

**ASSESSING NATURAL RESOURCE DAMAGES  
RESULTING FROM THE BP DEEPWATER HORIZON  
DISASTER**

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**HEARING**  
BEFORE THE  
SUBCOMMITTEE ON WATER AND WILDLIFE  
OF THE  
COMMITTEE ON  
ENVIRONMENT AND PUBLIC WORKS  
UNITED STATES SENATE  
ONE HUNDRED ELEVENTH CONGRESS  
SECOND SESSION

—————  
JULY 27, 2010  
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Printed for the use of the Committee on Environment and Public Works



Available via the World Wide Web: <http://www.fdsys.gov>

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U.S. GOVERNMENT PUBLISHING OFFICE

23-572 PDF

WASHINGTON : 2017

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# ASSESSING NATURAL RESOURCE DAMAGES RESULTING FROM THE BP DEEPWATER HO- RIZON DISASTER

TUESDAY, JULY 27, 2010

U.S. SENATE,  
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,  
SUBCOMMITTEE ON WATER AND WILDLIFE,  
*Washington, DC.*

The Subcommittee met, pursuant to notice, at 2:30 p.m. in room 406, Dirksen Senate Office Building, Hon. Benjamin L. Cardin (Chairman of the Subcommittee) presiding.

Present: Senators Cardin, Inhofe, Lautenberg, Vitter, Whitehouse, and Merkley.

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

Senator CARDIN. The Subcommittee will come to order.

Today's hearing is on assessing natural resource damages resulting from the BP Deepwater Horizon disaster. We welcome everyone to our Committee room on this very important subject of assessing the damage to the environment from the BP oil.

On April 20 of this year the BP Deepwater Horizon exploded and began this Nation's greatest manmade environmental disaster. The catastrophe claimed 11 lives and has left thousands of others in turmoil across Louisiana, Texas, Mississippi, Alabama, and Florida. Our hearts and prayers go out to the families of those who died in the BP Deepwater Horizon explosion and to the fishermen and other hard working Americans whose jobs and way of life are threatened.

The first priority in this disaster has been to stop the flow of oil from the well. We are heartened by recent progress and hope that the well will be sealed for good soon. We must ensure our responders have the resources and organization they need to remove the oil that is in the water and to protect the Gulf Coast.

But even when the oil is removed to the extent possible it will not be enough to fully restore water and wildlife or compensate the public for the loss of these natural resources. BP and its partners are responsible for repairing this environmental destruction, in addition to the economic devastation they caused.

As all of America has seen in the morning newspapers and the nightly television news, the current \$75 million limit on oil spill liability damages represents but a small fraction of the actual economic and environmental costs. Senator Menendez's bill that this

Committee adopted will make sure that BP is legally bound to honor its pledge to pay all legitimate claims, including those to our natural resources. I am proud to be a co-sponsor, and I look forward to that bill being considered by the full Senate.

But just as critical for recovering compensation for damages to natural resources and the water and wildlife that sustain regional economies, our cultural heritage and treasured ways of life is the natural resources damage assessment. This is a legal process conducted by the Federal and State agencies to identify how natural resources have been injured, the best method for restoring them, and the type and amount of restoration needed to compensate the public.

The answers developed through the natural resource damage assessment determine the size of the bill presented to BP and its partners. They shape the scale and scope of the restoration work done to repair the damage. If we are going to get the restoration work done right, and if we are going to hold BP and its partners accountable for the true extent of the natural resources damages they caused, then we need to get an accurate and complete assessment of the damage.

We have already seen in efforts to stop the leak at the bottom of the sea what happens when we don't get good information. Without an accurate assessment of the flow rate from the wellhead, early containment efforts failed. Once a loose cap was placed on the well, BP wasn't prepared to capture all the oil it could through the containment system. We can't afford to have the same incomplete approach when it comes to cleaning our waters and restoring our fishing stock and bird population or any of the other critical ecosystem restoration tasks that lie ahead.

We are here today to shine a light on the important process of assessing natural resource damages, learn any lessons from the past efforts, especially *Exxon Valdez*, and be sure that our Federal agencies have the tools they need for the best assessment possible.

I want to thank today's witnesses for being here to help us shine light on this very, very important issue. As Chairman of the Senate Environment and Public Works Water and Wildlife Subcommittee, I have been to the Gulf and seen first-hand the environmental and economic impacts of the BP oil disaster. What I saw was devastating. I saw colonies of oiled pelicans huddled with their young. I saw mile upon mile of oiled shoreline along the beaches of Grand Isle, a barrier island off the coast of Louisiana and a popular summer resort.

On that day, the water was closed. And I thought what I would be doing if this was in Maryland with Ocean City with the beach community closed during the summertime. Obviously, we need to do everything we can to help the people of the region, and we need to make sure that we do everything we can to get a restoration plan that repairs the damage that has been done.

During today's hearing, I hope we will have a chance to talk about whether there is adequate funding so that the assessment that is being done will be done as accurately as possible; whether the limit of \$75 million, how that should be modified; whether we have a commitment to the long-term impact.

We might find information, as we did in *Exxon Valdez*, that suggests to us that the current assessments need to be flexible enough to deal with the long-term impact of restoration; whether we have objectivity in the assessment, knowing full well that we need to work with BP as we do the assessment now, is there necessary objectivity? Do we have transparency? Do we have peer review? Are we coordinating the efforts between the Federal Government and the local governments and the private entities that can help us in this effort?

In short, there are a lot of questions I think we need to review during this hearing, and I appreciate the cooperation that I have received from my Republican colleagues as we start this process in the Subcommittee.

With that, let me turn to Senator Inhofe, the Ranking Republican Member of the full Committee.

[The prepared statement of Senator Cardin follows:]

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

On April 20 of this year the BP Deepwater Horizon exploded and began this Nation's greatest manmade environmental disaster. This catastrophe claimed 11 lives and has left thousands of others in turmoil across Louisiana, Texas, Mississippi, Alabama, and Florida. Our hearts and prayers go out to the families of those who died in the BP Deepwater Horizon explosion and to the fisherman and other hard-working Americans whose jobs and ways of life are threatened.

The first priority in this disaster has been to stop the flow of oil from well. We're heartened by recent progress and hope the well will soon be sealed for good.

We must ensure our responders have the resources and organization they need to remove the oil that's in the water and to protect the Gulf Coast.

But even when the oil is removed to the extent possible it will not be enough to fully restore water and wildlife or compensate the public for the loss of these natural resources.

BP and its partners are responsible for repairing this environmental destruction in addition to the economic devastation they've caused.

As all of America has seen in the morning newspaper and nightly television news, the current \$75 million limit on oil spill liability damages represents a small fraction of the actual economic and environmental costs.

Senator Menendez's bill, S. 3305, that this Committee adopted, will make sure that BP is legally bound to honor its pledge to pay "all legitimate claims" including those for natural resource damages. I am proud to be a co-sponsor, and I look forward to its adoption by the full Senate.

But just as critical for recovering compensation for damages to natural resources—those waters and wildlife that sustain regional economies, our cultural heritage, and treasured ways of life—is the Natural Resource Damage Assessment.

This is a legal process conducted by Federal and State agencies to identify how natural resources have been injured, the best methods for restoring them, and the type and amount of restoration needed to compensate the public.

The answers developed through a Natural Resource Damage Assessment determine the size of the bill presented to BP and its partners. They shape the scale and scope of the restoration work done to repair the damage.

If we are going to get that restoration work done right, and if we are going to hold BP and its partners accountable for the true extent of the natural resource damage they've caused, then we need to have an accurate and complete assessment of the damage.

We've already seen in efforts to stop the leak at the bottom of the sea what happens when we don't have good information. Without an accurate assessment of the flow rate from the wellhead, early containment efforts failed. Once a loose cap was placed on the well BP wasn't prepared to capture all the oil it could have through its containment systems.

We can't afford to have the same incomplete approach when it comes to cleaning our waters and restoring our fishing stocks or bird populations or any of the other critical ecosystem restoration tasks that lie ahead.

We are here today to shine a light on the important process of assessing natural resource damages, learn any lessons from past assessment efforts, especially the *Exxon Valdez*, and be sure that our Federal agencies have the tools they need to do the best assessment possible.

I want to thank our witnesses for being here today to provide their insight into this critical process and the efforts going on in the Gulf. I am grateful for the work they've done and are doing to make sure polluters like BP pay for the damage they've done and to ensure that the public is made whole for what they've lost.

As Chairman of the Senate Environment and Public Works Water and Wildlife Subcommittee, I have been to the Gulf and seen first-hand the environmental and economic impacts of the BP oil disaster. What I saw was devastating.

I saw colonies of oiled pelicans huddled with their young. I saw mile upon mile of oiled shoreline along the beaches of Grand Isle, a barrier island off the coast of Louisiana and a popular summer resort. That day the water was closed to fishing and swimming, and the town that should have been full of tourists was empty. Worst of all I know that what I saw was just the most visible and short-term effects of this disaster.

My colleagues and I are committed to doing everything we can to right the wrongs that have happened to the Gulf. We hope we can assist the Administration in this assessment work and its other critical efforts to restore the health of the Gulf Coast region and a cherished way of life to its people.

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

Senator INHOFE. Thank you, Senator Cardin, and I thank you for scheduling Subcommittee hearing today because these have been some things that we really need to get into.

I would like to briefly mention that I am working on a report on the Administration's response to the BP incident thus far. To date we have discovered numerous bureaucratic delays to mitigation and containment caused by Federal entities, and I look forward to a thoughtful discussion on some of these issues today.

After the tragic *Exxon Valdez* spill, which was 20 years ago, and I recall that I was up there shortly after this and we helped work diligently to pass the Oil Pollution Act of 1990 to help address many of the legislative gaps and shortcomings highlighted by that incident.

The OPA was created with the important goals of strengthening Federal authority over oil spill removal actions, creating a Federal liability scheme for addressing oil spills, and addressing the issues of removal costs and damages. OPA established a solid framework for response that was missing during the *Exxon Valdez* spill.

This hearing can help us examine this process of the natural resource damage assessment currently underway and hopefully give us necessary guidance to improve any inadequacies.

As I have stated before several times, when it comes to the BP disaster our focus should be on mitigating and containing the environmental impacts, providing assistance to the victims in the Gulf, and investigating the causes so we can prevent a disaster like this, or any kind of disaster, from happening again.

Today, our Committee is fortunate to have a distinguished group of witnesses that have diverse, unique experiences to share. I would like to especially thank John Young, the Chairman of the Jefferson Parish Council, which is the Grand Isle area that you are talking about, Mr. Chairman. I am glad he is here today to testify. Mr. Young has experience both in working on the aftermath of Hurricane Katrina as well as the current BP spill. He has valuable insight in the ongoing response effort during this current tragedy



and has first-hand knowledge of the coordination and relief efforts on the ground.

And while we still do not know the full extent of the devastating effect of the BP Deepwater Horizon spill, we owe it to the people of the Gulf region and the American people as a whole to carefully examine the effectiveness of the Federal response, as well as the potential legislation that Congress can offer.

What I would guard against is using this. I remember so well when I went up to the *Exxon Valdez*, there were a lot of environmentalists, a lot of them with their own agenda up there actually celebrating and stating that they were going to parlay this into stopping the exploration of the North Slope. My response at that time, Mr. Chairman, is well, that was a transportation accident. And if you stop that production, that is going to increase transportation and increase the possibility of something like this happening again. And they didn't really care.

So there are some, I am sorry to say in this case, who are trying to parlay this into something to advance a personal agenda doing away with all drilling, with all of our ability, then, to be able to produce our own energy here in America. And I hope that doesn't happen, and this hearing is going to be I think instrumental in focusing on what the real problem is and the solutions that are out there.

Thank you, Mr. Chairman.

[The prepared statement of Senator Inhofe follows:]

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

Thank you, Senator Cardin, for scheduling today's Subcommittee hearing to discuss the difficult and extensive process of determining natural resource damages stemming from BP's Deepwater Horizon disaster.

I would like to briefly mention that I am working on a report on the Administration's response to the BP incident thus far. To date we have discovered numerous bureaucratic delays to mitigation and containment caused by Federal entities, and I look forward to a thoughtful discussion on some of those issues today.

After the tragic *Exxon Valdez* spill, which occurred over 20 years ago now, Congress worked diligently to pass the Oil Pollution Act of 1990 (OPA) to help address many of the legislative gaps and shortcomings highlighted by that tragedy. The OPA was created with the important goals of strengthening Federal authority over oil spill removal actions, creating a Federal liability scheme for addressing oil spills, and addressing the issues of removal costs and damages. OPA established a solid framework for response that was missing during the *Exxon Valdez* spill. This hearing can help us examine the process of natural resource damage assessment currently underway and hopefully give us the necessary guidance to improve any inadequacies.

As I have stated before, when it comes to the BP disaster our focus should be on:

- Mitigating and containing the environmental impacts;
- Providing assistance to the victims in the Gulf; and
- Investigating the causes so we can prevent a disaster of this kind from happening again.

Today our Committee is fortunate to have a distinguished group of witnesses that have diverse and unique experiences to share. I would especially like to thank John Young, Chairman of the Jefferson Parish Council, for testifying today. Mr. Young has experience both in working on the aftermath of Hurricane Katrina as well as the current BP spill. He has valuable insight into the ongoing response effort during this tragedy and has first-hand knowledge of the coordination and relief efforts on the ground.

While we still do not know the full extent of the devastating effects from BP's Deepwater Horizon spill, we owe it to the people in the Gulf region and the American people as a whole to carefully examine the effectiveness of the Federal response

as well as the potential legislation we in Congress can offer to help. I hope that this hearing today will be a positive step in that direction.

Senator CARDIN. Senator Lautenberg.

**OPENING STATEMENT OF HON. FRANK R. LAUTENBERG,  
U.S. SENATOR FROM THE STATE OF NEW JERSEY**

Senator LAUTENBERG. Thanks very much, Mr. Chairman. I am here in the nick of time, and I wish that we had been in the nick of time with the subject under discussion here.

It is more than 3 months since the BP oil well blew out. We are still waiting for the flow of oil contaminating the Gulf to be permanently stopped. But the unfortunate reality is even after the well is stilled for good, the damage and devastating from this tragedy is going to linger on not just for months, but obviously for years.

And as we have seen from past spills, it can take decades before the environment and wildlife recover from these disasters. For instance, more than 20 years ago after the *Exxon Valdez* foundered, 19 animal species in Alaska are still struggling to recover from the spill, and two, including herring, a very important species for their economy and their environmental infrastructure, have shown no signs of improvement. And as much as 180 million of gallons have poured into the Gulf of Mexico since the BP Deepwater Horizon rig exploded, 15 times as much as the *Exxon Valdez*, and it is killing hundreds of birds, she-turtles and other marine life.

And there are lots of chilling scenes coming out of the Gulf: black-coated pelicans flapping their wings helplessly, the bay crabs with oil lodged under their shells, and clusters of dead jellyfish floating on the water.

But of equal concern is what we don't see. Most animals will die far out in the ocean on the water or in the thick of coastal wetlands, and they will never be known or counted. Species impacted by the spill will likely also include sperm whales, bluefin tuna, and precious coral.

As the clean up and control efforts continue we have to be absolutely sure that the work to undo the damage is effective. And today in the Gulf some of the remedies being pursued may ultimately make matters worse. For example, we simply don't know if the powerful chemical dispersants which have been used in abundance to break up the oil are really safe for sea life. Current law doesn't require adequate testing of these dispersants. And because of that relief workers and wildlife have become unwitting participants in a dangerous science experiment.

For example, we don't know if breaking down the oil into smaller components will make it more likely that the fish will eat the oil, which will slowly accumulate in other species up the food chain.

And that is why today, Mr. Chairman, I am introducing a Safe Dispersants Act, a common sense bill that will require long-term testing and disclosure of all ingredients in the dispersant before it can be used in response to a spill.

Let's be clear. Even as we take every step possible to clean up this spill and protect the environment and wildlife, we simply cannot wait for the next oil disaster to occur. The tragedy in the Gulf has confirmed beyond a shadow of a doubt that offshore drilling has inherent dangers. And in fact during hearings in May I asked

oil executives if any one of them could guarantee that another offshore rig disaster of this magnitude wouldn't happen. Not one of them could say anything that they couldn't guarantee it.

So we can't leave our fate in the hands of big oil. And that is why I am going to continue to insist that we place a permanent ban on offshore drilling off the Atlantic Coast. The bottom line is this is a time to move away from that oil and not encourage new drilling. And it is time to invest in clean and safe renewable energy.

And I thank the Chairman for holding this hearing, and I look forward to hearing from our witnesses' insights.

Thank you, Mr. Chairman.

Senator CARDIN. Thank you, Senator Lautenberg.

No member of our Committee has been more directly impacted by this spill than the Senator from Louisiana, who I had a chance to be with when we were at Grand Isle in Louisiana.

Senator Vitter.

**OPENING STATEMENT OF HON. DAVID VITTER,  
U.S. SENATOR FROM THE STATE OF LOUISIANA**

Senator VITTER. Thank you, Mr. Chairman. Thank you for this important hearing, and thank you very much for your visit with other members of the Committee several weeks ago. I joined you all for the day, and I think it was extremely productive for me, and I hope for everybody who was on that visit. Thank you for that time. We really do appreciate it.

I want to make four points real quick. First of all, the natural resource damages assessments are imperative for cleaning up this mess properly and to ensuring the future environmental health of the Gulf. So we need to get this right.

I have enjoyed working with you and your staff in particular on having the National Academy of Sciences take a comprehensive look at the best methodologies for assessing resource damages, and I appreciate all of that work in that ongoing effort.

But we need to get this right. If we get it wrong, Gulf fishermen—recreational and commercial—and everybody else in my part of the world could be seriously economically crippled in terms of inadequate restoration of our wetlands and habitats.

Second, I certainly completely agree with you that we need to ensure that BP takes full responsibility and pays for all of the damages without limit. I am concerned that we are not going to pass that into law because I believe the Menendez bill is not going to pass the Senate anytime soon.

So again, I urge everyone in the Senate to come together around my legislation which would remove any cap for this event. That has been cleared on the Republican side. That could pass the Senate tomorrow, be passed into law very quickly to remove any doubt, any possibility of any cap with regard to this event as we continue to debate permanent policy for the future. So I would encourage everybody's openness and consideration to that.

No. 3, Mr. Chairman, I know it is not the subject of this hearing, but I again want to quickly emphasize my extreme concern with the drilling moratorium in the Gulf. It is an absolutely consensus in Louisiana that that moratorium is crippling us economically and not protecting our environment. Everyone there, including fisher-

men, including coastal communities, including those most invested in the environment, want immediate safety measures, but want that moratorium lifted. I will continue to work with other Members on that.

And fourth, Mr. Chairman, also want to recognize and thank one of our witnesses today, Councilman-at-Large John Young of Jefferson Parish, my home parish. He represents me. He represents me and my family well. He has been a leader on all of these issues on the ground, and I look forward to his and others' testimony.

Thank you.

Senator CARDIN. Thank you, Senator Vitter.

Senator Merkley.

**OPENING STATEMENT OF HON. JEFF MERKLEY,  
U.S. SENATOR FROM THE STATE OF OREGON**

Senator MERKLEY. Thank you, Mr. Chair.

I think it is critical that we get this right. We know that the natural resource damages are going to be enormous in scale. There was a ship called the *New Carissa* that ran aground off of the southern coast of Oregon. It killed 2,300 sea birds and 800 shore birds and it was thought to have killed millions of oysters in Coos Bay, causing more or less \$10 million of damage, all of that from less than 2,000 barrels of oil. By contrast, we are talking here about 60,000 barrels per day, so a scale several orders of magnitude beyond.

So I appreciate the hearing. I look forward to the testimony.

Thank you, Mr. Chair.

Senator CARDIN. Thank you very much, Senator Merkley.

Let me just alert my colleagues, and the witnesses, and those that are here. We anticipate a vote on the Senate floor at 3 o'clock today. I believe it is only one vote. We will do our best to continue the hearing, but it might be necessary to take a short recess in order to make sure all the Members have an opportunity to vote on that issue.

So let me welcome our first group of panelists. First, we have Cynthia Dohner. She is the Regional Director of the U.S. Fish and Wildlife Service in the Southeast Region, overseeing the Service's activities in 10 States, including those along the Gulf Coast, as well as the Commonwealth of Puerto Rico and the United States Virgin Islands. She is also the lead official to the Department of Interior for BP Deepwater Horizon natural resource damage assessment.

We also have with us Tony Penn, the Deputy Chief in the Assessment and Restoration Division of NOAA. Mr. Penn plays an important role in NOAA's damage assessment cases broadly and in the work on the BP Deepwater Horizon assessment in particular. He was previously a natural resource economist conducting damage assessment work primarily in the Gulf and the Caribbean regions. I want to thank him for being here today to give us insight into this critical process of assessing the damage in the Gulf of Mexico.

And our third witness is Dr. Eva J. Pell, the Under Secretary for Science. Dr. Pell directly oversees the operations of the National Museum of Natural History, including the operations of the Smithsonian Environmental Research Center in Edgewater, Maryland, and the Smithsonian Museum Conservation Institute in Suitland,

Maryland. The Smithsonian holds specimens of water quality throughout the Gulf region which can be very important in trying to assess the specific damages caused to the environment as a result of the BP Deepwater Horizon oil spill.

So I look forward to all three of our witnesses' testimony. Your entire statements will be made part of our record, and we will start with Ms. Dohner.

**STATEMENT OF CYNTHIA DOHNER, REGIONAL DIRECTOR,  
SOUTHEAST REGION, U.S. FISH AND WILDLIFE SERVICE**

Ms. DOHNER. Chairman Cardin and members of the Subcommittee, I am Cynthia Dohner, Regional Director of the U.S. Fish and Wildlife Service's Southeast Region, Department of Interior's authorized official for the natural resource damage assessment restoration process in the BP Deepwater Horizon oil spill.

I appreciate the opportunity to appear before the Subcommittee today to testify on the process for assessing damages to natural resources.

Before I begin my statement, I would first like to extend my condolences to the families of those who lost their lives, to those injured in the explosion and sinking of the Deepwater Horizon oil rig, and to those whose livelihood and communities are being devastated by this oil spill.

