequate to know what it will take to fix or remove inadequate or outmoded dams. Even more important, we also do not know the number of people and businesses at risk in those residual risk areas associated with structural flood control measures, or the number in the mapped flood hazard area on FEMA's flood maps. It appears less than about 5% of the nation's population lives in the 100 year floodplain, about 10 million, but we are not sure. How many additional people live in residual risk areas is not known.

The federal government brings two main things to the table to reduce flood losses: (1) data, and (2) money. The most effective measures to reduce flood losses rest with local and state government. It is they who have the authority for land use, planning and permitting development and codes.

The most important element the federal government can bring to assist locals and states in managing flood risk is data, and that is especially true during this time when the federal government has little or no funding. Toward that end, we recommend federal resources focus on completion of the National Levee Database, refinement of the dam inventory, and a compilation of the number of structures, people and businesses at risk to flooding in the U.S.

B. FLOOD RISK MANAGEMENT: THE LIMITED ROLE OF STRUCTURAL FLOOD CONTROL

For more than a century, water resources have been managed primarily through the use of structures, including levees, dams, canals, flood walls, and surge barriers. These structures enabled growing communities to impound waters for supply purposes and to contain flood waters, up to a point. Most of the population lived near rivers or the coast, since waterways were our highways and the rivers were our source of water for industrial, crop irrigation and human and livestock consumption. The federal government got into the flood control business in an organized way when Congress asked the Corps to become involved with the levees in Sacramento in 1917. By 1926, the Corps had hemmed in the Lower Mississippi River along its thousand mile course through six states, relying solely on levees to control floods, and reporting that the system of levees "is now in condition to prevent the destructive effects of floods."¹ The very next year, this levees-only approach led to widespread destruction when the extent and consequences of levee overtopping, failure, and flooding exceeded even that of New Orleans during Hurricane Katrina. Over the history of floods in the United States, we have learned that all flood control structures pose residual risk that must be considered and that they require costly maintenance that begs the question: who benefits and who pays?

There are six main components to the problematic use of flood control structures in the United States today.

1. It results in communities and states incorrectly viewing flooding as a federal responsibility. The Flood Control Act of 1936 provided authority for the Corps of Engineers to be the lead agency on flood control projects in the nation, and fostered the notion that the federal government has responsibility for management of floods. That authority has been used extensively for structural projects such as levees,

¹ United States Army Corps of Engineers, *Annual Report of the Chief of Engineers for 1926: Mississippi River Commission* (Washington: GPO, 1926), p. 1793.

dams, and channelization, which modify our natural waterway systems to accommodate human development needs. While the Corps has authority to perform non-structural projects such as elevation or relocation of at-risk buildings, the vast majority of projects have been structural. Reasons for that include the Principles and Guidelines (P&G) which results in structural projects having the highest National Economic Development (NED) ranking, so are usually the option locals select for mitigation projects. This is often true even though the total cost of a non-structural option may be lower. Locals see these projects as a way to obtain federal monies, and more important, to externalize the consequences of structure's failing to federal taxpayers through PL 84-99 and disaster relief.

Moreover, as structures age and deteriorate, they require costly maintenance, strengthening, and improvement to provide levels of protection that communities have grown to expect, and that may no longer be provided by the project. Many local project sponsors failed to account for ongoing operations & maintenance costs, or to consider how hydrologic changes may affect levels of protection over the life of the project. The resulting outcry exerts political pressures for federal bailouts for levees and to delay flood risk mapping that would actually show the flood risk.

2. Six years after Katrina, we still do not know how many miles of levees and canals there are in the nation, or their condition. As a nation, we are operating in the dark about the location and condition of most of our levees and structures along canals. The Corps is completing its inventory of the 14,000 miles of levees that are within federal authorities, and working closely with FEMA to include additional structures identified through NFIP mapping. However, neither agency has authority to gather data on the nonfederal levees that proliferate the American landscape. Many private levees have been built to protect farmland from frequent flooding. Over time, however, communities and infrastructure have been built or greatly expanded in areas that will be inundated when those levees are overtopped or fail. Little is known about the current condition of non-federal levees and canals, including whether these structures were designed to meet today's conditions, or designed at all, or whether they have been properly maintained by the non-federal interests. Property owners behind those structures may not even be aware the levee "protecting" them is deteriorating and subject to failure or is inadequate to handle foreseeable flood events. Too often, we learn about the existence and condition of these structures when one fails or is overwhelmed by a flood event and there is loss of life or property damage.

For these reasons, ASFPM strongly supports efforts by the Corps to complete the nationwide inventory of federal levees, including canal structures, and encourages Congress to specifically include in this inventory the thousands of miles of other levees built by other Federal agencies, states, towns, farmers, landowners, and other private interests. While some of these levees, canals, flood walls and storm surge barriers have been well-built and maintained, many others were not, or were not built to handle larger floods. To fully understand and manage the scope of the nation's exposure, Federal and nonfederal levees and canals need to be inventoried, including an estimate of their current actual level of protection, condition, and scope of development they are relied upon to protect, and the population at risk behind them. A comprehensive inventory of the locations and protective qualities of the nation's levees will enable Congress, states, and local governments to grasp the full scope of the nation's exposure. Only then can comprehensive, effective risk management programs be designed and actions prioritized to invest resources where they will address the areas of greatest risk or of greatest benefit to the community, state, or the nation's taxpayers.

3. Levees and the NFIP. Levees have been built to various heights to contain storms of various frequencies and magnitudes. Before the 1970s, the Corps of Engineers focused on building levees to

protect properties from the Standard Project Flood (SPF), the 500, or 200-year flood. However, communities began feeling pressure from developers and property owners to develop that land behind levees, so communities often sought to “remove” land from the mapped 100-year flood zone. That is because the presence of a 100-year levee, when accredited under the NFIP, removes the flood zone designation from the “protected” property, and thus eliminates the NFIP requirement to comply with construction standards, such as elevation of any new or substantially improved buildings in that area, and also removes the requirement for purchasing flood insurance. Increased development in these flood risk areas may provide a short-term economic benefit to the local community with potentially long-term adverse consequences to the community, and perhaps even more so to the nation’s taxpayers.

FEMA leaders emphasize that the 100-year standard used in the NFIP is only for flood insurance purposes, and was never designed or adopted to be a standard for public safety. However, many factors conspire to make this minimal, 100-year level of protection the most popular standard for new levees. These factors include the attractiveness of short-term relief from NFIP requirements, the ease with which the levee project can be “sold” to the public, and the externalization of catastrophic damage costs due to levee failure away from those who gained the benefits and onto the federal taxpayers. In other words, these 100 year levees became the “buy cheap” option the community chose. The false perception of a federally endorsed 100-year standard of protection combines with local and state desire to spend less money, preventing communities from fully exploring and selecting greater than 100-year levels of protection or from selecting other mitigation options that may have smaller long term costs, but less federal cost sharing up front. Moreover, even if communities recognize the need for greater protection – for areas of urbanization or where failure will have huge consequences—the economics may become a barrier. In short, the 100 year standard, which was never intended to be a public safety standard, has become a public safety standard. It is inadequate for this purpose.

By default, the design standard for levees is currently based on either (1) the 100-year standard of the NFIP, or (2) the level of protection justified using federal, development-oriented policy that attempts to maximize the levee project’s net national economic development (NED) return to the nation. While a larger levee may have a positive benefit/cost (B/C) ratio, the B/C may be higher for the 100 year than the 500 year, and the current Principle and Guidelines promote selecting the alternative that “maximizes” the B/C, which may not be the best long-term or sustainable solution. The NFIP and NED factors, along with cost-sharing requirements and the federal budget process, have resulted in “lowering the bar” for most levees in the nation to the 100-year standard, even in cases in which the consequences of the failure of a particular levee would be catastrophic. They also can result in ignoring the options of non-structural measures that could be used instead of a levee to avoid the catastrophic consequences in larger flood events. Ironically, based on current practice, the nation and citizens would fare better if a community built a “99-year levee,” because this would lead to the continuation of both mandatory flood insurance as well as continued floodplain management construction practices—which collectively would lower vulnerability and financial risk much more than would a 100-year levee by itself.

4. Residual risk. Risk is actually a two part equation, where “risk= probability x consequences”. While flood control structures may reduce the probability of flooding, at least for smaller floods, the consequences are dependent on the value of development behind or below a structure that will be damaged when a structure fails or overtops. As stated elsewhere in this testimony, there are many measures that communities and citizens can use to reduce flood risk, and using only a single measure too often leads to unsustainable communities.

A significant problem with the management of our flood control structures is that people by and large do not fully understand the nature of flood risk and the fact that it can never be fully eliminated. It is too easy to believe that a levee or other measure provides complete protection from flooding when, in reality, a large "residual" risk remains behind the levee and downstream of the dam.

5. Flood risk is increasing in residual risk areas. Flood risk increases when new homes and businesses are allowed to be built or redeveloped behind levees. This is especially problematic if it is an agricultural dam or levee that was designed just to lessen periodic flooding of crops. These structures were never meant to accommodate even the 100-year flood, and do not meet the higher level of protection that is appropriate for urbanizing areas. Moreover, legacy structures that may have been designed to withstand yesterday's 100-year flood have been rendered ineffective due to development in the watershed that increased runoff, or due to the more severe rainfall events associated with our changing climate.

6. Conflicting Purposes for Missouri River Flood Control Reservoirs. A number of large storage reservoirs were built on the Missouri that now are being asked to serve multiple purposes:

- (1) Flood Control
- (2) Navigation
- (3) Hydropower
- (4) Irrigation
- (5) Water Supply
- (6) Water Quality
- (7) Recreation, and
- (8) Fish & Wildlife, Including Endangered Species

Operating the system to meet all of these purposes cannot be done without conflict. Those interested in navigation and recreation want the reservoirs held high, whereas those wanting maximum flood control want the reservoirs low so there is more room to store floodwaters during heavy floods. Full flood control capacity of the Missouri main stem reservoir system was available at the start of the 2011 runoff season. Until rain events in May, there was no need to evacuate water at historic levels. However, heavy runoff occurred in the Missouri River Basin above Sioux City, Iowa during May and June 2011 due to rainfall, and a much later than usual and fast melt of the snowpack.

In order to protect the dams from overtopping and potential failure, the Corps had to open the gates (some for the first time in 50 years) and pass the flood flow downstream. This resulted in very heavy flows that caused flooding and in some cases, levee failure in those downstream communities. Such events likely will occur again, and the USACE will face difficulty trying to balance these many conflicting interests, so significant damages will again occur.

C. THE NEED FOR A NATIONAL FLOOD RISK MANAGEMENT POLICY AND FRAMEWORK

The conditions that led to the "Era of Unintended Consequences" just described have long been recognized by policy experts. In fact, leaders of both the Corps and FEMA acknowledged as early as the 1970s that the 100-year standard was inappropriate for structures in urbanized areas. In recent decades, numerous reports have called for a sharing of responsibilities and accountability among all levels of government, business, and private citizens; balance among the many competing uses and

functions of rivers, coasts, and floodplains; and for the national coordinated strategy for management of the nation's waterways and floodplains.

ASFPM recommends that a national flood risk management strategy is necessary, even urgently necessary. Such a strategy would include consideration of use of flood control infrastructure and use of state and local practices proven to effectively manage and reduce flood losses and associated environmental, social, and economic disruption. The challenges presented by increasing flood-related losses, by deteriorating flood control infrastructure and by lack of federal, state and local funds make it critically important to:

1. make more effective use of limited resources
2. remove the perverse effects of programmatic disincentives to risk reduction
3. develop meaningful incentives for state and local planning and decision-making that includes flood risk reduction
4. make far better use of the flood risk reduction tools available to all levels of government and individual property owners

As the nation grapples with challenges associated with flood control structures and associated flood risk, Congress must consider the full range of measures to reduce risk, including flood insurance, changes in land use, and the strategic relocation from areas of greatest risk. States and local governments must change long-held beliefs about their role and responsibility in addressing flood risk, and the long-term costs of local development decisions.

Flood risk management entails the evaluation of the broad range of actions to assess and reduce the risk of flooding, and to alter event probability, consequences, or both. For decades, levees have been extensively used to attempt to control floodwaters and to remove lands behind levees from the insurance and land use regulation requirements associated with the National Flood Insurance Program. People have built homes and businesses assuming that their property will never flood. Local officials and property owners generally are unaware of their residual risk. As levees and systems are assessed to determine levels of protection and condition, many communities learn that their levees are not designed for large flood events, do not protect to the level of moderate floods like the 100-year event, or will not perform as anticipated, and that additional actions are necessary to manage risk, including flood insurance and management of development in flood prone and residual risk areas.

Despite enormous past investment in flood "control" structures, that spending has been outpaced by development in risky areas and development in the watershed that increases runoff and flooding, and by the steady deterioration of those structures. As the public grows to recognize the risks associated with levees, communities are working to evaluate the various actions they can take in response to those risks: levees can be repaired and improved or set back from the river to relieve pressure and erosion on the levee; homes, businesses, and infrastructure at risk can be relocated to reduce risk and restore floodplain function; waters can be detained upstream; and measures can be combined to achieve the most effective results with scarce public dollars.

We are in an era of flood infrastructure "triage" – the process of prioritizing federal response to flood risk associated with levees and rationing scarce federal dollars on multiple-objective risk reduction projects that may include floodplain restoration, reconfiguration of structural systems, and combinations of approaches to make the best use of limited public resources. Response to increasing flood risk and flood control infrastructure challenges – and smart investment of limited public dollars – must entail evaluation of the full range of measures to reduce risk, including flood insurance, changes in

land use, and strategic relocation from areas of greatest risk. Such evaluation will require national policy and leadership in flood risk management, beyond the scope of a levee safety policy or program. As emphasized above, a complete inventory of all of the nation's levees – federal, nonfederal, and private – is the first step to conduct the levee triage that will be necessary so that everyone, including Congress, understands the scope of the crisis we face.

Incentivizing Effective State & Local Practices

Too many federal—and corresponding state and local—public policies and activities for water-related resources and hazards operate at cross purposes and even foster activities that undermine safety and environmental quality. Under current federal policies and programs, states and local governments have little incentive to steer development from flood-prone lands. On the contrary, they are able to benefit locally real estate taxes, and then externalize the consequences of poor local land use policies to the federal taxpayer through a burgeoning disaster relief program. Programs should be reformed to eliminate the incentives they unwittingly provide for making unwise decisions and taking inappropriate action with regard to our water resources. In their place, we must create positive incentives for appropriate action anywhere in the watershed, but especially in areas that are floodprone or otherwise ecologically sensitive.

To assure the success of a national flood risk management initiative, the federal government will need the participation and commitment of states, local governments, and the private sector. Communities and states will need to commit to robust and inclusive planning processes, reaching beyond their jurisdictional boundaries and traditional partners, many for the first time. They will also need to review and integrate existing plans for land use, hazard mitigation, infrastructure, and other responsibilities. Finally, important data will need to be acquired or generated, maintained, and used to populate the infrastructure databases, including location, level of protection, general information on the condition, and the number of structures in residual risk areas for all levees regardless of provenance, ownership, and responsibility for operations and maintenance.

Inclusion of a diverse menu of incentives can help motivate state and local governments in their efforts to plan and manage flood risk associated with flood control structures. Incentives can cost the federal taxpayers less than continuing to pay disaster relief for flood damages if the incentives encourage states and locals to manage development wisely to avoid creating tomorrow's disaster. Additionally, technical assistance programs such as the U.S. Army Corps of Engineers (USACE) programs for Planning Assistance to States (PL 93-251) and Floodplain Management Services (PL 86-645) support a partnership between all governments to achieve innovative management of flood risk along with other water resources challenges. Existing federal law in environmental and other policy areas provide useful examples of incentives beyond simple monetary inducements to reward states for robust programs. In addition to the data and planning contributions outlined above, incentives should be designed to encourage and reward States that meet and exceed minimum standards on a sliding scale; the more rigorous or innovative the program, the greater the rewards.

- 1. Development of a National Flood Risk Management Program, to address levee and dam safety among the broader range of risk management challenges and opportunities.** We cannot address levees and dams as an entity onto themselves without consideration of land use decisions and the full range of flood risk management tools. Additionally, effective state and local programs need to operate within a unified National Flood Risk Management Program that guides decision-making at all levels. If a program only addresses the levee or dam structure and not the responsibility of local

communities to control and guide the development in the associated residual risk areas, the ability to reduce risk is lost. Finally, a National Flood Risk Management Program should identify the federal interest in preventing and reducing catastrophic flood losses considering the full range of risk management options – not just the levees and dams:

- a. A national policy should be adopted to prevent federal participation in the construction of new levees and dams except to protect existing development where a full range of options, including all nonstructural options, have been considered and included in a multifaceted approach. This new national policy should be embodied in future Water Resources Development Acts, Principles & Standards, and other statements of broad national policy.
 - b. A complete inventory of all of the nation's levees and dams – federal, nonfederal, and private – is the first step to conduct the triage that will be necessary to understand the scope of the nation's exposure, and to ensure that limited public dollars are spent wisely.
 - c. Any national program to address levees, dams and embankments in the floodplain that modify flooding, and include them in the oversight and regulation applicable to the traditional definition of any of those structures.
 - d. Federal funds to support construction of new levees or dams in urbanized areas must provide protection for no less than the 500 year flood.
 - e. Eligibility for funds for levee work on pre-existing structures, including under the Flood Control and Coastal Emergency Act (P.L. 84-99, 33 U.S.C. 701n), must include requirement that levee structure provide no less than 100-year level of protection and do not push water on other property, thus adversely affecting others property rights.
 - f. All new levees, and considerations for rehabilitation of existing levees, should be set back for the waterway to allow natural systems to provide natural flood reduction benefits, relieve the erosion and hydraulic pressure on the levee, and allow the waterway's natural ecosystems and resources to function.
2. **Residual risk areas behind levees and below dams must be mapped and all properties therein insured for flood at full risk premiums.** Property owners in residual risk areas must be required to obtain risk-based flood insurance coverage to help manage economic loss of what for many of them is their only capital asset, assure equitable distribution of responsibility, incentivize maintenance & risk mitigation, and to help manage potential legal liabilities associated with levees and dams and their owners, program managers, and providers of engineering services.
- a. Affordability of flood insurance must not be an impediment for those who need coverage but cannot afford it. Property owners at risk who cannot afford insurance are those who most need it, as well as advice and support to help them undertake mitigation of their structure. Every resident has the right to be fully informed of their flood risk. Furthermore, family safety should not be a luxury available only to those who can afford it. For these reasons, Congress should investigate development of a means-based voucher, premium rebate, or similar system to provide interim relief for those who cannot truly afford to pay flood insurance premiums.

- b. A new, but temporary federal program to address flood insurance affordability should be managed through an agency that deals with income supplemental programs, such as the Department of Housing and Urban Development. The National Flood Insurance Program is not an appropriate vehicle for means-based programs. Moreover, measures such as premium subsidies, delaying insurance requirements, and other measures intended to reduce financial burdens serve only to distort risk perception and undermine the fiscal soundness and other aspects of the flood insurance program that promote individual responsibility.
 - c. In addition to measures to address affordability, the following innovations in insurance warrant exploration as stand-alone approaches or in combination, such as long-term group insurance behind levees that is attached to the property:
 - 1) Group flood insurance obtained by the districts who own levees and dams provided to property owners throughout the residual risk area through premiums combined with existing district fees. This measure is attracting attention as a benefit for everyone involved, since owners' liability is reduced, property owners' financial risk is managed, and everyone shares a common stake in the ongoing maintenance of that structure and other risk reduction measures that keep premiums down.
 - 2) Group flood insurance obtained by the community provided to property owners throughout the residual risk area through premiums that can provide coverage for all properties, not just those with federally backed mortgages, thus the community can recover when the levee or dam is overtopped or fails. The community is also the entity that has control over future development and redevelopment, and can use its development plan and mitigation plan to manage risk and reduce flood insurance premiums.
 - 3) Long-term flood insurance based on the length of any federally-backed loan, to reduce the rate of policy nonrenewal and provide continued financial security to citizens.
 - 4) Flood insurance attached to the property rather than to the insured, to ensure continuity of coverage even if property is transferred;
 - 5) Legislation requiring that all property insurance policies in the nation cover all natural hazards; and
 - 6) Privatization of flood insurance.
- 3. Minimum performance standards for communities to qualify for federal funding to construct new, rehabilitate or repair existing levees or dams, and develop infrastructure in residual risk areas.**
- Although land use planning is a local and state function, the federal government plays an important role in helping communities guide development through conditions on the availability of federal dollars and through policy and regulatory guidance. In addition to minimum standards, to qualify for federal funding to construct new levees, rehabilitate, or repair existing levees, and develop infrastructure in residual risk areas, communities must be required to:
- a. Participate in the National Flood Insurance Program;
 - b. Adopt a FEMA approved Hazard Mitigation Action Plan that includes emergency action and planning (EAP) for residual risk areas associated with all levees and residual risk areas in their jurisdiction, including post-flood recovery and resiliency;

- c. Prevent the construction of critical facilities (CFs) in areas subject to inundation in the 500 year floodplain, and that requires that all CFs be protected, accessible, and operable in the 500 year flood;
- d. Evaluate the full array of nonstructural measures to reduce risk, implement effective nonstructural measures in combination with any structural measures that are selected, and adopt standards to prevent any post-project increase of risk, prior to any commitment of public funds toward levee work;
- e. Demonstrate binding and guaranteed financial capacity and commitment to long-term operations and maintenance, rehabilitation, and management of all structures and system components in the community's jurisdiction;
- f. Adopt short- and long-range flood risk reduction planning as part of the community's mitigation, development and land use planning, including comprehensive planning and zoning that:
 - 1) Reflects and addresses flood hazards, levees, dams, and other relevant flood damage reduction structures, and articulates the community's objectives in managing flood risk;
 - 2) Incorporates and references data, including maps, that shows current conditions, trends, and likely future conditions, and addresses each hazard that may confront or impact the community in any material way;
 - 3) Identifies areas of highest risk in which new development and redevelopment are not permitted due to the hazard, and that if damaged in a future flood or other calamity, are appropriate for buyout of properties and floodplain restoration;
 - 4) Identifies existing properties that pre-date current zoning regulations or development codes, and that are appropriate for buyout when the property is next available for transfer;
 - 5) Identifies vulnerable structures, lifelines (such as water, sewer, power, critical roadways), and critical facilities (such as emergency operations centers, fire stations, hospitals, evacuation centers, water supply and hazardous materials storage areas); and
 - 6) Articulates property owner rights and responsibilities in flood risk and residual risk areas.
- g. Participate in regional/watershed planning to identify and manage risk that crosses jurisdictional boundaries;
- h. Notify levee and dam owners and provide opportunity to comment on all proposed development in that owner's residual risk area; and
- i. Communicate annually with property owners in residual risk areas to notify them of their risk, update them on emergency action plans, report on levee/dam operations and maintenance over the past year, and for other public notification and engagement activities.

D. RECOMMENDED NEXT STEPS TO ADDRESS THE PROBLEM IN ADVANCE OF THE NEXT BIG FLOOD

After each major flood in our nation's modern history, experts have gathered to consider the flooding problem and craft recommendations for the future. Unfortunately, we have "hit the snooze button" for public policy change in response to these wake-up calls, and have paid a high price in subsequent flood

disasters. We must make use of significant recommendations from those reports which remain valid today and better utilize the many resources and tools which remain untapped

The 1994 report, *Sharing the Challenge: Floodplain Management into the 21st Century*, known as the Galloway Report, authors made specific recommendations for changes to federal policies, programs, and activities to reduce flood risk associated with levees. The report emphasized that the existing “loose aggregation of federal, local, and individual levees ... does not ensure the desired reduction in the vulnerability of floodplain activities to damages.” The report’s recommendations from more than eighteen years ago reverberate over the years to remind us all that, for decades, leaders on these issues have made the same recommendations grounded in common sense measures. These include the following:

- To reduce the vulnerability to flood damages of those in the floodplain, the nation should:
 - Give full consideration to all possible alternatives for vulnerability reduction, including permanent evacuation of floodprone areas, flood warning, floodproofing of structures remaining in the floodplain, creation of additional natural and artificial storage, and adequately sized and maintained levees and other structures;
 - Adopt flood damage reduction guidelines based on a revised *Principles and Guidelines* that would give full weight to social, economic, and environmental values and assure that all vulnerability reduction alternatives are given equal consideration; and
 - Where appropriate, reduce the vulnerability of population centers and critical infrastructure to the standard project flood discharge through use of floodplain management activities and programs.
- Increase the state role in all floodplain management activities including, but not limited to, flood fighting, recovery, hazard mitigation, buyout, floodplain regulation, levee permitting, zoning, enforcement, and planning.
- To ensure the integrity of levee and the environmental and hydraulic efficiencies of the floodplain, states and tribes should ensure proper siting, construction, and maintenance of non-federal levees.
- Require actuarial-based flood insurance behind all levees that provide protection less than the standard project flood. A mandatory flood insurance purchase requirement behind such levees would provide a number of benefits to the public and to property owners:
 - Property owners would be insured against the real possibility that a levee will be overtopped or will fail,
 - Federal expenditures for disaster assistance would decline,
 - Property owners would be more fully aware of the residual risk in building or locating behind a levee, and
 - Communities would have an incentive to seek higher levels of protection.