The magnitude of the BP Deepwater Horizon oil spill is unprecedented in the United States and could result in unparalleled injury to the Gulf of Mexico's ecosystem and its vast and diverse natural resources. Assessments are underway to quantify impacts to numerous species and populations across five States and along thousands of miles of shoreline and hundreds of thousands of acres of coastal and marine habitat.

The nature and extent of injuries to natural resources, especially in the coastal and marine environment, remains uncertain and the full impact of the oil spill will likely not be known for decades. The natural resource damage assessment and restoration process, or NRDAR, focuses on identifying injured natural resources, determining the extent of the injuries, recovering damages from responsible parties, and planning and carrying out natural resource restoration activities to achieve pre-spill conditions.

The process involves Federal and State agencies and tribal governments acting as trustees for those natural resources under their legal jurisdiction. Lands and natural resources under the trusteeship of the Department of Interior are among the resources most impacted by the BP Deepwater Horizon oil spill. To guide the NRDAR process through the preliminary stages, the trustees have formed the Trustee Steering Committee to facilitate cooperation and coordination among the participating Federal and State agencies.

The steering committee includes representatives from Texas, Louisiana, Mississippi, Alabama, Florida, the Department of Commerce, and the Department of the Interior. The Departments of Defense and Agriculture, along with affected tribes in the Gulf, may also participate in the NRDAR action.

Thirteen technical working groups have been established by the trustees based on broad resource categories. Each group is devel-

oping studies to assess injuries pertaining to its resource areas, taking into account impacts from the oil spill and response actions.

In addition to these studies, the trustees are reviewing and as appropriate incorporating vast amounts of monitoring data on the Gulf of Mexico to better understand and assess injuries that may potentially result from the BP Deepwater Horizon oil spill. Trustees are also actively seeking scientific information and data from sources inside and outside the Government. Data generated by experts outside the NRDAR process are often invaluable in establishing baseline conditions, accurately quantifying the full extent and magnitude of injuries, and developing properly scaled restoration activities.

At the beginning of this incident, Interior bureaus, including the U.S. Fish and Wildlife Service, the National Park Service, and the U.S. Geological Survey, immediately deployed personnel and resources to collect pre-spill or baseline data necessary for a NRDAR claim. The Bureau of Land Management and Bureau of Indian Affairs later joined in these efforts.

To date Interior bureaus have received approximately \$900,000 in funding from the Departmental NRDAR Fund. In addition, Interior obligated more than \$1.5 million of its \$4.7 million request from the U.S. Coast Guard-managed Oil Spill Liability Trust Fund to support initial baseline data collection along with agency and State coordination work.

Finally, individual bureaus have also spent some of their base funding to support initial work. In May 2010 BP provided \$45 million to Federal and State trustees for the beginning phases of the injury assessment process. The Department of Interior and NOAA were allocated a total of \$20 million in advance funding.

So far, Interior has obligated most of its \$10 million for personnel costs, equipment, and supplies and contracts with outside experts to implement assessment plans. In addition the U.S. Fish and Wildlife Service recently established a specific account through our reimbursable process for these NRDAR activities. The establishment of this account will ensure that the damage assessment activities that we determine are needed will be able to continue moving forward in a timely fashion.

The scope and magnitude of natural resource injuries and other impacts resulting from the BP Deepwater Horizon oil spill are unprecedented. We do not know at this time the extent of the injuries, but we believe that they will affect fish, wildlife, and plant resources in the Gulf and possibly in other areas across the country for years and decades to come. This spill has illuminated the need for additional information about wildlife, fisheries, and habitat as we try to quantify the damage and understand the cumulative effects of the stressors that act on the Gulf Coast ecosystem.

Finally, I would like to underscore how proud I am of our employees and volunteers and the extraordinary effort they are putting forth to respond to this unprecedented event and their continuing work and dedication to protect and restore America's natural resources.

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to testify. I will be happy to answer any questions.

[The prepared statement of Ms. Dohner follows:]

**TESTIMONY OF CYNTHIA DOHNER, REGIONAL DIRECTOR, SOUTHEAST  
REGION, U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR,  
BEFORE THE SENATE ENVIRONMENT AND PUBLIC WORKS SUBCOMMITTEE  
ON WATER AND WILDLIFE, REGARDING ASSESSING NATURAL RESOURCE  
DAMAGES RESULTING FROM THE BP/DEEPWATER HORIZON OIL SPILL  
DISASTER**

**July 27, 2010**

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Chairman Cardin and Members of the Subcommittee, I am Cynthia Dohner, Regional Director of the U.S. Fish and Wildlife Service's (Service) Southeast Region and the Department of Interior's Authorized Official for the Natural Resource Damage Assessment and Restoration process in the BP/Deepwater Horizon oil spill.

I appreciate the opportunity to appear before the Subcommittee today to testify on the process for assessing damages to natural resources resulting from the BP/Deepwater Horizon oil spill.

Before I begin my statement, I would first like to extend my condolences to the families of those who lost their lives, to those injured in the explosion and sinking of the Deepwater Horizon oil rig, and to those whose livelihoods and communities are being devastated by this oil spill.

The magnitude of the BP/Deepwater Horizon oil spill is unprecedented in the United States and could result in unparalleled injury to the Gulf of Mexico's ecosystem, and its vast and diverse natural resources. Assessments are underway to quantify impacts to numerous species - some of which are threatened or endangered - across five states and along thousands of miles of shorelines and hundreds of thousands of acres of sensitive and critical wetland habitats in wildlife refuges and national parks. The nature and extent of injuries to natural resources, especially in the marine environment, remains uncertain and the full impact of the oil spill likely will not be known for decades.

**Response and the Natural Resource Damage Assessment and Restoration Program**

When an oil spill occurs, response efforts and the natural resource damage assessment and restoration (NRDAR) process under the Oil Pollution Act and its implementing regulations begin immediately. The U.S. Coast Guard leads response activities related to marine and coastal oil spills while the U.S. Environmental Protection Agency is the lead for inland or hazardous waste spills. These agencies are supported by U.S. Department of the Interior through the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, the U.S. Department of Commerce through the National Oceanic and Atmospheric Administration, and agencies or officials from Louisiana, Mississippi, Alabama, Florida and Texas. Typically the responsible party also is involved in the response. Response efforts focus on cleaning up or removing the oil to reduce or eliminate the risk to human health and the environment. In certain cases, efforts to restrict oil contamination or migration have the potential to adversely impact the environment. The Service, in coordination with other federal and state

agencies, is very involved in evaluating these projects with the intent of ensuring that adverse impacts are avoided to the maximum extent practicable.

But these response efforts may not fully restore injured natural resources or address the public's lost use of the resources. The NRDAR process focuses on identifying injured natural resources, determining the extent of the injuries, recovering damages from those responsible, and planning and carrying out natural resource restoration activities to pre-spill conditions. NRDAR focuses on restoring the injured resources but also making sure the responsible parties compensate the public for the lost use of those resources. It involves federal and state agencies, and Tribal governments, acting as "trustees" on behalf of the public for those natural resources under their legal jurisdiction. The Oil Pollution Act (OPA) of 1990 was passed in the wake of the *Exxon Valdez* disaster to provide specific legal authority for addressing the consequences of oil spills, including providing trustees with the authority to carry out the responsibilities of NRDAR.

Although the response and NRDAR processes occur independently, assets and plans are coordinated and shared as appropriate, with the ultimate goal of cleaning up the environment, restoring injured natural resources and holding responsible parties liable for the associated impacts, including clean up and restoration.

#### **Department of the Interior/U.S. Fish and Wildlife Service's Role in NRDAR**

The Department of the Interior (DOI) is trustee for a large part of our nationally owned public lands and many natural resources. These include lands such as National Parks and National Wildlife Refuges; lands managed by the Bureau of Land Management; tribal lands and natural resources held in trust by the federal government; waters managed by the Bureau of Reclamation; and federally protected plants and animals such as migratory birds, marine mammals, marine turtles, and federally-listed threatened and endangered species. The agencies within the DOI responsible for the management of trust resources are the U.S. Fish and Wildlife Service, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, and National Park Service. DOI is currently pursuing approximately 550 NRDAR cases across the country and the Service serves as the lead DOI bureau in more than 95 percent of those cases.

Lands and natural resources under the trusteeship of the DOI are among the resources most impacted by the BP/Deepwater Horizon oil spill. A Department of the Interior Coordination Team, which includes representatives from the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, U.S. Geological Survey and the Office of the Solicitor, is currently working to implement and further develop a long-range plan for coordinating NRDAR activities within the Department for the Deepwater Horizon oil spill, but also looking at ways of identifying and implementing - with our partner state and federal trustee agencies - shorter term NRDAR restoration projects as appropriate.

#### **NRDAR Process**

The NRDAR process involves three primary phases: 1) pre-assessment, 2) injury assessment and restoration planning, and 3) restoration implementation. During the pre-assessment phase,



trustees collect time-sensitive data to determine if any trust resources have been injured or are likely to be injured by the oil spill.

The injury assessment and restoration planning phase involves identifying and quantifying the extent and magnitude of injuries by conducting economic, physical and biological studies. During this phase trustees are also considering potential restoration options based on factors such as likelihood of success, technical feasibility, cost effectiveness, and restoration projects that may already be developed in regional restoration plans. This phase concludes with the trustees' selection of restoration projects following approval by the trustee council and with public input. These projects are designed to fully compensate the public for the injury to natural resources by restoring, rehabilitating, replacing, or acquiring the equivalent of injured natural resources to achieve the condition that would have existed had the oil spill not occurred, the impact of which will be reassessed throughout the restoration implementation phase and for decades after through a long-term monitoring plan. Examples of restoration projects include restoring bird breeding habitat, reconstructing wetlands and barrier islands, restoring fisheries, and increasing public awareness and access to natural resources. The responsible parties are liable for the cost of assessment and restoration work and often work cooperatively with the trustees during this process.

The final phase, restoration implementation, involves recovering damages for injured natural resources and using those damages to implement restoration projects. OPA requires the trustees to use funds obtained through a settlement or litigation to restore, replace or acquire the equivalent of the injured resources and the services provided by those resources. Injury to species and habitats is measured from the moment the oil impacts the natural resources until the injured resources are returned to their pre-spill or baseline condition. Determining the extent and magnitude of injury requires a rigorous scientific process that can take several years to complete. Many factors such as the amount and type of oil, where it is released, the nature of cleanup actions, the size of the impact area, and the sensitivity of the natural resources determine the amount of time it will take to complete the assessment. Nonetheless, the process is nimble enough to accomplish restoration projects even before the full assessment is completed, provided those projects prevent additional or ongoing injury, are reasonable, and approved by the trustees. These projects may be used to offset the total liability.

#### **NRDAR Activities Related to Deepwater Horizon Oil Spill**

Federal and state entities with natural resource trust responsibilities have initiated an NRDAR process to assess natural resource injuries caused by the spill and to identify appropriate restoration actions. To guide this process through the preliminary stages, the trustees have formed a Trustee Steering Committee to facilitate cooperation and coordination among the participating state and federal agencies. The committee includes representatives from Texas, Louisiana, Mississippi, Alabama, Florida, the Department of Commerce, and the Department of the Interior. Because they have jurisdiction over natural resources in the area, the Departments of Defense and Agriculture along with affected tribes in the Gulf are also invited to participate in the NRDAR action. A memorandum of understanding establishing the Deepwater Horizon Oil Spill Trustee Council that will ultimately oversee the steering committee and the NRDAR process is currently being developed.

Thirteen technical working groups have been established by the trustees based on broad resource categories that include natural resources, human use of impacted natural resources, and cultural sites. Each group is developing studies to assess injuries pertaining to its resource area taking into account impacts from the oil spill and response actions. In addition to these studies, the trustees are reviewing and, as appropriate, incorporating the vast amount of monitoring data on the Gulf of Mexico to better understand and assess injuries that may potentially result from the BP/Deepwater Horizon oil spill.

#### **Bird Technical Working Group**

The NRDAR trustees are in the review or implementation process for 11 study plans for birds. Some of these efforts, like the beach bird and aerial bird studies, provide data on a wide range of birds. Other studies focus on impacts to particular groups of birds, such as secretive marsh birds and colonial waterbirds, while one study is devoted to piping plover, a species on the federal list of threatened and endangered species. A twelfth study, focusing on wintering waterfowl, is currently being developed.

#### **Water Column Technical Working Group**

The long-term release of oil and dispersants in the open water of the Gulf has contributed to a complex exposure regime for biological resources (i.e., plankton, fish, invertebrates, turtles, mammals and birds) in the water column. The Water Column Technical Working Group is working to determine the fate and transport of the oil, taking into account the application of dispersants, both on the surface and by subsurface injections. Initial data collection has focused on physical and chemical characteristics of water, oil, dispersant, and possibly other response-related water additives, in both impacted and non-impacted areas. Physical and chemical measurements of temperature, salinity, dissolved oxygen, fluorescence, light, currents, and other conditions are being taken.

#### **Fish Technical Working Group**

The Fish Technical Working Group has the responsibility of evaluating injuries to fish, shellfish, and their supporting habitats. Due to the complexity of the Gulf fishery, this group has divided into several subgroups to evaluate injuries to various ecosystem components, such as coastal zone fisheries, deepwater fisheries, shellfish, and bottom-dwelling organisms. In addition to studies to assess broad fishery impacts, the trustees are developing plans to assess injuries to specific species of concern, such as threatened Gulf sturgeon and whale sharks.

#### **Marine Mammals and Sea Turtles Technical Working Group**

The Marine Mammal and Sea Turtles Technical Working Group is implementing plans for conducting aerial surveys of offshore marine mammals and sea turtles and assessing potential injuries to manatees. Plans have been developed for assessing potential injuries to turtles in the water, nesting females, eggs, and hatchlings. These plans focus on the loggerhead and Kemp's Ridley sea turtles and encompass nesting populations along the Gulf coast. In addition to impacts from oil, these plans address potential injuries from spill response activities.

**Submerged Aquatic Vegetation Technical Working Group**

Submerged aquatic vegetation are rooted vascular plants that, except for some flowering structures, live and grow below the water surface. They include seagrasses growing in the Gulf of Mexico and saline estuaries, as well as brackish and freshwater plant species. These plants provide food and habitat for many aquatic animals, help maintain water quality, and protect shorelines from erosion. Pre-impact samples and data within these vegetation communities are being collected to document pre-oiling conditions, where possible, for the purposes of assessing potential injury.

**Coral Technical Working Group**

Both shallow and deep-water corals from Texas to Florida may be affected by the spill. This includes the Florida Reef Tract, the most extensive living coral reef system in North American waters and the third largest system in the world, extending approximately 530 km from Martin County, on the Atlantic coast, to the Dry Tortugas, west of Key West, in the Gulf of Mexico. Several coral reef monitoring programs have existed for years and those efforts help form the foundation of our current work to document pre-impact condition of the corals.

**Shoreline Technical Working Group**

Shoreline assessment provides information on the degree and extent of oiling on intertidal shoreline habitats and vegetation. The primary intertidal shoreline habitats being examined include marsh, dune, beach, man-made structures, mud and tidal flats, debris, rip rap, and forested wetlands. We expect to use this information to develop a statistically rigorous sampling effort to determine the magnitude of injury to natural resources in the intertidal zone. Shoreline assessments have been conducted on much of the Louisiana coast by state and federal trustees, and efforts are now increasing to assess shorelines in Mississippi, Alabama, Florida, and Texas.

**Terrestrial and Freshwater Technical Working Group**

The Terrestrial and Freshwater Working Group is responsible for assessing potential damage to natural resources above the mean high tide line, including terrestrial and freshwater habitats. Assessments are in development for terrapins, beach mice, otter, mink, alligator, crocodile, and possibly coastal dunes.

**Human Uses Technical Working Group**

The Human Uses Technical Working Group is responsible for the assessment of potential direct, human-use injuries related to this event, including impacts to outdoor recreation, commercial navigation, travel, and increases in market prices for consumer goods, such as seafood. We are currently implementing three studies – general shoreline use, recreational boating, and shoreline fishing. We are also collecting information on navigation delays from port authorities, seafood markets on prices, fishery closures, public health advisories, and changes in numbers of visitors.

**Chemistry Technical Working Group**

The Chemistry Technical Working Group has developed a Quality Assurance Plan (QAP) and protocols for sampling and fingerprinting water, stranded oil, and oil in vegetation or on other environmental media for the purpose of documenting the presence and current condition of oil believed to be from the BP/Deepwater Horizon event on shorelines in different habitats in the Mississippi River delta region. The number of samples collected will be commensurate with the

extent of oiling and/or conditions at each site. Samples collected by the trustees are being analyzed to determine the general and specific character of the oil in accordance with the QAP and data will be delivered in accordance with the approved data sharing agreement between the trustees and BP.

**Cultural Resources Technical Working Group**

Most of the trustees' Cultural Resources Working Group efforts have focused on the compilation of information regarding archaeological sites, historic buildings, traditional cultural properties, historic or cultural landscapes, and traditional resource uses; conducting baseline resource inventories/condition assessments; developing protocols to document and treat different types of historic properties; and establishing a framework for consulting with other Trustees, the State Historic Preservation Offices, and Indian Tribes pursuant to Section 106 of the National Historic Preservation Act.

**Data Management Technical Working Group**

The Data Management Technical Working Group serves all resource groups by helping collect and securely store data gathered during NRDAR activities. The Group also provides data and reports to trustees.

**Aerial Imagery Technical Working Group**

The trustees are relying on a variety of aerial and satellite imagery to facilitate injury studies for many of the Technical Working Groups. DOI scientists have taken the lead in evaluating existing imagery, assisting in imagery interpretation, and identifying additional imagery needs.

The trustees are finalizing and implementing the first round of injury studies from data that was collected in the first few weeks of the spill. We are now planning for the assessment of future injuries that may result as seasons and species assemblages change. We also are developing additional studies to evaluate broad injuries across the Gulf of Mexico ecosystem.

The collective effort and integration of all technical working groups will provide a comprehensive picture of the nature, extent, and magnitude of natural resource injuries across the Gulf of Mexico ecosystem. Our comprehensive assessment will provide the basic information to guide Gulf-wide restoration efforts through the NRDAR process. The trustees plan to utilize existing restoration efforts underway throughout the Gulf to achieve the most expedient and beneficial restoration of the ecologically and economically important Gulf of Mexico ecosystem.

The NRDAR process underway in the BP/Deepwater Horizon oil spill is built upon many of the lessons learned from the 1989 *Exxon Valdez* spill in Alaska. For example, trustees are posting study plans on the internet to increase transparency; conducting frequent calls with study plan leaders, lead scientists and others to assist in developing a broad, integrated ecosystem perspective; and reviewing the myriad restoration possibilities in the Gulf to ensure injury assessment studies are providing relevant data related to these possibilities.

**Funding Mechanism**

At the beginning of this oil spill, DOI bureaus, including the U.S. Fish and Wildlife Service, National Park Service, and U.S. Geological Survey, immediately deployed personnel and resources to collect pre-spill or baseline data necessary for an NRDAR claim. The Bureau of Land Management and Bureau of Indian Affairs later joined these efforts. There are three main funding mechanisms for the NRDAR process: (1) collection through payments by the responsible parties; (2) reimbursements from the Oil Spill Liability Trust Fund (OSLTF); and (3) reimbursements from DOI's NRDAR.

Funding Committed by BP as a Responsible Party:

In May 2010, BP provided \$45 million to state and federal Trustees for the beginning phase of the injury assessment process. DOI and NOAA were allocated a total of \$20 million in advance funding. The two agencies agreed to split the \$20 million evenly. So far, DOI has obligated most of its \$10 million for personnel costs, equipment and supplies, and contracts with outside experts to implement assessment plans. Recently, the NRDAR trustees asked BP to replenish the advance funds and are now providing them with a preliminary accounting of funds obligated to date.

In addition, the Service has established a specific account through our reimbursable process for these NRDAR activities. The establishment of this account will ensure that the damage assessment activities that the trustees determine are needed to document injuries and determine the amount of restoration required will be able to continue moving forward in a timely fashion. Funding these extraordinary efforts is challenging for agencies within DOI.

OSLTF Funding:

In addition to DOI's request to BP to replenish its advance funding, DOI also requested and received a commitment of roughly \$4.7 million from the OSLTF. DOI has obligated more than \$1.5 million in funding of its \$4.7 million request from the U.S. Coast Guard managed OSLTF to support our initial baseline data collection along with agency and state coordination work, and individual bureaus also spent some of their base funding to support initial work. DOI has further requested an additional \$15 million from the OSLTF to continue funding assessment activities. We expect that BP and the other responsible parties in the Deepwater Horizon oil spill will be held accountable for all reasonable assessment costs including those provided by the OSLTF, the DOI NRDAR fund, and by individual DOI bureaus

DOI NRDAR Funding:

To date, DOI bureaus have received \$900,000 in funding from the DOI NRDAR fund. An additional \$5 million from the DOI NRDAR fund has been provided for DOI's Deepwater Horizon Damage assessment activities. DOI's NRDAR fund, which receives both Congressional appropriations and recovered assessment costs from previous NRDAR cases, has made significant funding commitments to other important NRDAR cases being pursued by DOI bureaus. However, \$6 million is being held in reserve so that it can be directed to this event.

Ultimately, we expect that BP and the other responsible parties in the Deepwater Horizon oil spill will be held accountable for all reasonable assessment costs including those provided by the OSLTF, the DOI NRDAR fund, and by individual DOI bureaus.

### **Third Party Involvement**

An NRDAR is fundamentally a legal claims process and litigation must be anticipated. Although more than 95 percent of NRDAR claims are resolved cooperatively with court approved settlements, the remaining five percent are resolved through litigation.

In an effort to ensure the most scientifically robust and complete assessment, the trustees regularly engage a variety of scientific and subject matter experts based on the type of expertise needed. For example, the Service often hires non-governmental bird experts to work with its staff experts in developing bird injury studies. These experts provide valuable input and can help provide an accurate and thorough assessment of the injury. The Service encourages these experts to publish their findings in peer reviewed journals.

Trustees actively seek quality information and data from sources inside and outside the government related to plan development and data interpretation. Data generated by experts outside of the NRDAR process are often valuable in establishing baseline conditions, accurately quantifying the full extent and magnitude of the injuries, and developing properly scaled restoration options. Finally, restoration under the NRDAR process can be and often is fully integrated into ongoing or regional planning efforts, and can be used to enhance or complement those efforts.

### **Conclusion**

The scope and magnitude of natural resource injuries and other impacts resulting from the BP/Deepwater Horizon oil spill are extraordinary and still not fully known. We do not know at this time the extent of the injuries, but we believe that in all likelihood, they will affect fish, wildlife and plant resources in the Gulf, and possibly in other areas across the country, for years or more likely decades to come. This spill has illuminated the need to collect better information about wildlife, fisheries, physical processes, and habitats, not only during a spill event, but in advance of potential oil spills and after a spill is contained, to quantify more effectively the damage and understand the cumulative effects of the stressors that act on the Gulf Coast ecosystem.

Finally, I would like to underscore how proud I am of our employees and volunteers, and the extraordinary effort they are putting forth to respond to this unprecedented event and their continuing work and dedication to protect and restore the American public's natural resources of the region.

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to testify today, and I will be happy to answer any questions you may have.

**Environment and Public Works Committee Hearing  
July 27, 2010  
Follow-Up Questions for Written Submission**

**U.S. FISH AND WILDLIFE SERVICE and NATIONAL OCEANIC AND ATMOSPHERIC  
ADMINISTRATION RESPONSES**

Questions from:

Senator Benjamin L. Cardin

*The FWS and NOAA witnesses should coordinate answers for the following questions:*

1. Please describe the process, from start to finish, for developing and implementing an assessment study as part of the Natural Resource Damage Assessment (NRDA). In that description, please include the following:

- a. How are study ideas generated?

**The development and prioritization of NRDA injury pre-assessment studies have been primarily driven by the anticipated nature and extent of oiling and oil-related injury to natural resources. For example, the Secretive Marsh Bird Study Plan was one of the first avian NRDA study plans designed and implemented by the Trustees because the impacts to near shore marsh habitats were expected to be devastating. Specific components and tasks within each study plan have been selected and designed relying upon experience from past oil spills, sound science, and with the main purpose of documenting and quantifying injury to a particular trust resource. NRDA injury assessment study plans also seek to consolidate the assessment of resource injuries into a particular group or guild that have common attributes and that can be restored using similar methodologies. This consolidation streamlines the process and is more cost-effective than assessing and restoring each species separately.**

- b. Who must approve and sign off on a study before it can begin?

**Most NRDA study plans have been designed with significant interchange and input from subject expert representatives from each of the affected Trustee entities. Each Trustee agency/bureau (Florida, Alabama, Mississippi, Louisiana, Texas, the Department of the Interior (DOI), and the Department of Commerce (DOC)/ National Oceanic and Atmospheric Administration (NOAA)) has developed its own internal process for study plan review and approval. Within the DOI, this review generally includes the Office of the Solicitor (SOL). Within NOAA, studies are developed by the technical working groups, which include attorney oversight, and then put through a series of technical reviews. Signatures of the lead Trustee representative and the Governor of Louisiana are required prior to implementation.**

- c. What role does BP, the responsible party, or their contractor ENTRIX, play in the development of a study?

**As permitted under the Oil Pollution Act's NRDA regulations, in some instances BP has been working cooperatively with the Trustees to collect preassessment data and to conduct NRDA activities. The Trustees have afforded BP the opportunity to provide input to the Trustees in the development of preassessment study plans and many of the plans have been signed off on by representatives of Trustees and BP. Cooperation facilitates the collection and sharing of reliable data, while allowing all parties to conduct their own analysis and interpretation of that data. As data from the studies become available, the Trustees may adapt study approaches or methods, or consider conducting additional studies, as needed, to ensure that the impacts of the oil spill can be fully identified and measured.**

**BP is not the only designated responsible party that has been identified for the Gulf spill, however, it is the only party that is currently working with the Trustees at this time for NRDA injury pre-assessments. The Trustees initiated and completed draft study plans internally, prior to presenting them to BP's contractor Entrix for review, discussion, and comment. The Trustees made some changes to the study plans after reviewing and discussing Entrix's comments. Then we finalized our plans and they were submitted to BP, as one of the responsible parties, to either approve and fund or decide not to fund. Usually, BP followed the recommendation of its contractor and funded the studies. When we could not reach agreement with Entrix, or BP decided not to fund, the Trustees used their own funding sources, or sought funding from the Oil Spill Liability Trust Fund (OSLTF), to conduct a study. While in general the negotiations between the Trustees and Entrix to fund specific injury studies resulted in BP agreeing to provide funding, several negotiations took weeks to complete and resulted in late starts to the piping plover, non-breeding shorebirds, and gulf sturgeon plans. In addition, the secretive marsh bird and colonial waterbird studies had to be initiated with other funding sources until an agreement with BP could be finalized, and the late start for these studies necessitated significant alterations to the original study plan.**

How do the Trustees approach negotiations with BP over studies and the scope of work?

**The Trustees engage with BP and its contractor Entrix on each study plan or study plan component that has the potential to document injury to natural resources and/or BP's liability. Each task of each study plan has been reviewed by BP. While the Trustees seek concurrence from BP and its contractors, they are prepared to undertake the studies on their own if necessary to protect the government's claim.**

How long do these negotiations last? Please provide a range that includes the time spent in the longest negotiation with BP over a NRDA study.



Negotiations on study plans have typically spanned weeks. For example, the Colonial Waterbird Study Plan was provided to BP for its review on June 3, 2010. After many discussions and meetings, BP signed the Colonial Waterbird Plan nearly six weeks later on July 15, 2010.

Has BP rejected any research project proposed by the Trustees?

**Yes, originally the federally endangered Piping Plover Injury Assessment Plan had component tasks to examine impacts to blood physiology from oil exposure, behavioral impacts, and prey base endpoints; all of which were rejected by BP and Entrix.**

Please describe the outcome for each of those studies; was it jettisoned, modified, or carried out by the Trustees without BP participation?

**With regard to the piping plover example previously mentioned, the workplan was revised. The avian blood physiology (exposure validation) component was transferred into a separate workplan, which DOI is pursuing independently without BP. The final piping plover workplan does not contain specific behavioral and prey base data collection activities, but does adequately address the research objectives for which these components were originally proposed. The Trustees have implemented the piping plover work independently, although BP has indicated recently it would like to participate on this work plan.**

**We have been able to reach agreement or a level of cooperation with Entrix/BP on all proposed bird studies/workplans. However, portions of some workplans involving the collection of blood physiology data have not been endorsed by BP/Entrix. The workplans in question include the piping plover example previously described, and workplans involving colonial waterbirds and secretive marsh birds.**

- d. Does the Department of Justice play any role in or have any authority over the choice or scope of NRDA studies?

**The Department of Justice (DOJ) typically does not play a day-to-day role in the oversight of details related to the choice, scope, development, or implementation of Natural Resource Damage Assessment (NRDA) injury study plans. The Trustees often seek to engage the DOJ early in the process, to keep the assigned attorneys apprised of significant developments in the NRDA case, and to seek their counsel on other legal issues. This is the role that DOJ has played in the NRDA process for the BP Deepwater Horizon oil spill.**

- e. How long does it take to complete each stage in this development and implementation process? If the timing is not standard, please provide a range.

Depending on the complexity of the study, number of participants, and other factors, it can take anywhere from a few days to several weeks to go from an initial study proposal to actual implementation.

- f. Which steps in the development and implementation process must happen before assessment work begins?

There are several steps in the implementation of a NRDA study plan. Once an injury assessment approach or methodology (e.g., telemetry or aerial survey) for a particular resource has been identified, the principle investigator(s) must be identified and engaged. The Trustees must then work together, often with the investigator(s), to design and draft the study plan. It is important for the Trustees to try and reach a general consensus on the various aspects of each study plan. Once consensus is reached, the Trustees provide the Responsible Parties (RP) the opportunity to participate and comment on the study plan. Once the RPs and their contractor have weighed in, the Trustees then decide which, if any, of the RP's comments to accept. The plan is finalized and funding is identified and secured for the study. The funding source for each study plan has varied depending upon RP's agreement and the Trustees decision to follow through with collection of a particular injury assessment data set independent of Responsible Party funding. Once the funding source has been identified, the study plan is sent to contracting for processing if necessary. It should be noted that even if the agencies fund the study, they still expect to recover those costs as damage assessment costs. BP agreeing to fund studies just give the agencies the extra assurance.

2. The Damage Assessment, Remediation & Restoration Program (DARRP) website links to NRDA studies approved as of July 19, 2010 (*see* [http://www.darrp.noaa.gov/southeastdeepwater\\_horizon/injury.html](http://www.darrp.noaa.gov/southeastdeepwater_horizon/injury.html)). Each of these studies is signed by both a representative of a Trustee agency and a representative of BP or their contractor ENTRIX (*see e.g.* Workplan for Secretive Marsh Bird Mortality).
- a. Does joint approval mean that BP has agreed to pay for the study? If so, and BP pays for a study done by third party scientists, does BP directly pay those scientists? Are those scientists contracted to BP or to the federal Trustee agency?

It is our experience that joint approval demonstrates a commitment from BP to fund the studies. Study plan costs are paid directly by BP (e.g., private vessel costs) or through later reimbursement of Trustee documented costs. Outside scientists working on the study plans are generally contracted and paid by the Trustee agencies. Those costs will be reimbursed once they are documented and submitted to responsible party for full reimbursement.

- b. Agency witnesses testified before the subcommittee that BP has provided \$45 million to the Trustees for assessment work. Does this amount account for, or is it in addition to,

study-by-study funding? If it is in addition to that funding, has BP provided any additional lump sum funding after this \$45 million investment?

**The \$45 million provided by BP is for additional Trustee assessment activities. Of this amount, DOI and NOAA each received \$10 million and the remainder was provided to the states of Louisiana, Mississippi, Alabama and Florida. The \$10 million provided to DOI has been used primarily to support DOI salary and travel expenses associated with Deepwater Horizon NRDA activities, and to fund contracts implementing study plans agreed to by BP and the Trustees. In early September, BP also provided DOI with \$2.9 million as reimbursement for certain salary expenses and paid contract invoices.**

- c. Are there any other repercussions, either positive or negative, that stem from BP's approval of a NRDA study? For instance, does that signed approval limit BP's rights to challenge the data or methods of collection in litigation surrounding the NRDA claim?

**BP's approval of study plans does not limit its rights to challenge the data or methods in a subsequent litigation. However, in the case of litigation, the fact that BP had agreed to specific study methods/approaches or data collection would make it harder for BP to contest the appropriateness of the study or relevance of its results.**

- d. Are all approved NRDA studies posted to the DARRP website noted above (16 workplans listed as of August 10, 2010)? Please provide any criteria used to determine which studies should be posted and which should not.

**It is the intent of the federal Trustees to post all study plans on the NOAA DARRP website and the U. S. Fish and Wildlife Service (FWS) Environmental Contaminants website when the plans are signed by BP and appropriate Trustee agency representatives. As of February 11, 2011, 34 of 61 co-signed plans had been posted on these websites. The remainder are in the process of being cleared for posting. Clearance requires review of the plans by attorneys and redaction of personal contact information or confidential business information prior to posting.**

3. If BP and the Trustees cannot agree on either the necessity or structure of a study, is it paid for out of the Oil Spill Liability Trust Fund?

**The OSLTF is also available to fund longer-term assessment studies through the NPFC claims process, which includes a statutory requirement that all claims first be presented as a cost demand to the Responsible Parties. If the Responsible Parties decline payment, fail to respond within 90 days, fall under one of OPA's liability exclusions, are unknown, or there are certain other circumstances present, the claim can then be submitted to the NPFC.**

Are there any limitations, in law, regulation, guidance or practice on the elements of a study that are paid for out of the Trust Fund?

**The NPFC has a responsibility to ensure that funds paid out of the OSLTF are “reasonable assessment” costs, under OPA so that the NPFC can seek reimbursement of these expenditures from Responsible Parties - through the courts if necessary. The NPFC has issued interim claim regulations (33 CFR § 136) that apply to all claims, including those for assessment costs. On technical matters, the NPFC provides some deference to the trustees. Under current law, there is a \$500 million total per-incident limit on what can be spent out of the OSLTF. Does the Trust Fund pay for the study from its start to its completion in all instances?**

**We cannot state what occurs in all instances. Each study is independently scrutinized by the NPFC and some studies may be funded, in part, by other sources such as the voluntary payment by responsible parties. If the full study is presented to the NPFC for payment by the Trust Fund, the NPFC might ask about portions of it, and whether it can be done in phases.**

If the Trust Fund does not pay for parts or all of a study, where does the funding come from?

**NOAA and DOI maintain limited appropriated funds upon which to draw from in these instances.**

4. Please provide a complete list of NRDA studies that have been or are being implemented to assess natural resource damages resulting from the *Deepwater Horizon* Oil Spill as of the date of the response to these questions. For each study, please indicate the date of its approval, the dates of implementation, the parties conducting the study and their affiliations (federal agency, academic institution, etc.), and whether the study was jointly approved by the responsible party.

**Please see Attachment 1 for a list of NDRA studies.**

5. Please provide a complete list of the Trustee working groups and their members.

**Please see Attachment 2 for a list of Technical Workgroup members.**

6. It has been reported initially in a July 16, 2010 article in the *Press-Register* that BP has approached respected Gulf Coast scientists offering substantial pay to do Natural Resource Damage Assessment work outside the Trustees' process. In return, BP is requiring those scientists not work with or share their research with federal and state Trustees.

- a. Have the Trustees sought to work with scientists who have been unable to do assessment work because of contracts with BP? If so, on how many instances has this issue arisen?

**In a few instances, the Trustees have sought to work with scientists who were already under contract with BP. With the large number of qualified academics working in the Gulf Region, the Trustees have not had any issue finding appropriate outside scientists to support the natural resource damage assessment. To date, the Trustees are working with more than two dozen academic experts from roughly 20 academic institutions.**

- b. The *Press-Register* article quotes Richard Shaw, associate dean of LSU's School of the Coast and Environment, saying that "The government needs to come through with funding for the universities," because without available funding "[t]hey are letting go of the most important group of scientists, the ones who study the Gulf." What are the Trustee agencies doing, both inside the NRDA process and beyond it, to develop a comprehensive and long-term research program that will engage the best third-party experts in a government-led effort to understand the effects of the spill on the ecology of the Gulf?

**NRDA studies are designed to characterize and quantify specific injuries and scale appropriate restoration in a focused, straight-forward, and legally defensible manner. NRDA is not intended to provide for comprehensive research programs. The costs of such programs may not be recoverable unless the results are tied clearly and concisely to injury assessment, quantification, and/or scaling.**

**The Trustees have engaged leading researchers from several universities and non-profit research institutions, including Louisiana State University, in NRDA planning and implementation activities. We recognize the value of such expertise and are trying to take advantage of the knowledge and experience of leading researchers to the extent practicable under the NRDA process. Additionally, we anticipate further utilization of Gulf of Mexico experts in restoration design, implementation, and monitoring.**

**The agencies are also interested in longer term research and monitoring of the Gulf beyond what can be justified as NRDA-related. NOAA has engaged its internal scientists to identify proposals for studying the Gulf. NOAA is also planning a solicitation of proposals on these issues from the academic community. In addition to the NRDA work, the DOC in concert with the FWS, USGS and other DOI agencies remain committed to working towards long-term restoration of the Gulf coast. Efforts underway include the development of a gulf-wide science strategy and assessment; DOI working with partners through the Landscape Conservation Cooperatives to expand biological planning and design capacity and bolster climate change science capacity; and DOC and DOI coordinated with the Council on Environmental Quality and other Federal agencies on Secretary Mabus' plan for long-term restoration of the Gulf Coast.**

Additionally, on October 5, the President signed an Executive Order establishing the Gulf Coast Ecosystem Restoration Task Force. Its mission is to coordinate intergovernmental responsibilities, planning, and exchange of information to better implement Gulf Coast ecosystem restoration and to facilitate appropriate accountability and support throughout the restoration process. Members of the Task Force will include five state representatives appointed by the President upon recommendation of the Governors from each Gulf state and one senior official from many federal agencies including Interior, Commerce, Agriculture, Defense, and Justice. The Task Force will be chaired by the EPA Administrator and may include representatives from affected Tribes.

7. Are the Trustees permitted under the regulations and guidelines that govern the NRDA under the Oil Pollution Act of 1990 to implement anyone of the specific damage remedies from the following four outlined in OPA: restoration, replacement, rehabilitation, and the acquisition of equivalent resources to those damaged? What is the role for habitat protection and acquisition of equivalent resources in restoring injured wildlife to its pre-incident state, according to the Trustees' interpretation of the law?

OPA's definition of damages as the cost to "restore, replace, rehabilitate, or acquire equivalent resources" is an expression of the statutory mandate that damages must be used to address the injury to public natural resources caused by the spill. Restoring, replacing, rehabilitating, or acquiring equivalent resources are all tools available to Trustees to utilize, depending upon what is most effective for a given place, time, and incident. Specific conditions faced by federal, state, and tribal resource managers – such as the scarcity or abundance of a population, the fragility of habitats, and other stressors on an ecosystem -- most often inform restoration strategies. The OPA Natural Resource Damage Assessment regulations provide some guidelines to Trustees for making restoration determinations. In addition to site and incident specific conditions, the OPA regulations provide that Trustees should first consider restoration alternatives to address injury that provide natural resources and natural resource benefits of a similar type and quality to those that were injured, before considering other alternatives to compensate the public and the environment.

8. The Exxon *Valdez* Oil Spill (EVOS) Trustees created a panel of independent experts to review each study and the comprehensive nature of the assessment and restoration program to ensure that it was thorough and comprehensive. The EVOS Trustees believe this peer-review process that gave the public greater confidence in the Trustees work. Will the *Deepwater Horizon* Oil Spill Trustees put a similar peer-review panel in place to review the assessment and eventually restoration program?

The EVOS panel of independent experts was put in place after the settlement of the natural resource damages claim. The Trustees are already using peer review, in some instances, to evaluate its assessment work for the BP *Deepwater Horizon* oil spill and will continue to evaluate the process. In our experience, however, no single

panel of experts is able to perform peer review for all of the varied kinds of studies and plan development processes that are needed for a major NRDA like this one. The Trustees need discretion to use different approaches to peer review for different studies and projects, rather than a one-size-fits-all mandated process.

9. The State of Alaska has a website with information on the Exxon *Valdez* settlement that tracks recovery of resources for the public. What sort of metrics can the Trustees create and make available to the public to demonstrate the damage to Gulf of Mexico resources and progress in restoring, replacing or acquiring the equivalent resources?

**Under the NRDA process, Trustee agencies identify potentially injured resources during the pre-assessment phase. In the BP Deepwater Horizon case, technical working groups (TWGs) have been established to determine the impact of the oil spill on multiple trust resources, including birds, marine mammals, terrestrial and aquatic wildlife, human use, cultural resources and others. The TWGs are responsible for identifying endpoints and developing procedures and methods to measure potential injury to their respective resources in study plans. Currently, signed work plans are available on both the NOAA and DOI NRDA websites, so the public can see the progress being made by the Trustee agencies. As the NRDA process continues, assessment plans, and some results will be made available. For example, NOAA has posted the analytical chemistry results from some of its early water sampling efforts in the Gulf of Mexico. Finally, as the restoration phase proceeds, scoping meetings will be held to acquire public input and ideas for the draft Damage Assessment and Restoration Plan (DARP), and the public will be requested to provide comments on the draft DARP before it is finalized. There will be metrics associated with the different selected restoration projects (e.g., acres restored) and the public will be informed about the projects during the course of restoration implementation and monitoring, although how they will be informed has not yet been determined at this time.**

U.S. FISH AND WILDLIFE SERVICE RESPONSES

Questions from:

Senator Benjamin L. Cardin

10. In written testimony submitted to the Subcommittee, Ms. Dohner stated that the Department of the Interior has set up a reimbursable account outside the existing Natural Resource Damage Assessment Revolving Fund to fund *Deepwater Horizon* natural resource damage assessment work.
- a. When was that account established? What is the limit on the funding available from that account? Will it be available to fund other NRDA work outside the Deepwater Horizon incident?

**The reimbursable account was established on August 3, 2010, following execution of an Interagency Agreement (IAG) between the Fish and Wildlife Service and the National Pollution Funds Center (NPFC). On October 21, 2010, the account held \$50,004,116, of which \$43,560,579 is available for U.S. Fish and Wildlife Service NRDA activities.**

**This reimbursable agreement does not provide up front funds, but is a commitment by the NPFC to reimburse costs for activities approved in the IAG specifically for the Deepwater Horizon NRDA activity.**

- b. What is the account intended to fund? Are there particular stages in the development and implementation of assessment studies laid out in answer to question 1 above where this fund is used?

**The reimbursable agreement is intended to fund specific activities and studies approved in the IAG related to the Deepwater Horizon NRDA case.**

- c. How does the intended use and rules governing the fund differ from the Natural Resource Damage Assessment Revolving Fund in place at the Department?

**Funding provided by the DOI NRDAR Fund generally is case specific; however, the individual studies and activities implemented using the funds are determined by the DOI Case Management Team. Reimbursable funding approved by the NPFC is only for activities authorized in the IAG for a specific case. Use of these funds is not at the discretion of the DOI Case Management Team.**

11. What are the roles and responsibilities of the Fish and Wildlife Service Environmental Contaminants program in the Natural Resource Damage Assessment work done by the Department of the Interior? What is its role in the *Deepwater Horizon* NRDA?