Additionally, the Galloway Report makes the following specific recommendations regarding Corps programs and practices:

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- The Administration and Congress should reaffirm its support for the USACE criteria for compliance in O&M under the PL 84-99 levee repair program and send a clear message that future exceptions will not be made.
- The USACE should investigate procedures to minimize impacts associated with levee overtopping. Differing methods to lessen levee overtopping impacts should be investigated. A report should be prepared by USACE that details preferred engineering techniques to improve current levee structures, where appropriate.
- Federal and state officials should restrict support of flood fighting to those levees that have been approved for flood fighting by the USACE.

Sustainable flood risk management and flood control structures safety can best be achieved through sound, shared management at all levels and the private sector. To foster those sound approaches and discourage ineffective, costly approaches, the ASFPM recommends the following additional steps.

- ASFPM recommends that the report called for in Section 2032 of the 2007 Water Resources Development Act be funded and pursued with all haste. This report on the vulnerability of the United States to flooding will include an assessment the extent to which Federal programs either are reducing risk or may be adding to risk, and proposals to change Federal programs so they reduce risks to human life and property in different regions of the country.
- The PL 84-99 and FEMA Disaster Relief Programs often serve to shift the consequences of inadequate flood control structures or non-federal responsibilities associated with them from levee owners and communities to the federal taxpayers. We recommend that the PL 84-99 and the disaster relief programs be reviewed and aligned with the flood risk management, levee and dam safety, the NFIP and all federal programs impacting flood risk. As noted above, PL 84-99 for any levee-related damage should not be available for levees that provide less than 100-year protection, to any entity that is not in compliance with a national or state levee safety program, or to any community that does not participate in the NFIP.
- Federal investments in new levees should not be made for a structure that provides less than 500-year protection, and the Corps process maximizing the NED should explicitly incorporate this standard as a lower boundary for federal investment. In addition, Congress and the Administration should adopt a standard of 500+ year protection for levee design as the minimum standard for purposes of federal investment.² These requirements should be phased in for existing levees, which will need a significant phase in period.
- Before a levee is federally recognized as providing a certain level of protection (and this must include protection from future levels of flooding) and before a levee project is approved for construction, reconstruction, or repair, the local sponsor must clearly demonstrate the financial and administrative capability to provide for operation and maintenance for the life of the structure, which may be in perpetuity.

² Existing levees that provide less than 500-year protection but meet all requirements for design, maintenance, and operation, and are recognized by federal programs as meeting the standards for 100-year protection, could be granted grandfather status. Criteria should be developed to determine when and if protection provided by a specific levee would need to be upgraded and how that would be achieved.

- Federal funding should be allocated in ways that promote a more collaborative working relationship among states and communities that share waterways and watersheds. To prevent flood damage, for example, a larger federal cost share could be provided for those risk management projects that were developed collaboratively and that considered opportunities to avoid increasing flood levels in other communities/areas and also limit adverse impacts on a river or coast natural systems. . To hold down increases in flood levels and better protect water quality, some funding could be targeted to (1) encourage greater state and local investment in water quality planning that aims to reduce or better manage urban runoff; (2) encourage the implementation of protective land use strategies, such as acquisition and relocation of existing structures at high risk and preservation of floodplains as open space; and (3) promote collaborative flood risk, water quality, hazard mitigation plans and land use plans that take a regional focus on flooding, social or environmental impacts and involve all the relevant local jurisdictions within a watershed.
- Federal funding should be consistent with state and local hazard mitigation plans, growth management initiatives, and environmental needs. For example, consideration should be given to whether federal funds for transportation, water treatment, and other infrastructure are providing incentives to build in flood-prone areas. Beyond funding incentives, the federal government can also play an important role in encouraging sound practices. For example, the federal government could encourage and incentivize states and localities to reform outdated planning laws that hinder efforts to conduct comprehensive flood risk management and land use planning.

National Levee Program—The issues surrounding a levee safety program are many and they are complex. ASFPM suggest that Congress not attempt to lay out the entire future of a national levee safety program at this time. First of all, the report you received does not give you adequate information to do that, and until you see an inventory of all levees in the nation— the number of miles, their ownership, and their general condition—with some general estimate of the cost and time it will take to address the existing inventory of levees, it is not reasonable to craft a final solution. These factors will need to be cross matched with new standards for level of protection and design, construction, operation and maintenance of levees, and a vision of how the responsibility for flood risk associated with levees is to be shared among all levels of government, the private sector and especially those people, businesses, and communities “protected” by levees.

These latter elements need to be developed, and this could be one of the first tasks of a commission or whatever oversight group Congress might set up. The oversight group could explore and develop those components, determine the progress in each state toward a levee safety program, and expand and refine the incentives and disincentives the federal government could adopt that will foster this shared responsibility Those efforts can proceed concurrent with the inventory, so within a couple of years Congress would have the information and full picture, enabling you to then establish a more complete national levee program.

In the meantime, some first steps Congress could take at this time might include:

- Draft and enact a Levee Safety Act of 2012 to stand up the National Levee Commission or similar independent oversight body to develop data and craft next step recommendations to Congress.

- Task the new Commission with overseeing completion of the National Levee Inventory, including nonfederal levees, and reporting to Congress within a certain time on:
 - State capabilities and possible barriers to the creation of robust state levee safety programs throughout the nation.
 - Further exploration and recommendations for incentives for state and local flood risk and levee safety programs
 - Initiate development of national engineering standards for levee and their operation and maintenance

CONCLUSION

As each hurricane and riverine flood disaster raises awareness of the instability and insecurity of the current flooding predicament, the nation is waking up to find that we cannot afford to continue to live in a disaster relief environment. Past reports on flooding have provided important guidance on engineering, evacuation, and education. However, key opportunities remain untapped.

One of the cornerstones of an effective program for the nation must include a requirement for investigations into alternatives before structural measures are built or identified for rehabilitation or improvement. The lack of sustainable mitigation alternatives or incentives is a major deficiency of the current national approaches. Flood insurance and public education alone are not sufficient to mitigate fully the devastating effects of structural failure and inadequate floodplain management. Effective mitigation can take many forms, but the most sustainable and successful mitigation actions entail local and state initiatives to achieve the following:

- National flood risk management programs and policy should call for the gradual retreat away from rivers and coasts, provide for mitigation measures that foster acquisition of structures in high risk areas, provide for setback levees, and give rivers room to flood and so that floodplains can perform their natural flood reduction function and provide other benefits;³
- The Federal *Principles and Guidelines* should give full weight to social, economic, and environmental values and assure that all vulnerability reduction alternatives are given full and equal consideration;
- Water resources should be managed and planned for on a watershed basis, and Federal funding should be allocated in ways that promote a more collaborative working relationship among states and communities that share waterways and watersheds
- All flood risk areas, including residual risk areas must be mapped and those people and businesses in those areas made aware of their risk, as well as their responsibility and options for dealing with that risk.
- States and local governments that participate in federal structural flood reduction programs and access federal resources must be required to fully consider the broad range of nonstructural and hybrid nonstructural/structural solutions;
- Flood-prone areas should be restored and permanently preserved as open space, through land acquisition, buyout and relocation, and adoption of open space plans; and

³ The State of California is leading the way with this approach. The nation should follow its lead.

- State and local plans and activities for development and hazard mitigation should reflect all hazards and identify actions with multiple benefit;
- Critical facilities should be sited out of harm's way and also protected to and operational during the 500-year flood, using future development for calculating the 500 year flood.
- Levees should not be built or enlarged to protect undeveloped land, or for deep floodplains or high-risk storm surge areas due to the dire consequences when these levees fail or are overtopped;
- The Federal government should not invest in any new levees that provide less than PMF or 500+ year protection, and take climate change into account;
- No flood control structure should be cost shared with federal resources unless the non-federal partner has assured funding for long term operation and maintenance.

States and local governments that have committed to these measures fare best in floods, are more resilient and sustainable, and should be showcased as examples to follow. Moreover, these practices should be incentivized since they demonstrate the commitment needed to be worthy of trust to care for a significant federal investment. Those policies and practices that contribute to the ever-increasing risk of loss of life and property in floods should be identified and eliminated; not incentivized with continued outpourings of federal resources.

As Congress considers the floods of 2011 and the lessons learned from them, ASFPM stands ready to provide assistance in the continuing quest to reduce loss of life, flood damage and disasters. Today, we once again stand at a crossroads--- with an opportunity to work with you to craft a national flood risk management policy framework that will serve the nation for decades to come. Thank you for the opportunity to share the wisdom, experience and expertise of our members on these important issues.

For more information, please contact Larry Larson, ASFPM Executive Director, at (608) 274-0123, or via email at larry@floods.org.

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October 18, 2011
Follow-Up Questions for Written Submission

Questions for Larry Larson—Association of State Floodplain Managers

Senator Barbara Boxer

I. Your testimony highlights a number of recommendations for next steps to help with flood risk management.

A. What would you prioritize as the top three steps that need to be taken in the near term?

1. *Avoid further development in high flood risk areas and gradually retreat existing development back from high flood risk areas.*
2. *Require flood insurance in residual risk areas associated with flood control structures, such as levees and dams.*
3. *Remove federal incentives for development in high flood risk areas on our rivers and coasts. This includes tax write offs for disaster damages from natural hazards in high risk areas, repeated disaster relief in high hazard areas that have not performed mitigation, programs that incentivize development behind levees, such as PL 84-99 that provides federal taxpayer funds to rebuild levees that are damaged or fail during flood events, etc.*

B. Which of these steps will require Congressional action?

Steps 2 and 3 will require Congressional action; and Congressional appropriations are required for some buyout and relocation programs to support gradual retreat from high flood risk areas.

II. Your testimony discusses the need for a comprehensive levee inventory, including non-federal levees, that expands on the inventory the Corps is already completing for federal levees.

A. Who do you think is best suited to complete a full survey of all the non-federal levees?

A combination of Federal, State and local entities should complete the inventory. The USACE can be the keeper of a National Levee Database. FEMA and other federal agencies can contribute to it, as can States and Levee owners. Ultimately, some funding will be needed for someone to complete the inventory, whether the USACE, or States. The USACE should also identify levees that have requested repeated P.L. 84-99 funding histories and add the information as a layer in National Levee Database.

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B. How can this effort best be coordinated with the work the Corps has already undertaken related to Federal levees?

Should not be a problem. The USACE and FEMA are already working together on it, and the Corps has invited other entities to input whatever levee data they have. Some state and local hazard mitigation plans (required under the Disaster Mitigation Act of 2000) include levee information. Requiring appropriate levee and dam data in these plans could assist both FEMA and the Corps in collecting data for the levee inventory.

III. The National Committee on Levee Safety released its draft report in 2009, but the final report has not been forwarded to Congress yet.

A. What are the most important items in the report that you think need to be authorized by Congress in the near term to begin development of a national levee safety program?

1. Congress should name and design the program to be "Levee Risk Management", not "levee safety". The latter implies that a well built and maintained levee makes everything safe, which is not the case. If the land use and development associated with lands behind the levee are not controlled, the consequences/risk go up. Levee risk management addresses all those issues, not just the levee, thus reducing future disasters.

2. A process to complete the levee inventory so we know the scope of issue

3. Flood insurance must be required in levee residual areas.

4. Establishing State programs for levee risk management, and building that capability.

5. A Federal oversight body that is not one-agency specific, even if it is housed in one federal agency—decisions must be made jointly. The work of the body must be informed by experts beyond engineering; those who know and understand future flood risk management, land use and development, and environmental management approaches that can reduce future risk. Most flood risk is created by land use and development decisions that increase the consequences when the levee overtops or fails. Engineering addresses the probability of flooding, but does nothing to reduce consequences.

6. Requirements that a process be developed to determine which levees have a federal interest, and would thus be eligible for federally backed loans or technical assistance. Due to fiscal constraints, not all levees can be "fixed" to comply with adequate standards, so choices will have to be made.

7. Standards for urban levees must be established and should require a minimum level of protection of 500-year or standard project flood in order to qualify for any federal assistance or programs.

8. No federal funds or grants for any purpose should be provided in residual risk areas behind levees unless the state and community of jurisdiction provides assurance that the consequences behind the levee will not increase.

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Questions for Larry Larson—Association of State Floodplain Managers

Senator James Inhofe

I. In your opinion, were the mechanisms and procedures that Corps had in place to communicate with local and state governments and other stakeholders during the flood events adequate?

A. If not, please explain and include any recommendations for improvement.

Overall, the Corps did communicate fairly well during the event. Would suggest the Corps ensures it sends yearly reminders to all property owners in floodways and bypasses reminding property owners their land has flowage easements (e.g. Birds Point, etc.)

II. With limited time before the next potential flood event, what actions would you recommend the Corps and Congress take in order to prepare? Please also include any recommendations that are better suited for the long term.

A. How would you prioritize these recommendations?

1. *The Corps has a triage system for levee repair to set priorities—good system. But there are too many levees currently eligible to be in the PL 84-99 system, which then allows federal taxpayer funds will be used to repair them after a flood. To be consistent with other federal programs and standards, it is reasonable to only allow levees providing 100- year protection into the PL 84-99 program. Small levees with as little as 5 year protection are now eligible for federal funding, yet they get repeatedly damaged or destroyed and have limited federal interest at best.*
2. *Acknowledging that it is quite likely several levees and/or systems will not be repaired for the next flood season, there should be a significant campaign focusing on the need to obtain flood insurance, even if one's structure is behind one of these levees not damaged this year.*

B. How can we maximize the use of federal funds?

Cost sharing that rewards those who properly maintained their levee. Determine if there is really a federal interest in a levee before spending federal funds on repair. There is simply not enough federal taxpayer funding to upgrade all inadequate levees in the nation. Upgrading them is largely a community choice; if the community decides it is their best long term option for flood mitigation.

III. What actions are needed to lessen the likelihood and limit the damages of another flood of this magnitude in the future?

1. *New levees should never be built to protect undeveloped land. While that is supposedly a USACE policy now, it can be overturned by the NED alternative (Natomas)*
2. *Avoid further development in high flood risk areas and gradually retreat existing development back from high flood risk areas*
3. *Require flood insurance in residual risk areas associated with flood control structures, such as levees and dams.*
4. *Remove federal incentives for development in high flood risk areas on our rivers and coasts. This includes tax write offs for disaster damages from natural hazards in high risk areas, repeated disaster relief in high hazard areas that have not performed mitigation, programs that incentivize development behind levees, such as PL 84-99 that provides federal taxpayer funds to rebuild levees that are damaged or fail during flood events, etc*

Senator CARDIN. Thank you, Mr. Larson.
Mr. Mattelin.

**STATEMENT OF BUZZ MATTELIN, PRESIDENT, LOWER MISSOURI COORDINATED RESOURCE MANAGEMENT COUNCIL;
PRESIDENT, MONTANA ASSOCIATION OF CONSERVATION DISTRICTS**

Mr. MATTELIN. Chairman Cardin, members of the Committee, thank you for this opportunity.

I am a third-generation Montana farmer. I grow high quality durham wheat and malting barley and sugar beets on the Missouri River bottoms in northeast Montana. My family, for 97 years, has been living and working along the river, 80 miles downstream of Fort Peck, the first dam on the Missouri River system.

In addition to running the farm business, I also represent irrigation interests on the Missouri River Recovery Implementation Committee, known as MRRIC.

This was a difficult summer, dealing with the flood and watching floodwaters drown my crops. My heart goes out to all those who have suffered flood damages, especially those who had damages to their homes.

Conditions responsible for the 2011 Missouri River flooding began in the fall of 2010. Fall rains resulted in wet soils prior to freeze-up. Frozen soil doesn't allow moisture from melting snow to enter the soil and the water runs off. Record Plains snowfall, 300 percent of normal in my area, melted and ran off, filling every prairie pothole, wetland in over half of Fort Peck's annual flood control zone.

When the record rain came in May, it fell on saturated soils and it all ran off. The mountain snow pack had continued to grow and reached 141 percent of average. The combination of these conditions resulted in the record flooding of 2011.

What could have improved flood response? Earlier recognition of the flood could have improved response. I don't blame the Corps. As a farmer who has watched a hailstorm wipe out a year's work and income, I understand what it is like to be at the mercy of nature. The Corps could not have foreseen the record rainfall. It is easy to judge with the benefit of hindsight. It is easy to work backward when you know the runoff totals. It is much harder when nature keeps throwing more water your way.

The Missouri River master manual states the sooner a significant flood event can be recognized and appropriate pre-releases of flow scheduled, an improvement in overall flood control can be achieved. Earlier recognition may have allowed some management flexibility or decreased the maximum releases. Average runoff above Sioux City, Iowa is 24.8 million acre feet. By September, it ended up 61 million acre feet.

Operational flood tunnels at Fort Peck would have increased the safety during the flood. The two flood tunnels at Fort Peck were not available for use because of severe vibration at the gates. At some of the other dams, the spillway was shut down for inspection and repair. This wasn't an option at Fort Peck. Authority has been requested for replacement, but not approved.

What worked well? The mainstream dams and structures performed as designed and the Corps operated the system in accordance with the master manual and existing laws. The system afforded downstream residents time to prepare, plan and remove possessions from harm's way and the system lessened the severity of the flood.

The National Weather Service river forecast was extremely helpful. This forecast predicts river stages at gauging stations 5 days forward.

How about a way forward? Let's not overreact with abrupt changes to the master manual. It doesn't make good sense to manage the system for an event that occurs once in 500 years. The master manual is the foundation for long-term decisions and investments, both private and public. With the well-vetted revision completed in 2003, the master manual has provided 50 years of stability in a contentious basin. The master manual provides an equitable path to management of the system for flood control, hydro-power, navigation, water supply, irrigation and recreation and wildlife.

I can think of at least two ways to improve flood control in the Basin. First is to provide more space in the reservoirs, but less stored water is at a detriment to other authorized purposes. My choice, and the second, is to improve recognition of significant events. The annual operating plan begins each new year at normal or average starting point. We rarely, if ever, have an average year.

The Corps does a good job of incorporating mountain snow pack, Plains snow pack and short-term precipitation and AOP, but fails to use variables like soil moisture and climatic trends. Soil moisture data is readily available in weekly crop reports. We should also look at El Nino and La Nina events. When you overlay past La Nina events with high runoff years in the Basin, there are definite correlations during the high runoff years in the 1970's, 1990's and this year. Pacific Decadal Oscillation, or PDO, is another ocean temperature phenomenon that shows promise as a predictor of precipitation in the Northern Plains.

We also need to ensure adequate funding for USGS stream gauges. As Federal budgets have tightened, the share that non-Federal partners pay has increased. The USGS gauges are a critical link in flood control and can't be dependent on soft sources of funding.

I will close with something that a farmer friend said to me as he was dealing with the flood. Without any bitterness, he said, "The river has been good to me for many years, but this year belongs to the river."

[The prepared statement of Mr. Mattelin follows:]

TESTIMONY of Buzz Mattelin

Montana Farmer

Before the U.S. Senate Committee on Environment and Public Works

Good morning/afternoon Chairman Boxer, ranking member, Inhofe and other members of the committee. Thank you for the opportunity to share with you my perspective of the Missouri River flood of 2011.

I'm a third generation Montana farmer. I grow high quality, durum wheat and malting barley in rotation with sugar beets, on the Missouri River bottoms in Northeast Montana. For 97 years my family has been living and working along the River, 80 miles downstream of Fort Peck Dam, the first dam of the Missouri River System. In order to achieve this sustainability we've learned to live in harmony with our environment which is harsh and extremely variable. In addition to running the farm business I'm a director of the Montana Wheat and Barley Committee. I also represent irrigation interests on the Missouri River Implementation Committee known as MRRIC.

I had firsthand experience this summer dealing with the flood and watching flood waters drowned my crops. My heart goes out to all of those in the Country that have suffered flood damages especially those who had damages to their homes.

I'm here today to share my view of the conditions that produced the 2011 flood, what could have improved flood response, what worked well in responding to the flood, and some ideas about a way forward.

The flood of 2011 began in the fall of 2010 when ample rain fell across the northern plains. When wet soil freezes, it forms an impermeable layer resulting in maximum runoff from any accumulated snowfall. Much of Montana's plains east of the continental divide had record snowfall. Glasgow National Weather Service, which is near Fort Peck, recorded ten feet of snow or roughly 300% more than normal. As the plains' snow melted Montanans experienced their first flooding. By the end of April the snow had melted leaving saturated soils and filling over half of Fort Peck's annual flood and multiple use storage zone. The spring rain began falling on my farm on May 9 with nearly three inches accumulating by May 11. The soil became so saturated that the normally dry creek that runs through my farm would flow with runoff from only a small shower.

The first big rains came to tributaries of the Yellowstone River which joins the Missouri just across Montana's border with North Dakota. Crow Agency on the Little Big Horn River received 10 inches of rain on May 22 beginning a fateful week for the Missouri River Basin. Record rain continued all week with severe flooding in Billings, Joliet, Lavina, and Ryegate. The rains also fell in the Missouri drainage above Fort Peck with record flooding at Roundup on the Musselshell River and Lewistown on Big Spring Creek and on the Milk River at Glasgow.

By the end of week the situation had worsened. Faced with even higher river flows and a looming mountain snowpack which had reached 141% of normal, projected releases were increased to 150,000 C.F.S. from Garrison and 50,000 C.F.S. from Fort Peck. Fort Peck releases later peaked on June 15 at 65,900 C.F.S. the previous record was 35,000 C.F.S. in 1975. The pool elevation reached 2252.3 on June 16, 2.3 feet above the top of the spillway gates. As we experienced record releases from Fort Peck we also had four to six inches of rain fall in the watersheds that join the River below the dam. The gauging station at Culbertson about 100 miles below Fort Peck exceeded 100,000 C.F.S. in mid June. The National Weather Service lists the probability of exceeding 91,000 C.F.S. at Culbertson as .2%. This reach of the River below Fort Peck has no levees and very little bank stabilization. The high flows resulted in overtopping of high banks and high rates of bank erosion. The damages on my reach of the River look similar to the damages from the levee breaches I saw in Iowa.

I believe the combination of saturated soils prior to freeze up, record plains snowfall, saturated spring soils, record rainfall, above normal mountain snowpack resulted in epic flooding.

What could have improved flood response?

Earlier recognition of the flood. I don't blame the Corps. As a farmer who has watched a hail storm wipe out a years' work and income, I understand what it is like to be at the mercy of nature. The Corps could not have foreseen the record rainfall. It is easy to judge with the benefit of hindsight, but it is easy to work backwards when you know the runoff totals. It is much harder when nature keeps throwing more water your way. The Missouri River master manual states: "The sooner a significant flood event can be recognized and appropriate prereleases of flow scheduled, an improvement in overall flood control can be achieved." Forecasted runoff on April 1 was 33.8 M.A.F., May 1, 44 M.A.F., and mid September, 61 M.A.F. Earlier recognition may have allowed some management flexibility or slightly decreased the maximum releases.

Operational flood tunnels at Fort Peck would have increased the safety during the flood. The two flood tunnels at Fort Peck were not available for use at levels above 5000 C.F.S. due to severe vibration of the gates. Authority has been requested for replacement of the gates, but not approved. At many of the dams spillways were closed for inspection and repair and water was diverted through the flood tunnels, Fort Peck didn't have this option creating a dangerous situation.

Accurate inundation maps would have helped people deal with the flood. Inundation maps for my area were inadequate or non-existent. The only tool we had was county 100 year flood plain maps, which were not accurate.

What part of the flood response worked well?