**The Fish and Wildlife Service's (FWS) Environmental Contaminants Program has the lead on 94 percent of all the Department of the Interior NRDA cases and is an active participant in nearly all DOI NRDA cases. Its role in the NRDA program**



**covers all activities that range from preparing a damage assessment to restoring natural resources. Examples of these roles often include designation as the Department's Authorized Official, assignment as a case manager, science advisor, or as a member on the Trustee Council. For larger cases, the FWS may also provide personnel to support all levels of the damage assessment including biologists, GIS specialists, contracting specialists, database managers, and other administrative personnel.**

**For the Deepwater Horizon NRDA, the FWS has many specific roles in which we have assigned personnel. For example, the Department's Authorized Official is the Regional Director of the FWS Southeast Region. The FWS is also the Lead Trustee for all Bureaus of the Department and the Federal Lead Administrative Trustee for all involvement. In addition, the FWS has personnel working as a case manager, the liaison to the Incident Command, project team leaders, and many biologists writing sampling plans and collecting field data (such as conducting beach bird surveys). Many FWS programs are involved in work related to NRDA including public affairs, contracting and budget, GIS, national wildlife refuges, migratory birds, and endangered species, just to name a few.**

- a. How many NRDA cases the Contaminants program is currently working on in addition to the *Deepwater Horizon* spill? How much revenue for restoration does the program bring in from polluters each fiscal year?

**The Fish and Wildlife Service's Environmental Contaminants program is currently working on over 450 active NRDA cases in addition to the Deepwater Horizon case. The amount of revenue that the FWS brings in each year is variable based on both the number of settlements and the amount of each settlement. However, over the past five fiscal years (FY06 – FY10), the FWS has brought in a total of approximately \$430 million including interest for restoration, excluding the funds and interest received from the Exxon Valdez settlement. It is important to note that this total does not account for spills of comparable magnitude to Deepwater Horizon.**

- b. How is the Contaminants program covering both the ongoing NRDA cases while handling the response and assessments that are ongoing for the *Deepwater Horizon* spill?

**Covering over 450 active NRDA cases as well as the response and assessment for our Nation's largest man-made oil spill has been a challenge to the Environmental Contaminants program. Initially, work stopped on some NRDA cases and other duties usually performed by Environmental Contaminants personnel were postponed. At this time, most Environmental Contaminants personnel have completed their details and are resuming regular job duties. We have established a new NRDA office and are hiring new personnel to focus on the oil spill effort. .**

- c. Please provide the Contaminants Program's budget for the past five fiscal years. What resources does the Contaminants Program have for pre-incident planning and training?

Fiscal Year	Appropriated Dollars (Subactivity code 1130)
2006	\$10,874,000
2007	\$11,077,000
2008	\$12,172,000
2009	\$13,242,000
2010	\$13,987,000

**The Environmental Contaminants program does not have any resources allocated specifically for pre-incident planning and training. Any funds that are obligated to these activities come directly from our appropriated dollars .**

- d. Would the Contaminants Program benefit from a yearly allocation from the Oil Spill Liability Trust Fund for preparedness, response, restoration, and damage assessment capabilities? Please describe these benefits.

**The Contaminants Program's discretionary funding as well as the funds from NRDA settlements address preparedness, response, restoration, and damage assessment activities.**

12. Congress has provided the National Park Service with the authority to seek damages for injuries beyond those covered by the Oil Pollution Act and CERCLA under the Park System Resource Protection Act. Could the Fish and Wildlife Service use similar authority?

**The FWS does not have the explicit statutory authority to seek compensation from responsible parties for National Wildlife Refuge System (NWRS) and National Fish Hatchery System (NFHS) resources that are injured or destroyed. However, existing laws and programs help the FWS address injuries that may not be covered by the OPA and CERCLA.**

In what kinds of circumstances could the Agency use that authority?

**The FWS would need to fully assess gaps in current authority to determine what specific circumstances may exist that would require new authority. Injuries to resources not covered under OPA or CERCLA include injuries caused by fires, tree cutting, automobile wrecks , vandalism, boat and vessel groundings and or damages caused by toxic or harmful substances not specifically listed as hazardous substances under OPA or CERCLA.**

Why is it appropriate for the Fish and Wildlife Service?

**OPA and CERCLA authorize the FWS to recover funds and directly address harm to resources managed or controlled by the FWS – including NWRS and NFHS resources. However, these authorities are strictly limited to harm caused by the release of “listed” hazardous substances. When toxics are dumped on or near a refuge that are not formally “listed” as hazardous substances, recovering funds to address the harm from the responsible party is quite difficult. The appropriateness of any such authority would be determined the gap assessment mentioned above.**

**Senator James M. Inhofe**

1. Due to the depth of BP's Macondo well, there is potential for damage to fish and other species that aren't as accessible or easily studied as many on shore or shallow water species. What steps does Fish and Wildlife plan to take in order to address the potential difficulties of performing a NRDAR at these depths?

**The Fish and Wildlife Service (FWS) is working jointly with the National Oceanic and Atmospheric Administration (NOAA) to evaluate injuries from the BP Macondo oil well. The two federal agencies are focusing efforts on those natural resources for which they have primary management responsibility. Thus, the FWS is focusing its injury assessment efforts on migratory birds, various federally listed species, and the nearshore and onshore habitats, such as wetlands, for these species. Both agencies work closely together in planning and evaluating assessment efforts to maximize the quality and value of the information collected. For example, FWS scientists are working with NOAA scientists to design and conduct aquatic toxicity tests, measure water column effects of the oil on plankton and fishes, evaluate injuries to deepwater corals, and, using photo-surveys and other remote sampling techniques assess nearshore marine species.**

2. Could you please describe how DOI and Fish and Wildlife plan on working with other trustees-such as the individual states-to ensure the NRDAR process doesn't get fragmented between trustees?

**DOI and the FWS have helped form a Trustee Council Steering Committee composed of representatives of the Federal and State trustee agencies with management responsibility for natural resources in the Gulf. The goal of the Council, with public involvement, is to jointly produce and implement a final Restoration Plan that fully compensates the public for all documented injuries attributable to the BP Deepwater Horizon oil spill. The Council meets regularly to coordinate assessment and restoration planning activities and decision-making is by consensus of the members. The Council and its legal counsel have been working to formalize how the Council will function in the future through a Memorandum of Understanding.**

3. According to your testimony, you believe that restoration projects can be accomplished prior to a full assessment being completed. Is Fish and Wildlife currently working on any specific restoration projects, and do you expect them to "offset the total liability" as you said could be the case in your testimony?

**The FWS is not planning to implement NRDA restoration projects independent of the Trustee Council process, but several restoration options are being pursued by the Trustee Council. These include potential emergency restoration projects, as defined by the OPA NRDA regulations, and a separate set of potential early restoration projects. The Trustees recently presented a set of proposed emergency restoration projects to BP with a request that BP perform or fund the projects.**

**Examples of such projects include the stabilization of damaged seagrass beds to prevent further deterioration and the collection and propagation of marsh plants to facilitate rapid restoration. The Trustees are also reviewing potential “early” restoration projects that would not meet the requirements for “emergency restoration” but would nonetheless be appropriate to begin implementing before completion of the NRDA.**

4. Thus far, how would you describe Fish and Wildlife's working relationship with BP? Are you aware of any instances where BP has been less than forthcoming responding to your agencies requests or hindered the NRDAR process?

**In certain instances, BP has insisted on reimbursing contractor costs only after a bill/invoice has been provided. This has resulted in problems for some contractors who do not have sufficient capital to carry debts for extended periods. In cases where we have not reached agreement with BP on specific pre-assessment protocols, the Trustees have proceeded without BP's cooperation when we believed time critical information would be lost. Generally, these instances have not impeded the overall working relationship between the Trustees and BP. To date, the other responsible parties have not participated in the NRDA process at all.**

Senator CARDIN. Thank you for your testimony.

We know this is difficult. All of the individuals who are involved in the day to day work here to try to get this right, so we appreciate the work of your employees and your agency, and same thing with NOAA.

Mr. Penn.

**STATEMENT OF TONY PENN, DEPUTY CHIEF, ASSESSMENT AND RESTORATION DIVISION, OFFICE OF RESPONSE AND RESTORATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**

Mr. PENN. Thank you, Chairman Cardin and members of the Subcommittee, for the opportunity to testify on NOAA's role in assessing natural resource damages from the Deepwater Horizon oil spill.

My name is Tony Penn. I am the Deputy Chief of the Assessment and Restoration Division in NOAA's Office of Response and Restoration. I appreciate the opportunity to discuss the critical roles NOAA plays during and following oil spills and the importance of our contributions to protect and restore the natural resources, communities, and economies affected by oil spills.

Before I discuss NOAA's efforts I would first like to express my condolences to the families of the 11 people who lost their lives in the explosion and sinking of the Deepwater Horizon platform.

NOAA is deeply concerned about the immediate and long-term environmental, economic, and social impacts to the Gulf region from the Deepwater Horizon oil spill. Over the past 3 months NOAA has provided sustained scientific support to the Unified Command and carried out our trustee responsibilities. We are fully mobilized and working tirelessly to address spill impact on the Gulf region, and we will continue to do so until the release is fully controlled, the oil is cleaned up, the natural resource damages are assessed, and the restoration of those natural resources is complete.

My testimony today will briefly mention NOAA's role in oil spill response and focus on NOAA's role in natural resource damage assessment.

NOAA has three critical roles during spills. We serve as a scientific adviser to the Coast Guard to provide trajectory predictions on the fate and transport of oil, conduct overflights and mapping, identify sensitive environmental resources, and conduct shoreline surveys to guide clean up.

Second, we represent the Department of Commerce in spill response decisionmaking activities of the National Response Team. We also assess and restore natural resources injured by the spill and their lost human uses through a process called natural resource damage assessment, or NRDA.

Natural resource damage assessment restores natural resources injured by the spill. It is conducted by several Federal agencies, States, and tribal trustees who share decisionmaking authority equally through consensus. NOAA, acting on behalf of the Secretary of Commerce, is the lead trustee for many of the Nation's coastal and marine resources.

NOAA and the co-trustees are authorized by the Oil Pollution Act, or OPA, to recover damages from the responsible party on be-

half of the public for injuries to and lost use of trust resources resulting from an oil spill. OPA requires compensation in the form of restoration, and the appropriate compensation is determined through the NRDA process.

At the outset of the Deepwater Horizon spill NOAA quickly mobilized staff to collect a variety of data that are critical to help inform the damage assessment. NOAA and co-trustees continue to collect data in the Gulf of Mexico and across five States that will help us determine what natural resources have been injured and what human uses have been affected due to the spill.

Technical working groups composed of State and Federal trustees and representatives from BP are gathering historical information and developing and implementing field studies for a variety of natural resources. Resources being assessed include fish and shellfish, birds, marine mammals, turtles, and sensitive habitats such as wetlands, sea grasses, beaches, mud flats, deep and shallow corals, and water column and bottom sediments.

Currently NOAA and the co-trustees are in the early stages of the damage assessment and are documenting exposure of resources and habitat for oil. The data and information being collected now from baseline, and exposure studies will be used to determine what further studies to pursue to document injury.

It is too early in the process to know what the full scope of the injury studies will be. Although the concept of assessing injuries may sound relatively straightforward, understanding complex ecosystems, the services those ecosystems provide, and the injuries caused by oil and hazardous substances takes time, often years.

The effects of the Deepwater Horizon oil spill on natural resources are dependent on multiple factors, including the type and quantity of oil, what life stages of animals are exposed, where, and for how long.

Ultimately, the trustees will determine how best to restore the injured natural resources and will develop the most appropriate restoration projects to compensate the public for lost resources and services. Those projects will be paid for or implemented by the responsible parties, and trustees will monitor the projects to make sure the natural resources are successfully restored.

We intend to complete this process as efficiently and quickly as we are able because our goal is to restore the natural resources of the Gulf. In the wake of such an event we are reminded of the importance of the coastal ecosystems and the dependence of human livelihoods on the health and prosperity of our seas.

I would like to assure you that we will not relent in our efforts to restore natural resources affected by this unprecedented oil spill. We will fully compensate the public for its natural resource and service losses.

Thank you for allowing me to testify on NOAA's damage assessment efforts. I am happy to try and address any questions that you may have.

[The prepared statement of Mr. Penn follows:]

**WRITTEN STATEMENT OF  
TONY PENN  
DEPUTY CHIEF, ASSESSMENT AND RESTORATION DIVISION  
OFFICE OF RESPONSE AND RESTORATION  
NATIONAL OCEAN SERVICE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
U.S. DEPARTMENT OF COMMERCE**

**HEARING ON  
ASSESSING NATURAL RESOURCE DAMAGES RESULTING FROM THE BP  
DEEPWATER HORIZON DISASTER**

**BEFORE THE  
SUBCOMMITTEE ON WATER AND WILDLIFE  
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS  
U.S. SENATE**

**July 27, 2010**

Thank you, Chairman Cardin and Members of the Subcommittee, for the opportunity to testify on the Department of Commerce's National Oceanic and Atmospheric Administration's (NOAA) role in the assessing natural resource damages resulting from the Deepwater Horizon BP oil spill.

My name is Tony Penn and I am the Deputy Chief of the Assessment and Restoration Division within NOAA's Office of Response & Restoration. I appreciate the opportunity to discuss the critical roles NOAA serves during and following oil spills and the importance of our contributions to protect and restore the natural resources, communities, and economies affected by this tragic event. Before I discuss NOAA's efforts, I would first like to express my condolences to the families of the eleven people who lost their lives in the explosion and sinking of the Deepwater Horizon platform.

NOAA's mission is to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs. NOAA is also a natural resource trustee and is one of the federal agencies responsible for protecting, assessing, and restoring the public's coastal natural resources when they are impacted by oil spills, hazardous substance releases, and impacts from vessel groundings on corals and seagrass beds. As such, the entire agency is deeply concerned about the immediate and long-term environmental, economic, and social impacts to the Gulf Coast and the Nation as a whole from the Deepwater Horizon BP oil spill. NOAA is fully mobilized and working tirelessly to lessen impacts on the Gulf Coast and will continue to do so until the spill is controlled, the oil is cleaned up, the natural resource damages are assessed, and the restoration is complete.



My testimony today will discuss NOAA's role during oil spills and the natural resource damage assessment (NRDA) process, who the natural resource trustees are for the Deepwater Horizon BP oil spill and how NOAA is working with our co-trustees; NRDA efforts underway; and future activities to provide for protection and restoration of natural resources. .

#### **NOAA'S ROLES DURING OIL SPILLS**

NOAA has three critical roles mandated by the Oil Pollution Act of 1990 and the National Contingency Plan:

1. During the emergency response, NOAA serves as a conduit for scientific information to the Federal On-Scene Coordinator. NOAA provides trajectory predictions for spilled oil, conducts overflight observations of oil on water, identifies highly valued or sensitive environmental areas, and conducts shoreline surveys to determine clean-up priorities.
2. As a natural resource trustee, NOAA conducts a joint Natural Resource Damage Assessment (NRDA) with co-trustees to assess and restore natural resources injured by the oil spill. NRDA also assesses the lost uses of those resources, such as recreational fishing, canoeing, and swimming, with the goal of implementing restoration projects to compensate the public for these injuries.
3. Finally, NOAA represents the Department of Commerce in spill response decision-making activities through the National Response Team.

#### ***Response***

The U.S. Coast Guard (USCG) is the Federal On-Scene Coordinator and has the primary responsibility for managing coastal oil spill response and clean-up activities in the coastal zone. During an oil spill, NOAA's Scientific Support Coordinators deliver technical and scientific support to the USCG. NOAA's Scientific Support Coordinators are located around the country in USCG Districts, ready to respond around the clock to any emergencies involving the release of oil or hazardous substances into the oceans, shorelines and related areas. Currently, NOAA has all of its Scientific Support Coordinators around the country working on the Deepwater Horizon oil spill.

With over thirty years of experience, NOAA continues to serve the Nation by providing its expertise and a suite of products and services critical for making science-based decisions. Examples include trajectory forecasts on the movement and behavior of spilled oil, overflight observations, spot weather forecasts, emergency coastal survey and charting capabilities, aerial and satellite imagery, and real-time coastal ocean observation data. Federal, state, and local entities look to NOAA for assistance, experience, local perspective, and scientific knowledge. NOAA's Office of Response and Restoration (OR&R) was called upon for scientific support 200 times in 2009 for issues related to oil and hazardous substance spills.

#### ***Natural Resource Damage Assessment (NRDA)***

NRDA is a legal process to determine the type and amount of restoration needed to compensate the public for harm to natural resources and their human uses that occur as a result of an oil spill. Stewardship of the Nation's natural resources is shared among several federal agencies, states, and tribal trustees that conduct NRDA's. NOAA, acting on behalf of the Secretary of Commerce, is the lead federal trustee for many of the Nation's coastal and marine resources, and is authorized by the Oil Pollution Act of 1990 to recover damages on behalf of the public for

injuries to trust resources resulting from an oil spill. The Oil Pollution Act encourages compensation in the form of restoration. The appropriate type and amount of compensation is determined through the NRDA process.

NRDA in NOAA is conducted by the Damage Assessment, Remediation and Restoration Program (DARRP). Established in 1990 after the Exxon Valdez oil spill, DARRP is composed of a team of scientists, economists, restoration experts, and attorneys to assess and restore injured resources. Since 1990, NOAA, together with other federal, state, and tribal co-trustees have recovered over \$500 million for restoration of natural resources injured by oil, hazardous substances and vessel groundings. NOAA works cooperatively with co-trustee agencies and (in the case of a cooperative assessment of injuries) the responsible party (or parties) to share data and information collected during the spill and during the injury assessment. Working cooperatively with the responsible party and co-trustees can save time and money and can result in restoration being implemented faster and more efficiently.

Although the concept of assessing injuries may sound relatively straightforward, understanding complex ecosystems, the services these ecosystems provide, and the injuries caused by oil and hazardous substances takes time – often years. The time of year the resource was injured, the type of oil or hazardous substance, the amount and duration of the release, and the nature and extent of clean-up are among the factors that affect how quickly resources are assessed and restoration and recovery occurs. The rigorous scientific studies that are necessary to prove injury to resources and services may also take years to implement and complete. The NRDA process ensures an objective and cost-effective assessment of injuries – and that harm to the public's resources is fully addressed.

#### ***National Response Team***

The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan, is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The purpose of the National Contingency Plan is to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans. NOAA represents the Department of Commerce on the National Response Team and works closely with regional response teams and local area committees to develop policies on dispersant use, best clean-up practices, and communications, and to ensure access to science-related resources, data, and expertise.

#### **NOAA's NATURAL RESOURCE DAMAGE ASSESSMENT EFFORTS**

Oil spills affect our natural resources in a variety of ways. They can directly impact our natural resources, by oiling marine mammals, for instance. They can diminish the ecological services an ecosystem can provide, such as the loss of critical nursery habitat for shrimp, fish, and other wildlife or the loss of floodwater protection resulting from an oil spill. Oil spills may also diminish how we use natural resources by affecting fishing, boating, beach going, and wildlife viewing opportunities.

#### ***Natural Resource Trustees***

Trustees for the Deepwater Horizon oil spill includes NOAA, Department of the Interior's (DOI) U.S. Fish and Wildlife Service, DOI National Park Service, and the designated State trustee agencies for the states of Texas, Louisiana, Mississippi, Alabama, and Florida. The Deepwater Horizon oil spill NRDA will be conducted pursuant to the Oil Pollution Act (OPA) of 1990.

Natural resource trustee agencies are responsible for trust resources as designated by the National Contingency Plan (40 CFR § 300.600). The Secretary of Commerce (acting through NOAA) is a trustee for the following natural resources and their supporting ecosystems: marine fishery resources; anadromous fish; endangered species and marine mammals; and the resources of National Marine Sanctuaries and National Estuarine Research Reserves.

At the outset of the Deepwater Horizon oil spill, NOAA quickly mobilized staff from its DARRP to begin coordinating with federal and state co-trustees and the responsible parties to collect a variety of data that are critical to help inform the NRDA. Several technical working groups (composed of NOAA, federal and state co-trustees, and representatives from one responsible party (BP)) are gathering existing scientific information and developing and implementing baseline (pre-spill) and post-impact field studies for multiple resource categories. Resources being assessed include fish and shellfish, bottom-dwelling biota, birds, marine mammals, turtles, and sensitive habitats such as wetlands, submerged aquatic vegetation, beaches, mudflats, deep and shallow corals, and the water column, including bottom sediments. The trustees are also collecting and reviewing relevant water column, shoreline, wildlife and other data being collected as part of the response and by other entities. In addition, trustees are assessing potential adverse impacts from necessary response actions, including dispersant use at the surface and at depth. NOAA is coordinating co-trustee participation in most of the technical working groups and is providing scientific and technical expertise and information management to many parts of the overall NRDA effort.

While it is still too early in the process to know what the full scope of the damage assessment associated with the Deepwater Horizon oil spill will be, NOAA and co-trustees are concerned about potential short and long-term impacts to fish, shellfish, marine mammals, sea turtles, birds, and other sensitive resources, including impacts to their habitats, such as wetlands, beaches, bottom sediments, and the water column. These areas may include National Estuarine Research Reserves and National Marine Sanctuaries that may be impacted by the oil spill. The data collected in the Gulf of Mexico and across the five Gulf states (Texas, Louisiana, Alabama, Mississippi, and Florida) will be used to determine what natural resources have been injured and what human uses have been lost due to the spill.

#### ***Data Collection Efforts***

NOAA research ships and contracted ships have been deployed to collect chemical and biological samples pre- and post-oiling. Additional baseline and injury assessment plans are now being implemented. Existing plans will be updated and others developed going forward to determine what resources are, have been, or could be exposed to oil. The information below provides an update on the cruises and data collections efforts for various sensitive resources and habitats. The data and information being collected will be used to determine how best to restore injured resources and develop the most appropriate restoration projects to compensate the public

for associated lost services. The information provided below outlines NOAA's cruises and data collection efforts for various sensitive resources and habitats.

#### ***Water Column***

The purpose of the water column assessment is to document the persistence, fate, and transport of the oil in the water column and the resulting exposure of fish, shrimp, and other aquatic resources to this oil over time. Baseline (pre-oiling) water quality data for the coastal areas of the five Gulf states have been, and continue to be, acquired by the trustees. This includes water samples collected in near shore areas and from long-term monitoring sites from NOAA's Mussel Watch program.

Cruises aboard NOAA vessels, NOAA contracted vessels, and partner research vessels began in late April and have continued to gather data specific to the water column inside and outside of the oil slick. During these cruises, water samples were collected to analyze for the presence of oil and whether any oil recovered matched the Deepwater Horizon oil "fingerprint." Since the beginning of May, NOAA has been conducting and coordinating sampling of the sub-surface region around the Deepwater Horizon well-head and beyond to characterize the presence of subsurface oil. The sub-surface search involves the use of sonar, UV instruments called fluorometers, which can detect the presence of oil and other biological compounds, submersible laser-scattering instruments to determine oil concentration and distribution, and collection of water samples from discrete depths using a series of bottles that can be closed around a discrete water sample.

NOAA, federal partners, academics, and others in the research community have mobilized to research and quantify the location and concentration of subsurface oil from the spill. NOAA Ships *Gordon Gunter*, *Thomas Jefferson*, *Nancy Foster*, *Delaware II*, and *Pisces* have conducted and continue to conduct missions to collect water samples from areas near the wellhead as well as further from the wellhead and in the coastal zone. Water samples from many of these missions are still being analyzed and additional missions are in progress or being planned to continue the comprehensive effort to define the presence of oil below the surface and understand its impacts. These and other data will be used to determine the presence of a submerged plume and to calibrate a three-dimensional model of the entire oiled area.

#### ***Fisheries (Nearshore & Offshore) and Plankton***

In addition to the historical baseline data on fisheries assemblages in the Gulf of Mexico, cruises are collecting pre- and post-oiling data on fish and plankton resources. An initial cruise on the *R/V Weatherbird II* (a National Science Foundation vessel) in late April collected water and biota data from outside the oiled zone. A second cruise that started on May 4, 2010, collected data on living marine resources at 32 existing Southeast Area Monitoring and Assessment Program (SEAMAP) sites off of the Florida panhandle (as baseline) and 6 stations in the vicinity of the oiled area. In addition to sampling for adult and larval fish and plankton, water samples were collected to characterize oil droplet numbers and size in the vicinity of the plume. Samples were also taken to assess toxicity, stable isotopes, sediments, and bottom-dwelling biota.

The NOAA ship *R/V Gordon Gunter* has conducted a survey of fish larvae in the Gulf, and has also been deployed to use its sonar and fluorometry equipment to map the presence of

submerged oil. Water samples will be analyzed to confirm sonar readings. Cutting-edge technology developed by University of South Florida scientists, called the "SIPPER," has been deployed to view microscopic marine life, such as zooplankton, fish eggs and larvae, as well as minuscule droplets of oil. The NOAA ship *Delaware II* has been deployed to gather data about the conditions of highly migratory species, e.g., tuna, swordfish, in waters around the Gulf of Mexico spill site. In addition, NOAA ships *Oregon II* and *Pisces* are deployed in the eastern and western Gulf of Mexico to conduct seafood and water quality testing and survey reef fish, bottom-dwelling fish, and shrimp species abundance.

#### ***Oysters and Other Nearshore Benthic Biota and Habitat***

NOAA's Mussel Watch Program quickly mobilized to sample shellfish, water, and sediments at 64 sites in the Gulf of Mexico, ranging from the Brazos River in Texas eastward to the Florida Keys, in order to establish baseline data before the oil hit the shoreline. These samples will be analyzed for 60 oil-related compounds known as polycyclic aromatic hydrocarbons (PAH). Oil from the Deepwater Horizon oil spill has a unique chemical "fingerprint" of constituent PAHs and other compounds that will allow Mussel Watch researchers to distinguish contamination from this spill from oil coming from other sources. Once the oil hits the shoreline, new samples will be taken and tested. Additional sampling plans are being developed for Northern Gulf Coast oyster beds and sea grass habitat to document exposure to and presence of petroleum hydrocarbons and to evaluate and identify adverse effects to these resources.

#### ***Shoreline Habitats***

NOAA is currently working with other resource trustees to document the shoreline habitats (e.g., beaches, mudflats, mangroves, wetlands) that have been, are being, or could be exposed to the oil. Trustees are working to assess pre- and post-oiled shorelines, and to document the spatial extent and degree of oiling on intertidal shoreline habitats. As the oil contacts the shoreline, aerial imagery has been used to identify priority response initiatives and vulnerable habitat and to provide up-to-date information on the location of the oil. Between 4 and 7 shoreline survey teams are in the field daily. Information from these efforts is being used to produce maps to detail the extent of shoreline oiling over time and to identify stations for potential use in future injury-assessment studies.

#### ***Other Resource and Habitat Assessment Efforts***

In addition to the work described above, additional assessment efforts are being conducted by the co-trustees to determine what resources are, have been, or could be exposed to oil for the following categories:

- **Submerged Aquatic Vegetation:** Several co-trustee teams are in the field daily to assess potential impacts to sea grass habitat and other submerged vegetation and document potential presence of and exposure to petroleum hydrocarbons and dispersants from discharged and dispersed oil.
- **Birds:** Work plans to assess baseline conditions of pelagic, colonial marsh, and other birds are in place. Bird survey teams continue to survey beaches for birds in Florida, Alabama, and Mississippi. Work plans to assess post-oiling impacts to birds are underway.

- **Marine Mammals and Turtles:** The trustees continue to conduct marine mammal and turtle aerial surveys by fixed-wing planes and helicopter to document exposure, acute effects, and potential changes in behavior or distribution. In addition, co-trustees are conducting vessel based surveys of protected marine mammals in near-shore, e.g., dolphins and manatees, and deep water habitats, e.g. sperm whales.
- **Deep-water benthic habitat:** Trustees are compiling existing data and information about the deep-water benthic communities, as well as any information about their sensitivity to dispersed oil. More formal assessment plans to document pre- and post-oiling conditions are being executed for deep water benthic communities in the vicinity of the mc252 well. For example, a major ongoing deepwater coral study funded by Minerals Management Service and NOAA's Office of Ocean Exploration and Research is being utilized for an initial Tier 1 NRDA impact assessment of deep coral and chemosynthetic community habitats. This study includes invaluable pre-spill baseline imagery and active *in situ* experiments.
- **Shallow-water corals:** Trustees are compiling existing data and information about the deep- and shallow-water coral communities, as well as any information about their sensitivity to dispersed oil. More formal assessment plans to document pre- and post-oiling conditions are being developed to examine and document potential exposure, acute effects, and potential changes to coral reef communities in the FL keys, Dry Tortugas, and FL middle grounds.
- **Terrestrial Wildlife:** Appropriate information about terrestrial wildlife communities – for example, deer, rabbits, quail, and turkeys – and information about their sensitivity to oil is being collected, and a more formal assessment protocol is under development.
- **Human Use:** NOAA and co-trustees are collecting existing information about human uses, including cultural uses. Field teams are conducting user intercept surveys from Louisiana to Florida. Overflights are being used to gather beach use information along the Gulf Coast.

#### ***Sampling and Data Management***

For all the efforts listed above, NOAA, the co-trustees, and the responsible party have agreed to a data workflow process so that samples collected for analytical chemistry follow the same means of tracking, chain of custody, quality assurance/quality control, and data delivery into a unified database for analysis. NOAA, in coordination with DOI and other federal agencies, is providing geospatial support through the Environmental Response Management Application (ERMA). ERMA is a web-based Geographic Information System tool designed to assist both emergency responders and environmental resource managers who deal with events that may adversely impact the environment. ERMA is serving as a tool for coordinating information across the response teams and providing a common operational picture. Because of the demand for this capability, NOAA recently released a public version of ERMA. The ERMA website (<http://www.geoplatform.gov/>) allows the public timely access to information cleared by the Unified Command.

## ACTIVITIES TO IMPROVE FUTURE RESPONSE AND RESOURCE ASSESSMENT EFFORTS

The Deepwater Horizon oil spill is a grave reminder that spills of national significance can occur despite the many safeguards and improvements that have been put into place since the passage of OPA. Although the best option is to prevent oil spills, the risk of oil spills remains a concern given the offshore and onshore oil infrastructure, pipes, and vessels that move huge volumes of oil through our waterways. If a spill does occur, responders must be equipped with the appropriate tools and information. An effective response, based on solid science and smart decision-making reduces environmental and socioeconomic impacts, as well as clean-up costs. Research and development and technological innovation by the public or private sector in the following areas would greatly enhance the tools and technologies available in the event of a spill.

- ***Oil Fate and Behavior from Deepwater Releases***  
 Our ability to know where the oil is located is limited by what we can see and detect. As the Deepwater Horizon oil spill is demonstrating, there is a need to understand how oil behaves and disperses within the water column when released at deep depths. The emerging advancement in modeling three dimensionally can greatly enhance response operations and mitigation efficacy. NOAA's surface trajectory models predict where the oil on the surface is going based upon wind, currents, and other processes, and visual overflights validate where it is now. NOAA is currently employing facets of deep water oil spill models that were developed in part from the findings of the MMS DeepSpill Joint Industry Research Project done in 1999-2000 with international participation. However, we still understand little about the movement of oil deep in the ocean or the movement of dispersed oil that is suspended in the water column. The enhancement of three dimensional models will improve our ability to predict the movement of oil at depth and allow us to direct precious resources to validate the model's accuracy. Currently, NOAA is working to implement FY 2010 funds to enhance three-dimensional models.
- ***Technology for Oil Detection in the Water Column and on the Seafloor***  
 Research on new technologies for rapid and accurate detection of oil in deep water and plumes in the mid-water is needed. This would include the development of technologies to enhance our understanding of the fate and transport of oil, and to better understand the effects of oil on benthic habitat. There also appears to be some utility in applying existing technologies in a new and unique way to reach these same goals. For example, in limited research applications, modern multibeam echo sounders have been able to detect oil in the water column and on the seafloor. In addition, sensors on autonomous underwater vehicles and gliders are capable of detecting the presence of oil and gas in the water column. Whether provided by new technologies, or through re-examining the capabilities of current technologies, highly accurate information on the precise location of spilled oil would be of significant benefit to a spill response, such as Deepwater Horizon oil spill. Timely understanding of the precise location of the spilled oil would allow responders to position their activities and better utilize limited resources to maximize our contributions to protect and restore the resources, communities, and economies affected by these tragic events.

- ***Surface Observations and Trajectory Models***

Real-time data on currents, tides, and winds as well as sustained observations of physical and chemical parameters of the whole water column are important in driving the models that inform the trajectory forecast for the spilled oil. As the Integrated Ocean Observing System generates more data from technological advances like high frequency radar, the prediction of oil location can be improved by pulling these observations into trajectory models quickly. Through the collaborative efforts of the U.S. Integrated Ocean Observing System (IOOS), two of the three radars along the northern Gulf of Mexico coast were quickly re-established and made operational and now all three are delivering surface current data. Because we cannot predict where a spill will occur, data delivery from high frequency radars is envisioned to be part of a seamless national system.

Data collected by space-based synthetic aperture radar can be used to produce high resolution images of the Earth's lands and oceans and can also be used in all types of weather, as it can "see through" clouds and darkness. Current use of NOAA-generated experimental products suggest that data from space-based synthetic aperture radar can assist in detecting and refining the areal extent of oil, which would provide valuable information to help determine where response efforts and resources should be deployed.

Current hydrographic surveys carry out sustained observations of the whole water column in the Gulf of Mexico, Florida Bay, and Florida Keys, and will be extended if the oil or dispersant spread through the Strait of Florida and into the Gulf Stream. These surveys, along with satellite observations and numerical models, allow monitoring of currents and features responsible for the transport of oil and dispersant. A sustained observing system for this region would allow NOAA to provide predictive information about how the spill may impact the East Coast of the United States.

- ***Long-Term Effects on Species and Habitats***

Spilled oil can remain in the sediments along the shoreline and in wetlands and other environments for years. More than twenty years later, there are still toxic levels of sub-surface oil in Prince William Sound from the Exxon Valdez spill. Research is needed to improve our understanding of the long-term effects of oil on sensitive and economically important species and habitats. Continued research is also needed to determine the effects of oil and dispersants that are suspended in the water column on pelagic species, as well as research on the effects of oil on deep water corals, chemosynthetic communities (animal communities living in the deep sea on dissolved gases and benthic habitats) and benthic habitats. Important interagency studies are currently underway that will provide valuable information on the sensitivity and resilience of these deepwater communities, and will inform response actions.

- ***Data Management Tools for Decision Making***

The key to effective emergency response is efficiently integrating current science, information technology, and real-time observational data into response decision-making. NOAA has developed the Emergency Response Management Application (ERMA), a web-based information management application, to facilitate preparedness, response, and restoration decision-making for oil spills and for other coastal hazards. ERMA integrates



observations (e.g., NOAA National Buoy Data Center data, weather data, shoreline data, vessel traffic information, etc.) with archived data sources (e.g., NOAA's National Oceanographic Data Center's historical data) in an easy to use, Google-based format to aid in evaluating resources at risk, visualizing oil trajectories, and planning rapid tactical response operations, injury assessment and habitat restoration. Having access to retrospective data is critical to bring value to real-time observational data being collected. NOAA is working with the Department of Interior DOI and state trustees to assure that data management tools can be integrated.

NOAA is currently using the Gulf of Mexico ERMA for the Deepwater Horizon oil spill response to help manage the common operational picture for all command posts (<http://www.geoplatform.gov/gulfresponse/>). The Gulf of Mexico ERMA is updated daily to provide a dynamic and automated tool allowing for greater access, more layers of data, and high-resolution photography. ERMA allows users to navigate through different layers of information to reveal actual data and magnify areas of geographic interest – ultimately improving decision making. In addition to the Gulf of Mexico, ERMA is operational in the U.S. Caribbean and New England.

- ***Natural Resource Protection Tools***  
Environmental Sensitivity Index (ESI) database and map products provide information that helps reduce the environmental, economic, and social impacts from oil and hazardous substance spills. ESI maps include information on biological resources (such as birds, shellfish beds, and endangered species), sensitive coastal and nearshore habitats (such as marshes, tidal flats, and sea grass beds, National Estuarine Reserves and National Marine Sanctuaries), and human-use resources (such as public beaches, parks, and drinking water intakes). ESI maps are one tool that spill responders can use to identify priority areas to protect from the spreading oil, develop cleanup strategies to minimize impacts to the environment and coastal communities, and reduce overall cleanup costs. NOAA's goal is to update ESI maps approximately every 10 years to ensure responders have up-to-date information.
- ***Research to Improve Tools for Assessment and Restoration***  
Current techniques to assess and restore injured natural resources need to be constantly updated and refined. As our understanding of complex ecosystems evolves, so should our modeling tools and restoration techniques. For example, currently, site-specific protocols for assessing injuries to unique, high-value habitats such as those found in the Arctic are needed. In addition, research and tools to better assess and quantify natural resource services — such as water filtration and capture, flood protection, carbon sequestration, recreation, and education — across a range of habitat types can help ensure the public is fully compensated and the environment is fully restored.
- ***Air Quality Impacts***  
In addition to its marine responsibilities, assists in predicting the air quality impacts from oil and hazardous substance spills. The characteristics of pollution released from large areas of burning oil and the widespread evaporation of oil are significantly different from routine air quality/atmospheric dispersion scenarios. Research and development of

improved tools to estimate the characteristics of compounds entering the atmosphere, and integration of those tools with NOAA's existing atmospheric modeling capabilities, would significantly improve NOAA's ability to predict smoke and chemical concentrations in the atmosphere resulting from such incidents.

- ***Oil in Arctic Environments***

Continued acceleration of sea-ice decline in the Arctic Ocean as a consequence of global warming may lead to increased Arctic maritime transportation and energy exploration that in turn may increase the potential of oil spills in the Arctic. Recent studies, such as the Arctic Monitoring and Assessment Programme's Oil and Gas Assessment, indicate that we currently lack the information to determine how oil will behave in icy environments or when it sinks below the surface. We also lack a basic understanding of the current environmental conditions, which is important for conducting injury assessments and developing restoration strategies. Research is needed to better understand the challenges of spill response in Arctic waters and the most effective tools and techniques to utilize in such environments.

- ***Human Dimensions***

Research is needed on how to incorporate impacted communities into the preparedness and response, restoration and recovery processes to help to address the human dimensions of spills, including social issues, community effects, risk communication methods, and valuation of natural resources. Transparency and communications can be improved to share information with impacted communities on how and why decisions are made, and the breadth of response and NRDA activities that have been and will be undertaken for the Deepwater Horizon oil spill.

## **CONCLUSION**

I would like to assure you that we will not relent in our efforts to protect the livelihoods of Gulf Coast residents and mitigate the environmental impacts of this spill. In the wake of such an event, we are reminded of the fragility of our coastal ecosystems and the dependence of coastal economies on the health and prosperity of our seas. Thank you for allowing me to testify on NOAA's response and damage assessment efforts. I am happy to answer any questions you may have.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) RESPONSES

Questions from:

Senator Benjamin L. Cardin

**Questions for Mr. Penn only for the remainder:**

10. The Damage Assessment, Remediation and Restoration Program has the lead within NOAA for Natural Resource Damage Assessment work.

a. What is the role of the program and how many NRDA cases is it handling right now?

**The role of NOAA's Damage Assessment, Remediation and Restoration Program (DARRP) is to assess and restore the public's natural resources under NOAA's trusteeship that have been impacted by oil spills, hazardous waste sites, or vessel groundings in National Marine Sanctuaries. Currently, the program has approximately 230 active cases. Activities in these cases span from advising remedial agencies to implement protective cleanups, to assessing injuries and lost uses, to settling cases, to implementing and monitoring restoration projects.**

b. How much revenue for restoration does the program recover from polluters each fiscal year (on average) for restoration?

**Since 1991, NOAA's program, working with other federal, state, and tribal co-trustees, has recovered approximately \$500 million dollars in damages for restoration of injured natural resources. Over 20 years, that's an average of \$25 million dollars per year.**

c. How is the program balancing its ongoing cases in the face of the demands of the Deepwater Horizon incident? Will it be able to do so going forward?

**Given the large geographic scope and extended time period of this spill, NOAA's Damage Assessment, Remediation and Restoration Program (DARRP) has had to divert staff from throughout the country to work on the BP Deepwater Horizon oil spill. DARRP is working on a plan that balances the staffing and resource needs of the BP Deepwater Horizon case with other case needs. The long-term plan is to hire temporary additional staff or contractors so that DARRP can focus on casework beyond the BP Deepwater Horizon oil spill.**

d. How is the program funded? What kind of resources does the program have for pre-incident planning and training?

**NOAA's DARRP is funded through a combination of base appropriations, a Damage Assessment and Restoration Revolving Fund (DARRF), and oil spill reimbursable accounts. The DARRF is a revolving fund where reimbursements of past damage assessment costs are used to fund future damage assessment work. Funds placed in the DARRF for restoration are used exclusively to restore natural resources harmed by specific incidents. For oil spills, like the BP Deepwater Horizon spill, the NRDA program benefits from NOAA's reimbursable system that allows the program to receive a loan from NOAA for damage assessment costs. Once the program is reimbursed by the Responsible Party, it pays off its reimbursable "debt" to NOAA. NRDA is also supported by a base appropriation. NOAA commits part of its appropriation to pre-incident planning and training. Training and coordination with other federal, state, and local agencies that have response and restoration responsibilities is critical to success in mitigating the effects of future spills.**

- e. **Would the program benefit from a yearly allocation from the Oil Spill Liability Trust Fund for preparedness, response, restoration, and damage assessment capabilities? Please describe these benefits.**

**Currently, NOAA does not receive annual appropriations from the Oil Spill Liability Trust Fund (OSLTF). With funding from the OSLTF, NOAA priorities would be to: 1) enhance our level of readiness to respond to oil spills; 2) develop cost-effective approaches and tools that will improve effectiveness in response and damage assessment; and 3) support focused and applicable research that addresses oil spill impacts. Some of these activities are already supported through base appropriations.**

**Senator James M. Inhofe**

1. **I have been troubled by reports that BP has been trying to hide evidence of natural resource damages and "buying up" scientists. Have you seen evidence of such actions, and could you describe the interactions of your agencies with BP in assessing damages?**

**With the large number of qualified academics working in the Gulf Region, the Trustees have not had any issue finding appropriate outside scientists to support the natural resource damage assessment. To date, the Trustees are working with over two dozen academic experts from close to 20 academic institutions.**

**Under the Oil Pollution Act, the Trustees are required to offer the responsible party an opportunity to participate in the assessment. The Trustee agencies are working on many assessment activities cooperatively with BP representatives. This includes agreeing on 46 environmental sampling plans to date and collecting the data for these plans.**

2. **Could you please describe to me how NOAA plans on working with other trustees such as the individual states-to ensure the NRDAR process doesn't get fragmented between trustees?**

**NOAA has worked closely with Department of the Interior (DOI), Department of Defense (DOD), and the States to form a Trustee Steering Committee (TSC) composed of representatives of the Federal and State Trustee agencies. The TSC is working to finalize a Memorandum of Understanding (MOU) that would formalize the BP Deepwater Horizon NRDA Trustee Council. Operating under a formal MOU, the Council will continue to meet regularly to coordinate assessment and restoration planning activities. Decision-making by the Council is by consensus of the members. The goal of the Trustee Council is to jointly produce a draft Damage Assessment and Restoration Plan and implement a final Restoration Plan that will fully compensate the public for all documented injuries attributable to the BP Deepwater Horizon spill. Even without a MOU, the trustees are already working together as if a MOU were in place.**

3. **According to the recent NOAA and USGS report, nearly 70 percent of the oil spilled in the Gulf is gone either from dissolving naturally, being burned, dispersed, skimmed or captured. Does this optimistic report lessen some of the initial fears and lower the expectations of natural resource damages? Do you agree with White House Press Secretary Robert Gibbs' recent statement saying, "I think it is fairly safe to say ... that many of the doomsday scenarios that we talked about and repeated a lot have not and will not come to fruition."**

**NOAA had no predetermined estimate of the amount of injury or damage from this spill. Under the Oil Pollution Act, the Trustees must prove injuries to and lost use of natural**

**resources by using rigorous scientific and economic studies. We are in the process of planning and conducting these studies to understand what the true impact has been.**

Senator CARDIN. Thank you very much, Mr. Penn.  
Dr. Pell.

**STATEMENT OF EVA J. PELL, UNDER SECRETARY FOR  
SCIENCE, SMITHSONIAN INSTITUTION**

Ms. PELL. Thank you, Chairman Cardin and distinguished members of the Subcommittee, for the opportunity to provide testimony today on the role the Smithsonian Institution might play in assisting in the aftermath of the oil spill in the Gulf of Mexico.