The mainstem dams and structures performed as designed and the Corps operated the system in accordance with the Master Manual and existing laws. The System afforded downstream residents time to prepare, plan, and remove possessions from harm's way. And the System lessened the severity of the flood.

The Corps established a Joint Information Center and created a daily Riverwatch to ensure timely and coordinated release of accurate information to the public. Accurate information effectively dealt with the misinformation and rumors that run rampant during a crisis.

The National Weather Service River Forecast was extremely helpful. This forecast predicts river stages at gauging stations five days forward.

A way forward

We should not overreact with abrupt changes to the Master Manual. It just doesn't make good sense to manage the system for an event that occurs once in 500 years. The Master Manual is the foundation for long term decisions and investments, both private and public. With the well vetted revision completed in 2003, the Master Manual has provided 50 years of stability in a contentious Basin. The Master Manual provides an equitable path to balance management of the system for flood control, hydropower, navigation, water supply, irrigation, recreation, and wildlife.

I can think of at least two ways to improve flood control in the Basin. First is to provide more space in the reservoirs for flood water. But less stored water would be to the detriment of most of the other authorized purposes that benefit both the upper and lower Basin.

The second and my choice, is to improve recognition of significant events. Whether they are floods or droughts. The Corps' Annual Operating Plan (AOP) begins each new runoff year at a normal or average starting point when we rarely if ever have an average year. The Corps does a good job of incorporating mountain snowpack, plains snowpack, and short term precipitation into the AOP but falls short in using variables like soil moisture and climatic trends. Soil moisture data is readily available in weekly crop reports that rank soil moisture as short, adequate, or surplus. We should also look at El Nino and La Nina events. When you overlay past La Nina events with high runoff years in the Basin, there are definite correlations during the high runoff years in the 70', 90's and this year. Pacific Decadal Oscillation or PDO is another ocean temperature phenomenon that show promise as a predictor of precipitation on the Northern Plains. Incorporation of these types of variables into the AOP could significantly improve flood control.

We need to ensure adequate funding for USGS stream gauges. As federal budgets have tightened the share that non federal partners pay has increased. The USGS gauges are a critical link in flood control and can't be dependent on soft sources of funding.

Several forums are emerging to deal with the things I've mentioned and other 2011 flooding issues. I don't know which forum will be most successful, but my bias is toward a forum that provides the highest degree of collaboration and the most basic level of input.

I would like to close with something that a farmer friend said to me as he was dealing with the effects of the flood. Without any bitterness he said "The River has been good to me for many years, but this year belongs to the River".

**Environment and Public Works Committee Hearing
October 18, 2011
Follow-Up Questions for Written Submission**

Questions for Mattelin

Senator James Inhofe

1. In your opinion, were the mechanisms and procedures that Corps had in place to communicate with local and state governments and other stakeholders during the flood events adequate?

Yes, as I mentioned in my testimony, "The Daily Riverwatch" via internet and social media and the daily teleconference briefing gave accurate timely information for the residents of the Missouri River basin.

2. With limited time before the next potential flood event, what actions would you recommend the Corps and Congress take in order to prepare? Please also include any recommendations that are better suited for the long term.

- (a) How would you prioritize these recommendations?

- (b) How can we maximize the use of federal funds?

First, I would recommend that repairs to any flood control structures, at the six mainstem dams, that sustained damage during 2011 flooding be the highest priority. Failure of these structures pose the greatest threat to human life. As I mentioned in my testimony the gates that control the flood tunnels at Fort Peck are not fully operational, we dodged a bullet this year but they should be fixed in the long term.

Given the heightened state of alert, if an abnormally high run off scenario develops ,it will be quickly recognized and appropriate releases scheduled. I would encourage and facilitate this effort.

Next I would repair structures that protect private property, beginning with those with the highest population density. The emergency conservation program (ECP) administered by USDA's FSA seems to be the best tool for rural private landowners to deal with flood damages, This program is seriously underfunded compared to the need.

Finally I would repair damages to erosion control structures and channel infrastructure.

The people of the Basin are hurting. I think that temporarily moving some of the funding for wildlife recovery to pay for repair of essential flood control structures would send a strong positive signal that the government cares about the people of the Basin. This would help to maximize the use of federal funding.

Thanks for the questions and the opportunity to respond.

Buzz Mattelin

Senator CARDIN. Thank you, Mr. Mattelin.
Mr. McGean.

**STATEMENT OF TERENCE J. McGEAN, P.E., CITY ENGINEER,
OCEAN CITY, MARYLAND**

Mr. MCGEAN. Thank you.

The Town of Ocean City is located about a 3-hour drive east of here, on a barrier island on the Atlantic coast of Maryland. Although the census lists Ocean City's population as only about 7,000, we host over 8 million visitors each year, and on an average summer weekend, our population swells to 300,000 people. This makes Ocean City the second largest city in Maryland in the summer time.

Ocean City is 10 miles long, and encompasses a total area of just three and a half square miles. Within that small area, we have 28,000 living units valued at over \$10 billion. As a barrier island community, our greatest risk is ocean flooding from tropical and extra-tropical storm events.

In 1985, Tropical Storm Gloria passed just offshore of Ocean City. The storm destroyed the Ocean City boardwalk and damaged or undermined the foundations of numerous buildings. With virtually no beach or dune system after Gloria, Ocean City was at a crossroads. It was right around this time that beach replenishment became recognized shore protection strategy and the Miami Beach project was completed and proving to be very successful.

Studies showed that if a beach platform itself could be stabilized, then a positive cost benefit ratio for Federal participation in a shore protection project could occur. To that end, the local and State governments completed what became known as Phase One of the beach replenishment project. Using 100 percent local funds, the Ocean City Beach was widened to create a suitable foundation for a Federal project.

In 1990, the Federal project, formally known as the Atlantic Coast of Maryland Shoreline Protection Project, began construction. The project built 8.3 miles of new sand dune, a one and a half mile seawall protecting the boardwalk, and a storm berm along the entire oceanfront. The project cost \$48 million and was cost shared between Federal and local governments.

The project was nearly complete in 1991, when a series of northeast storms, including the infamous Perfect Storm that in previous years would have several damaged Ocean City, struck. Ocean City suffered no damage except for some lost sand. And while adjacent beach town businesses had to close, we were open for business and didn't miss a beat.

The success of the project continues to this day. Total damages prevented are now \$330 million. Total project costs, including phase one of 100 percent local money, initial construction of the Federal project, and periodic replenishments total just over \$100 million with the Federal share at just over \$50 million.

Although the prevented damages numbers are impressive, they don't tell the whole story. Prior to beach replenishment, the assessable base of Ocean City was \$3 billion, and we contributed \$35 million in annual Federal tax revenue. Today the assessable base is

over \$10 billion and over \$75 million in Federal tax revenue comes from the city annually.

On Saturday, August 28th, Ocean City was literally in the eye of the hurricane. You can see us there and you can see Hurricane Irene. The storm came in our busy summer season, and expecting the worst, we successfully evacuated the town. When the sun came up Sunday morning, I sent out our damage assessment teams. But instead of toppled buildings and destroyed infrastructure, we found loose siding and a pothole in the city parking lot. By noon on Sunday, our business was open. Visitors were streaming back into town. And we had one of the busiest Labor Day weekends we have had in years.

In some ways we got lucky. The storm passed quickly and came through at low tide. But I would call your attention to this photograph taken in Ocean City 25 years ago just after Gloria, a storm very similar to Irene. Now imagine we never had beach replenishment. We would start from this point and have 25 years of erosion at two feet a year, plus additional damage from nor'easters and hurricanes. That would have been the condition of Ocean City, or what was left of us, as Irene struck.

Now look at Ocean City today. This photo shows the exact same area of the beach taken last week. These projects work. Irene served as a reminder that the damages from a hurricane are not limited to the coast. In Ocean City, Irene demonstrated that by recognizing the risks associated with strong storms, then adopting strict building codes and investing in effective flood protection measures like beach replenishment, the impact from these storms can be significantly reduced.

Thank you very much.

[The prepared statement of Mr. McGean follows:]

Full Testimony of Terence J. McGean, PE City Engineer, Ocean City Maryland to Senate Committee on Environment and Public Works, hearing "A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems"

Good morning, my name is Terence McGean and I have been the City Engineer for Ocean City, Maryland for just over 20 years. I have a degree in Civil Engineer from Texas A&M University and am a Maryland Registered Professional Engineer. The Town of Ocean City is located about a 3 hour drive East of Washington DC on a barrier island on the Atlantic Coast of Maryland. Although the census lists Ocean City's population as only 7,102, we host over 8 million visitors each year and on an average summer weekend our population swells to an estimated 300,000 people. This makes Ocean City the second largest city in Maryland in the summertime. The primary reason for the Town's popularity is the wide, clean, and free public beach that runs along our entire coastline.

Ocean City is roughly 10 miles long and encompasses a total area of just 3.5 square miles. Within that small area we have 28,000 living units valued at over \$10 billion dollars. As a barrier island community, our greatest risk is flooding damages from tropical and extratropical storm events. Mother nature's natural storm protection for barrier islands are the systems of beaches and dunes that absorb wave energy and protect the mainland. Since Ocean City's founding in 1875, numerous methods of shore protection measures were installed to protect the resort from storm damage. These included wood and metal seawalls, wood groins, stone groins, and other types of hardened shorelines and engineered structures. None of these projects were very successful. As our beach continued to naturally erode, storm damages became more frequent and costly.

In 1962 Ocean City experienced a devastating Nor'Easter that caused somewhere between \$10-\$20 million dollars in damage (1962 dollars). That storm was the catalyst for a number of efforts to better protect the City. In 1972 the City adopted a building limit line that firmly restricted development along

the Ocean Front. That restriction has since been adopted into State law. The City also began working with the Corps of Engineers to develop a comprehensive shoreline protection system for the Town.

The best technology available at the time recommended the construction of a series of hundreds of stone groins all along the island. In a partnership with the State of Maryland, three of these groins were installed between 1981 and 1983 at a cost over \$1.5 million dollars. While these groins were moderately effective at slowing beach erosion in their immediate vicinity, they provided no immediate storm protection and the cost to fully implement the project was simply unaffordable.

In 1985 Tropical Storm Gloria passed just offshore of Ocean City. The storm destroyed the Ocean City boardwalk, and damaged or undermined the foundations of numerous buildings. With virtually no beach or dune system left after Gloria, Ocean City was at crossroads. It was right around this time that Beach Replenishment was becoming a recognized shore protection strategy and the Miami Beach Project was completed and proving to be very successful. Ocean City, Worcester County, and The State of Maryland entered into a partnership with the US Army Corps of Engineers to study the feasibility of Beach Replenishment in Ocean City. Studies showed that if the beach platform itself could be stabilized, then a positive cost benefit ratio for Federal participation in a shore protection project for Ocean City would occur. To that end the local and State Governments completed what became known as Phase 1 of the Beach Replenishment Project. Using 100 percent local funds, the Ocean City beach was widened in 1988 to create a suitable "foundation" for the Federal Project.

In 1990, the Federal project, formally known as the Atlantic Coast of Maryland Shoreline Protection Project, began construction. The project consisted of construction of 8.3 miles of new sand dune, a 1.5 mile seawall protecting the boardwalk, and a sand "storm berm" along the entire ocean front to protect both structures. The project cost \$47.7 million and was cost shared between the Federal and local governments. The project nearly completed in 1991 just prior to a series of Northeast storms including

the infamous "Perfect Storm" that in previous years would have caused extensive damage in the Town. Instead, Ocean City suffered no damages except some lost sand and while adjacent beach communities businesses closed for repairs, Ocean City never missed a beat.

The success of the Beach Replenishment project and the partnership between the Corps of Engineers and the local governments involved continues to this very day. Since the completion of the project there have been no structural damages from ocean flooding. More importantly, there have been no injuries or deaths from storms. Total damages prevented are now estimated at over \$330 million. The total project costs including the locally paid for Phase 1 project, initial construction of the Federal Project, scheduled replenishments in 1998, 2002, 2006 & 2010 along with storm repairs total just over \$100 million with the Federal share at just over \$50 million.

Although the prevented damages numbers are impressive, they don't tell the whole story. The protection provided by the project and the stability of having a long term Federal commitment has allowed Ocean City to grow as a year round travel destination. In the year prior to the completion of Phase 1 of the Beach replenishment project, the assessable base of Ocean City was \$3 billion dollars and the Town economy generated \$35 million in Federal tax revenue. Today the assessable base is over \$10 billion dollars and over \$75 million in Federal tax revenue comes from the City annually. In other words, for an annual Federal investment for shore protection in Ocean City of less than \$2.5 million dollars, you preserve over \$75 million in annual Federal revenue.

On Saturday August 28, 2011 Ocean City was literally in the eye of the hurricane. The storm event that we had been warned would wipe out Ocean City had arrived. Irene brought 60 mph winds, and 20 foot seas. The storm came during our busy summer season and expecting the worst, we successfully evacuated the Town. When the sun came up Sunday morning I sent out our damage assessment teams. Instead of toppled buildings and destroyed infrastructure, we found some loose siding and a pothole in

a city parking lot. By noon on Sunday our businesses were open and visitors were streaming back into Town leading to one of the busiest Labor Day weekends we have had in years.

In some ways we got very lucky, the storm passed quickly and came through at low tide. But I call your attention to this photograph taken in Ocean City just after Gloria, a storm very similar to Irene. Now imagine we never had beach replenishment. Imagine 25 years of normal beach erosion at 2' per year plus the additional damage that would have been caused by the Nor'Easters in 1991, 1992, 1998 and 2009. That would have been the condition of Ocean City (or what was left of it) as Irene struck. Now look at Ocean City today. This photo shows the exact same area of the beach taken last week.

Hurricane Irene is not the first natural disaster to hit Ocean City and it will certainly not be the last (in fact a week before the hurricane we had the earthquake and two weeks after we had a tornado). Irene served as a reminder that the damages from a hurricane are not limited to the coast. In Ocean City, Irene demonstrated that by recognizing the risks associated with strong storms, then adopting strict buildings codes and investing in effective flood protection measures like the beach replenishment project, the impact from these severe storms can be significantly reduced..

Thanks to Beach Replenishment and the continued commitment of the Army Corps of Engineers to the project, Ocean City was well prepared for Hurricane Irene. On Friday, while everyone else was heading West out of Town, the Corps survey crew was in Ocean City to document the condition of the beach. After the storm on Sunday, when we started letting property owners back in town, one of the first people I ran into was not a resident wondering about the condition of their building, it was Jim Jones with the Corps coming to see how the beach had held up. Happily, all Irene had done was move some sand around a little. No repairs were needed and today the project stands fully ready for the next storm.



TOWN OF
OCEAN CITY
The White Marlin Capital of the World

December 16, 2011

RE: October 18 Senate EPW Testimony follow up.

Senate Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510
Atten: Jonathan Aronchick

Dear Mr. Aronchick:

Thank you for the opportunity to testify at the October 18th, 2011 Senate Hearing "A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems." In response to the questions from Senators Cardin and Inhofe I offer the following:

Questions from Senator Cardin:

1 (a) *What costs has Ocean City incurred in the construction of the project over it's 20 year history?*

A. The initial construction costs of the project were cost shared 65% by the Federal Government and 35% by the local sponsor, periodic replenishment costs are shared 53% by the Federal Government and 47% by the local sponsor. The State of Maryland is the official local sponsor of the project, under separate agreements with the State of Maryland all local sponsor costs are shared 50% by the State of Maryland, 25% by Worcester County and 25% by Ocean City. The total local sponsor costs for the project to date, including Phase 1 (no Federal Participation), Phase 2 (Initial construction Federal Project), periodic replenishments, maintenance, and monitoring is \$50,768,000 of which the City has spent \$12,269,000. A full breakdown of all costs is attached.

1(b) *How many lives have been lost during storms at Ocean City since the projects inception?*

A. Thankfully, not a single life has been lost due to storms since the project's inception.

1(c) *What is the estimated value of the damages avoided by the project?*

A. The Army Corps of Engineers estimates that \$331 million dollars (2006 dollars) in damages have been avoided by the project.

MAYOR & CITY COUNCIL
P.O. BOX 158
OCEAN CITY,
MARYLAND 21843-0158

www.oceancitymd.gov

MAYOR
RICHARD W. MBEHAN

CITY COUNCIL MEMBERS

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President

LLOYD MARTIN
Secretary

BRENT ASHLEY
DOUGLAS S. CYMEK
JOSEPH T. HALL, II
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MARGARET PILLAS

DENNIS W. DARR
City Manager

KATHLEEN A.P. MATTHIAS
City Clerk

Ocean City, MD



2001

1(d) *As you note in your testimony, Ocean City swells to the second largest Maryland city in terms of population every summer. The tourism trade is of incredible importance to the City and the State. What have been the federal excise tax receipts in the City in recent years. Is that directly related to the effectiveness of the Corps project? What would happen to those tax receipts if the project were not maintained.*

A. Ocean City does not have sufficient data to estimate all Federal Excise tax receipts, however we are able to estimate communications excise tax receipts and Federal Income taxes paid by residents and businesses in Ocean City. In FY 2011, \$38 million in direct federal income tax, \$805,000 in direct federal fuel tax, \$565,000 in direct federal communications excise taxes and an additional estimated \$36 million in indirect federal taxes for a total of over \$75 million in estimated federal revenues were generated by Ocean City. Ocean City is a beach resort destination. Tourism related industry is the only industry within the City Limits and the vast majority of visitors come for our beach. Without the Corps project, there would be little to no beach left and therefore it is reasonable to assume that most of the economic activity associated with the beach would also disappear.

If the project were not maintained, revenues would fall as the beach eroded. In 1989, the last year prior to the federal project, federal tax revenues from Ocean City were \$34 million (\$59 million in current dollars). Therefore, one would expect that federal tax revenues would drop by \$16 million after 4 years and continue to fall.

1(e) *Given the performance of the project, would you say that it has been a good use of federal funds?*

A. To date, the federal government has invested a total \$50 million dollars in the Ocean City Beach project. The project has prevented \$331 million in flood damage to properties and in 2010 alone, Ocean City generated \$75 million in federal tax revenue. There have been no structural damages or loss of life from ocean storms since the project was completed. By all definitions, I would certainly say that the project is a success and a good use of federal funds.

Questions from Senator Inhofe

1. *In your opinion, were the mechanisms and procedures that the Corps has in place to communicate with local and state governments and other stakeholders during the flood events adequate?*

A. Yes, representatives from the Corps Baltimore District were in constant contact with me before, during, and after the event. The Corps sent a survey team to document the condition of the project just prior to the storm. The Corps had a representative on site immediately after Ocean City lifted the evacuation order Sunday morning and the District Commander, Colonel Anderson, arrived later in the day for a full evaluation.

2. With limited time before the next potential flood event, what actions would you recommend the Corps and Congress take in order to prepare? Please include any recommendations that are better suited for the long term.

A. The most important recommendation I would have would be for the Federal Government to honor its existing agreements to maintain these very important flood protection projects. The Agreement between the State of Maryland and the Army Corps of Engineers for the Ocean City project calls for a 53% federal share for all periodic beach replenishment costs required for the project for a period of 50 years beginning in 1994. Yet in 2009 when funding should have been appropriated for a scheduled replenishment in 2010, no money was included in the President's budget for the work. A portion of the required federal funds were ultimately added in the budget approved by congress but not the full 53% share.

In the fall of 2009 the Ocean City flood protection project was damaged during a severe NorEaster. Thankfully, after seeing first hand how well the project performed during this storm and how important the repairs and required replenishment efforts would be to its continued success, Congress appropriated the additional money needed to fully restore the project and the work was completed in the winter of 2010. Had the federal government not ultimately honored its funding commitment in 2009, Ocean City would have faced hurricane Irene without adequate storm protection.

One of the best ways to prepare for a flood event is to make sure that in place flood protection measures are properly designed and maintained. The top priority of the Corps and Congress should be to ensure that the funding and expertise is there to properly maintain existing, proven flood protection projects. Yet each year funding to maintain these projects as required by agreements signed by the Corps of Engineers is not included in the budget submitted to congress, and therefore each year local governments are forced to lobby congress for this funding directly and the funding is unfairly labeled as an earmark.

2(a) How would you prioritize these recommendations?

Fully fund all existing Corps of Engineers local cooperation agreement commitments. Existing projects must be maintained.

New projects should be evaluated and funded based on what the project protects in this order: life safety, critical infrastructure, economic impact of the area protected, value of the property protected. My understanding of Corps of Engineers cost/benefit analysis for determining if a flood protection project is built only considers the value of the property being protected.

2 (b) How can we maximize the use of Federal Funds?

A. Commit funds to mitigate against and prepare for flood events. Current thinking seems to be to consider flood protection projects as "ear marks" to be cut from the

Corps of Engineers budget and instead to simply fund massive emergency damage repairs after the fact through FEMA. I would maintain that it is much more cost effective to prevent the damage in the first place by constructing and maintaining effective flood protection projects.

I hope that I have satisfactorily answered the very good questions raised by Senator Cardin and Senator Inhofe. If there are additional questions or clarifications, please do not hesitate to contact me

Sincerely,



Terence J. McGean, P.E.
City Engineer
(410) 289-8786

**Price Level Update
Atlantic Coast Project Storm Damages Prevented**

Storm Date	Damages Prevented ¹	Damages Prevented Current 2006 Price Level ²
October '91	\$32,000,000	\$49,000,000
January '92	\$52,000,000	\$79,000,000
December '92	\$71,000,000	\$105,000,000
March '94	\$29,000,000	\$40,000,000
February '98	\$46,000,000	\$58,000,000
TOTAL		\$331,000,000

¹Damage amounts at price level of storm event date.

² Applied ENR Building Cost index and CPI to update damage amounts.

Beach Costs Summary through 2009 and estimated for 2010

Project Costs:

Project	Federal Share	State Share	County Share	City Share	Total	and CA
Phase 1 Renourishment Project 1988	-	6,123,152	3,061,576	3,061,576	12,246,304	2,262,017
Phase 2 Renourishment Project	-	7,922,431	3,961,215	3,961,215	47,660,364	6,100,000
State Design and Real-Estate Costs	31,815,503	1,696,524			1,696,524	
1988 Renourishment	4,323,251	2,258,555	1,139,277	1,139,277	8,866,360	1,285,000
2002 Renourishment	2,649,056	1,174,581	587,290	587,290	4,998,217	744,000
2006 Renourishment	3,777,660	1,675,000	837,500	837,500	7,127,660	931,710
2010 Renourishment (cost share estimated)	4,786,120	1,947,436	973,718	973,718	8,680,992	1,050,000
Monitoring Costs	2,724,923	1,208,221	604,110	604,110	5,141,364	
Maintenance Costs	-	2,223,249	1,104,915	1,104,915	4,433,079	
Totals to date	50,082,513	26,229,149	12,269,601	12,269,601	100,850,864	12,372,727

Updated 10/11/2011

OCEAN CITY, MARYLAND
ESTIMATED ANNUAL TAX RECEIPTS
FOR ALL LEVELS OF GOVERNMENTS
Period Ending June 30, 2011

TYPE	TOWN	WORCESTER COUNTY	STATE OF MARYLAND	FEDERAL GOVERNMENT	TOTAL ANNUAL TAXES
1 PROPERTY TAX - BASE =	10,413,493,746				
2 ADMISSIONS @ .03	41,133,300	72,894,458	11,663,113		125,690,870
3 ROOM TAX @ 045 Town/06 State	1,179,152				1,179,152
4 RETAIL SALES @ .06	11,907,434		15,876,579		27,784,013
5 ALCOHOLIC BEVERAGE & TOBACCO		655,250	40,076,016		40,731,266
6 REAL ESTATE TRANSFER & RECORDING	560,018	5,777,300	1,952,690		8,289,908
7 INCOME - OCEAN CITY NET INCOME =			3,254,790		3,254,790
8 LICENSES & PERMITS	524,878	1,115,966	6,560,975	37,793,950	45,995,769
9 MOTOR FUEL	2,428,462	180,922			2,609,384
10 UTILITIES	63,271	48,226	1,607,527	805,501	2,524,525
	912,606	145,036	191,920	565,250	1,814,812
	58,729,141	80,737,558	81,163,210	39,164,701	259,834,609

NOTES:

- 1 ASSESSABLE BASE DETERMINED BY STATE OF MARYLAND AS OF 12/31/10
- 2 ACTUAL TAX COLLECTED IN FISCAL YEAR ENDED 06/30/11
- 3 ACTUAL TAX COLLECTED IN FISCAL YEAR ENDED 06/30/11
- 4 Comptroller of the Treasury, "Consolidated Revenue Report for 2011"
- 5 ACTUAL FEES & TAXES COLLECTED IN FISCAL YEAR ENDED 06/30/11
- 6 ACTUAL FEES & TAXES COLLECTED IN FISCAL YEAR ENDED 06/30/10
- 7 TAXABLE INCOME FOR OCEAN CITY RESIDENTS ONLY FOR 2010 PER COMPTROLLER OF THE TREASURY; taxes for year ended 06/30/10; federal taxes @ 20% + 7.65% FICA
- 8 ACTUAL FEES & TAXES COLLECTED IN FISCAL YEAR ENDED 06/30/11
- 9 ACTUAL TAX COLLECTED IN FISCAL YEAR ENDED 06/30/10
- 10 Town = cable television franchise
Federal excise tax applied to communications excise tax of 1.44% State and 4.24% Federal.