I, too, wish to express my condolences to all the victims of this disaster.

My name is Eva Pell. I joined the Smithsonian Institution in January of this year after a long career as a plant scientist and academic administrator. I now have the privilege of serving as the Under Secretary for Science at the Smithsonian where I oversee 500 scientists and the operation of all the science-based museums and institutes.

The Smithsonian Institution, through its vast collections, its outstanding research capacity, and its highly skilled service providers, is poised to contribute to the long-term understanding and management of the Deepwater Horizon oil spill. As others have pointed out, this oil spill is probably the worst manmade ecological disaster in U.S. history. Understanding the impact will benefit from facts. Hard data on the pre-spill environment will be critical.

For the last 30 years, the National Museum of Natural History has collaborated with the Bureau of Ocean Energy Management, Regulation and Enforcement to archive the collections from the Bureau's Environmental Studies Program. These collections are housed at the Museum's Support Center in Suitland, Maryland. Most of the collections focus on the Gulf because that was where most drilling occurred.

I would like to emphasize and acknowledge the foresight of the Bureau in collecting these quantitative baseline collections. In total the Bureau collections amount to more than 330,000 samples. Of these, more than 93,000 came from the Gulf of Mexico. They were collected at over 500 different depths, some as deep as 2 miles and at 1,000 different places.

The map on display in your packet gives you some idea of the geographic coverage. The red dots are the Bureau's quantitative samples. Each one of those red dots is a place that may have yielded hundreds of species and thousands of specimens. The yellow dots represent additional Smithsonian marine collections from other sources.

The Smithsonian is committed to long-term studies of ecosystems and biodiversity. These collections play a crucial role in assessing environmental disasters. For example, in 1986 more than 50,000 barrels of oil impacted the coast of Panama, including the habitats adjacent to the Galeta Marine Laboratory of the Smithsonian Tropical Research Institute. Because the Smithsonian had already studied the site for many years the Bureau chose the Smithsonian to assess the impact of the spill. This study was one of the first to clearly document the long-term effects of oil on soft bottom marine habitats such as are found along the U.S. Gulf Coast.

I also call your attention to near-shore survey research conducted by SERC, the Smithsonian Environmental Research Center in Edgewater, Maryland. Our researchers have developed an extensive baseline data set of both native and non-native fouling organisms in four major bays in the Gulf of Mexico. Again, these data will help inform adverse changes in species composition in near-shore environments impacted by the Deepwater Horizon oil spill.

Since 1999 SERC is also home to the National Ballast Information Clearinghouse, which has been collecting information on ship arrivals and ballast water discharges as vectors of invasive species. The ballast water data base provides a means to assess the risk that shipping might serve to spread toxic oily water beyond the Gulf.

Thinking also of the service arm of the Smithsonian Institution, I am pleased to report that the veterinarians from the Smithsonian National Zoological Park are working on a rotating basis assisting veterinarians from other Federal agencies to oversee the logistics and release of recovering wildlife, primarily birds, from the affected region.

To conclude, one of the great contributions of the Smithsonian is its long-term commitment to collections and its capacity to make them available to understand the past, explain the present, and predict the future.

I have brought with me a specimen from the Gulf of Mexico collection which I hope is going to be brought forward now. It is a deep sea stony coral, one of the 90 species that form the superstructure needed for many organisms that live in the depths of the Gulf of Mexico.

Thank you for the opportunity to testify, and I look forward to answering any questions you may have.

[The prepared statement of Ms. Pell follows:]



Testimony of  
Dr. Eva J. Pell  
Under Secretary for Science  
Smithsonian Institution  
Before the  
Subcommittee on Water and Wildlife  
Committee on Environment and Public Works  
United States Senate  
Hearing on  
“Assessing Natural Resource Damages Resulting from the BP Deepwater Horizon Disaster”  
July 27, 2010

Thank you Chairman Cardin and distinguished members of the Subcommittee for the opportunity to provide testimony today on the role that the Smithsonian Institution might play in assisting in the aftermath of the oil spill in Gulf of Mexico. My name is Eva Pell. I joined the Smithsonian Institution in January of this year after a long career at Penn State University where I served as a faculty member studying the effects of air pollutants on vegetation; and then as the Senior Vice President for Research and Dean of the Graduate School. I now have the privilege of serving as the Undersecretary for Science at the Smithsonian where I oversee 500 research scientists and the operations of the National Museum of Natural History; the National Air and Space Museum; the National Zoo and its Conservation Biology Institute in Front Royal, Va.; the Smithsonian Astrophysical Observatory in Cambridge, Mass.; the Smithsonian Environmental Research Center in Edgewater, Md.; the Smithsonian’s Museum Conservation Institute in Suitland, Md.; and the Smithsonian Tropical Research Institute in Panama. Collectively we care for an estimated 137 million specimens. About one third of our collections and staff focus on the marine realm.

Regarding the Deepwater Horizon oil spill, knowing what the conditions were like before the event is essential to understanding its impact. The Smithsonian is committed to long-term studies of ecosystems and biodiversity, and the data and collections that have resulted can play a crucial role in situations such as that posed by the gulf oil spill. For example, in 1986 more than 50,000 barrels of oil impacted the coast of Panama, including the habitats adjacent to the Galeta Marine Laboratory of the Smithsonian Tropical Research Institute. Because the Smithsonian had already studied this site for many years, the Department of Interior’s Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) (formerly known as the Minerals Management Service) chose the Smithsonian to assess the impact of the spill. This study was one of the first to clearly document the long term effects of oil on soft bottom marine habitats such as are found along the U.S. Gulf Coast. Collections documenting this study (see below) are archived at Smithsonian’s National Museum of Natural History (NMNH). Throughout history, scientific collections have helped to resolve the issues of the day.

My testimony today focuses on the assistance the collections at the NNMH can provide to a coordinated national response to the Deepwater Horizon oil spill. This spill already has been described by many experts as the worst man-made ecological disaster in U.S. history. The extent

of the ecological impact, its geographic extent, and possibilities for remediation at this point are only estimates, not known facts. Given the likely economic impacts of the spill and future costs, the accuracy of before and after comparisons are important. Assembling an accurate and detailed description of the Gulf of Mexico marine ecosystem as it existed prior to the spill is the chief topic I will address today.

Before describing the NMNH collections, I call your attention to research conducted by the Smithsonian Environmental Research Center (SERC) that has distinct relevance to the issue at hand. For the last 11 years SERC has conducted quantitative field surveys of the nearshore invertebrates that comprise the fouling community of North America. The fouling community is a robust environmental indicator of the broader ecosystem structure and function, and these surveys provide an extensive baseline data set of both native and non-native species. SERC surveys (2002) covered a broad geographic extent, including extensive sampling of four major bays in the Gulf of Mexico (Tampa Bay & Pensacola, FL, Galveston Bay & Corpus Christi Bay, TX). This unique data set contains taxonomic information as well as data on the relative abundance and diversity of native and non-native species. The design of our fouling survey offers a very powerful tool to test for possible impacts of the Deep Horizon oil on the ecology of both native and non-native fouling organisms. It is thought that differential invasion success may be related to the degree of habitat disturbance: highly disturbed habitats have open niche space that non-native species exploit, while pristine or less disturbed habitats have less open niche space and greater native biological resistance to invasion.

SERC also has two other important baseline surveys from the Gulf of Mexico. SERC is home to the National Ballast Information Clearinghouse which has been collecting information on ship arrivals and ballast water discharges as vectors of invasive species since 1999. The ballast water data base provides a means to assess the risk of shipping serving to spread toxic oily water from Gulf ports to distant ports in other regions of the U.S. and foreign countries. SERC biogeochemists have baseline samples and analyses from salt marshes and mangrove ecosystems in both Port of Fouchon, Louisiana, and the southern end of Florida, which would allow assessment of oil impacts on these ecological systems.

Thinking also of the service arm of the Smithsonian Institution I am pleased to report that veterinarians from the Smithsonian National Zoological Park (NZIP) are working on a rotating basis assisting veterinarians from other federal agencies. They are working out of an incident command center in Houma, LA, overseeing the logistics and release of recovering wildlife – primarily birds – from the affected region. At the present time, only veterinarians have been requested by the US Fish and Wildlife Service, but other NZIP animal care staff, as well as migratory bird researchers, stand ready to assist as needed.

**National Museum of Natural History and the role of collections:**

The National Museum of Natural History (NMNH, previously the US National Museum, in part) has, since its beginning, been linked to the collection activities of the U. S. Government. The 1846 legislation that created the Smithsonian Institution identified the U.S. National Museum as the repository for natural history specimens belonging to the United States, “All collections of rocks, minerals, soils, fossils, and objects of natural history, archaeology, and ethnology, made by the National Ocean Survey, the United States Geological Survey, or by any other parties for

the Government of the United States, when no longer needed for investigations in progress shall be deposited in the National Museum” (20 U.S.C. § 59). In fact, it was research in the marine environment, the 1838-1842 U.S. Exploring Expedition that made clear the national need for such a repository. The role of the Smithsonian as the primary repository for federally funded collections has been repeatedly affirmed by Congress by legislation in 1879, 1965, 1970, and 1991.

Scientific collections are an essential and irreplaceable component of the national scientific infrastructure, as documented in the 2009 report of the *Interagency Working Group on Scientific Collections* (OSTP, 2009). Speaking just for the Smithsonian, we collaborate with the Federal Aviation Administration, the U.S. Air Force, and the U.S. Navy to identify birds involved in over 5,000 collisions with airplanes annually. Last summer, a number of Canada geese famously forced US Airways Flight 1549 to land in the Hudson River, luckily with no loss of life. Knowing the species of bird in each collision allows humans, as far as possible, to design systems to minimize collisions. We collaborate with the United States Department of Agriculture (USDA) by hosting 40 USDA entomology staff at NMNH because the collections are critical to their mission of protecting U.S. Agriculture. When the citrus leaf miner invaded the U.S. in 1993, the NMNH collections contained the only identified material in the country. Our scientists rapidly identified the pest, which enabled targeted control programs throughout citrus agriculture regions. Smithsonian collections also played a crucial role in the identification and control of many other invasive species, for example, the veined rapa whelk that damages Chesapeake oyster populations, or the Asian longhorned beetle, on track to cause billions of dollars of damage to urban trees. Our unique database on volcanic eruptions is the international standard for basic science in this area, supporting plans to mitigate threats to human life near volcanoes, as well as threats to aviation. We also support our armed forces by hosting the Walter Reed Biosystematics Unit, a component of the Walter Reed Army Institute of Research. Mosquitoes, in particular, spread some of the most deadly and debilitating diseases, and NMNH therefore supports the largest and most comprehensive mosquito collection in the world. Another recent example is *Hyalomma* ticks, which are particularly common and diverse in Iraq. They transmit viral hemorrhagic fevers. Luckily, we have the world’s best reference collection of *Hyalomma* ticks. Wherever our soldiers are, the ability to rapidly identify disease vectors in their environment is crucial to mitigating risk. Our collections have been used repeatedly to answer basic and historical questions regarding many diseases: Lyme disease, influenza, and hemorrhagic fevers, to name a few.

In the near future our collections may play crucial roles in two areas: climate change and ocean acidification. Since 1963 we have archived the results of environmental monitoring in the Antarctic, a partnership with the U.S. Antarctic Program (USAP). Climate models predict that the climate change may be particularly evident at the North and South Poles. The density and scope of our historical collections can provide the “before” to climate change’s “after.” Ocean acidification, itself caused by climate change, threatens keystone species—reef builders—of many marine ecosystems. Clams and corals, for example, record growth rates in their skeletons. Those growth rates depend on the availability of calcium carbonate, and that depends on ocean acidification. Growth rates as reflected in the skeletons of marine organisms are an important record of environmental change.

**NMNH Collections, BOEMRE, and the Gulf of Mexico:**

Since 1979, NMNH has collaborated with the BOEMRE to archive the collections generated by their Environmental Studies Program. The BOEMRE has been conducting intensive environmental studies on the Outer Continental Shelf (OCS) for more than 30 years to support information needs for managing oil and gas development on the continental shelf and slope. Through its initial design, and during the first four years of program activity, the BOEMRE Environmental Studies Program established baseline environmental conditions based on a large number of biological, chemical, and physical parameters. With these baseline conditions, future monitoring studies during and after development would, presumably, have allowed an assessment of the long-term effects of development. After a review and recommendations from the National Academy of Sciences, this program design was revised in 1978. Subsequently, a new program of directed studies has provided data to inform critical decisions before they are required. These baseline surveys took place from 1974 to 1978, and the Smithsonian has all or most of the specimens they generated in our collections. Specimens from numerous additional BOEMRE-directed studies are also in our collections. Data from these studies, including site and collecting event specific physico-chemical, oceanographic, sedimentary and biodiversity data are available in the various technical reports prepared by program contractors. These reports, available on-line at <https://www.gomr.mms.gov/homepg/espis/espisfront.asp>, provide information that document not only the biodiversity of these sites, but the population characteristics and environmental conditions at the time the samples were collected. For the Gulf of Mexico alone, from 1974-2010, this site provides 109 "baseline" reports, 252 "biology" reports, 86 "fate & effects" reports, and 340 "technical summaries." The availability of this extensive supporting data in conjunction with the specimens themselves makes these collections an irreplaceable research resource for comparative studies on the invertebrate biodiversity (animals without backbones) of the Gulf of Mexico.

These specimens represent one of the most extensive collections of marine organisms from U.S. continental shelves and slopes, in terms of geographic coverage, sampling density (spatial and temporal), number of phyla represented, and associated data collected concomitantly (other organisms, chemical, hydrographic, geologic). The BOEMRE therefore established a system for the archiving of, and access to, these specimens. Through a series of contracts, BOEMRE has partnered with the Smithsonian's NMNH-Department of Invertebrate Zoology (in its role as the repository for federally-funded collections) to ensure the long term maintenance of and access to invertebrates collected during these studies. The BOEMRE Environmental Studies Program deserves praise for the foresight and initiative shown in conducting and preserving the results, especially the collections, from these surveys.

**Details of BOEMRE surveys as represented in NMNH Collections:**

NMNH to date has received material from 21 continental shelf, slope and canyon surveys as well as two special oil spill surveys. These are: the Atlantic Slope and Rise Program (ASLAR); George's Bank Benthic Infauna Monitoring Program (BIMP); Central Atlantic Benchmark Program (CABP); California Monitoring Program (CAMP); Central and Northern California Reconnaissance Program (CARP); the Canyon and Slope Process Study (CASPS); Central Gulf Platform Study (CGPS); Gulf of Mexico Chemosynthetic Communities (CHEMO); Deep Gulf Shipwrecks of World War II (Deep Wrecks); Northern Gulf of Mexico Continental Shelf

Habitats and Benthic Ecology (DGoMB); the special Ixtoc oil spill survey in the Gulf of Mexico (IXTOC); the South Atlantic Outer Continental Shelf Area Living Marine Resources Study (LMRS); Gulf Of Mexico Hard Bottom Communities (Lophelia); Mississippi, Alabama, Florida Benchmark Program (MAFLA); Mississippi-Alabama Marine Ecosystem Program (MAMES); Mississippi/Alabama Pinnacle Trend Ecosystem Monitoring Program (MAPTEM); the New England Environmental Benchmark Program (NEEB); the Northern Gulf of Mexico Continental Slope Study (NGOMCS); the special Panama Oil Spill Study (POSP); the South Atlantic Benchmark Program (SABP); the Southern California Baseline Study (SOCAL); the Southwest Florida Shelf Ecosystems Study (SOFLA); and the South Texas Outer Continental Shelf Program (STOCS). In addition to the biological material, more than 200 color slides of animals in situ were received from the MAPTEM program.

During the 30+-year tenure of the contracts between BOEMRE and the Smithsonian, more than 337,012 lots of sorted and identified material and 20,000 lots of unprocessed samples or mixed taxa have been received. "Lot" means a single jar or vial of specimens that have identical collecting data. One lot may comprise one or dozens or thousands of specimens. Therefore lot statistics always underestimate the actual number of specimens involved. Of this number more than 93,000 lots originated from studies in the U.S. Gulf of Mexico and more than 18,000 lots originated from the studies following the oil spill in Panama. In that case, Smithsonian marine scientists also led a scientific study (funded by BOEMRE, see above) of the ecological consequences of the oil. It remains a benchmark study in the field.

In the aggregate these collections document at least 4,000 species of marine invertebrates from 602 families from 22 phyla. Recent scientific publications document that the Gulf as a whole contains roughly 15,000 species, with perhaps another 3,000 species still undiscovered. These represent everything from ecological keystone species to economically important species to potentially threatened or endangered species. "Keystone" species are those on which most of the rest of the ecosystem depends. The North Atlantic cold water coral (*Lophelia pertusa* (Linnaeus, 1758) is a keystone species because it is one of the most important deep water reef-builders, and thus fundamental to deep marine ecosystems. It occurs within 20 or so miles of the Deepwater Horizon well-head, as documented by trawl samples from 1984 and direct observation from submersibles during BOEMRE -funded studies between 2004 and as recently as September of last year. Economically important species are the focus of the National Oceanic and Atmospheric Agency's National Marine Fisheries Service. Examples are the three commercially important Gulf shrimp species (pink and brown shrimps, *Farfantepenaeus duorarum* and *F. aztecus*, and the white shrimp, *Litopenaeus setiferus*), all of which are well-represented in NMNH collections. Endangered or "at risk" species include several populations of genetically distinct bottlenose dolphins, and the Florida manatee, which is particularly vulnerable to oil fouling of the plants on which they feed. Finally, many of the species collected through these surveys were entirely new: between 300 and 400 new species were described based on these collections and many more await description.

**Distinct Roles of Smithsonian and BOEMRE:**

The Smithsonian role in this partnership has been the archiving of the collections that support these technical studies, the improvement of the scientific quality of the collections as resources

permitted, and making them publicly available in digital form through our website. BOEMRE conducted the surveys, received reports from the scientists and contractors involved, and is therefore the final authority on data and analyses extracted from the collections. The Smithsonian enhances the value of the collections by meticulously creating digital records for each sample of specimens, including precise georeferenced locality data and other important ecological aspects. Few other museums have the resources to create so many records of such high quality. The quality and quantity of digitally available data will make these collections in particular extremely valuable to scientists seeking information on the pre-spill ecosystem.

**Importance of Collections:**

To give the committee some idea of the importance of these collections, the staff recently estimated that fully 58% of publicly available specimen-based records from the Gulf of Mexico represent Smithsonian collections. I would like to emphasize that many marine research institutions around the Gulf and elsewhere will play key roles in assessing damage and measuring remediation and recovery in the years ahead. The Smithsonian is ready to collaborate and support that work in any way it can. It is also likely that many scientists and institutions have data or collections that are not publically available (i.e. accessible via on-line databases) that are highly relevant to the Deepwater Horizon oil spill. However, the massive size and quality of the BOEMRE survey collections at the Smithsonian will surely continue to be an important resource.

These collections, therefore, represent a unique and now irreplaceable resource to describe quantitatively the pre-spill Gulf of Mexico ecosystem. The depth range of these collections is enormous, ranging from five to nearly 3,000 meters (nearly two miles). From the label data we calculated that specimens were accessed at 459 distinct depths. The deep collections are especially valuable because survey work at such depths is extremely expensive and limited. Given the depth of the Deepwater Horizon well-head, data on abyssal communities are especially important. A Gulf-wide BOEMRE -funded deepwater study listed above as DGoMB was recently published and includes a number of these deep stations very near the spill site in its database. The total number of distinct geographic points sampled is roughly 1,000. In short, by the standards of biological sampling in general, and especially considering the rarity of deep-water samples, these collections are truly impressive.

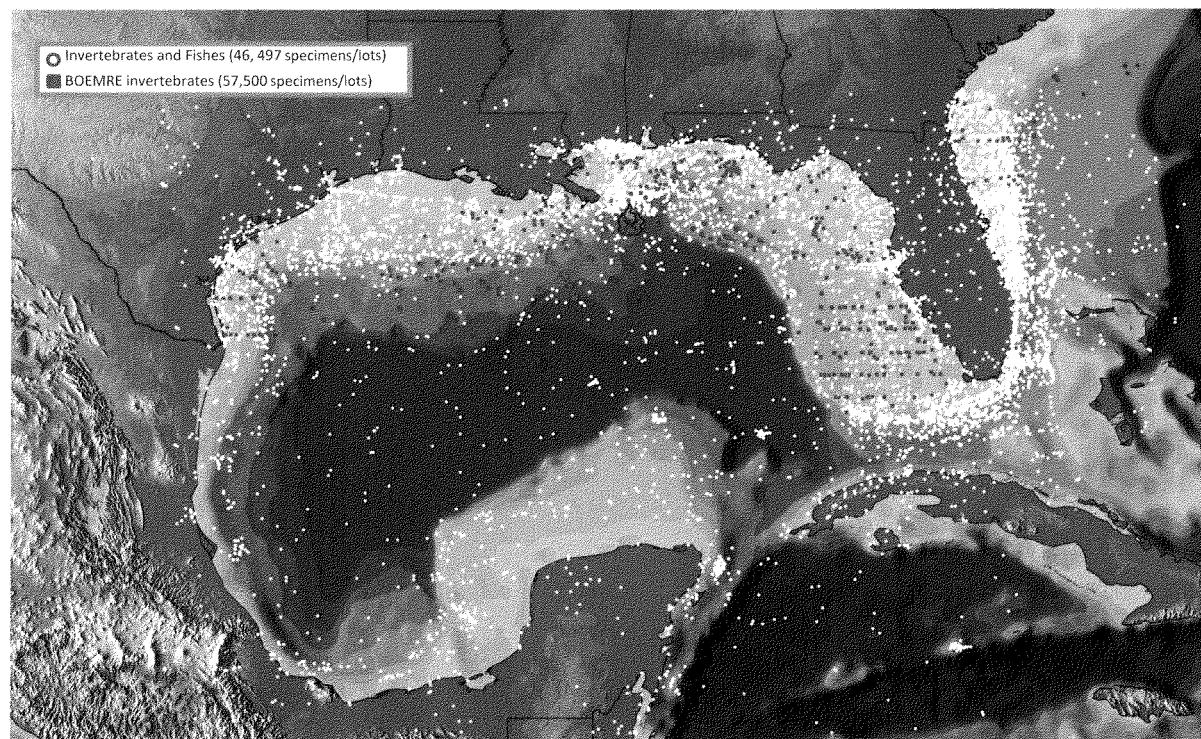
Ideally, the scientists that will carry out inventories and surveys of the post-spill environment will want exactly comparable pre-spill surveys, using the same methods, and designed for the same analytical protocols. There is one ongoing BOEMRE and NOAA-funded study of deep corals in the vicinity that is ideally suited to this task. We cannot say at this time to what extent the 1974-1978 baseline surveys, and most surveys since then, fulfill these stringent requirements. Even if the background raw data are not available, it is possible that such data could be regenerated directly from NMNH collections. In conclusion, it is already obvious that NMNH collections have had, and will have, an important role to play in describing the pre-spill ecosystem.