THIS REPORT DESCRIBES TAXES COLLECTED DIRECTLY IN OCEAN CITY OR FROM OCEAN CITY RESIDENTS.

THE ECONOMIC IMPACT OF THE COMMUNITY ON SURROUNDING COMMUNITIES IS CONSIDERABLE. USE OF A MULTIPLIER SERVES TO DEMONSTRATE OVERALL ECONOMIC IMPACTS, WHICH TYPICALLY EXTEND BEYOND THE LOCAL AND INTO REGIONAL OR STATE-WIDE ECONOMY. THE MULTIPLIER FACTOR OF 1.9348 DERIVED BY THE "U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS" APPLIED TO STATE AND FEDERAL TAX RECEIPTS YIELDS A MORE ACCURATE ESTIMATE OF OCEAN CITY CONTRIBUTIONS TO STATE AND FEDERAL GOVERNMENTS.

FEDERAL TAXES	MULTIPLIER FACTOR	TOTAL ANNUAL DIRECT AND INDIRECT TAXES
STATE OF MARYLAND TAXES	39.164,701 X	75,775,863
	81,163,210 X	157,073,274
	120,347,811	232,849,137

Senator CARDIN. Thank you, Mr. McGean.
Captain Lorino.

**STATEMENT OF CAPTAIN MICHAEL R. LORINO, JR.,
PRESIDENT, ASSOCIATED BRANCH PILOTS**

Captain Lorino. Thank you, Mr. Chairman, good evening.

Mr. Chairman, before I touch on some of my concerns with the 2011 high water situation on the Mississippi River system, I would like to thank the Corps New Orleans District for doing a great job, not only this year, but in past years as well. When the Corps district is funded adequately and equipped adequately, they do a fantastic job.

Mr. Chairman, this brings me to our primary issue. How can we adequately fund the Corps' budget to properly maintain the Mississippi River system? I can assure this Committee it is well within all of our best interests to collaborate and solve this problem. Combined, the five ports on the Mississippi River system make up the largest port system in the U.S., the second largest in the world.

More than 10,300 vessels transited through Southwest Pass going either in or out of our river system in 2010. Each of those vessels was safely navigated through one of the most treacherous and demand river systems in the world. Failure to properly maintain Southwest Pass to project dimensions is a safety issue for all of us who live and work on the river system. But just as importantly, it is a substantial economic threat to our Nation.

We handle, Mr. Chairman, 30 percent of the Nation's oil imports, 60 to 70 percent of the Nation's grain exports. Those numbers can be reduced drastically without proper maintenance of the shipping channel. The issue is complex, but the bottom line is simple. Without adequate funding for dredging and maintenance, you cannot get American-made and grown goods on ships for export with high river conditions. The demand for these products exist. But if shipping companies cannot access American goods, they will go elsewhere. I don't have to tell you what that would mean for our farmers, millions of individual jobs and our Nation's economic bottom line.

The problem we see today comes from two sources: constant under-funding of the Corps budget and the mis-use of the Harbor Maintenance Trust Fund, for which it was instituted to ensure necessary funding for our ports and harbors. For the past 12 years, the New Orleans District has been underfunded in their O&M budget. Next year they will be underfunded by at least \$20 million once again, and that is if nothing goes wrong, such as another high river, for example.

To their credit, for the past 12 years, the Mississippi Valley Division of the Corps has understood how critical the Mississippi River system is. They have reprogrammed funds from other projects to accommodate necessary dredging.

Reprogramming of funds will no longer occur. The Corps now operates under a white paper that restricts funding usage. And this new policy eliminates the possibility of dredging enough to maintain project dimensions at a particular time.

In one of the many meetings I had with the Corps on this issue, I discussed the economic impact associated with cargo loss and the

response was, it will be shipped from other ports in the U.S. Mr. Chairman, that is not correct. This is very inaccurate. When I further stated we could have a grounding or even an oil spill, I was told, maybe something has to bring this issue to light.

This brings me to serious concerns that the change in the Corps' policy regarding funding does not reflect sufficient priority to the Mississippi River system. Instead, it appears to be more about political posturing and an effort to garner further necessary funding for the Corps. We are being used as a pawn in a very dangerous game.

Mr. Chairman, this is not an acceptable way to manage the busiest and most complex waterway system in the U.S. and possibly the world.

Please refer to the slide presentation that we have. I would like to review the diagrams that demonstrate the impact of loss of project dimensions, depth and width, the possibility of a collision in Southwest Pass, which could shut off America's heartland.

[Slide shown.]

Captain Lorino. Mr. Chairman, the first one is, if you would look there and see where the red meets the yellow, that is the entrance to American heartlands. If that area is closed, everything shuts off. Everything. Nothing moves in and out the river system.

[Slide shown.]

Captain Lorino. Next one. That is two ships that are passing in a normal channel. You have 300 feet between those two ships, 300 feet between two ships that are about 1,000 feet long and 150 feet wide.

[Slide shown.]

Captain Lorino. When you reduce the channel, Mr. Chairman, from 750 to 650, you can see it goes down to 195 feet wide, very narrow.

[Slide shown.]

Captain Lorino. No. 5, 600 to 500, we now have 100 feet to pass those two ships, as was done last year. When you get down to 400 feet, Mr. Chairman, it is not a safe situation at all. But it has been done, because we have to keep our river system open. But the fact that just because we lose project draft and dimension is a safe issue, it is really not. It is something that has to be stressed and maintained at all times. Both project width and dimension.

Senator CARDIN. I am going to have to ask you to complete your statement.

Captain Lorino. Yes, sir.

Mr. Chairman, I just wanted to touch on these, and I thank the Committee, and I will be happy to answer any questions.

[The prepared statement of Captain Lorino follows:]

Testimony by Michael R. Lorino, Jr.
Before the Senate Committee on
Environment and Public Works
Tuesday, October 18, 2011

Thank you Madam Chairman and committee members.

Madam Chairman, before I touch on some of my concerns with the 2011 high water situation on the Mississippi River system, I would like to thank the Corps New Orleans District for doing a great job not only this year but in past years as well. When they have been adequately funded and equipped, they are fantastic.

Madam Chairman, this brings me to our primary issue - how can we adequately fund the Corps' budget to properly maintain the Mississippi River System? I can assure this committee, it is well within all of our best interests to collaborate and solve this problem.

Combined, the 5 ports on the Mississippi River make up the largest port system in the U.S. and the 2nd largest in the world. More than 10,300 vessels transited through Southwest Pass going either in or out of our river system in 2010.

Each of those vessels was safely navigated through one of the most treacherous and demanding river systems in the world.

Failure to properly maintain Southwest Pass to project dimensions is a safety issue for all of us who live and work on the river, but just as importantly it is a substantial economic threat to the nation.

We handle 25% to 30% of the nation's oil and 60% to 70% of the nation's grain exports. Those numbers can be reduced drastically without proper maintenance of the shipping channel.

The issue is complex, but the bottom line is simple - without adequate funding for dredging and maintenance, you cannot get American-made and grown goods on ships for export when high river conditions exist. The demand for these products exists, but if shipping companies cannot access American goods, they will go elsewhere. I don't have to tell you what that would mean for our farmers, millions of individual jobs, and our nation's economic bottom line.

The problems we see today comes from two sources - consistent under-funding of the Corps and the misuse of the Harbor Maintenance Trust Fund, which was instituted to ensure necessary funding for our ports and harbors.

For the past 12 years, the New Orleans district has been underfunded in their O&M budget. Next year, they will be underfunded by at least \$20 million, and that is if nothing goes wrong, such as a higher river than expected, for example.

To their credit, for the past 13 years the Mississippi Valley Division of the Corps has understood how critical the Mississippi River system is, and they have reprogrammed funds from other project budgets to accommodate necessary dredging.


Reprogramming of funding will no longer occur. The Corps now operates under a White Paper that restricts funding usage, and this new policy eliminates the possibility of dredging enough to maintain project dimensions at any particular time.

In one of the many meetings I have had with the Corps on this issue, I discussed the economic impact associated with lost cargo, and the response was "it will be shipped from other ports in the U.S.". This, for the record, is inaccurate. When I further stated we could have groundings, or even worse an oil spill - I was told that "maybe something has to bring this to a boil".

This brings me to serious concern that the change in Corps policy regarding funding does not reflect sufficient priority to the Mississippi River system. Instead, it appears to be more about political posturing in an effort to garner further, albeit necessary, funding for the Corps. We are being used as a pawn in a very, very dangerous game.

Madam Chairman and members, this is not an acceptable way to manage the busiest and most complex waterway system in the U.S. and possibly the world.

Please refer to the slide presentation that we have provided. I would like to review the diagrams that demonstrate the impacts of loss of project dimensions, depth and width increases, and the possibility of a collision in Southwest Pass, which would shut off America's heartland.




*Associated Branch Pilots for the
Port of New Orleans*

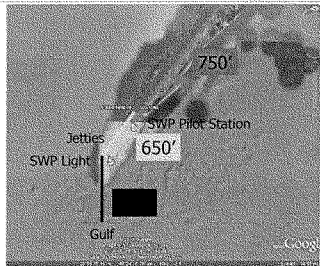
Capt. Mike Lorino, President

Southwest Pass Area

Examples of the Known Effects to Navigation
Due to Channel Narrowing

**Existing Channel Widths
Entrance to the Mississippi River
Southwest Pass Area**

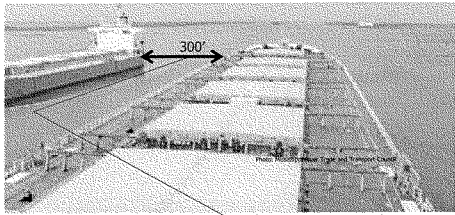




The map shows the entrance to the Mississippi River at the Southwest Pass. It features a central channel with a width of 750 feet. To the left, there are jetties and a SWP Light. A SWP Pilot Station is marked with a width of 650 feet. The Gulf of Mexico is labeled at the bottom. The map is credited to COOS.

10/17/2011Associated Branch Pilots for the Port of New Orleans2

Safe Passing Distance in Existing 650' Channel



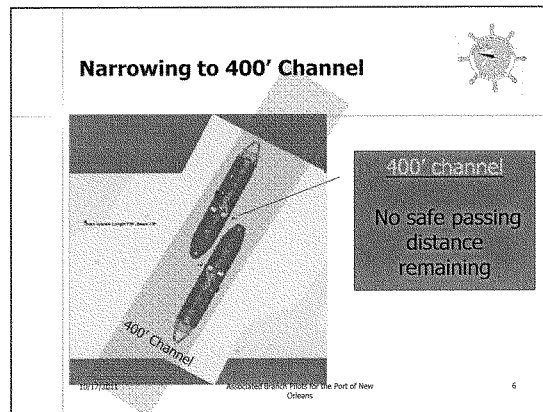
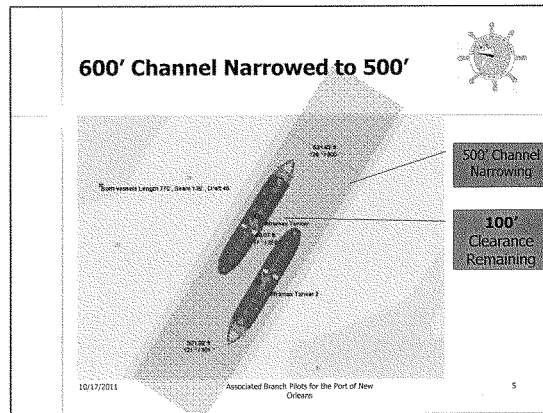
Existing Safe Passing Separation Approximately 300'

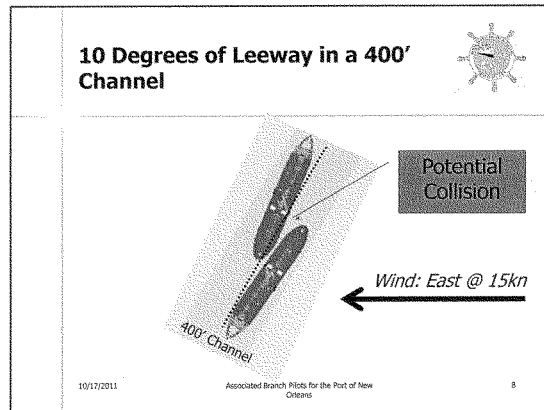
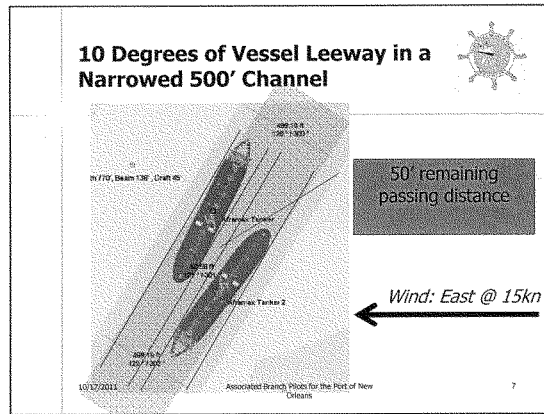
10/17/2011 Associated Branch Pilots for the Port of New Orleans 3


Effect of Narrowing From 750' to a 650' Channel

Passing clearance reduced from 300' to 195'

10/17/2011 Associated Branch Pilots for the Port of New Orleans 4




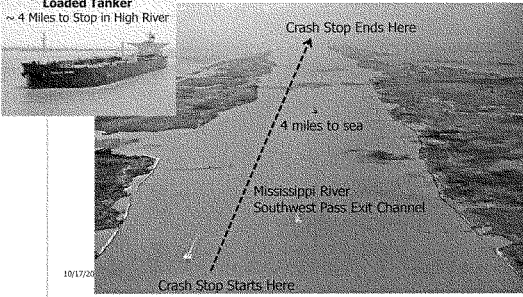


Crash Stop 

- In high current conditions, it often takes nearly 4 miles to stop a loaded down-bound ship in the Mississippi River entrance passes.
- Many ships will end up stranded aground after this maneuver.

10/17/2011 Associated Branch Pilots for the Port of New Orleans 9

Crash Stop 



Loaded Tanker
~ 4 Miles to Stop in High River


Crash Stop Ends Here

4 miles to sea

Mississippi River Southwest Pass Exit Channel

Crash Stop Starts Here

10/17/2011



*Associated Branch Pilots for the
Port of New Orleans*

Capt. Mike Lorino, President

Thank You

Examples of the Known Effects to Navigation
Due to Channel Narrowing

10/17/2011 Associated Branch Pilots for the Port of New Orleans 11

Senator CARDIN. Thank you for your testimony.
Mr. Dunnigan.

**STATEMENT OF BRIAN DUNNIGAN, DIRECTOR, NEBRASKA
DEPARTMENT OF NATURAL RESOURCES**

Mr. DUNNIGAN. Good afternoon, members of the Senate Committee on Environment and Public Works. I will be brief.

I would like to begin by reporting that the Governors or their representatives from eight Missouri River Basin States met with the Corps yesterday to coordinate their efforts and actively address needed matters related to Missouri River flooding. This was not the first meeting of the group, as most of the Governors also attended an August 19th meeting in Omaha to discuss concerns related to the flood.

In that first meeting, Governors or their representatives from seven of the eight States signed a letter indicating a clear consensus that flood control must be the highest priority in the operation of the Missouri River mainstem system. It also strongly requested that the Corps thoroughly examine future management of the river in light of this year's precipitation and flooding, and report to them on alternate actions to reduce future high flow events.

Finally, it was requested that the Corps provide recommendations for specific operational changes to afford greater future flood protection and consult with States and tribes in selecting and implementing any changes.

In yesterday's followup meeting, the Governors discussed opportunities to increase future flood control focus and discuss recovery priorities and coordinations. One point that can be taken from these meetings is that the Basin Governors are very serious about taking action to reduce the risk of future flooding and the level of future flood damages as well as address recovery priorities.

We don't have a full reliable tally of damages at this time. But we have received data in Nebraska on over \$155 million in public infrastructure damages eligible for assistance. We had disaster declarations for 13 counties along the Missouri River, and another three counties in the North Platt Basin on the other end of the State.

Overall, our experience with the Corps activities during the flood was positive. We generally received invaluable assistance from the Corps personnel and are very appreciative of its assistance on levees and emergency mitigation. One outcome I hope to see come from future efforts is improved communication in both the spring rise situations, where flooding becomes a possibility, and during the emergency flood situation itself. Flooding involves a wide spectrum of State and local government responses, where having the best possible information as soon as possible can help result in better and more cost-effective decisionmaking.

While a thorough examination of the 2011 Missouri Basin flood will likely identify some areas where different actions could have been taken, the most important controllable outcome is how we incorporate new data and perspectives into future decisionmaking in terms of both mainstem system operations and how those of us in the Basin prepare and respond. In Nebraska, it has resulted in a strengthened focus on flood control as a system priority. We look

forward to working with the Corps of Engineers as they re-examine their activities and options in light of new information and Basin priorities.

Thank you.

[The prepared statement of Mr. Dunnigan follows:]



Dave Heineman
Governor

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
Brian P. Dunnigan, P.E.
Director

IN REPLY TO:

October 18, 2011

Senator Barbara Boxer, Chairman
United States Senate
Committee on Environment and Public Works
Washington, DC 20510-6175

Dear Chairman Boxer and Committee Members:

I am Brian Dunnigan, Director of the Nebraska Department of Natural Resources, the state agency responsible for administering Nebraska laws pertaining to floodplain management and dam safety. Nebraska is one of the states affected by this year's flooding in the Missouri River Basin and I would like to speak with you about the cooperative response efforts of states in the basin to this year's historic flooding and unprecedented flows, as well as Nebraska's experience and response, and the U.S. Army Corps of Engineers response to the flooding.

Interstate Coordination

I would like to begin by reporting that the Governors or their representatives from eight Missouri River Basin states met with the Corps in Omaha yesterday to coordinate their efforts and actively address needed matters related to Missouri River flooding. This was not the first meeting of the group, as most of the Governors also attended an August 19 meeting in Omaha to discuss concerns related to the flood.

In that first meeting, Governors or their representatives from seven of the eight states signed a letter indicating a clear consensus that flood control must be the highest priority in operation of the Missouri River Mainstem System. It also strongly requested that the Corps thoroughly examine future management of the river in light of this year's precipitation and flooding and report to them on alternate actions to reduce future high flow events. Finally, it requested that the Corps provide recommendations for specific operational changes to afford greater future flood protection and consult with the States and Tribes in selecting and implementing any changes. In yesterday's follow-up meeting the Governors discussed opportunities to increase future flood control focus and discussed recovery priorities and coordination.

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One point that can be taken from these meetings is that the Basin's Governors are very serious about taking action to reduce the risk of future flooding and the level of future flood damages as well as address recovery priorities.

One outcome I hope to see come from future efforts is improved communication in both the spring rise situations where flooding becomes a possibility and during the emergency flood situation itself. Flooding not only has major economic, health and safety implications for our states, but involves a wide spectrum of state and local government responses where having the best possible information as soon as possible can help result in better and more cost effective decision making.

To help you better understand those state and local responsibilities, as well as what we faced, I would like to report to you on our Nebraska experience with and response to this year's unprecedented flows and flooding.

Nebraska Flood Response

I don't want to dwell on the runoff totals for the 2011 Missouri River flood event, since the Corps and others are best positioned to discuss that. I will simply note that an August 4 Corps News Release referring to runoff above Sioux City noted: *"Runoff for the calendar year is projected to reach 61.8 MAF, 249 percent of normal. The previous record of 49 MAF was reached in 1997."* While the projected runoff total represents a major increase from the previous record, the timing of the runoff was also very significant. Despite discussions on system operation, the reservoir system did provide the major benefit of reducing peak flows.

One challenging facet of the 2011 Missouri Basin flood in Nebraska occurred relatively early in the flood season when we faced major flooding challenges at opposite ends of the state. While much of the discussion on Missouri River flooding has revolved around mainstem reservoir system operation, the North Platte River in Nebraska also receives much of its inflow from the northern portion of the Rockies and ultimately flows into the Platte and then into the Missouri well downstream of the reservoir system. When Nebraska established an emergency operations center in May we were faced with the prospect of providing sandbags and securing helicopters that could provide emergency assistance and repairs at both the far western and far eastern margins of the state. The Corps provided timely assistance with those emergency needs.

We don't have a full reliable tally of damages at this time, but we have received data on over \$155 million in public infrastructure damages eligible for assistance. We had a disaster declaration for thirteen counties along the Missouri River and another three counties in the North Platte Basin at the other end of the state. Currently six highway bridges over the Missouri River from Nebraska into surrounding states are still closed, although this is due to accessibility of bridge approaches and not structural damages to the bridges themselves. In addition to damages to private structures and public infrastructure, we have significant cropland and other land

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damages. With that being said, our neighbors in Iowa have a much higher amount of land in the floodplain as the bluffs are typically closer to the river on the Nebraska side of the river. In that regard we were relatively fortunate.

Corps direct assistance to the State of Nebraska and local governments during the course of the flood was substantial. This included over two million sandbags in addition to heavy bags, pumps and other assets. The Corps provided \$6.8 million in emergency contracts for risk reduction measures. Corps mitigation activities included contracts for North Platte, Dakota City, South Sioux City, Bellevue and Omaha. Much of that involved levee related work.

U.S. Army Corps of Engineers Flood Response

I believe any assessment of Corps response to this year's flooding needs to take into account the unprecedented nature of the flows and the overall long term benefits operation of the Missouri River Mainstem system has brought to our basin. The Corps operates a complex system with eight authorized purposes and many of its decisions are dependent upon operational criteria in its master manual. This is not an easy task. The new data and viewpoints generated by the flooding have not only deepened our commitment to flood control in Nebraska but have provided information that will need to be considered by the Corps as they manage the river in the future.

Overall, our experience with Corps activities during the flood was positive. I contacted our Nebraska Emergency Management Agency Director on his experience and he indicated that the Corps had been very responsive and that they had experienced no problems with the Corps. We generally received invaluable assistance from Corps personnel and are very appreciative of its assistance on levees and emergency mitigation. We do have some suggestions for future Corps activity and hope to work with the Corps as they assess the 2011 flood and examine how it might affect future operational options. Some of those suggestions I have already detailed when discussing the activities and requests of the eight state governors. Some additional relatively more technical suggestions include the following:

- I would like to reemphasize my earlier suggestion and examine options for improved communications with the Corps during the spring and flood situations.
- I suggest the Corps work diligently to see flood control storage is available at beginning of upcoming runoff seasons. There is a need to further discuss options for reducing flood risk in the upcoming 2012 season. Can the System be operated by either keeping the storage on March 1st below the 56.8 MAF, or keeping the 56.8 MAF for a longer period, or a combination of both to provide some insurance for flood control in 2012? On March 1st this year system storage was at 57.6 MAF approximately 0.8 MAF into the annual flood control zone. When feasible, an effort should be made to more fully examine the effect of different operational criteria on potential future flood damage reductions and

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other authorized purposes. We are also very supportive of current Corps damage assessment and repair activities.

- There is a need to incorporate data from 2011 flood into all analysis and decision making in as timely a manner as practicable. The five inflow scenario simulations presented in the draft 2011 -2012 Annual Operating Plan use the 1898 – 2006 historical period to derive inflows. It is uncertain why the period was not updated to include the remaining years through 2011. We recognize that 2011 is not yet over, but it would be possible to project the final months. I suggest that if practicable, the Corps consider updating the period this year rather than waiting until next year.
- I would suggest the Corps examine options for considering wet and dry cycle influence and Weather Service long-range outlooks in conjunction with their future runoff projections. In the most recent years we have been in a wet cycle in terms of runoff and that combined with high water levels in the system and damages that have occurred bring a heightened sense of concern to the 2012 season. In some situations the Corps may need to consider adjusting releases before winter conditions limit flexibility.

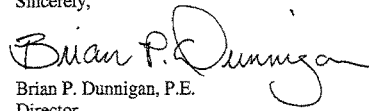
I would suggest the Corps consider simulating 1% or 2% flood recurrence intervals to assist in assessing consequences of extreme runoff levels.

Overall, it is very important that the Corps address the Governors' request to thoroughly examine future management of the river in light of this year's precipitation and flooding, and report to them on alternate actions to reduce future high flow events.

Closing Remarks

While a thorough examination of the 2011 Missouri Basin flood will likely identify some areas where different actions could have been taken, the most important controllable outcome is how we incorporate new data and perspectives into future decision making in terms of both mainstem system operation and how those of us in the basin prepare and respond. In Nebraska, it has resulted in a strengthened focus on flood control as a system priority. We look forward to working with the Corps of Engineers as they reexamine activities and options in light of the new information and basin priorities.

Sincerely,



Brian P. Dunnigan, P.E.

Director

Senator CARDIN. Thank you very much, Mr. Dunnigan.
Mayor Wharton, thank you for being here.

**STATEMENT OF HON. A.C. WHARTON, JR., MAYOR, CITY OF
MEMPHIS, TENNESSEE**

Mayor Wharton. Thank you, Senator. Thanks for convening the hearing. I would like to thank Senator Alexander for inviting us up.

I will likewise be brief. Of course, I am from Memphis, Tennessee, which is right in the tip of the delta there. I join the other witnesses in underscoring the fact that for the most part, our systems, as aged as they may be, did indeed work. We want to thank the Corps of Engineers for working with us as we installed some of the floodwalls, which had never been used, quite frankly, and again, are quite up in age.

In spite of working so well, the flood did impact our community. Fortunately, though, the impact was not as severe as it could have been. St. Jude's Children's Hospital, which is located just a few blocks from the river, was spared some massive flooding because the system did work.

I might add, though, that the pumping station that kept St. Jude's from out of the flood is 95 years old. And the key point I would like to leave is that while the system worked this time, it has aged so that we are not confident that in future floods of this magnitude that these aging structures will be able to withstand the pressure placed upon them by floods of this magnitude.

So I would hope that we would take away from these hearings some estimate and some time table for beginning, while we have the time, to reinforce the aging infrastructure. As Senator Alexander pointed out, President's Island, which is leading us out of the economic slump, it is almost a perfect storm, as someone just indicated, we have high unemployment, but over the past 18 months, we have been able to place about 2,000 jobs with Electrolux, Mitsubishi, Nucor and other employers coming in there. We want to make sure that those investments are indeed safe.

As we look at our initial estimates, we are looking at \$20 million to \$30 million to repair. You saw the channel that was threatened across President's Island, dredging work of \$2.5 million, shoreline work of another \$5 million. So again, a very costly occurrence. We wish to thank the Corps again for working with us, helping us maintain and install the structures. And we ask that they continue their diligence in forecasting into the future as to the life of these structures and what it is going to take to make sure that they are able in the decades to come to withstand future floods of this and perhaps greater magnitude.

Thank you so much for holding the hearing.

[The prepared statement of Mayor Wharton follows:]

Testimony of the Honorable A.C. Wharton

Mayor

City of Memphis

October 18, 2011

Senate Environmental and Public Works Committee

Good morning. Honorable Chair Boxer, Honorable Ranking Member Inhofe, members of this distinguished committee, and Tennessee's capable and highly respected Senator Lamar Alexander, I thank you for this opportunity to speak on behalf of Memphians and the Historic Mississippi Flood of 2011.

Our City faced a daunting challenge in managing and recovering from this natural disaster. Our first responders worked diligently to protect and save lives, and minimize the loss of property and possessions of our citizens. The President, our congressional delegation, and the Governor of the State of Tennessee acknowledged the historic work of our first responders and the countless number of volunteers.

However, despite the admirable actions of the Office of Preparedness, First Responders, and the volunteers of United Way of the Mid South, some of our citizens are still in transition as they rebuild homes and lives. For a few minutes, I would like to give you an overview of the 2011 Mississippi Flood.

The U.S. Army Corps of Engineers, USACE, was an excellent partner during the 2011 Mississippi flood event. The USACE staff is to be commended for their professionalism, conduct, and competency. The City and USACE worked collaboratively and diligently to ensure that the flood control/protection systems were installed correctly and the functioned as designed. Overall, the City was able to count on the USACE to assist the City with its expertise, resourcefulness, and sense of teamwork during the course of the flooding event.

The Flood impacted our local community. Fortunately for the City of Memphis, the existing flood control and protection systems constructed to protect the City functioned as designed and undoubtedly saved thousands of properties from flooding, including businesses which were protected, as well as St. Jude's Children's Research Hospital. Most of these systems had never been tested or put into service before and were understandably a point of major concern.

However if it had not been for the floodwalls and levees, buildings such as our City's Pyramid would have had 8 to 10 feet of water within the structure. Hundreds of millions of dollars, if not billions, in damages would have been suffered.

The City did not escape unaffected:

- Across the area nearly 390 properties were damaged including three mobile home parks whereby every home was destroyed.
 - Numerous businesses were significantly impacted, and some businesses were forced to shut down in the already weak Main Street economy.
- DeWitt Spain Regional Airport, a local regional airport under the Memphis and Shelby County Airport Authority, was flooded. The facilities on site suffered significant damages and the estimated cost for repairs and other flood related activities are \$3.1M plus additional losses in revenue due to the closure of the facility.
- Several streets and bridges were damaged by flood waters and had to be repaired.
- Hundreds of streets had to be cleaned and cleared of debris.
- The City of Memphis's two Waste Water Treatment Plants handled up to an additional 250 million gallons a day due to flood conditions.
- The Memphis U.S. Coast Guard facility had to be evacuated and relocated.
- Port of Memphis/Presidents Island suffered the greatest damages:
 - ½ mile of shoreline damaged
 - Erosion damage to berm structure along 4 miles of levee
 - Nearly 800 acres of farmland damaged
 - 2.5 miles of erosion damage to containment walls
 - 3 miles of levees needed to cleaned
 - Major dredging work of the harbor is needed
- The City of Memphis costs for the flood event was approximately \$ 5.0M

Our Immediate and long term recovery needs are in three areas:

- The Port of Memphis will need to be funded either through the USACE or by local/state funds:
 - Estimated cost to repair shorelines: \$20 to \$30M
 - Estimated cost for dredging work needed: \$2.5M, at a minimum
 - Estimate and additional \$5.0M in repairs needed, at a minimum
Depending upon further assessments.
- Evaluate the existing flood protection and control systems.
 - Flood control infrastructure and systems are aging and will need rehabilitation.
 - The City has grown in size, thus additional flood control and protection systems are needed to protect expansion/development areas.
- Funding for the development and application of technologies such as Geographic Information System (GIS).

Finally, but equally as important as the information I shared with you, we asked forty of our survivors identified through the FEMA process to complete a questionnaire. The summary of those responding is in the appendix of our handout.

Thank you for the opportunity to appear before you today.



City of Memphis Performance Questionnaire

1. Are you a Flood Victim as identified by the Federal Emergency management Administration?
 Response: Yes – 39 No -- 1

2. Did government provide adequate notice of the impending flood (on a scale of 1 – poor to 5 – good)?
 Response: Average score of 40 responders 3.7

3. How well do you think the media performed in advising citizens of the impending flood, relief efforts and ongoing flood recover (on a scale of 1 – poor to 5 – good)?
 Response: Average score of 40 responders 3.8

4. Were you advised to evacuate and if so, were you given sufficient notice (on a scale of 1 – poor to 5 – good)?
 Response: Average score of 40 responders 2.9

5. If you evacuated, did you stay in a shelter or with friends/family?
 Hotel 4 Family 20 Shelter 3 No Response 4

6. If you stayed in a shelter, how would you rate the experience (on a scale of 1 – poor to 5 – good)?
 Response from five responders 4.0

7. If you were advised to evacuate, did the government provide transportation assistance to the Shelter Assistance Center?
 Yes 3 No 23 N/A 14

8. Was your home tagged by the City's Code Enforcement?
 Response: Yes 11 No 24 N/A 6

9. If so, what color tag did you receive?

Response: Red 10 Yellow 4 Green 0 N/A 13 No 6
 No Response 6

10. If your home received a red tag, have you received free assistance in removing drywall and items submerged in flood water?

Response: Yes 5 No 13 N/A 11
 No Response: 8

11. Do you know who to call to receive free assistance with clean-up of your home?

Response: Yes 8 No 29 N/A 3

12. From the options below, please select the one that most closely fits your situation:

- I lost all my belongings.
- I lost 50% of my belongings.
- I lost 25% of my belongings.

Response: 19 Responders lost 56.22% of their possessions.

13. From the options below, please select the one that most closely fit your situation:

- FEMA reimbursed me for my entire loss
- FEMA reimbursement only covered 50% of my loss
- FEMA reimbursement only covered 25% of my loss
- I received no FEMA reimbursement

Response: 36 Responders received an average of 26% of coverage for their loss from FEMA

14. If you received FEMA and insurance benefits, will that be enough to help you in restoring your home?

Response: Yes 6 No 23 N/A 8 No Response 3

15. Do you believe you've fully recovered from the flood and your life has returned to normal?

Response: Yes 6 No 33 N/A 1

16. If not, what would it take for you to fully recover?

Response: Funds 11 Rebuild Homes 8 Time 5 Other 7
Other includes: Clothing, Furniture, Utility Assistance, Auto Supplies

17. Do you believe that you or members of your household were traumatized by the flood?

Response: Yes 23 No 15

18. If so, will the affected member(s) seek counseling?

Response: Yes 11 No 19 N/A 1 No Response 9

19. If you have children, will your child start a new school because of the flood?

Response: Yes 6 No 30 No Response 4

20. How many times has your home flooded in the last 10 years?

Response: One Time 16
Two Times 8
Three Times 1
None 10
No Response 3

21. Were you a resident of a mobile home park that flooded?

Response: Yes 1 No 34 N/A 3

22. Have you ever heard of **2-1-1**?

Response: Yes 16 No 23

23. If so, did you dial **2-1-1** to access social and human services to assist you with your needs after the flood?

Response: Yes 8 No 27 N/A 3

24. Do you know what a long-term recovery committee is and what it does to assist victims of disasters?

Response: Yes 9 No 29 N/A 1

Senator CARDIN. Thank you for your testimony. Thank all of you for your testimony, and thank you for condensing the presentation in light of our time restraint. We very much appreciate that. We assure you, your entire remarks will be not only made part of the record but will be used by the Committee as we investigate how to proceed.

Let me turn first to Senator Johanns for questioning.

Senator JOHANNNS. Let me say to each of you, I appreciate your being here. Brian, a special thanks, coming out from Nebraska.

Mayor, we hadn't met before, but I think you and I are working on a trail in your community. I have been working with some business people there.

Mayor Wharton. Charlie McVain.

Senator JOHANNNS. Yes.

Mayor Wharton. We were in Omaha earlier this year.

Senator JOHANNNS. Yes. It is funny that in Nebraska, a guy would work in a trail. But I happen to know some people there.

Mayor Wharton. You will be able to ride a bike from Memphis to Omaha.

Senator JOHANNNS. Yes. We like that idea.

Without digging into questions, because I think we had great testimony and all of your statements will be a part of the record, Mr. Chairman, if I might just offer a thought. As we think about the next year coming up, I have to imagine, everybody on this panel is nervous. Because many of the things that built up to create the problem this year are not only there now, but they aren't likely to improve any between now and next spring when we start to deal with runoff and those issues.

The second thing that I think we have all learned from this hearing is that we have about a \$2 billion issue hanging out there that quite honestly, my concern is that we just didn't get a good sense of how that problem is going to be solved. There apparently is no supplemental coming our way. I appreciate it is very difficult economic times and budget time and somehow, some way, we have to figure out how to fund these things.

But the reality is, I am a little bit worried that we are going to hit a drop-dead date here where, in the Midwest, there is no construction season left. If we appropriate the money in December, it isn't going to help much, because you can't do construction during the winter months that needs to be done.

So at the conclusion of this hearing, I am hoping that we feel a sense of urgency to try to solve this problem. I did not hear today any good way of solving it. But somehow, some way, Mr. Chairman, I am hoping that Republicans and Democrats, in a very bipartisan way, can sit down and talk through this and figure out how to get the funding and get it quickly so we can take advantage of the limited days that are left in this construction season and try to repair some of the damage that is out there.

Then the final thing I would say to all of you who have worked on these issues longer than I have, obviously, I just want to encourage you, continue to work with the Corps, continue to work with us. We have a whole host of problems out there.

Mayor, when you say that your St. Jude's Hospital, which is world-renowned, I grew up knowing about this hospital, was saved

by a pumping system that is nearly a century old, that has to be a concern to everybody. Because I guarantee, we have those problems throughout the system.

I had a choice of asking questions or saying a few words. Thank you, Mr. Chairman, for your patience. I decided it would be best use of my time to say a few words.

Senator CARDIN. Well, Senator, I think you really summarized the circumstances extremely well, and I fully concur in your comments. There is a sense of urgency here.

It is interesting, at this hearing, we had 20 witnesses at the witness table, just showing the interest, including nine Members of Congress. During the course of this hearing, nine members of the Committee have participated, which is a large number, considering this is a day in which there are a lot of committees that are meeting.

So I think there is a great deal of interest. And as our Chairman and Ranking Member said at the beginning of this hearing, this is an area where we have bipartisan agreement that we need to do what is necessary to protect the people of this Country. So I agree with Senator Johanns, I think this is a matter of urgency. We have to move forward.

Dr. Galloway, I think your challenge to us was absolutely right. We do need to develop a national plan for flood risk management. I like that term, flood risk management. Yes, we use traditional structures such as dams and levees, but we also use the green infrastructure that we have been talking about. And it is the management issues. We can't prevent these extreme conditions, but you certainly can manage them in a much more effective way so the public knows the risks and you take appropriate action to minimize it. So we don't have as much damage to repair after the fact. I thought that was well done.

And to Mr. McGean, I just want you to know, your numbers updated our numbers. The direct savings were three to one if you include all government investments, six to one from the Federal Government's investment.

But your last number I thought was the most telling. And that is, the work that we have done on green infrastructure has actually brought in more money to the Federal Treasury. More money to the Federal Treasury. If you took a look at that view of Ocean City and realized what the assessed values and revenues and tourism would have been if the renourishment programs had not been done, versus how it is today and what we were able to preserve and get back into business quickly after Hurricane Irene struck, then you know that the Federal Government, as recipients of tax dollars, got more money in as a result of its relatively modest investment over the period of time with \$50 million.

So I think that these projects enjoy bipartisan support for a good reason. They make good economic sense as well as providing the services that are important to the people of this Country.

Captain Lorino, I have one question for you. Because your numbers really worried me when you got to that 400 foot level. Was that a temporary problem of obstruction? Or was that the failure to maintain channels at the appropriate width when you got to 400 feet? Because we don't want you at 400 feet.

Captain Lorino. Well, Mr. Chairman, we are speaking today about 2011. I have been a pilot on the river for 33 years. And every year, you have high river. Every year you encounter the same type of situation that we had, it is only a different degree. But the answer to your question, sir, yes it was 400, it went down as low as 185 feet, to be quite honest with you, during a certain part of time.

Then we had to lower the draft from 47 feet to 45 to 43. And when we say that, it is easy to say each foot represents a million dollars of cargo either in or out of the United States. So when I am asking for \$20 million to maintain that channel and we lose a few ships, it is nothing. So the answer sir, is, it is very narrow. We try to do the best we can. The Corps does a fantastic job when they have funding.

Senator CARDIN. We agree with you, and our challenges on the East Coast are a little bit different. But maintaining our channels is critically important. I know some of the risk factors on the C&D Canal, trying to navigate that. We have been trying to get rid of those areas that present huge risks. It is a funding issue, and we need to make sure that that is done.

I am going to keep the record of the Committee open for questions that may be asked by members of the Committee to you all. Because of the lateness of this panel, I would just ask your cooperation that if questions are proposed in writing that you would respond promptly to the Committee. Not quite as bad as Secretary Darcy did for Senator Whitehouse. If you could respond a little bit quicker, we would certainly appreciate it, and it would make our Committee record complete.

Again, thank you for your patience. Thank you for your testimony and more importantly, thank you for what you have done to help build this great Nation and keep our people safe. With that, the hearing will stand adjourned.

[Whereupon, at 12:45 p.m., the committee was adjourned.]

[Additional material submitted for the record follows.]



October 17, 2011

The Honorable Barbara Boxer
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

The Honorable James M. Inhofe
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

RE: A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems.

Dear Chairwoman Boxer and Ranking Member Inhofe:

On behalf of American Rivers' members and supporters across the nation, thank you for holding a hearing on the floods of 2011 and the condition of the nation's flood control systems. American Rivers is the leading organization working to protect and restore the nation's rivers and streams. American Rivers works to protect our "natural defenses" - our wetlands, rivers, floodplains, and upland and coastal areas -- to safeguard communities and the environment.

2011 has been an extreme year for flooding events, but instead of writing it off as an outlier, we should prepare and adjust our flood policies as if it is the new norm. We know that flooding is becoming more frequent and more severe and flood losses continue to increase.¹ Flooding in the northeast reached historic proportions this year: we saw up to 15 inches of rainfall in Pennsylvania and New York and Hurricane Irene inundated parts of Vermont and New Jersey for days and communities are still working to recover. This is after devastating flooding in Rhode Island in March 2010 and record flooding throughout the Northeast in 2006. In fact, data recorded from 1958 -- 2007 indicate that the largest increase in heavy downpours has occurred in the Northeast and Midwest.² These extreme events are saddling communities with the challenges of larger and more frequent floods and predictions indicate that the size of the nation's floodplains will grow by 40-45% over the next 90 years putting even more communities in harm's way.³ For far too long we have built in floodplains and we have paved over the landscape, destroying our natural defenses.

When it comes to managing our water resources, the past should not be the sole guide for the future. While levees, dams, and other structures will continue to play a role in flood management, they must be

¹ Pew Center Press Release June 28, 2011. 2011's Extreme Weather Shows U.S. Vulnerability to Climate Change. See the Pew Center on Global Climate Change Publication "Extreme Weather and Climate Change: Understanding the Link and Managing the Risk". http://www.pewclimate.org/docUploads/Climate-Extreme-Weather_1.pdf

² *Ibid.* From 1958-2007 the annual average of number of days of heavy precipitation increased by 58%, outpacing any other region in the nation.

³ Lehmann, E. July 22, 2011. RISK: Flood-prone land likely to increase by 45% -- a major challenge to federal insurance program. Climate Wire. <http://www.eenews.net/public/climatewire/2011/07/22/1>.

the last line of defense, not the only one. Levees do not eliminate the risk of flooding, they reduce flood risk and when they fail, the damage can be catastrophic.

An alternative to walling off rivers with levees is to allow rivers room to be rivers. Flooding is a natural occurrence, and where feasible, it is often safer and cheaper to restore floodplains and give rivers room to spread out. Floodplains and wetlands act as sponges to hold flood waters, slow the impacts downstream, and allow water to infiltrate into the ground. Moving people out of the floodplain and restoring natural systems like wetlands, floodplains, upland and coastal areas makes sense for public safety, taxpayer dollars, and the environment.

Comprehensive Flood Risk Policy is Needed

The nation is in desperate need of a comprehensive and integrated approach to reducing flood risk – one that increases resiliency, safeguards communities and the environment, and spends taxpayer dollars responsibly. To prepare our nation's communities for extreme events we should invest in our natural defenses that can help to store and convey floodwaters naturally. Moving development out of flood prone areas eliminates flood risk altogether. Recent findings by the National Academies supports this notion that the current budget realities require the nation to consider more flexible, innovative, and lower cost solutions to achieving water-related objectives.⁴ Without incentives and requirements for individuals and communities to choose these approaches, we will continue to repeat the mistakes from the past.

A new Community Resiliency and Flood Risk Management Program is needed to provide a comprehensive approach to managing flood risk and keeping communities safe. Such a program would include the Levees Safety Program as a subset of a broader flood risk management approach that is based on assessing flood risk at a river basin scale.⁵ It would entail assessing all types of water control structures (dams, levees, floodways, bypasses, etc.) independent of who owns them (federal or private) and would prioritize nonstructural solutions to mitigate flood risk.

Lessons from the 2011 Floods

The record 2011 flooding on the Mississippi and Missouri Rivers and elsewhere throughout the country actually helped show that if you give a river room to move, you can protect communities. The floodways and bypass channels, used for the first time ever in some cases, made an enormous difference in saving cities like New Orleans and Baton Rouge in Louisiana, and Cairo, Illinois, from certain devastation. As the nation begins the "reset and recovery" phase, we must look strategically to see where can we implement more floodways and bypasses and operate these on a more frequent basis.

The activation of these floodways taught us that public understanding of the system is vital. Memories are short and unfortunately communities living and working in floodways believe they are safe. It is critically important for federal and local agencies to warn landowners and residents who utilize floodways that in any given year there is a potential for flooding and to encourage the minimization of loss to property subject to substantial damage.

Floodways are essential elements of the nation's flood management system and they are a cost effective flood risk management solution that provide multiple benefits. Back in 1927, General Edgar Jadwin, Chief of Engineers designed the flood control system of the lower Mississippi River valley with this in mind. Language on the recommended plan states:

⁴ National Academy of Sciences. 2011. *National Water Resources Challenges Facing the U.S. Army Corps of Engineers*. National Research Council Committee on U.S. Army Corps of Engineers. The National Academies Press. Washington, D.C. http://www.nap.edu/catalog.php?record_id=13136

⁵ The Water Resources Development Act of 2007 established the National Committee on Levee Safety (NCLS) which developed a legislative proposal based on its report and recommendations to Congress in January 2009.

"7. Man must not try to restrict the Mississippi River too much in extreme floods. The river will break any plan which does this. It must have the room it needs, and to accord with its nature must have the extra room laterally."

and:

"Some additional capacity can be obtained in the main river by local setbacks of the levees. As a general setback is not practicable the remainder must be supplied by floodways paralleling the general course of the river".⁶

Smaller and more strategically placed and frequently implemented "release valves" throughout a river basin could increase community resiliency and help to communicate the multiple benefits of our rivers and floodways to the public. The Yolo bypass in the Sacramento Bay Delta is an example of a frequently flooded bypass that helps to convey floods while also capturing nutrients and providing wildlife habitat. Allowing a river to widen out and reconnect with its floodplain is a flood risk management strategy that is gaining more and more support among politicians and national environmental organizations, particularly after the Missouri River flooding when both American Rivers and Senator Christopher "Kit" Bond agreed this was a smart approach:

"In an interview, Mr. Bond agreed that one strategy that would improve flood management and renew the river's resources would be to allow it to widen outside its channelized banks in certain rural areas."⁷

We envision a targeted strategy by the Corps of Engineers and the Natural Resources Conservation Service in partnership with other federal agencies and non-governmental organizations to locate and implement these floodways and bypasses throughout the nation. Other "nonstructural" approaches such as setting levees back or notching levees, conservation easements, and relocations are needed as well.

Strategies to voluntarily move people out of harm's way and out of floodplains are critical to reducing flood risk. Currently, efforts are underway to relocate the town of Olive Branch, Illinois. After its levee breached in early May, the town was severely flooded and now the town is interested in a wholesale move off of the floodplain. While other similar case studies exist, we must have federal policies in place that can help make them the norm rather than the exception.

Likewise, new and creative incentives must be developed to encourage local communities, particularly those hit hard by the 2011 floods, to make wise decisions about how to recover and how to protect the natural floodplain. The federal taxpayers cannot afford to continue footing the increasing bills for flood recovery. Instead, we should devote funding to local communities that supports technical assistance and the communication of flood risk to encourage wise decision-making that allow for more resilient communities. For example, the technical assistance programs such as the U.S. Army Corps of Engineers (USACE) programs for Planning Assistance to States (PL 93-251) and Floodplain Management Services (PL 86-645) while small programs, can make a huge difference to communities across the nation who currently are struggling to recover in smart and cost effective ways to be more resilient to the next flood.