Thank you for the opportunity to testify today and I look forward to answering any questions you may have.



Smithsonian

## Smithsonian Institution, National Museum of Natural History Invertebrate and Fish Collections from the Gulf of Mexico



Environment and Public Works Committee Hearing  
July 27, 2010  
Follow-Up Questions for Written Submission

Questions for Pell

Questions from:

Senator James M. Inhofe

1. As was the case in the *Exxon Valdez* tragedy, there was not enough baseline information for the damage assessment to be performed adequately, and it seriously hampered the ability to perform any assessment at all. In this instance, is there adequate baseline information for all affected areas, including the deep water areas off-shore, to perform a satisfactory NRDA?

Answer:

The Smithsonian Institution has been the repository of biological samples from the Gulf of Mexico with the first samples dating back to 1838. In total the institution has 1,416,563 specimens from that region with new samples contributed annually. Sampling sites span the entire gulf region. In 1974 the Department of Interior's Minerals Management Service (predecessor to the Bureau of Ocean Energy Management, Regulation and Enforcement) began an ongoing program to assess the status of the marine environment in the Gulf of Mexico in anticipation of oil exploration. To date the Smithsonian has taken possession of 93,428 lots (containers with multiple specimens) of invertebrate samples from the region. Baseline information for damage assessment depends on the particular kind of natural resource injury or service loss being assessed. The Smithsonian's samples, which span the Gulf of Mexico including the region of the oil spill, and will be available to the natural resource trustees for their damage assessment work and to anyone else conducting research involving this region. It must be noted that many samples still require data entry and sometimes also identification.



Senator CARDIN. Let me thank all three of you for your testimony.

Ms. Dohner and Mr. Penn, your agencies are trustees in regards to the natural resource damage assessment. As such, I think you have a particularly important role in the view of protecting the public interest.

The law requires that the natural resource damage assessment do a preliminary assessment as to the damages, to develop a restoration plan, and to monitor the restoration implementation. To get this right you have to have an accurate assessment going in. And I have been concerned as to whether particularly U.S. Fish and Wildlife has adequate resources in order to move forward with the assessment.

NOAA has a little bit better flexibility as far as funding, and I wrote Secretary Salazar as to whether he needed help on funding. If I understand the law properly, you have two choices. You either fund the assessment and then seek reimbursement from BP, or you get BP's approval to do an assessment project which may or may not be coming or may be delayed or could cause the concern as to its objectivity as to the scope in which BP agrees to the funding request. So it is important that you have your own independent funding sources in order to be able to do an accurate assessment.

So my first question to you is whether you have adequate resources. You talked, Ms. Dohner, about I think a little over \$1 million has been committed through DOI or Fish and Wildlife that BP has made available, I thought you said somewhere around \$50 million, if you said correctly, toward these assessments?

Ms. DOHNER. \$45 million.

Senator CARDIN. \$45 million. And then there have been press accounts that BP has committed as much as \$500 million for its own independent review of the damages, hiring a lot of the top scientists in the Nation under nondisclosure agreements where they may very well have information that is important for us, but in a way, BP is preventing that from being reviewed publicly.

Do we have adequate resources to do this assessment?

Ms. DOHNER. Sir, thank you for the letter. We do know about the letter, and we are going to address that and get a response back to you.

At this time we were able to start what we needed to do. At the very beginning we started within days to do these pre-assessments, and the funding was adequate. And we have been able to fund all the different pre-assessment studies that we needed to date. And we are working with BP on additional funds that will help us go forward with this damage assessment. And then we also have funds available through the Department of Interior, the NRDAR funding mechanism. And then we can also go to the oil spill liability trust fund.

So to date we have had funds available to continue with the studies that we need to go forward with the pre-assessment.

Senator CARDIN. Are you concerned by the reports that BP is hiring a significant amount of academic talent under nondisclosure agreements?

Ms. DOHNER. Sir, there is some concern, but we also are exploring and looking out to experts and providing the opportunity to

those experts to get involved in the different studies that we are developing for pre-assessment and assessment. So we believe within the Department of Interior and the U.S. Geological Survey and NOAA, the different universities that we are able to reach out to for help with the development of these studies, that we, too, have the expertise that we need to go forward.

Senator CARDIN. As trustees I believe you really have a fiduciary responsibility to make sure that you are satisfied for the purposes of the people of this Nation, representing them, that there is independence and objectivity on these assessments. Do you feel that that is your responsibility, to be able to ensure us that these assessments are being done to the standard of independence that we should expect? And if it is not, that you will come forward and let us know?

Ms. DOHNER. I do agree that we need to make sure that we have the studies that are rigorous and that they will ensure that we have the proper assessments going forward. And we do believe that at this time we have been able to develop pre-assessment studies. And as we go into the assessment stage, we will be able to reach out to researchers that we need to make sure we have the proper studies. And if there are issues, we will make sure that we reach out when needed.

Senator CARDIN. That is not exactly my question. On behalf of this Committee, do we have your assurance that if the independence and objectivity is not at the standard you think is right to protect the public, that this Committee will be notified so that we are aware of the concerns that you are experiencing?

Ms. DOHNER. Sir, I can make the commitment that we will make you aware of any concerns that we would have as we go forward.

Senator CARDIN. Thank you. I appreciate that.

One last point, and I will turn it to my colleagues, and that is transparency is important here. There is a lot of interest with peer review. Can either one of you tell us what procedures are being put in place in the assessment process so that there is an openness that the public can review and that the experts in this area will have a chance to review? And whether you are encouraging peer review?

Mr. PENN. Thank you. I will take that. Yes, we are also very interested in transparency. We are very interested in doing the right science, making sure it is objective science. At this stage in the process our review has been occurring within our co-trustee groups. We have had different levels of review on our study plans.

We have recently posted our pre-assessment plans on our Web site. We are trying to be proactive in getting information out there about what is in our study plans, as well as we are getting information data back from some of these studies. We are moving forward with posting some of that information as well.

That is, I don't want to say unprecedented for our natural resource damage assessment work, but I think we have been very up front and focused on that transparency here.

In terms of opening up the assessment to a full public process, we have a number of things that are required in OPA in terms of engaging the public. We provide notice of intent. We let the public know that we are going to be doing a damage assessment. We en-

gage their comments on our damage assessment and restoration plans.

In this case we will be doing much more than that. We will be going above and beyond the minimum requirements in the OPA NRDA regulations. In terms of how exactly we will engage external peer review throughout this process, I think that is something that we need to talk about in our co-trustee group. Again, we are doing some of that internally. How much we open that up to the outside will be a co-trustee consensus decision.

I guess the one thing I would want to raise here is that, yes, we want to be transparent, and we are interested in getting good feedback on our work. At the same time we are trying to protect the Government's interest in this claim. And so there may come a point where we have to be guarded about how much we are saying publicly.

Senator CARDIN. And I certainly understand that, but I would ask that this Committee be kept informed as those decisions are being made.

Mr. PENN. OK.

Senator CARDIN. Senator Vitter.

Senator VITTER. Thank you, Mr. Chairman.

Ms. Dohner and Mr. Penn, I want to direct a couple of questions to you in particular. Certainly I agree with everyone here that natural resource damage assessments are extremely important. There is one thing I would rank as more important, particularly over the last couple months, which is natural resource damage prevention. In that category, my experience directly has been the same as most Louisianians that Federal agencies have been great at raising objections, dragging feet with regard to practical initiatives put forward at the State and local level.

And in particular I am thinking of the emergency dredging barrier island plan which took weeks and weeks to get a small portion of it approved. And I am also thinking of various proposals to block the oil from entering Barataria Bay.

Can each of you tell me what your agency's role in that process was? Because from a Louisiana perspective, what the Federal agencies were best at was raising countless objections, slowing things down to an impractical pace, and blocking what seemed to be a lot of good, practical emergency solutions being put forward.

Ms. DOHNER. Senator, speaking as the Regional Director for the Southeast Region, our field staff are involved in the review, working with the Corps to review those permit proposals. They worked with the Corps to review the different proposals on both the berm and the rock berms. And they provided permit measures and different things as part of that permit review.

We do need to make sure that we go through all the environmental processes that we have to do as we go forward with those types of projects to make sure that we minimize impacts to the environment and the different legal requirements we have.

Senator VITTER. Well, first of all, specifically in those two cases, what was U.S. Fish and Wildlife Service's input?

Ms. DOHNER. The U.S. Fish and Wildlife Service reviewed each one of those permit proposals and provided information back to the

U.S. Army Corps of Engineers on permit conditions as they went forward.

Senator VITTER. I understand that. What I am asking is, broadly speaking, what was the information? What was the input?

Ms. DOHNER. Sir, I don't know the specifics so I would have to go back and get that information and get back to you with the specific measures.

Senator VITTER. OK. Can your agency get that in some detail to my office?

Ms. DOHNER. Yes, sir.

Senator VITTER. OK. Second, in response to your general answer, let me just point out that while you are taking your time, quite frankly, doing these environmental assessments, oil is going into Louisiana marshes. This isn't a non-emergency situation. This is a clear emergency situation, and clear environmental damage was happening every hour of every day. So I think that is the universal perspective on the ground in Louisiana.

Mr. Penn, what about NOAA?

Mr. PENN. Yes, we also provided comments on the plans. I think at the end of the day our comments were that we wanted to monitor. We didn't stand in the way of the berms. We wanted to monitor what was happening because of the berms. We wanted to evaluate the effectiveness of the berms from the standpoint of ecological benefits. But at the same time we were also looking at would there be any potential harm because of these projects.

And so from a damage assessment perspective if there were response-related impacts because of these actions those injuries would be coverable under our natural resource damage assessment process.

So I think from those perspectives we were supportive. We wanted to monitor what was happening out there environmentally, and then we would look at that from a natural resource damage assessment perspective to see if there were any injuries caused by this response action that we would have to pursue.

Senator VITTER. And then what about the separate proposals to try to block oil more effectively from going into Barataria Bay?

Mr. PENN. I am sorry, sir. I am not familiar with that particular proposal. That was separate from the berm?

Senator VITTER. It was. Again, if you could have NOAA respond more specifically to me, I would appreciate it.

Mr. PENN. We will. Thank you.

Senator VITTER. OK. Also final question, concern has obviously been raised about the dispersants. What specifically is each of your agencies doing with regard to monitoring dispersant damage or assessing dispersant damage?

Mr. PENN. Sir, I will start. This is a real concern. Dispersants have been used in this spill unlike any other spill that I am aware of. And used in a way that is different from what we have seen in the past, using dispersants at depth, unprecedented volume of dispersants applied at the surface.

We are very much concerned about the dispersant effects on all of the water column as these dispersants go from the surface down and from the bottom of the ocean up through the water column.

Through our different technical working groups we are looking at different effects of both oil and dispersed oil, so oil including the dispersants. Right now, we have a deep coral cruise ongoing, documenting exposure of the deep corals to oil and dispersed oil. And all the details here I may have to get back to you on, sir, but we are looking at toxicity tests with fish and the impacts of dispersants and dispersed oil. I mentioned we are looking at exposure of the coral reefs to dispersed oil.

Our first step in this process—and this is where we are now is really looking at exposure. And once we identify that we have exposure of resources to oil, dispersed oil, then we will pursue the assessment of the impacts. We are moving forward on that. We are looking at impacts to fish. We are looking at some toxicity tests, but we have a long way to go.

Senator CARDIN. Thank you.

Senator Lautenberg.

Senator LAUTENBERG. Mr. Chairman, thanks for the opportunity to review this. I don't want to get off track here, but do any of you think that we can do deep sea or deep drilling in the search for oil and never expect any accidents or spills to accompany that? Would you say we could do that, Ms. Dohner?

Ms. DOHNER. Senator, I think you have to evaluate the risks on whether or not—

Senator LAUTENBERG. No, no. That is not the question. The question is do you think that we can expect a clear sail that will never have a spill or an accident when we are doing these things?

Mr. Penn, while Ms. Dohner thinks that over. Do you think that we can?

Mr. PENN. I don't think we can assure that accidents don't happen.

Senator LAUTENBERG. Ms. Pell.

Ms. PELL. I think history speaks for itself.

Senator LAUTENBERG. Well, that being the case, then how could the use of dispersants that might carry their own danger be allowed to just be introduced into the picture? I don't understand that. Do any of your agencies—all of you represent a scientific view of what is happening there; how is it that suddenly we have awakened to the fact that these dispersants may be dangerous unto themselves?

Mr. PENN. I think we have in region VI, the regional response team, and this really is a response decision in terms of whether or not to apply dispersants. I think from the damage assessment perspective we understand what the response decisions are. We look at what they are, and then we try and assess, OK, what are the impacts or the result of the response decisions.

So in this case the regional response team for that region had preapproved use of dispersants beyond the 3-mile State water limit. So that is sort of preapproved. I think the Unified Command, as they are making these decisions, has to weigh the tradeoffs.

Senator LAUTENBERG. So then I take it that you are agreeing that there was an understanding that there might be some dangers in the use of this.

Mr. PENN. Absolutely. It is a trade-off. It is do you disperse the oil further out at sea and fight it that way? Or do you have the

oil on the surface that can potentially come ashore and impact the resource there?

Senator LAUTENBERG. So we might be introducing a cure that enlarges the danger that we have from the spill.

You heard me say that I am introducing the Safe Dispersants Act. It requires advance testing and disclosure of the ingredients in these dispersants. Now, EPA Administrator Jackson has already testified that such a change in the law is necessary. Does NOAA agree?

Mr. PENN. Senator, we would be happy to look at the bill and look forward to providing comments. I can say generally that absolutely we agree that we need to know more about dispersants and that that information can better inform our decisions on when we use dispersants and whether or not it is appropriate to disperse oil or leave it on the surface and fight the spill that way.

Senator LAUTENBERG. Ms. Dohner, we don't know how to prevent an oil spill from happening. So far, we haven't come up with a way to keep that from happening. We talk about the two most obvious damage moments, the *Exxon Valdez* and now the Gulf of Mexico, but we also know about the spill off the coast of Australia. These things have been happening for years.

Now, we don't know how to prevent an oil spill from happening, and we don't know how to stop it, apparently, quickly once it has begun. And based on the 500 miles of oil-soaked coastline in the Gulf, I say we don't really know how to keep a spill from reaching shore where much of the damage occurs.

Do you think Congress should consider putting some areas off limits to new offshore drilling?

Ms. DOHNER. Senator, I have worked with fish and wildlife resources for a very long time, and I think that the American public treasures these resources. And I think that there are areas that you need to look at, including what areas are sensitive, and then how you go forward in those certain areas. And I think it depends on the particular area that you are looking at.

Senator LAUTENBERG. Yes, but it does—I take it from your words, it should be looked at.

Ms. DOHNER. I think that we need to evaluate that and see how it would impact those resources, shoreline resources, and the communities that could be impacted.

Senator LAUTENBERG. Yes. I just wanted to confirm that.

Mr. Chairman, there are many other questions, but I will forego it in the interest of time and expect that the record will be kept open.

Senator CARDIN. The record will be kept open for questions.

As our guests may have observed, there is a vote currently on in the Senate. Some of our colleagues went over to vote in an effort to try to keep the hearing moving as efficiently as possible.

Dr. Pell, let me return to you, if I might. The work that was done in collecting these specimens could be extremely valuable in trying to assess damages done as a result of the spill. It seems to me—and I am not a scientist, but it seems to me having specimens showing the condition of not only water but other related entities would be extremely important in analyzing the long-term impact caused by BP Oil.

My question is the resources. If I understand how your collections work, much of it is there but hasn't truly been fully analyzed. I want you to respond first as to what resources you need. And then second, to our trustees, our two representative agencies that are trustees, as to how you would see having these specimens would assist in trying to assess the damage that has been done to our natural resource.

Ms. PELL. Thank you for that question, Senator. Indeed, if you want to understand the impact of any event of this sort or any other sort, you always have to know what happened before. And I think my colleagues made reference to that. And so you need a baseline.

It was with that in mind that the Bureau for Ocean Energy Management began to take these surveys in the Gulf, knowing that there might be drilling, to know what was going on. And contractors have been contracting for almost four decades with the Smithsonian for us, not only to maintain these collections but to make them available. When we started there was no such thing as a digital record, but there is today, and 57,000 of the 93,000 lots, and the lots are big jars out in Suitland, Maryland, that are filled with samples in little vials. And so for 57,000 of those we have digital records that have the identities of the specimens, biological properties, chemical properties, physical properties of the water, and the GIS record of exactly where those samples came from.

We have another roughly 35,000 for which we are still putting the digital records together, which will make those samples accessible. We have a contract with the Bureau for Ocean Energy Management. We get \$200,000 a year, which is extremely helpful. And we are working through those samples. But we can do just so much in a year and until this emergency that was sufficient.

And it is going to be a matter for my colleagues as they do their assessment to know how quickly do they need that baseline. And if they need the baseline more quickly, then we would need to hire more individuals.

I should also say that in addition to all those samples, the Smithsonian has roughly another 129,000 lots that have been collected from the Gulf region that go beyond just the invertebrates, but are fish and mammals. And an even smaller number of these records are in the digital form at this time.

So these collections are enormously valuable and will be available to everybody in the public, of course. I don't mean only in the public, but they will be publicly available to anyone that wants to do an assessment.

Senator CARDIN. One of the reasons I want transparency is that I just want an honest assessment of the damages that have been done and do our best to get a restoration plan that protects the natural resources for the public as best as we can. And that is what we are all trying to do.

It seems to me what you have is extremely valuable. You say you have a \$200,000 annual budget. BP is committing it looks like \$500 million to an independent assessment, for what purposes I am not exactly sure they want this independent assessment for, if in fact they are going to be party to the assessment that is being done by the trustees.

It would seem to me that it makes sense to have this baseline in a format that is available for verification as to the findings that may come out of this assessment or the findings that BP is doing independently on its own. Is this a valuable tool to have?

Ms. DOHNER. Senator Cardin, I would agree that it is a valuable tool, and the baseline data sets that the Smithsonian has are vital to the case as we go forward with the assessments of pre-spill versus post-spill, and what we need to do going forward with this natural resource damage assessment.

Mr. PENN. I would agree. We have downloaded data from Smithsonian, and we will start looking at it to see just how it can inform our damage assessment going forward. But clearly it is a source of baseline information that we just don't have in many of our other cases, so we will take advantage of it.

Senator CARDIN. I would just urge that it might be worthwhile to talk to BP about helping us accelerate the digitizing of the material you are using, so that it is not only available for your purposes, but BP. I am not opposed to this being available to the public. It seems to me it just gives us all a common set of objective information that could help save some perhaps disagreements later on in the process. So it seems to me BP should have an interest in trying to expedite this process. You might want to just urge them to help us here.

We have talked about this issue, but let me just get it onto the record as far as the limit of liability. Clearly the damage that was done, and in *Exxon Valdez* I think the damages far exceeded \$75 million to the natural resources. Here the amount of money being spent—it is obvious that this \$75 million limit is going to be exceeded.

But I think it is important for us to get an early assessment as to the range in which we are talking about. As Congress is looking toward liability limit changes we might accept Senator Vitter's and remove it altogether. But I think it is important to get some range of the type of damages that have been done and the restoration costs, similar to what Senator Lautenberg was suggesting as to if we are doing this deep water drilling, we can expect that there are going to be oil spills, and we need to understand the damage so we have a better cost-benefit analysis before these drilling permits are issued.

So what is the timeframe on all of this? Any thoughts?

Mr. PENN. I guess I would like to follow up your point on the liability limit first, if I could. Clearly the liability here for damage assessment costs and the restoration costs will exceed \$75 million.

In terms of how long will it take us to determine what that ultimate liability is, I don't want to speculate. I don't think it will be this year. I wouldn't want this to extend 10 years, 20 years. Obviously our goal in this process is to get to restoration, and we want to do that as quickly as we can, bearing in mind that we have to have a strong assessment that tells us what the right restoration amount is.

So we will be balancing that or walking that line of getting enough information versus getting to restoration as quickly as we can.



Senator CARDIN. Let me interrupt you at this point because we are down to—oh, Senator Merkley has arrived. Perfect timing for Senator Merkley.

I am going to ask Senator Merkley to inquire of the witnesses, take as much as he needs, and we will then dismiss this panel and go on to the next panel.

And I know that Ms. Dohner, you wanted to respond a little bit further. I am going to let Senator Merkley take the answer.

Ms. DOHNER. Yes, sir. Thank you.

I just wanted to add that we need to make sure as we go forward that we are assessing all of the injuries. As we go forward that is one of the things that we are working on right now. And I agree with what Tony said. We are not sure how long it will take, but we need to make sure that we look at all the different things and make sure that we restore this to the pre-spill and make sure we have the right restoration going forward.

Senator MERKLEY [presiding]. Thank you all very much for your testimony. This may have been asked while I was running to vote, but if it has, feel free to be very brief, and we will all just check the record.

But in terms of the underwater plumes and the currents moving them about, how do we really track how those plumes are moving in order to do damage assessment? And how do we get a grip on the amount that is consumed by various types of wildlife at various levels in the sea column in order to understand the impact? And I will just add onto that, is there any potential impact here on the ability to consume some of the species that are in those plumes?

Mr. PENN. I will start, I guess, with response to your last question. There is a group in NOAA that is very concerned about seafood safety. There is closure throughout the Gulf, and has been. Some of those areas are starting to reopen now, and they are looking at PAHs and other contaminants. They need to make sure that they are at appropriate levels so that the seafood is safe.