Perhaps the most important lesson of the 2011 floods that we learned yet again is that rivers must be managed as entire systems, not by individual decisions or by individual interests. The underutilized navigation channel from Ponca, Nebraska to the mouth of the Missouri River is an example of outdated management that exacerbated the 2011 flooding:

The restricted navigation channel did not have the ability to safely carry away the high flows exiting Gavin's Point Dam. The corps' pile dikes and revetments forced the Missouri up and then out of its banks.⁸

⁶ House of Representatives, 70th Congress, Document N. 90. Flood Control in the Mississippi Valley. Message from the President of the United States. December 8, 1927, at p. 4.

⁷ See St. Louis Today Editorial Board "Widening Missouri River, reducing risk, key to flood control" July 4, 2011: *"In an interview, Mr. Bond agreed that one strategy that would improve flood management and renew the river's resources would be to allow it to widen outside its channelized banks in certain rural areas."* http://www.stltoday.com/news/opinion/columns/the-platform/article_ff5f3a3a-7713-56cd-aa53-43d8a7303ff2.html

Water stored for release for navigation in dry months means less space for flood storage. While navigation on the lower Mississippi River generates more revenue than it costs to operate, barge traffic on the Missouri River has dropped to practically nothing. A compromise solution would be for the Corps to dismantle the navigation channel in this stretch and to alter the flow schedule, allowing more room for the river.

As communities continue to struggle towards recovering before the next flood, we applaud your leadership in assessing the record breaking 2011 floods and practices that can reduce a communities' risk from flooding into the future. We look forward to working with you on legislative proposals that will protect communities and the rivers they depend upon.

Sincerely,



Andrew Fahlund
Senior Vice President for Conservation

⁸ See St. Louis Today *Guest commentary: The Missouri River compromise* by Robert K. Schneiders, July 26, 2011
http://www.sltoday.com/news/opinion/article_fe5a53d7-dc76-5f30-82cd-294f56e98072.html

Testimony of U.S. Senator Jerry Moran before the Senate Committee on Environment and Public Works Full Committee hearing entitled, "A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems."

Tuesday, October 18, 2011

10:00 AM EDT

EPW Hearing Room - 406 Dirksen

I would like to thank the Chairwoman and the Ranking member for affording me to the opportunity to submit testimony on this matter of great importance. The unprecedented flooding we experienced in the summer of 2011 along the Missouri River Basin requires Congress, the United States Army Corps of Engineers (USACE), the Federal Emergency Management Agency (FEMA) and our state and local partners to work together to ensure that we are adequately prepared for future flood events. I am anxious to identify the root causes of this extended flood event so that homes and can avoid the devastation and uncertainty they experienced in 2011.

In Kansas communities such as Atchison, Elwood, Wathena, Leavenworth, and Kansas City, property owners were left to the mercy of elevated water levels for most of the summer. These waters caused undetermined amounts of damage to our state's flood control infrastructure as well as economic disruptions through extended road closures. In my meetings with city and county officials in Kansas, it was made clear to me that water management practices should be improved to avoid future flood events such as what occurred this spring. While the state of Kansas fared better than many of our neighbors, the threat posed from the damage caused by extended elevated water levels persists. A levee failure on the Kansas side of the Missouri River would have led to devastating circumstances from which many communities would not have been able to recover from. The fear and anxiety displayed by Kansas residents was very real and very understandable. I share their concerns and I ask my colleagues in Congress to address these issues by establishing a set of standards that will create a safe environment for living and working along the Missouri River.

As a result of this year's weather, the Missouri River Basin achieved a set of new water volume data points in the spring and summer of this year. I strongly encourage the USACE to quickly incorporate this new data into their Master Manual so that new protocol can be established and implemented prior to the start of the 2012 season. The assessment and repair phases to be undertaken in the coming weeks and months must prioritize damage resulting from this summer's flood event in order to protect homes and businesses along the river. I would ask the USACE and their regional partners to convey to Congress, in specific terms, what resources they need to achieve their most important goal of protecting life and property. Specifically, we should explore whether the Corps should be given flexibility to transfer funds between accounts to fully address the damage caused by the 2011 floods.

The Missouri River is an economic driver for the millions of Americans living and working in the basin. Congress, alongside the USACE, must make certain that every avenue is explored so that the events of the summer of 2011 are not repeated in the future. I thank the USACE for keeping me and my office informed of the events and I look forward to their continued cooperation as we modify and improve our river management systems.

I thank you again for the opportunity to address the committee and its witnesses.

Oct. 18, 2011

Hon. BARBARA BOXER, *Chair*,
Hon. JAMES INHOFE, *Ranking Member*,
U.S. Senate Committee on Environment and Public Works

Statement Submitted for the Record by Dr. Nicholas Pinter, Professor, Southern Illinois University for Hearings Entitled "A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems," before the Senate Environment and Public Works Committee, United States Senate, Washington DC, October 18, 2011.

Thank you Chairman Boxer, Ranking Member Inhofe and Members of the Senate Environment and Public Works Committee for holding these hearings and for the opportunity to provide these comments for the Committee's record.

Madam Chairman, I am Nicholas Pinter, Professor of Geology and Environmental Resources and Policy at Southern Illinois University at Carbondale. In that capacity, I also serve as Director of the National Science Foundation-funded interdisciplinary doctoral program in Watershed Science and Policy. My research group has been working for more than 15 years on issues of river dynamics, flood hydrology, and floodplain management on large rivers in the U.S. and worldwide. Flooding this year again struck close to home, with all-time record flood peaks and extensive flood damage in the communities I serve along the Mississippi and Ohio Rivers of southern Illinois.

The spring and summer of 2011 have seen a sweeping range and number of disasters across the U.S. Flooding, in particular, has caused widespread damage along the Mississippi and Missouri Rivers as well as on rivers in New England and the Mid-Atlantic regions, and elsewhere in the country. These damages occurred despite past histories, studies, and measurements of flooding that span many decades to centuries and despite massive long-term investment in structural flood control and flood-risk mitigation in many areas.

A wide range of structural as well as non-structural flood-control strategies have been employed across the U.S. Although sometimes portrayed as systematic nationwide strategy, modification of our rivers and floodplains more typically represent a series of *ad hoc* experiments. The 2011 flood – and indeed every large U.S. flood – has shown that some of these experiments have been successes and some have been failures. Floods will strike

repeatedly in the future as they have this year and in the past, and how the nation fares depends very much on careful, objective, and critical evaluation of both the successes and failures during each and every flood.

When looking at the Mississippi, Missouri, and many other trunk rivers of the U.S., it is important to understand that these river systems have been so fundamentally altered that they are essentially man-made constructs. Their morphology and hydrology have little resemblance to those same rivers 100 to 200 years ago. Their channels have been narrowed to half or even a third of their natural size. Floodplains once tens of miles wide are now straight-jacketed into as little as one tenth of their original widths. My research group has compiled the largest database in the country, systematically documenting these changes for over 2500 miles of the Mississippi and Missouri and other rivers back in time 100 to 150+ years (a database now served up to all interested researchers by the U.S. Geological Survey). Strikingly, but perhaps not surprisingly, modern floods on these heavily modified rivers strongly and closely reflect the history and pattern of river and floodplain modifications – in places for the better, and elsewhere for the worse.

The focus of research in my lab for more than a decade has been to deconvolve the factors that make flooding larger or less severe, more or less frequent, and more damaging or less so over time. Such factors include storage of flood waters behind dams, runoff changes due to climate shifts and/or land-use change, floodplain protection by levees and floodwalls, changes in channel efficiency due to river navigation engineering, as well as broad questions regarding floodplain infrastructure and development. This research has been the subject of dozens of peer-reviewed scientific papers, but I will skip those details in favor of a few lessons clearly exemplified by the 2011 flooding.

One of the successes of the 2011 flood was the performance of the Lower Mississippi River flood-prevention system. The Lower Mississippi system was designed after catastrophic flooding 1927 by Gen. Edgar Jadwin, Chief Engineer of the U.S. Army Corps of Engineers. The “Jadwin Plan” raised and strengthened levees, added flood-control reservoirs on tributary streams, and designed bypass floodways. The mainline Mississippi levees constructed after 1927 were a major engineering success in 2011, holding even in areas where floods topped 1927 and 1937 record crests. The floodways designed by Jadwin also were successes during the 2011 flood. These floodways lowered flood levels by several feet and spared the population centers they were designed to protect. But unlike in the Bonnet Carre floodway, residents within the Birds Point-New Madrid floodway have built new structures, sought new development, and agitated and litigated against utilization of the floodway for its designed and authorized purpose. Birds Point residents and Missouri politicians have successfully pressured the Corps to wait longer and longer before activating the system, and flood levels in 2011 reached nearly 7 feet higher than Jadwin’s original design and >1.7 feet higher than the current legal activation level before the Corps

crevassed the fuse levee at Birds Point to save Cairo, IL and other communities up to 40 miles upstream and downstream.

In contrast to river design and engineering on the Lower Mississippi, a sweeping failure was apparent upstream as the 2011 crest approached Cairo, IL. On that stretch of the Mississippi, the Corps has constructed thousands of river "training" structures to facilitate barge traffic. Those structures have had the unintended effect of raising flood levels up to 15 feet – an effect confirmed by extensive scientific research in the U.S. and internationally but denied by local Corps engineers who built these structures. Over 40,000 feet of "wing dikes" and "bendway weirs" were added to the river in the three years prior to the great flood of 1993 alone, contributing significantly to record crests in 1993, 1995, 2008, and again in 2011. The Corps continues to build new "training" structures today. The U.S. entrusts the management of U.S. rivers to its Army engineers, but this organization has a documented history of sometimes denying its own mistakes. By trumpeting both successes and failures as triumphs, regardless of their outcome, the Corps unfortunately guarantees that U.S. river management fails to improve over time.

Looking forward, climate research tells us that we need to prepare for even more intense precipitation in the future. When climate research in The Netherlands predicted a 12.5% increase in flood volumes later in the 21st century, the Dutch government responded with an aggressive and forward-thinking policy of "Room for the Rivers," investing heavily in giving rivers more room to safely convey flood flows. At present, the U.S. remains on the opposite path – continuing to constrict our river channels and allowing steady encroachment onto our floodplains. In a 2005 paper in the journal *Science* entitled "One step forward, two steps back on U.S. floodplains," I discussed how, within 5-10 years after the great Midwestern floods of 1993, floodplain construction had renewed with a vengeance, including over \$2 billion in new infrastructure built in the St. Louis area alone on land that was under water in 1993. Despite safeguards of programs like the National Flood Insurance Program, local political and development interests manage to circumvent the spirit and often the letter of the law, leaving U.S. taxpayers on the hook for spiraling flood damages in the future.

But 2011 has brought signs of hope even on the seemingly intractable question of floodplain development. Near the confluence of the Mississippi and Ohio Rivers in southernmost Illinois, the town of Olive Branch was catastrophically flooded when its levee failed on May 2 of this year. The Olive Branch area has a population of just over 800 and is located in one of the most economically depressed areas of the state. After its levee broke, Mississippi River water swept in and inundated over 200 structures, many 6 feet deep or deeper. As of today, many of those structures remain uninhabitable, businesses have closed, mountains of sandbags litter the landscape, and many residents are still living with friends, relatives, and even illegally in the upper floors of condemned structures. Large

floods on the Ohio and/or Mississippi River have struck the area 19 times between 1844 and 2011, with the most severe flooding in 1927, 1937, 1973, and in 1993. This year, however, the residents of Olive Branch have pulled together and said, "enough is enough." The community has resolved to relocate to an all-new town site entirely up and off the floodplain. Southern Illinois University has been working with Olive Branch to plan its relocation and navigate the many bureaucratic, social, and economic hurdles that stand in its path. The grassroots support within the community has been remarkable, with over 90% of local property and business owners signing up for the Olive Branch buyout application to FEMA (an application with a benefit-to-cost ratio well above 5). Olive Branch is seeking to re-energize a process that has seen limited progress, and none at this scale, since the town of Valmeyer, IL moved off the floodplain in 1993. Valmeyer is 2 hours up the road, and its residents and leaders have been helping Olive Branch this year. Against a national backdrop of politicians and big-money developers putting ever more at-risk infrastructure onto floodplains elsewhere, these small town residents and leaders are doing the right thing, making "room for the river" and saving U.S. taxpayers the substantial costs of repeated disaster payouts. Olive Branch still faces numerous challenges in its plans, but its community spirit and common-sense wisdom about flood risk point to the correct future path for the U.S. as a whole.

Thank you for considering these concerns and recommendations.

Sincerely,

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Director, Watershed Science and Policy Program
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Sam Brownback, Governor

**Before the Committee
on Environment and Public Works
October 21, 2011**

Dear Chairman Boxer and members of the Committee on Environment and Public Works:

I would like to thank you for this opportunity to provide written testimony for the record of your hearing regarding the review of the 2011 Missouri River flooding and our concerns about the Corps current and future abilities to manage the Missouri River system for effective flood control. I am the Director of the Kansas Water Office, which serves as the water-planning agency for the State of Kansas. The Kansas Water Office has been involved with a review of the damage, problems, and lessons that can be learned from the 2011 Missouri River flooding.

On Monday, October 14, officials with the United States Army Corps of Engineers declared the devastating, historic flooding along the Missouri River had ended. The flooding, which began to impact Northeast Kansas in late June, impacted homes, farmland, businesses and entire communities. Bridges and highways were closed, forcing long and costly detours to deliver goods, provide emergency response, and even allow citizens to go to work. Nearly three months of flooding that preceded that Corps announcement left Kansas and other states with concerns over how the Corps handled this summer's flood event and the Corps ability to handle flood events in the future.

Kansas has concerns about how individuals, businesses, and local governments can recover from the historic flooding. Farmland along the flood zones has been extensively damaged by the long inundation. Farmers report deep craters in their land from the continual washing of the river. The costs to individual farmers to rehabilitate these lands are prohibitive.

In a time of low tax revenue, local governmental units are forced to find funding for repairs. On September 12, 2011, the Kansas City Business journal published a preliminary damage estimate for Leavenworth County Kansas that exceeded \$4 million. Kansas, and other states, face high costs to repair, replace, or duplicate what the river took away in 2011.

However, far more critical is how the Corps managed and responded to the flooding and how they will learn from 2011 to better manage flood events in the future. The governors of several states have formed a working group to work to improve river management. Kansas Governor Sam Brownback joined with the Governors of five other states along the Missouri River to ask Congress to implement an immediate and comprehensive review of the Corps actions. Kansas believes that an independent review would allow the Corps to be address issues more deeply and be better prepared in the future.

October 21, 2011
Page Two

Predicting water levels along the lengthy Missouri River is not easy. However, higher than normal snowpack prior to the 2011 floods should have been an indicator of the potential for greater than normal water levels following spring melt. Climate forecasts indicate similar large snowpack is expected in the coming year. The Corps implementation of the Master Water Control Manual of the Missouri River must take into account past experience and current technological advances to insure better protection of our citizens and property. There are concerns that, if potential flooding is not managed more effectively, the events of 2011 will be replayed in the summer of 2012.

We ask that this committee support the states call for a high level, independent review of the Corps response to the 2011 flooding. Kansas has already sent information to the members of our Congressional delegation, seeking their support for a review of the Corps actions. Such a review will not only assist the states, but will allow the Corps to better manage the Missouri River system in the future.

Sincerely,

A handwritten signature in black ink that reads "Tracy Streeter". The signature is written in a cursive, flowing style.

Tracy Streeter
Director
Kansas Water Office



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**Statement on the Mississippi and Missouri River Flooding
Senate Environment & Public Works Committee
October 18, 2011**

Chairwoman Boxer and members of the Committee,

On behalf of The Nature Conservancy, I appreciate the opportunity to submit a statement for the record concerning the historic flood events experienced this year on the Mississippi and Missouri Rivers. The Nature Conservancy is a non-profit organization dedicated to the conservation of biological diversity. Our on-the-ground conservation work is carried out in all 50 states and over 30 foreign countries and is supported by approximately one million members.

Lives and livelihoods continue to suffer because of the epic flooding on the Mississippi and Missouri Rivers earlier this spring. We at the Conservancy hope all those affected are able to recover as quickly as possible. We also hope this flood will bring about changes that reduce losses and suffering when the next flood occurs.

Opportunities exist to re-think how we manage these two great rivers that are vital to our nation's many needs, including agriculture, commerce, power, recreation, and sources of clean water for all of us, including the fish and wildlife that inhabit them. The Nature Conservancy supports the idea that improved flood risk management is a primary concern affecting all of these interests.

We think the way to achieve better management of flood risk is to become both more comprehensive and more flexible in our approach. Being more comprehensive includes combining flood protection and planned flood storage (reservoirs and floodplains) to provide room for the rivers to adequately pass flood flows. Being more flexible includes managing our reservoirs and using our floodplains to enable the system to operate differently depending on the size of the flood. Increasingly dynamic weather patterns, such as those which took managers of this system into uncharted territory this past spring and summer, suggest comprehensiveness and flexibility will need to become core operating principles.

The floods have shown us we cannot adequately control potential flood events through engineered infrastructure that does not also employ the wise use of our natural infrastructure, particularly floodplains. As was the case this spring, larger-than-planned-for floods can overwhelm engineered river systems, no matter how well designed or operated. The true cost of relying solely on dams and levees is becoming increasingly apparent. If we deploy a more comprehensive set of approaches -- one that includes the strategic reconnection of floodplains -- we can maximize the billions of dollars we've invested in infrastructure and reduce rebuilding costs in the future.

As we move forward in the recovery from these devastating floods, in addition to traditional methods, the committee should include in overall funding -- and encourage the employment of -- environmentally sound non-structural flood reduction measures where appropriate. In the long term, such a balanced approach can prove not only more effective at reducing risk, but also the most efficient use of scarce financial resources.

How can we improve the operation of these river systems? We must create incentives for affected landowners to collaborate with our federal agencies in building a state-of-the-art approach to flood management that involves:

1. Redesigning some levees and/or moving them farther from the river's channel. This provides more storage which lowers flood levels, reduces pressure on levees elsewhere, and helps carry the water downstream more safely.
2. Identifying and preparing to use floodplain areas that can be flooded with minimal damage. These areas also recharge groundwater, filter excess nutrients and sediments, and create additional habitat for waterfowl and fish.
3. Creating compensation funds for landowners whose land floods for the benefit of others.
4. Helping people who want to move out of harm's way and working to ensure new development in floodplains is "flood compatible."

While these floods are still fresh on our minds and while we are proceeding with short term repairs, we should also design and include in funding proposals cost-effective, long-term solutions to flooding that use non-structural tools to supplement and enhance engineered flood protection. We encourage you to fully evaluate the cause of this year's flooding and to develop plans for the Missouri and Mississippi Rivers that take into account the multiple values of the rivers and their floodplains. By taking a more comprehensive approach we can ensure that these multiple values are protected while better ensuring the safety of the people and businesses in the river corridors.

Again, thank you for the opportunity to comment, and please do not hesitate to contact me with any questions at: rbendick@tnc.org.

Sincerely,



Robert Bendick
Director of U.S. Government Relations

The Great Flood of 2011
Narrative by Brad Lawrence

The Great Flood of 2011 will go down in history as one of the most devastating natural disasters of all time. The following narrative depicts the key events that shaped my perception of the flood from a Fort Pierre, SD perspective. I want to provide a little background about the author. I am a graduate Mechanical Engineer from the South Dakota School of Mines and Technology. I have worked in the engineering field for a little more than 17 years. My focus has primarily been pavement, water, sewer and electric infrastructure associated with public works.

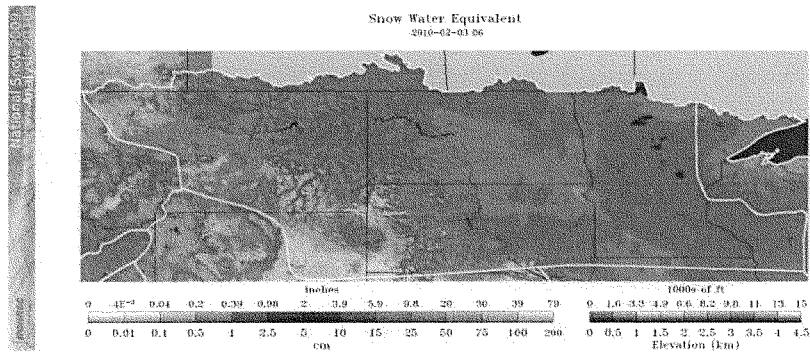
My first exposure to the possible threat that loomed due to the Missouri River came in the spring of 1997 (200% of normal flow year). Heavy plains snowpack had accumulated during the winter as a result of several strong blizzards that plagued the plains states that winter. As a result, the runoff from the plains snowpack filled the main stem reservoirs to near capacity in early April. This caused the US Army Corps of Engineers (Corps) to open one of the powerhouse bypass tubes in the Stilling Basin. Lake Oahe peaked less than two feet from maximum pool that year. The higher than normal discharges ran through the majority of the summer. This led to the observation that the plains snowpack can create a significant amount of runoff.

Since that first exposure, I have monitored and been intrigued by the amount of plains snow that has accumulated and the runoff associated with it. In 2009 I witnessed Lake Oahe raising five feet in seven days. That was an astonishing event considering we were just coming out of a nearly decade long drought. I again watched in 2010 as the combined runoff of the plains and mountain snowpacks converged to fill Lake Oahe to nearly the same elevation as it was in 1997. The very interesting thing about this was that the system had nearly 3 million acre feet (MAF) carry over drought storage that year to keep the lakes inside their maximum pools.

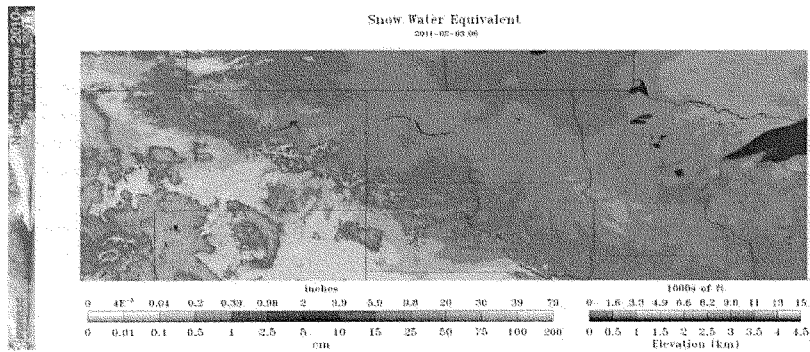
On February 3, 2011 I was asked to speak at the South Dakota Rural Water Managers Meeting in Fort Pierre. At that meeting some questions came up about the amount of snow on the plains and the anticipated runoff. I offered my opinion that the entire upper United States was primed for flooding. This included nearly every major river system east of the Missouri River and I included the Missouri river at that time. The reason was that the Corps had failed up to that point to remove the necessary water to reach the multiple use flood control storage requirement. That storage is required on March 1, 2011 the start of the runoff year. At that time, the Corps was 100,000 acre feet shy of the minimum required flood control pool.

On that same day I sent an e-mail (Ref. 1) to Kevin Morely with the American Water Works Association who is the coordinator the National Water and Waste Water Agency Response Network (NationalWARN) in Washington, DC. In that now infamous e-mail I warned of the increased possibility of (biblical) flooding across the entire upper plains east to the East coast. My intention was to warn the downstream states that the odds of a flood occurring this year were substantially increased. The reason for issuing this warning was to bring attention to the extreme amount of water stored in our plains and

mountain snow packs. At that time, the plains snow pack contained about 3.1" of water. This was according to the National Weather Service's (NWS) National Operational Hydrologic Remote Sensing Center (NOHRSC). This first pictograph shows the plains snow pack in 2010, when the total annual Missouri River runoff was determined to be approximately 150% of normal. The snow water equivalent on February 3, 2010 was listed at 2.4". The key thing to note here is where the higher concentrations of snow fell. The lighter colors of pink indicate more water. The higher concentrations were east of the Missouri River basin.



This second pictograph shows the snow water equivalent for the same date in 2011. As you can see there is much more pink on the western plains and the pink is covering much more of the Missouri River Basin.



I should note that comparing just one day from one year to the next can be misleading since one good snow storm or one good melt might bias the total amounts significantly. I compared day over day for

the entire month of January prior to this date to determine that this was a trend and not an isolated occurrence.

So our 3.1" compared to the 2.4" of snow water equivalent, yields a 129% increase over 2010 which was 150% of normal runoff. If you assume that the 2010 runoff was due to equal parts of mountain and plains snow pack, then the anticipated total annual runoff on February 3, 2011 was 194% of normal or a nearly 50% increase of normal over the previous year.

I also was looking at the two mountain snow packs that contribute runoff to the Missouri River Basin for water content. They were 7.4" in the Northern Rockies in 2010 compared with 9.3" in 2011 on that same date. I also had looked at the trend for these areas and they were consistent. In the Central Rockies it was similar with 3.3" in 2010 and 5.2" in 2011.

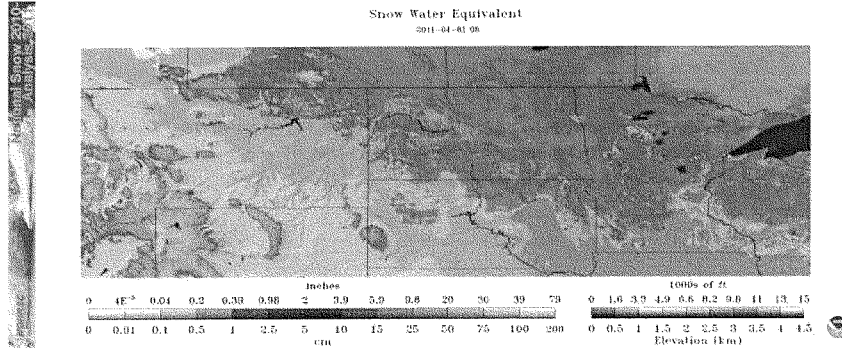
So any way that you look at it, we were in for a substantial increase in the amount of runoff in February of 2011 over the large runoff of 2010.

When I sent this information to Kevin Morely, he disseminated it to two federal agencies, EPA and Homeland Security. The information also was sent to all 50 state WARNs for their use and information. We did not try to hide this information. I did not send this information to the CORPS, as they (should) have a legion of people looking at this same or better information.

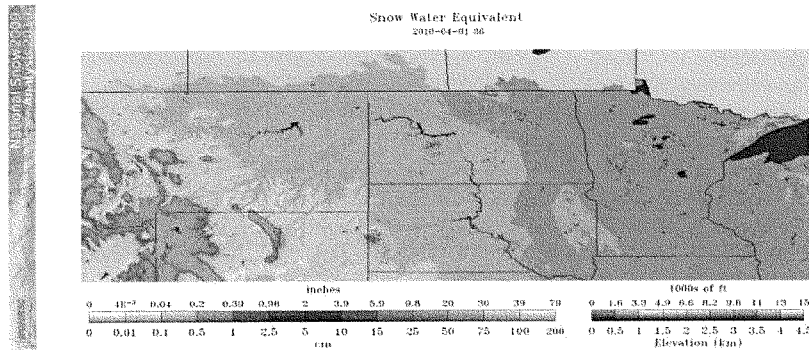
On February 22, 2011 the NWS issued its Spring Flood Risk Forecast. In that forecast the predictions by the NWS mirrored the statements in my February 3, 2011 e-mail. The only difference was the NWS didn't mention any increased risk for the Missouri River at that time.

During the month of February 2011 there was a significant melt that occurred. That melt ran off into the system and reduced the already below standard flood control pool by another 700,000 acre feet by the critical March 1, 2011 storage check. That means we entered the runoff year 800,000 acre feet below the required (Master Manual) flood control storage total of 16.3 million acre feet (MAF).

As I tracked this trend in snow water equivalency it increased consistently as we went farther into the spring months. This following pictograph shows the SWE for the plains snowpack on April 1, 2011. This is the date that the Corps chief of the Reservoir Control Center (RCC) claimed that the plains snow pack was overestimated and that the mountain snowpack was "nothing to write home about." The plain's SWE was 1.5" on that date or nearly 50% of the total on the ground on February 3, 2011. Note the significant light pink shades by Lake Sacagawea and just north and east of Fort Peck Reservoir. That water runs off into the Missouri River System.



As you can see from the following pictograph, contrast this to the plains snowpack for 2010.



The SWE totals for the “nothing to write home about” Northern Rockies and Central Rockies snowpacks on April 1, 2011 were 14.4” and 7.1” respectively. On April 1, 2010 those same SWE’s were 8.4” and 4.3”. I won’t even do the math as it is very easy to see the marked difference between 2010, a 150% runoff year, and the 2011 totals. Obviously nothing to write home about!

We prepared in earnest for spring flooding. We sought out sandbag suppliers, faster filling methods and started planning for what appeared to be a long term flood event with a magnitude of around 85,000 to 100,000 cubic feet per second (CFS). It would have been a minor flood and one that would be fought with sand bags and minor storm drain work.

I received a call from Eric Stasch with the Oahe Project office on May 18th. He said that the Corps was anticipating trouble with holding back all the runoff from particularly heavy rains in Montana in the past week. He indicated that the Corps wanted to run the Oahe powerhouse at full capacity and partially open one tube in the Stilling Basin to achieve 60,000 cfs to see if we had any consequences from that

discharge. On Thursday the 19th, the Corps ran Oahe at 65,000 cfs for the entire afternoon. We didn't experience any problems.

On Monday May 23rd we were called to a joint meeting with the Corps, SD Office of Emergency Management personnel and local emergency management officials to include the two cities of Pierre and Fort Pierre. At that meeting the Corps announced that they felt they would need to increase the discharges from Oahe to 85,000 cfs in the near future. While at that meeting I had calculated and written in my notes that we would be at or above 110,000 cfs by June 10. I showed my prediction to Mr. Stasch and he asked how I came up with that number.

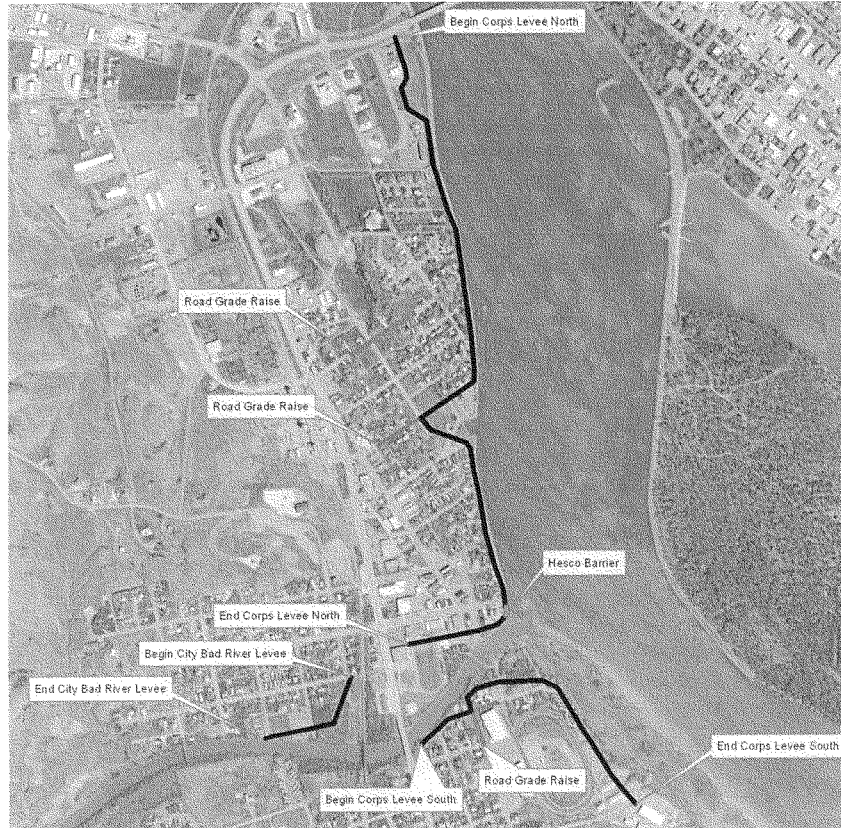
On May 24th at 5 PM we were called back again to another conference call with the Corps. The information they were disseminating was the latest flow prediction of 110,000 cfs. Our 100 year flood plain for the Missouri river was 70,000 cfs and would not have been that big of an event had it occurred. Now with a monster flood on the horizon, all thoughts shifted to how can we save our town.

For the first several days I didn't eat. I couldn't eat. It was all I could do to hold back the gag reflex. You see this was my hometown. This is where I went to school and graduated from high school. I knew early on that this was going to be a dance with the Devil. It would be proven just how difficult a dance it was going to be in a few short days.

On May 27th the Corps awarded a contract to construct protective measures for the cities of Fort Pierre and Pierre. The only issue was they left out all of Fort Pierre north of US Highway 14. The project started in earnest on Saturday May 28. The required completion date was June 1 at midnight. The project proceeded at an absolutely astonishing pace. However on date of award for the project we got the bad news that the levees would have to be increased another two feet to accommodate the newly anticipated 150,000 cfs discharges from Oahe. That was a cannon ball to the mainsail.

During this time we were working to increase the elevation of some of our roads that were inundated with water already. This effort provided a stable road network for the levee construction. Without the grade raises the task would have fallen short. We were simultaneously creating sandbag sites, providing elevation benchmarks for all areas along the river and providing as much information as possible to the public. There wasn't much sleep during this period, but I finally was able to eat.

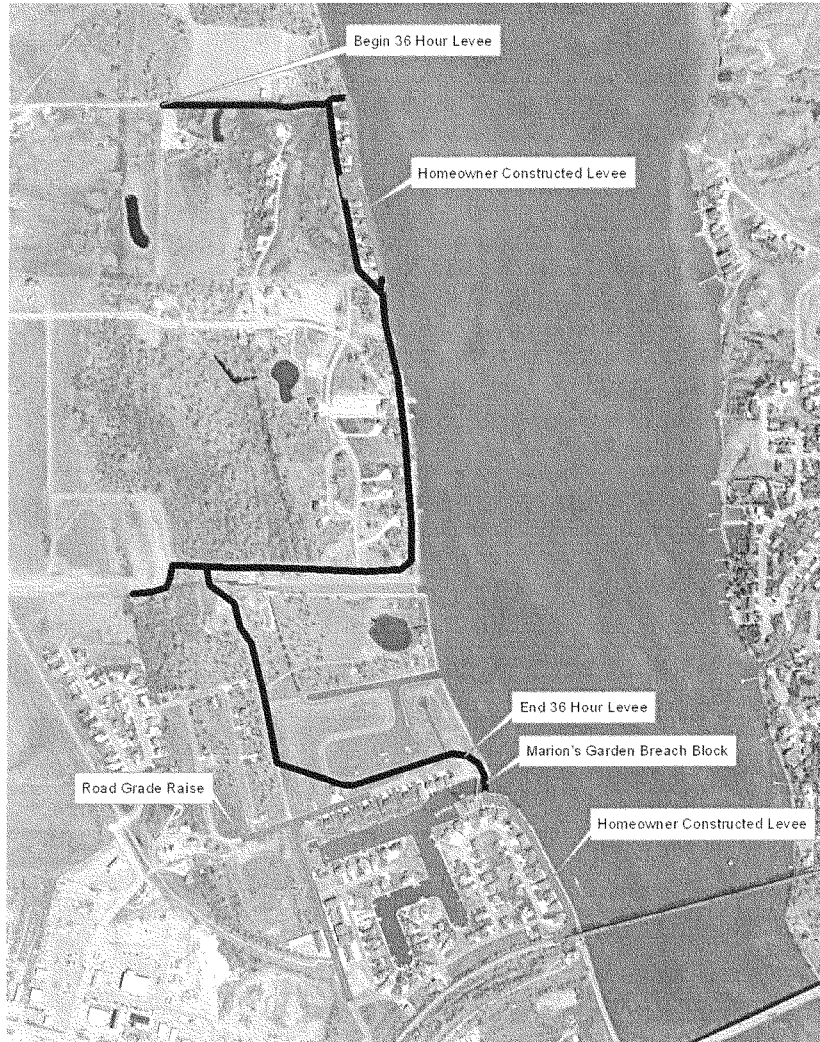
We received an incredible amount of support during these days from all over the US. People were donating food and having the local businesses bring it to us. It was incredible and very a humbling experience. There were days a person would wonder if we were worthy of such selfless and incredible support. We can never repay those that donated other than to pay it forward helping the next area of the nation that is in trouble.



There was one task that was still gnawing at us. That was how to protect the remaining half of the city left unprotected by the Corps levee. The main issue was plugging the three large canal breaches of the riverbank. The southernmost one was over 100' wide and fairly deep.

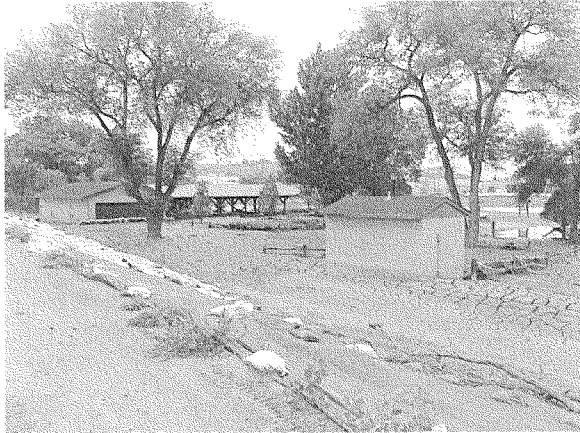
I worked with Scott Schweitzer from Brosz Engineering to devise a plan to capture as much of the northern segment of town as possible. We devised a plan to create a levee that would cover over half of the exposed area north of HWY 14. Simultaneously and unbeknownst to us was a plan being made by the Marion's Garden Homeowner's Association to plug their breach and build a levee along their riverfront. As that plan moved forward, we devised a plan and route to construct another 10,000' of levee. There were just a few issues: we didn't have any plans; second we didn't have time to go to bids; the water elevation was rising now every day and we had to race the water increases to completion.

We completed closure about hour 30 of the construction. It was a grueling task as 3,000' of the levee had to be constructed in sections of ground already underwater. By hour 36 we had made completion and were ahead of the water enough to take a short break. We returned and put a finish on the new levee system over the next few days.



While the levee system was being constructed, a pressing need for storm water pumping supplies and plans were needed. Brosz Engineering provided to us the plan to create 12 runoff basins and several more pumping sites. We used a 2.5" rain over a 24 hour period with high runoff coefficients as our base storm. Our first real test came when over 5" of rain fell in a little over 70 hour period starting on June 19th; so much for our plan. Our planning saved us by dictating where the largest amount of runoff would concentrate and where we needed to increase our pumping capacity the most. In the end we had 73 pumps and a monthly cost for storm water pumping of \$200,000.

That first large event triggered localized flooding due to storm water backup. This was compounded by the fact that not all of our 37+ storm sewers outlets into the river were plugged. We worked feverishly to plug the storm sewers and pump all the runoff from the massive rain out. Then it rained again on June 24th, only this time it was only about 2". This caused the Bad River to reach flood stage and start to leave the banks along the city of Fort Pierre. The river crested a little over bank full in the unprotected areas of Fort Pierre. The flooding left significant amounts of sediment in our park areas by the mouth of the Bad River.



Coincidentally during this same time, the Corps announced on their Friday June 17 5 PM conference call that they were increasing the discharges from Oahe to 155,000 cfs at 8 AM Saturday morning. They were then going to increase the discharge again on Monday morning to 160,000 cfs. This was an attempt to utilize the extra(?) storage available at Fort Randall Dam to keep a foot of free board on Oahe. The significant rains of June 19 through June 24 erased all hope that this tactic would work. The Corps abandoned the plan after only about 72 hours of running at 160,000 cfs.

Then on June 30 the hardest rain I have ever witnessed fell when over 2" of rain came down in less than an hour. For the third time in two weeks we were swamped. I was ready to quit. Between the increased discharges and the relentless rain we were beat. Mercifully the last significant rain fell on July 4th.

Things finally began to become what we termed "Flood Normal". We went about our daily lives working about 16-20 hours a day most of the time just keeping our heads above water. Finally the news came that the water would start to recede in mid August. There was a light at the end of the tunnel.

Since the drawdown began we have been working again at feverish pace. We are in a race with old man winter now. Levee removal is in full swing these days and so is the documentation phase with FEMA.

Many of us city workers were impacted either directly or through family members that were directly impacted by the flood. I had to evacuate my parent's home the week prior to the flood. I could see it coming and there wasn't going to be an opportunity to get their stuff out after the flood started. They came up to my house and lived there until late August when their home was reclaimed from the impact of flooding.

In summary the Corps is predicting a total runoff of around 60 million acre feet (MAF) or 220% of normal. If you take this flow and convert it to a 24 hours a day rate, it comes out to 82,877 cubic feet per second (cfs). What that means is that when winter operations are taken into consideration, we would have had to operate at something around the 120,000 cfs range for a long time to pass that much water. It would be longer than the 90 days we ran at 150/160 kcfs.

The real issue in my mind is that the Corps totally blew it when it came to understanding the amount of risk (water) the snowpacks contained. Additionally, because of that they never communicated what preparations and to what level were needed until it was too late. Earlier in my narrative when I reference the April Fool's Day e-mail that Jody Farhat sent out saying "it was nothing to write home about." She showed a total of lack of recognition of the pending disaster.

The other thing that is vitally important is that we were going to flood no matter what happened with the "Perfect Storm" in May up in Montana. Did it have an effect? Yes. But at the 160,000 cfs we were ultimately running, that "Perfect Storm" water passed through the system in less than 20 days. That leaves us to wonder what caused the rest of the 90 days of flooding; that was the mountain snowpack.

As I said in my narrative, we (I) were anticipating something in the 85-110 kcfs range for an event. I think the system could have been able to keep it in that range without the heavy rains in Montana. I haven't done any of the math to prove that out, but it seems that if we had that extra 3 to 5 MAF of storage, lost to the "perfect Storm" rains, coming into the mountain snowpack runoff; we could have reduced the peak amount by 25% or about down to 120,000 cfs. That would have put us in the 110,000 cfs range.

We also anticipated that the flood would become an issue in mid June rather than late May. The Montana rains did change the time frame for this event by moving it up earlier, increasing the peak flow rate and lengthening the duration of the event.

One other item that the Corps has read into my e-mail when I warned that the Corps would hold back waters due to downstream flooding is that I was talking about Mississippi flooding. In fact I only mention downstream. I did not limit it or otherwise indicate that it was the Mississippi that I was worried about. The Corps has indicated that they did indeed have concerns in the lower Missouri River basin during the

time that they should have been increasing discharges to keep pace with the plains snowpack runoff. It appears that the reference to the Mississippi River flooding is a red herring to throw us off the fact that they did indeed reduce discharges to avert flooding downstream.

In the end we may never know just what improvements could be made to the response. The reason is that the Corps response to the threat of flooding was so poorly conducted that drawing any plausible conclusions may prove impossible.

Respectfully Submitted,

Brad Lawrence
Director of Public Works

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Reference #1

I hear ya

Kevin M. Morley
Security & Preparedness Program Manager
American Water Works Association
1300 Eye Street, NW Suite 701W
Washington, DC 20005
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D: 202-326-6124
E: kmorley@awwa.org

Check out the new J100 RAMCAP Standard for Risk and Resilience @
www.awwa.org/j100ramcap

From: Brad Lawrence [mailto:bradl.cityftpierre@midconetwork.com]
Sent: Thursday, February 03, 2011 2:14 PM
To: Kevin Morley
Subject: Re: Monitoring WinterStorm Aftermath

Kevin,

You certainly may. I don't want to be a chicken little and claim that the sky is falling. I want to be a realist and notice that there is a large amount of snow to melt and runoff. I also wanted to point out to the states that missed this big event that they still have their bacon in the fire!

Thanks,

Brad

----- Original Message -----

From: Kevin Morley
To: Brad Lawrence
Sent: Thursday, February 03, 2011 12:59 PM
Subject: RE: Monitoring WinterStorm Aftermath

Excellent points Brad... Mind if I repackage this message while provide full credit to you?

Kevin M. Morley
Security & Preparedness Program Manager
American Water Works Association
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**Check out the new J100 RAMCAP Standard for Risk and Resilience @
www.awwa.org/j100ramcap**

From: Brad Lawrence [mailto:brad.l.cityftPierre@midconetwork.com]
Sent: Thursday, February 03, 2011 12:00 PM
To: Kevin Morley
Subject: Re: Monitoring WinterStorm Aftermath

Kevin,

I met this morning with the rural water managers in SD. One item of concern in the coming days/months is sandbagging supplies. I anticipate significant flooding from the Missouri River to the East Coast on nearly every significant river. This may be one for the record books.

I am including the Missouri River in that tally at this time. The Corps of Engineers has failed thus far to evacuate enough water from the main stem reservoirs to meet normal runoff conditions. This year's runoff will be anything but normal. This is compounded by the anticipated flooding downstream. The Corps will hold back water to help alleviate the downstream flooding; filling the reservoirs to capacity in the process. Once full, they will pass everything that comes in. In April 2009 the inflow to Oahe was 140,000 cfs. That would be a flood of biblical proportions here and downstream.

I would also anticipate that those states that are downstream and not affected directly by all this moisture will become affected when the runoff reaches them.

I will guarantee that the James River and Big Sioux River in SD will flood. The Red and James in ND along with many tributaries to the Missouri River will flood. Everything in MN including the Mississippi looks like it is primed to flood; especially the Minnesota River.

It looks like this most recent storm went right down the Ohio River Valley. That can't be good for that system.

There are some significant events that could preclude this and those are slow thaws with intermittent freezes and a general lack of precipitation for the rest of February and March.

So I would be working the flood preparation supply chain to see what is available and be ready. It is a high probability that a large scale flooding event(s) will occur this year.

Brad Lawrence <i>Director of Public Works, Chair SDWARN</i>	Historic Fort Pierre City of Fort Pierre 08 E 2nd Ave PO Box 700 Fort Pierre, SD 57532 tel: 605-223-7690 fax: 605-223-7693 mobile: 605-280-4988
bradl@fortpierre.com www.fortpierre.com	Want to always have my latest info? Want a signature like this?

----- Original Message -----

From: [Kevin Morley](mailto:Kevin.Morley)

To: hpsd@frontiernet.net ; [Alan Barefield](#) ; [Andrea Powers](#) ; [Arnold, Colleen](#) ; [Bieber, Steven](#) ; [Biederman, Terry](#) ; [Brad Brooks](#) ; [Brad Murphy](#) ; [Broussard, Don \(aitch2oh@lus.org\)](#) ; [Carr, Bill](#) ; [Chaplik, Tom](#) ; [Chris Taylerson](#) ; [Daniel Rayfield \(Danielrayfield@Prairieandwater.com\)](#) ; [Dougherty, Laurie](#) ; [Eric Meicher](#) ; [Gerwin, Steve](#) ; [Greg McKnight](#) ; [Howe, Mike](#) ; [Howlett, Rick](#) ; [Jacobson, Mike](#) ; [Jason Barrett](#) ; [Jim Brummer](#) ; [John Wiltrout \(jwiltrout@southbendin.gov\)](#) ; [Kelly, Scott](#) ; [Kirk Medina](#) ; [Lamb, Patti](#) ; [Lawrence, Brad](#) ; [Leslie Shurtleff](#) ; [Luther, Thad](#) ; [Lynch, Dan](#) ; [Mark Nicely](#) ; [Matthew Holmes](#) ; [McKenna, Johnna](#) ; [Michael Knox](#) ; [Michael Richardson](#) ; [Montressa 'Monty' Elder \(monty.elder@deg.ok.gov\)](#) ; [Morgan, Buddy](#) ; [Moulton, Pete](#) ; [Pat Credeur \(pcirwa@centurytel.net\)](#) ; [Pierson, Dale](#) ; [Randy Norden](#) ; [Riordan, Raymond](#) ; [Robin Halperin](#) ; [Schreppel, Connie](#) ; [Segal, Martha](#) ; [Sharon Williams](#) ; [Shaun Fielder](#) ; [Smith, Sandy](#) ; [Steve Shepard](#) ; [Stuhr, Michael](#) ; [Talley, Richard](#) ; [Ted Corrigan](#) ; [Titzmann, Paul](#) ; [Warnstaff, Clarence](#) ; [Wavra, Greg](#)

Sent: Thursday, February 03, 2011 8:34 AM

Subject: Monitoring WinterStorm Aftermath

I am sure many of you from Texas to Maine have your hands and bucket loaders full in the aftermath of this severe winter event.

I have not seen or been made aware of any specific WARN activations and/or responses. But just remember that there is a big family out here that is poised to provide assistance if called upon.

Please advise if I can be of any assistance in facilitating conference calls or making contact with other agencies to provide status updates etc as we have done in the past.

Kevin M. Morley
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E: kmorley@awwa.org

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American Water Works Association
The Authoritative Resource on Safe Water (R)

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IOWA · KANSAS · MISSOURI · NEBRASKA · NORTH DAKOTA · SOUTH DAKOTA

October 17, 2011

Dear Members of the US House and US Senate Missouri River Working Groups:

The Governors or their representatives of seven states directly affected by the Missouri River met in Omaha, Nebraska in August, to discuss our concerns with and issues related to the Missouri River flood control in the wake of this year's historic flooding and unprecedented flows. One of the outcomes of that meeting was a commitment to more direct high level involvement by the Governors and states in addressing issues that impact flooding on the Missouri River.

To this end, the Governors of Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming have formed a working group, to coordinate and actively address as needed matters pertaining to Missouri River flooding. We recognize that coordination will need to include both input to the U.S. Army Corps of Engineers (USACE) on potential actions to reduce flood damage from future high flow events and work with our congressional delegations to provide useful direction for Corps activities in our states. We look forward to working with you collectively on ways to provide greater flood protection in the basin, including sharing information between your bi-partisan Missouri River working group and our own.

At our August 19, 2011, meeting we discussed the need for an independent review of the 2011 Missouri River flood and actions taken by the USACE. We request that Congress consider conducting a high-level, independent review of the Corps' actions as they pertain to the 2011 Missouri River flooding. Specifically, was the Annual Operating Plan (AOP) and Master Manual followed and could different actions have been taken under the AOP that would have reduced flooding impacts in the basin? In addition, we encourage such a review to examine if recent USACE budgeting allocations have aligned sufficiently with the prioritization on flood control.

There is clear consensus from seven of our states that flood control must be the highest priority in the operation of the Missouri River Mainstem Reservoir System. We plan to work closely with the USACE to see that levees are assessed and repaired in a timely manner that minimizes the potential for future damages.

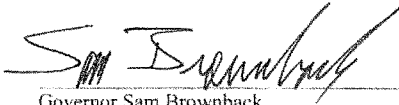
We met with USACE again today, October 17, 2011, and discussed the 2011-2012 Annual Operating Plan, levee repair, other recovery efforts, and future flood risks.


We look forward to working with you in the future and would appreciate any input you may have regarding this important issue. Thank you.


IOWA · KANSAS · MISSOURI · NEBRASKA · NORTH DAKOTA · SOUTH DAKOTA

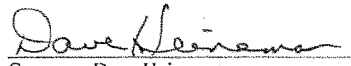
Sincerely,


Governor Terry E. Branstad
Iowa


Governor Sam Brownback
Kansas


Governor Jack Dalrymple
North Dakota


Governor Dennis Daugaard
South Dakota


Governor Dave Heineman
Nebraska


Governor Jeremiah W. (Jay) Nixon
Missouri

Prepared Testimony of Jeff Dooley, Manager, Dakota Dunes Community Improvement District
for Senate EPW Hearing on 2011 Floods

October 18, 2011

The Missouri River corridor experienced extreme flooding during the summer of 2011. The flooding was created by unprecedented releases from all the Dams along the Missouri River Basins operated by the US Army Corps of Engineers. Previous record releases were more than doubled for an extended period of time – from Memorial Day through late August early September. To put it into perspective, the previous record release from Gavin's Point (the southernmost dam) was 70,000 cubic feet per second (cfs). The releases from Gavin's Point Dam, which is the last Dam on the Missouri River System reached peak 160,000 cfs and those releases were sustained for more than a month before they were gradually decreased. This created a 500 year flood event for much of the Missouri River Corridor from Memorial Day through mid to late August.

The Corps has indicated that these high flows were a result of above average snow back in Wyoming and Montana, later snow melt than unusual and above average rains in the upper Missouri Basin (Wyoming and Montana). The Corp acknowledged as early as early January 2011, that the snow pack that feeds the Missouri River was 16 percent above normal. As late as May 10, the Corps indicated to me that, assuming normal runoff moving forward the reservoir system could be managed by slightly above normal releases. However, large amounts of rain in May created a crisis situation. On or about Tuesday, May 24th, the Corps announced releases would go as high as 85,000 cfs. Over the course of the next 7 to 10 days, the Corps announced ever increasing and unprecedented releases from Gavin's Point (along with all other dams on the Missouri). The 85,000 cfs went to 110,000 cfs then to 130,000 cfs then 150,000 and ultimately reached 160,000 cfs. These extreme, rapidly changing and short notice releases made it very difficult to prepare preventive measures and to get people out of harms way.

My name is Jeff Dooley and I am the Manager of the Dakota Dunes Community Improvement District, which is the local government in Dakota Dunes. Dakota Dunes is a small community (population 2,700) on the extreme southeastern corner of South Dakota. As all of other communities along the River, Dakota Dunes took extreme preventive measures to save infrastructure, property and lives. As of October 14, 2011, Dakota Dunes has had to spend over \$12 million in temporary levee construction, levee maintenance storm and sanitary sewer plugging, and pumping not to mention the removal of levees, the repairing of street, sewers and other infrastructure. We still have not fully recovered from the damage created by these unprecedented releases.

In addition to the cost of the preventive measures, more than 450 homes in Dakota Dunes had to be evacuated for the summer. While we were successful in maintaining the levee system

and keep the river from running through our community, ground water caused by the releases caused untold amount of damage within our community and forced people from their homes.

When you live along a river you can expect some flooding, but when that river is controlled by a series of dams operated by the US Army Corps of Engineers, you might expect a little less extremity. It has been indicated that these extreme releases were due to series of natural occruances over the course of 2010 and 2011, but to have to exceed the previous record by 128 percent and have to maintain this flow for two to three months, seems beyond the margin of error that should be allowable.

I am extremely concerned with how the Corps models their release schedule, the priorities under which they are expected to operate within the Corps Operating Manual for the Missouri River System and the data they use for their models and projections. Are they using the most updated topographical information, river cross sections and weather information?

The summer of 2011 will be ingrained in the memory of everyone who lives, works or farms along the Missouri River. This event (500 year event) has changed people's lives forever. Due to good fortune and the protective measures we undertook, my personal property was not damaged by the flood. But, as the Manager of the community I had to witness the distress caused by this event as my friends and neighbors were asked to leave their homes behind. This cannot happen again. We need to find out if and why these extreme releases were necessary and recognize or admit what could or should have been done to prevent it. Again, in a controlled river system there has to be an expected margin of error, but this year's releases far exceeded any reasonable expectation of those margins.

Respectfully submitted,

Jeffery D. Dooley, Manager
Dakota Dunes Community Improvement district

Date: 10/13/11

Testimony for the US Senate Committee on
Environment and Public Works

October 18, 2011

Mayor Laurie R. Gill

Pierre, South Dakota

Thank you Mr. Chairman.

South Dakota is the home to four of the Missouri River's six main stem dams, and our citizens have given more than any other jurisdiction in its efforts to prevent disastrous flooding. Thousands of acres of our richest farm lands were taken from us to construct the Missouri River's four main stem dams and entire communities were relocated. Our residents sacrificed much to prevent flooding not only within our state, but to protect residents and businesses all along the Missouri and Mississippi rivers - from South Dakota to the Gulf of Mexico.

Almost ironically, thousands of South Dakota residents are now recovering from a disastrous flood which these dams were designed to prevent. In the wake of this tragedy, one can't help but asking, "How did this happen?"

- Did management or mismanagement of those dams contribute to the flooding?
- What was unique about this year's runoff and subsequent rainfall?
- Did political influences affect the U.S. Army Corps of Engineers' Missouri River Management Plan and did it contribute to this flood?
- Most importantly, what should Congress do in the future to assure this NEVER, NEVER occurs again?

South Dakota's state capitol, Pierre, was heavily impacted by flooding. I was notified of possible flooding on Tuesday, May 24, 2011. The following afternoon,

waters from the Missouri River were spilling out of their banks and within a few short days, the city was impacted by significant flooding.

Unlike a traditional flood, which crests and then quickly recedes, residents in Pierre and other South Dakota communities endured an entire summer of flooding. In fact, the waters that spilled into our communities on Memorial Day weekend did not begin to recede until Labor Day weekend.

As the Mayor of Pierre, I lived the nightmare. My staff and I worked non-stop throughout the summer to prepare for flooding, combat the flooding and eventually recover from the flooding. Continuous challenges were met and addressed including: constructing protective levees with only a few days' notice; plugging storm water sewers to prevent flooding within the levees; pumping every drop of rainwater that fell in Pierre; constantly monitoring and repairing levees; sandbagging and monitoring critical infrastructure including drinking water wells; and the list goes on and on. This was a way of life for more than three months and the recovery will last for years.

Like most people in South Dakota, I have many questions related to this disastrous event. But I have only one wish ... that flood like this NEVER, NEVER occurs again.

I would like to submit this testimony on behalf of myself and the Pierre City Commission. I believe I echo the thoughts of those of residents up and down the Missouri and Mississippi rivers, regardless of their state residency, political affiliation or socio-economic status.

It is easy to blame others when misfortune affects us. This blame is even easier to place when questions go unanswered and common sense management is not observed.

The U.S. Army Corps of Engineers has taken a great deal of blame for the summer-long flood that affected Pierre and other communities along the Upper Missouri River Basin. Whether this blame is justified remains to be seen, but people have many questions and they are fearful that similar events will occur in the future if these questions are not answered today.

Throughout the years, Missouri River management has gone through many changes and been the center of many struggles. These struggles have been largely the result of competing interests between upstream and downstream states. These interests include, but are not limited to:

- Recreation
- Hydroelectric power generation
- Domestic water needs
- Navigation
- Irrigation
- Fish and wildlife
- Water quality; and of course
- Flood control

All of these interests were described in the 1944 Flood Control Act. They are as much a part of our political landscape today, as they were those days preceding World War II, but there is one reality ... the act's primary purpose was flood control.

As time has passed, however, the importance of flood control has become increasingly diluted. Flood control now competes with all of these special interests and the health and welfare of people living along the river's edge is often an after-thought.

Each time the Corps is directed to manage the Missouri River for these special interests, we grow further and further away from protecting upstream and downstream communities. And each time the Corps places a higher importance upon endangered species, a minimally important barge industry or simply political

pressure ... we move closer to devastating events like the one we saw this past summer.

Let's talk about flood control and what it means to communities along the Missouri River.

The Oahe Dam is located just five miles upstream from Pierre. The large, earthen structure gave reassurance to those living downstream and most residents were filled with a false sense of security. Among those who placed their faith in the Oahe Dam were lenders and insurance companies who did not require residents along the Missouri River to carry flood insurance. Today, most of the destroyed homes and businesses beneath the dam were not insured for flooding.

The story from Pierre is not unique. Homes, businesses and fertile lands were destroyed from Glasgow, Montana to New Orleans, Louisiana. It is unprecedented that so many communities were impacted by flooding. With this in mind, we must ask ourselves, "Why did this happen? What was different about our river's management and the water flowing through our communities?"

These are things we know:

- The Rocky Mountains received a large amount of snow and run-off was much higher than normal. This is something we knew early in the winter and many expected the basins to fill more quickly. We also know an unprecedented amount of precipitation fell in throughout the Upper Missouri River Basin in May. These figures are available to all of us and I don't believe anyone will challenge the information.
- We also know that Pierre residents were given less than one week to prepare for this unprecedented runoff into the Missouri River. Water from the Missouri River left its banks less than 24 hours after our initial notification of potential flooding.
- We know the projected water elevations and discharge rates changed on a daily basis. In one case, the projected flood elevation changed three times

in one day which created significant challenges for those attempting to protect their homes and businesses.

- We know that a preliminary cost estimate to repair our city's damaged streets, sanitary sewers, storm sewers, water wells, parks, and electrical systems will exceed \$16 million. This is only an estimate and costs may be much higher following our winter freeze and thaw.
- We know the flood of 2011 has devastated many of our local businesses. Some of them will never reopen and others will incur losses that may take years to recoup.
- We know the tremendous damages that were inflicted upon more than 300 homes in Pierre. Many residents remain temporarily displaced from their homes and many others will never return.
- We know the tremendous investment our state and communities have made ... and will continue to make ... in preparing for, managing, and now recovering from this terrible event.
- We know the incredible financial, mental and emotional toll inflicted upon residents that fought this flood for more than three months. Many residents were forced to relocate, while others remained and ran sump pumps that are still running today. And still others gave up after many exhaustive weeks of battling this flood and have no means of repairing or replacing their homes.
- We know that our community is weary, frustrated and seeking many answers from the people who manage the Missouri River. While most floods crest and then recede within days, our residents have lived this tragic event for more than three months.
- And finally ... we know that we NEVER, NEVER want to go through this again and we hope the proper steps will be taken to ensure sound, common-sense administration is used in managing the river.

Alternately, there are many things that we do NOT know. For example:

- How did the U.S. Army Corps of Engineers manage the information that was available to them in the days, weeks and months preceding this horrific event?
- How were water elevations and discharge rates managed and adjusted throughout the six main stem dams; and at what time were these management decisions made?
- How will our cities and states finance the cost of repairing and replacing our critical infrastructure?
- How will our residents recover from the financial burden of hastily preparing for this event, abandoning their homes, repairing the damage, and bearing the burden of other flood-related costs?
- How will our business community recover from its losses?
- When will our quality of life be restored ... our park systems, our golf courses, our bike trails, our athletic fields and our river-based recreation?
- When will we reclaim our streets and how will we repair them?
- But most importantly, when can we begin to feel comfortable that similar events will not reoccur ... and when can we return to our homes and businesses and feel safe again? When can we feel that someone in the Corps of Engineers is managing runoff to prevent future flooding?

We do not have answers to these questions, especially those related to future flood prevention. But we do know that our residents have been severely impacted by this flooding and our people are hurting ... financially, mentally and emotionally. We cannot go through this again.

I appreciate your time and attentiveness to our questions. We must all work together, seek answers to these difficult questions and assure this flood NEVER, NEVER occurs again. Thank you!

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Introductory Written Testimony of
Merle Scheiber
3802 N. Frontier Road
Fort Pierre, SD 57532

On Behalf of the
Fort Pierre Frontier Road Residents

Before the
Senate Committee on Environment and Public Works
United States Senate

Regarding:
2011 Flood in South Dakota

Tuesday, October 18, 2011

Chairman Boxer, Ranking member Inhofe, and Members of the committee, thank you for accepting my written testimony before the committee on the 2011 flood in South Dakota.

My name is Merle Scheiber. I am a resident of South Dakota living in Stanley County near the Pierre/Fort Pierre area along Lake Sharpe, below the Oahe Dam. I also serve as the South Dakota Insurance Director since August 2005. I am pleased to be given the opportunity to offer this written testimonial of my personal experiences in regard to the flooding that occurred in 2011 in South Dakota.

My home is located south of the Oahe Dam in the first housing development, which consists of 25 homes approximately 2 miles south of the dam. I have owned my home for 3 years and just recently (within weeks of the flooding) completed a very extensive remodeling project which took approximately all three years. My family lived in the home the last year of this three year period. The homes in this neighborhood began being built in the early 1980's, a number of homes have either gone under extensive remodeling or my neighbors have chosen to demolish the existing home and rebuild an entire new home. We have invested many hours and thousands of dollars into our homes with which the financial obligations still remain regardless if we are able to occupy our homes or not. There are many such "subdivisions" as ours along the Missouri River/Lake system in the immediate Pierre/Fort Pierre area and throughout South Dakota. My neighbors on Frontier Road come from many backgrounds with vary degrees of earned success.

In South Dakota, the Missouri River is impounded by four large dams. Oahe Dam, forming Lake Oahe near Pierre/Fort Pierre is one of the largest rolled earthen dams in the world and was completed in 1958. Fort Randall Dam, impounding Lake Francis Case near Pickstown, South Dakota was completed in 1952; Gavins

Point Dam was finished in 1955 and forms Lewis and Clark Lake near Yankton, South Dakota; Big Bend Dam was finished in 1963 and forms Lake Sharpe near Fort Thompson, South Dakota. The reservoir system on the Missouri River was designed for multipurpose use, hydroelectric power, flood control, navigation, municipal water, irrigation, fish and wildlife habitat, and recreation. Only two semi-natural segments of regulated “free-flowing” Missouri River remain in South Dakota. A 45 mile stretch below Fort Randall Dam flows into Lewis and Clark Lake and a 58 mile stretch below Gavins Point Dam, flowing into the channelized portion of the Missouri River near Sioux City, Iowa.

Therefore, in South Dakota there is very little “free flowing” water that is not managed or controlled by human hands. The United States Army Corps of Engineers has general management authority over the river/lakes and dams controlling the water of the Missouri River. They are responsible for maintaining the goals and objectives of the reservoir system, which includes flood control. Part of the administration of the Missouri River/Lake system is to monitor fluctuations in water intake amounts into the reservoir system and appropriately adjust water discharge amounts as to maintain the reservoir system’s goal of flood control. With administration comes a responsibility of proper notification to

all inhabitants along the Missouri River basin who have a potential risk of flooding. These areas of potential flooding are known to the Army Corps of Engineers beforehand by their geographic flood maps. Proper (or even reasonable) notification to residents in these potential flood areas is essential to the Corps' charge of "flood control". And in the case of the 2011 flood in South Dakota, the Corps failed miserably to timely notify South Dakota residents of the impending danger to life and property.

Instead of using a common sense approach to analyzing actual inflows into the reservoir system, they choose to follow a 135 year average method to analyze potential effects of "record" snowfall amounts that were accumulating in Montana and what any excessive rainfall amounts in the spring would add to this growing threat. They failed to react miserably week after week from the fall of 2010 to the spring of 2011 to accumulating moisture that would eventually flow into the Missouri River/Lake reservoir system. Through these months they had data available to realize that this was not an "average" year and could have discharged amounts of water that would have lowered reservoir amounts to levels acceptable even by their own master manual. They evidently do not realize that average amounts are obtained by analyzing "excessive" moisture

years with dry years. When records reach unprecedented new highs, the common sense management approach is to understand that this is not an "average" year and action or steps should be taken to manage reservoir levels for flood control purposes based on worst case scenario.

The months preceding the Corps releasing record CFS (cubic feet per second) from the Oahe reservoir indicates they either chose to ignore their own statistical data, or were negligent in their administration of this data, both indicate mismanagement of their "flood control" charge. This mismanagement resulted in the residents residing along the shores of Lake Sharpe, below the Oahe Dam to sustain considerable property damage and hardship throughout the summer of 2011, with no end in sight into the fall of 2011 and into 2012 as we begin the cleanup process.

The inflow amounts into the reservoirs clearly indicated rapidly rising water levels. Inhabitants along the Missouri River/Lake system should have been notified of these levels and the risk of flooding these posed well before the Army Corps chose to notify these residents. Even local Army Corps officials sounded alarms to their superiors indicating the impending danger. These concerns are

well documented through an extensive email trail. Yet, no action was taken, either on CFS discharge amounts or notification to residents. The Army Corps' own inflow/discharge records for the Oahe reservoir indicate the following leading up to record releases:

Date:	Inflow	Discharge	Reservoir Gage
January 15, 2011	24,000	23,500	1605.0
February 15, 2011	36,000	18,700	1606.6
March 15, 2011	35,000	16,200	1609.0
April 15, 2011	41,000	35,300	1616.7
May 15, 2011	50,000	51,100	1616.9
May 24, 2011	83,000	56,200	1617.6
May 27, 2011	107,000	73,100	1617.9

The inflow/discharge ratio for February and March would sound alarms to any prudent person. A significant larger amount of water over a consistent period of time was flowing into the Oahe reservoir. The pattern continued into April with the knowledge of record snowfall waiting in Montana AND at least three weeks before the unprecedented two week rainfall in May in Montana that the Corps repeatedly blames the flooding on. Hence, the days preceding and leading up to May 24th, the actual first time the Corps notified residents of impending flooding,

the inflow/discharge ratio indicated that the Oahe reservoir was fast filling up. Notice the spike in the Oahe reservoir levels, it jumped almost eight feet in one month, from March 15, 2011 to April 15, 2011 and again this is not contemplating the record snowfall in Montana that the Corps knew existed which will add historical record runoff yet the coming spring and before the two weeks of unprecedented rainfall.

A special note should be made here. The Army Corps has consistently through this whole ordeal, held fast to the argument that the unprecedented spring rains in Montana over a two week period the first of May 2011 are to blame for the flooding. It is highly suspect that no matter how unprecedented two week rainfall amounts are that it could impact our sophisticated reservoir system to flood downstream for almost **“Four Months”!** This was not a flash flood. The email trail exchanged between Corps officials is cited in a Sioux Falls newspaper, Argus Leader, analyzing the Corps’ response. These emails showed their lawyer constantly redirecting the discussion away from any analysis outside the realm of causation by the spring rains (stating “stay on message”). This sensitivity clearly shows that the Corps feared its blunder in failing to act on the snow pack evidence would subject it to criticism.

As the Army Corps ignored the warning signs of impending record levels of intake, they chose to make an even bigger mistake which indicates gross negligence of “flood control”. They failed to **timely advise** Missouri River basin residents of possible risk to flooding. Timely notice would have allowed residents to prepare their homes for flood waters and consider their risk of loss to flooding, possibly purchasing flood insurance even though the majority of homeowners were not in a designated flood plain. Flood plain maps are charted by the federal government, assessing higher risk to homeowners in designated flood plains, which mortgage lenders then use to require flood insurance before approving these loans. Neither the flood plain maps developed by the federal government nor my mortgage lender required that I carry flood insurance. I am not in a flood plain and I live below one of the largest rolled earthen dams in the world.

And what timely notice did the Army Corps of Engineers give me to prepare for these “potential” flood waters, **THREE DAYS!** On May 24th they notified us to prepare for water levels that could result in the flooding of my home. This was when the inflow amount on the Oahe reservoir was 83,000 and the discharge amount was 56,200. Three days later on May 27th, when the flood waters crossed

my gravel driveway and prevented larger trucks from bringing materials that would have allowed me to build a larger, stronger levy the inflow was 107,000 and the discharge was 73,100. I also lost power that day and was forced to fight the rising waters with gas generators/pumps brought in by boat. On June 5, 2011, I surrendered my home to the flood waters as the discharge limit reached 111,800 after many long days and nights, building and rebuilding my levy with sand bags, never going to sleep; friends, family, coworkers hauling and throwing sand bags till their hands could not even form a fist anymore; having 25 people descend upon your home taking, ripping, throwing all your personal property into any vehicle willing to drive through a foot of water. And during this time (and continuing after June 5th) the Corps continually dealt us information that was not correct about release limits or changes to these release limits.

My story can be repeated so many times for so many residents that were affected by the Corps' gross negligence. During the months of January 2011 through April 2011, we watched as the water discharge amounts were so minimal that sand bars were prevalent all along Lake Sharpe, even as record snowfall amounts accumulated in Montana. Now, as the waters have receded and I no longer have to take a boat to access my home that had 3 ½ feet of water on the main floor for

over 3 months, I struggle during the recovery process as FEMA and other governmental entities make me apply for assistance, appeal for assistance, quantify damage, verify eligibility during a long pain staking process that could have been avoided or at least mitigated by proper notice. Interestingly, about three weeks after the flood, FEMA sent out a bulletin suggesting residents consider buying flood insurance, in case there was “another incident” because there existed a threat of a levy breaking. Where was this notice in March or April of 2011?

As residents living in one of the most beautiful places in the United States, where we can live next to and experience the American Bald Eagle and other wildlife, we only ask that there be an admittance of causation; to be made whole; and reassured that this will never happen again at the hands of humans.

We did not inflict this upon ourselves, yet as Americans we are subject to a bureaucracy that none should have to experience as “disaster” victims. I cannot imagine that foreign disaster victims receiving aid from the United States have had to “qualify” so extensively as the United States’ own disaster victims. The Army Corps will still not admit negligence or even lesser, causation at their

administration, so now we must make ourselves whole. Their position is inconsistent and without logic; they blame the runoff overwhelming the main stream reservoirs on record spring rains, yet they knew very early that they were dealing with record mountain snow pack. The record snow pack alone should have prompted reanalysis and action before the rains ever started. They leave hard working Americans to rebuild their lives almost solely to their own exclusivity. And they leave us with no guarantee that it will not happen again, even as early as next year.

Thank you for the opportunity to submit my written testimony into the record of the Senate Committee on Environment and Public Works. I would be happy to respond to any questions.