With respect to the underwater plumes, I think we have a multi-tier approach to try and understand what is going on under the water. First, we are actually getting water samples. So we are dating and analyzing what is in that water in terms of oil, dispersed oil and actually having observational data on what is in the water.

Another approach that is helping us think about what is happening underwater is we do have expertise on our team in modeling. There is a model that we have used as trustees to understand what is going on with oil in the water, surface spill, sub-surface spills. That is certainly informing how we think about where the oil is going.

And then ultimately we can use the model to actually attribute effects of oil in the water column. We will also be looking at actual toxicity tests to also tell us what in reality we are seeing because of exposure to oil and dispersed oil as well.

So a combination of water samples, modeling, and then doing some toxicity tests to see how some of these critters are responding to those concentrations.

Senator MERKLEY. Does anybody want to add anything to that?

I will just note then that I think that this is really important because we need to make sure the public feels that they can com-

pletely trust the food supply because if there are mistakes made that reduce that trust, then the viability of the livelihood of folks who are operating in areas that the seafood is absolutely fine would be affected as well as the fact that the livelihoods affected of those folks whose fishing has been shut down. And that would be the worst of all worlds.

Thank you very much for your contribution to this discussion and bringing your expertise to bear. We appreciate your appearance today. And with that we will dismiss this panel and bring up the next panel.

I want to go ahead and start the introductions while the panel is getting seated. I will start that in the order of the panel, starting with Dr. Robert Spies. Dr. Spies conducts scientific field research around the United States on contaminants in marine ecosystems. He has particular expertise on oil spill impacts. He investigated the effects of oil spills in the San Francisco Bay and served as Chief Scientist on the *Exxon Valdez* Trustee Council from 1990 to 2001. We look forward to hearing what lessons he learned from that experience that are of use to the trustees addressing the disaster unfolding in the wake of the BP Deepwater Horizon disaster.

Our second member of the panel is Stanley Senner. As Conservation Science Director Mr. Senner oversees the science programs for the Ocean Conservancy. He was the State of Alaska's Restoration Program Manager following the *Exxon Valdez* spill. He later coordinated the post-spill science program for the State and Federal trustees that administered the \$900 million civil settlement between the Government and Exxon. We value Mr. Senner's experience and guidance to the Committee's oversight of the BP Deepwater Horizon natural resource assessment and restoration process. And if I might add, I believe you call Portland, Oregon, home, and we are very proud to have you involved and bringing your expertise to bear on the challenge.

Our third witness is Dr. Eric Rifkin. As Interim Executive Director of the National Aquarium Conservation Center, Dr. Rifkin is leading the Aquarium's efforts to conduct conservation research to understand aquatic ecosystems and to advocate for ocean health. Dr. Rifkin is here to describe the research partnership among the National Aquarium, Johns Hopkins University, and the Mote Foundation to gather baseline ecological information about Sarasota Bay, Florida. Dr. Rifkin's team will provide critical data that could help scientists demonstrate the impacts of the BP Deepwater Horizon spill on this ecosystem. And we look forward to his testimony.

I will turn to my colleague, Senator Vitter, for our fourth introduction.

Senator VITTER. Thank you, Senator.

And I want to welcome Councilman-at-Large John Young. John represents all of Jefferson Parish, which is a suburban New Orleans parish, our word for county. That includes Lower Jefferson Parish, including the communities of Grand Isle and Lafitte and the water body, Barataria Bay. All of those areas have been dramatically impacted by this spill, and those are areas Senator Merkley and Senator Cardin and others joined me in visiting. And John has been a leader in efforts on the ground, trying to be as

proactive and aggressive as possible in terms of battling the impact of the oil on our marshes.

So thank you for being here, Councilman.

Senator MERKLEY. With that, Dr. Spies, we will start with your testimony.

**STATEMENT OF ROBERT B. SPIES, PRESIDENT, APPLIED MARINE SCIENCES; FORMER CHIEF SCIENTIST, EXXON VALDEZ TRUSTEE COUNCIL**

Mr. SPIES. Senators, thank you for inviting me to testify with regard to the impact of the Deepwater Horizon oil spill in the Gulf of Mexico. I was Chief Scientist for the *Exxon Valdez* Oil Spill Trustee Council from 1990 to 2001 during the damage assessment and restoration programs.

Those of us who participated in these programs learned much from this experience, and I hope we can pass some of this on to those that are dealing with the current spill.

While every oil spill varies with the circumstances—and this is certainly an unusual one—large, damaging spills share enough characteristics to be notable, especially in the human response.

To provide a little context to you, following the *Exxon Valdez* spill in 1989 a large number of studies were initiated to determine the damage from the spill, many of which lasted several years or more. Then in 1991 a settlement was reached with the Exxon Corporation for damage to public resources. The settlement initiated the restoration program, with annual payments from the Exxon Corporation of \$900 million a year for 10 years.

A final restoration plan was approved by the trustees in 1994. Some damage assessment was carried forward into restoration phase, and it became apparent that there was an unanticipated lack of recovery of injured species and some lingering damage. This unanticipated damage resulted in a claim by the State and Federal Governments for further compensation in 2006 under a reopener clause in the original settlement. That claim has not been resolved.

In the course of assessing the impact of the *Exxon Valdez* spill we were able to evolve our approach to achieve a relatively efficient and effective scientific program in damage and especially in restoration. It took some time to achieve this, and because the present spill is so much larger and involves so many more agencies and interests it will be an immediate challenge to make the scientific work comprehensive and integrated.

In my written testimony I have 10 major points to make, and I will only have time today in oral testimony to talk about 3 of those that I think are perhaps the most important.

The first of those is the value of an ecosystem-based approach. Because many State and Federal Government natural resource agencies are organized and operated based on individual species it is not easy to implement ecosystem-based approaches organizing spill studies around individual species or groups of species at the expense of a broader ecosystem-based view.

For example, study impacts on sea birds and their recovery independent of the ecological conditions that sustain them, such as food supply, habitat quality, et cetera, make it difficult to achieve an overall assessment of the health of the Gulf ecosystem.

Ultimately, however, the health of the system, more so than the individual species, should be the yardstick by which we judge success of a large-scale restoration program.

Several years after the Alaska spill when affected populations were not meeting recovery objectives we launched a series of ecosystem-based studies of fish, birds and mammals that case a much larger net in Prince William Sound, taking into account food supply, reproduction, disease, predators, as well as any lingering oil exposure.

These studies were very effective in achieving a better understanding of the individual species for which the main agencies were responsible and also gave us insight into the trajectory of an ecosystem that is so important to the people of Alaska.

In addition, these multidisciplinary and multi-institutional studies helped break down artificial barriers that inevitably grew up as a result of dividing up the responsibility for the ecosystem among various agencies when no such divisions actually occur in nature.

The second point I would like to make is the value of the complete damage assessment. It is important not to end a damage assessment too soon, as subtle and indirect effects may not emerge for a while. We must understand the entirety of damage to know when the ecosystem has been made whole.

For example, detailed laboratory experiments carried out on pink salmon years after the Alaska spill showed that damage could be done to developing embryos and expressed later in poor survival of adults returning to their natal streams. And this was a result of exposure to parts per billion, not parts per million of oil which was previously found.

The third point I would like to make is how studies now will help in the future. Beyond knowing the full impact of a large spill, a rigorous and robust scientific program pays long-term dividends in advancing our knowledge of ecosystems so that we may more intelligently manage marine activities in the future.

For example, pink salmon management in Prince William Sound was advanced greatly by the detailed studies during the damage assessment and restoration work following the *Exxon Valdez* spill. No one likes to see a tragedy like this, but I think there is a potential silver lining in that the amount of information gathered about affected species and the ecosystem will help in future management.

Senators, that concludes my oral comments for today.

[The prepared statement of Mr. Spies follows:]

**Ecological Damage and Restoration  
for the BP *Deepwater Horizon* Gulf of Mexico Oil Spill:  
Lessons Learned from the *Exxon Valdez* Experience**

Testimony of Robert B. Spies, Ph.D.

United States Senate

Environment and Public Works Committee

Subcommittee on Water and Wildlife

“Assessing Natural Resource Damages Resulting from the BP *Deepwater Horizon*  
Disaster”

July 27, 2010

Thank you inviting me to testify with regard to assessing the impact of the *Deep Horizon* oil spill in the Gulf of Mexico. I was Chief Scientist for the *Exxon Valdez* Oil Spill Trustee Council from 1990 to 2001 during the Damage Assessment and Restoration programs. Those of us who participated in these programs learned much from this experience, and I hope we can pass this on to those who are dealing with the current spill. While every oil spill varies with the circumstances, large damaging spills share enough characteristics to be notable, especially in the human response. My colleague Stan Senner is providing testimony on the procedural and administrative lessons in Alaska, and I will emphasize scientific lessons learned. Some of our testimony relies on a document that we assembled with the assistance of Dr. Charles Peterson of the University of North Carolina, Dr. Dennis Heineman of the Ocean Conservancy, and Dr. Jeff Short of Oceana. (see attachment A).

Following the *Exxon Valdez* oil spill in 1989 a large number of studies were initiated to determine the damage from the spill, many of which lasted several years or more. Then in 1991 a settlement was reached with the Exxon Corporation for damage to public resources. The settlement initiated the Restoration Program with annual payments from the Exxon Corporation of \$90 million a year for 10 years. A final Restoration Plan was approved by the trustee council in 1994. Some damage assessment was carried forward into the restoration phase and it became apparent that there was an unanticipated lack of recovery of injured species and lingering damage. This unanticipated damage resulted in a claim by the State and Federal governments for further compensation in 2006 under a reopener clause in the original settlement agreement. That claim has not been resolved.

In the course of assessing the impact of the *Exxon Valdez* spill we were able to evolve our approach to achieve a relatively efficient and effective scientific program in damage assessment and especially in restoration. It took some time to achieve this, and because the present spill is so much larger and involves so many more agencies and interests, it

will be an immediate challenge to make the scientific work comprehensive and integrated.

It is critically important that we do all we can to ensure that the pre- and post-impact status of the Gulf ecosystems, including contaminant characterizations, is being assessed and documented as rigorously as possible in at least the most biologically productive and sensitive parts of the Gulf coast. These areas include the estuaries and especially the marshes and wetlands behind the barrier islands along the coast, which are the breeding and nursery grounds of myriad aquatic, intertidal, and avian species. Given the widespread and intensive application of chemical dispersants, the very large amounts of oil on the ocean's surface, and the presence of large quantities of subsurface oil, it also is critical to be sampling oceanic surface, deepwater and bottom communities as well.

Here are ten lessons learned or suggestions; some of these may be obvious and others not.

1. **Value of an ecosystem-based approach.** Because many state and federal government natural resource agencies are organized and operated based on individual species, it is not easy to implement ecosystem-based approaches. Organizing spill studies around individual species or groups of species at the expense of a broader ecosystem-based view--e.g., studying impacts on seabirds and their recovery independent of the ecological conditions that sustain them (food supply, habitat quality, etc.)--make it hard to achieve an overall assessment of the health of the Gulf ecosystem. Ultimately, however, the health of the ecosystem, more so than the individual pieces, should be the yardstick by which we judge the success of a large-scale restoration program.

Several years after the Alaskan spill, when affected populations were not meeting recovery objectives, we launched a series of ecosystem-based studies of fish, birds and mammals that cast a much larger net in Prince William Sound, taking into account food supply, reproduction, disease, and predators, as well as any lingering oil exposure. These studies were very effective in achieving a better understanding of the individual species for which management agencies were responsible, and also gave us insight into the trajectory of an ecosystem that is so important to the people of Alaska. In addition, these multi-disciplinary and multi-institutional studies helped breakdown artificial barriers that inevitably grow as a result of dividing up the responsibility for the ecosystem, when no such divisions exist in nature. We actually allocated seed money to groups of government, academic and private industry scientists to plan these ecosystem-based studies, which then went through several rounds of peer review by outside independent scientists. The end result was more tightly integrated and comprehensive studies across institutional lines.

2. **Value of a complete assessment of damage.** It is important not to end a damage assessment too soon, as subtle and indirect effects may not emerge for a while and we must understand the entirety of the damage to know when the ecosystem has been made whole. For example, detailed laboratory experiments carried out on pink salmon years after the Alaska spill showed that damage could

be done to developing embryos and expressed later in poor survival of adults as the result of exposure to oil in the low parts per billion range, as opposed to parts per million. These findings support a view that there can be damaging effects from a spill long after the visible oil is gone.

3. **How studies now will help in the future.** Beyond knowing the full impact of a large spill, a rigorous and robust scientific program pays long-term dividends in advancing our knowledge of ecosystems so that we may more intelligently manage marine activities in the future. For example, pink salmon management in Prince William Sound was advanced greatly by the detailed studies during the damage assessment and restoration work following the *Exxon Valdez* spill. Support from the restoration program enabled the mass marking of hatchery reared pink salmon in Prince William Sound, making it possible to distinguish them from and better protect wild stocks. While no one wants ecological disasters, it is important not to miss the opportunity to gain knowledge that will enable better future management.
4. **Value of historical data.** Take advantage of those organisms and habitats that have the best timelines of data and research prior to the spill as possible indicators of pre-spill conditions. Such information can permit application of the rigorous and potentially powerful statistical assessment approach, the Before-After-Control-Impact design (known as BACI). For example, finding damage to the harbor seal population in Prince William Sound was enabled by good aerial survey data leading up to the spill, and these surveys were continued for years afterwards. Funding implementation of an Ocean Observing System in the Gulf of Mexico, as well as in other parts of the country, would represent real progress establishing environmental baselines that will support evaluation of future threats and long-term restoration from this spill.
5. **Documenting the physical properties and detailed chemical composition of the oil.** Detailed chemical analyses of oil from the reservoir tapped by the *Deepwater Horizon* are crucial to anticipating the behavior and biological effects of the oil, as well as for confirming the provenance of oil collected from impacted environments. These tests and analyses should be conducted on oil samples collected before and after contact with seawater. Physical tests on oil collected prior to seawater contact should include measurements of viscosity, compressibility and density as functions of temperature and pressure. Chemical composition analyses should include measurements of normal alkanes, beginning with methane through at least tetracontane ( $n\text{-C}_{40}$ ), aromatic hydrocarbons from benzene through 6-ring polycyclic aromatic hydrocarbons (PAH), including alkylated homologues bearing up to four alkyl carbon atoms, and alicyclic biomarkers analyzed by gas-chromatography/mass spectrometry at  $m/z$  191, 217 and 218. These measurements also should be done on samples at various states of weathering to document how composition changes. The chemical similarity of oil spilled from the *Deepwater Horizon* and other sources of South Louisiana crude oil, as well as from the presence of numerous natural and human-derived sources of petroleum in the Gulf, make it important to chemically differentiate

spilled oil in various states of weathering and other sources of petroleum present in samples of water sediment and tissues collected.

6. **The power to detect change.** The obvious bears stating: longer time series and more frequent sampling will enhance statistical power to detect change. Monitoring programs need to be designed to distinguish oil-spill responses from unrelated spatial and temporal variation in the ecosystems that are affected. Many wildlife census techniques are surprisingly only able to detect changes when they are greater than about 50%, but the chances of detecting change are much better with longer time-series and more frequent sampling. In Alaska the Exxon corporation scientists claimed that as long as the census data for a species fell within the statistical bounds of historical data then that species could be considered recovered. So frequent and long-term sampling will be useful for better understanding both damage and recovery.
7. **Planning now for a smaller long-term program in the future.** Greater efficiency in the future can be obtained by coordinating offshore chemical and biological sampling with onshore efforts, so that when the wide scope of initial studies is eventually scaled back, it will be easier to consolidate the effort and retain maximum logistical efficiency. Stated another way, all other considerations being equal, co-locate as many different chemical/biological studies as possible at the same stations. This approach is essential to integration of studies that must be done to provide the ecosystem-based approach, which is the only means of inferring broader indirect effects of the spill. The models routinely used to estimate natural resource impacts of oil spills by matching oil concentrations, transport, chemical transportation, and fate to spatial distribution of biological resources only address short-term acute impacts of separate species, thereby seriously underestimating ecosystem impacts of the spill. Our initial studies of the intertidal damage from the *Exxon Valdez* in Alaska were largely uncoordinated with subtidal assessments, so that it became impossible to achieve a maximally integrated and less expensive program in later years. In fact, the initial intertidal studies documenting extensive damage were so elaborate that conducting valid follow up studies to assess recovery in later years would have cost many millions of dollars. Hence, the Exxon Valdez Oil Spill Trustee Council had other priorities and chose not to conduct those follow up studies.
8. **Available ships.** The lack of oceanographic sampling platforms, e.g. ships, though not a big problem in Alaska, appears to be one in the Gulf of Mexico. I have colleagues who wish to revisit stations in Gulf of Mexico that were sampled in years before the spill, but are unable to find a sampling platform. There is apparently a bottleneck for research into the effects of the spill due to the limited amount of ship time and space available.
9. **How many were killed?** Typically, only a small proportion of the marine birds, mammals and turtles that are killed by a spill are ever recovered at sea or ashore. Given that a number of factors, such as oil type, wind patterns, distance from shore, scavenging rates, and taxon-specific buoyancy of carcasses affect the recovery rate, it is necessary to rigorously design and implement carcass recovery



efforts and experiments to estimate loss rates and enable accurate estimates of the total numbers of wildlife mortalities.

10. **How toxic is the oil?** It will be important to initiate laboratory studies of oil and dispersant toxicity in large aquaria simulating natural ecosystems to augment the field assessment studies. These toxicity studies should involve collection of freshly released *Deepwater Horizon* oil as well as oil at various stages of aging and weathering in the testing. Experiments should run tests of oil alone and, very critically, oil combined with dispersants. The tests should not end with the typical short-term 3-5 day acute toxicity tests, but should include treatments to assess chronic impacts of longer-term (months) exposures, perhaps pulsed so as to replicate the continuing delivery of *Deepwater Horizon* oil into the Gulf. There are virtually no available data on toxicity of oil to deepwater species and to the degree possible much more testing should be done. It is possible that this approach may yield more information on the consequences of the spill to the broader Gulf of Mexico ecosystem as other approaches, especially its deep pelagic fauna, as it is notoriously difficult to establish pollution effects to mobile pelagic organisms from field census data.

In conclusion there are valuable lessons to be learned from the *Exxon Valdez* oil spill experience that will help refine the damage assessment and restoration activities in the Gulf of Mexico. Application of these lessons would make the large sums of money spent under these programs more efficient and effective in determining what happened, satisfying the American Public and helping to make the Gulf Mexico whole.

**Attachment A****Assessing Natural Resource Damages  
from the BP *Deepwater Horizon* Gulf of Mexico Oil Spill:  
Lessons Learned from the *Exxon Valdez* Experience  
May 24, 2010**

It is critically important that we do all we can to ensure that the pre- and post-impact status of ecosystems, including contaminant levels, are documented as rigorously as possible in at least those parts of the Gulf coast that are most sensitive, most biologically productive, and most important for wildlife and habitat conservation. These areas include the estuaries and especially the marshes and wetlands behind the barrier islands along the coast, which are the breeding and nursery grounds of myriad aquatic, intertidal, and avian species. Given the widespread and intensive application of chemical dispersants and uncertain fate of oil from a deepwater source, however, it also is critical to be sampling pelagic and benthic communities as well.

We have not had the opportunity to review or be briefed on the full suite of damage assessment and monitoring activities in the Gulf, but each of us (see below) is a veteran of the damage assessment and restoration science programs in Prince William Sound and the northern Gulf of Alaska following the *Exxon Valdez* oil spill (EVOS). Based on our collective experience, we offer the following recommendations with respect to the current situation in the Gulf of Mexico. This is not a comprehensive list of suggestions; some of these items may be obvious and others may not be. Any or all of us would be pleased to discuss these ideas further. Our contact information is below (at bottom).

**Organizational**

1. Put in place a strong coordinating scientific body, including at least a core group of external peer reviewers who remain in place on an extended basis, thus providing continuity in perspectives. Such a structure will help ensure coordination and cull unnecessary or marginal studies (which often are previously unfunded projects that agencies have wanted to carry out for a long time) that come out of the woodwork in times of crisis. Coordination needs involve meeting the challenge of forging an ecosystem-based natural resource injury assessment that acknowledges the interconnectedness among resources and creates explicit linkages among injury assessment studies. An effort should be made to include experts who have experience with comparable oil spills, such as the IXTOC I or other spills in subtropical waters.
2. Transparency is essential. The public will want to know what is being studied and what is being learned. While some of those details may be sensitive, it is crucial to share whatever can be appropriately shared about impacts. This will allay unnecessary fears and concerns about secrecy. The Unified Command/response organization already has provided a web page to coordinate and share news. Something similar is one tool that would help with communication about the scientific effort to the public and with coordination among researchers.

3. Institute integrated ecosystem-based studies on what are anticipated to be the hardest hit areas as a means to coordinate and merge—both conceptually and operationally—what otherwise could be disparate efforts of various federal, state and local agencies, as well as universities and private companies, across the Gulf of Mexico. Integrated studies will produce the best and most useful science, as well as be most efficient from an organizational standpoint. Only by constructing an ecosystem context for the injury assessment studies can indirect effects of the spill be inferred and evaluated, such as consequences of impacts on competitors, prey, and predators that can include trophic cascades.

#### Scientific

1. Put integrative water quality samplers, such as semi-permeable membrane devices (SPMDs), in key habitats and make use of bivalves, such as oysters, with existing histories of PAH analyses. It is critical to establish chemical baselines that will enhance the capacity to infer impacts of the spill wherever damage is most likely to occur. Suspension feeders, such as oysters, are very efficient at accumulating particulate matter, including oil microdroplets that may result from natural or artificial dispersion of oil into the water column.
2. Deployment of SPMDs, preferably spiked with performance reference compounds (i.e., selected perdeuterated PAH), permits time-integrated detection of background non-polar organic contaminant concentrations at the parts per trillion level. While it will take perhaps a week or two to procure and deploy SPMDs (commercially available from Environmental Sampling Technologies [St. Joseph, MO]), their deployment now and retrieval after another two weeks will give an unparalleled indication of background contamination levels. The ability of contaminants extracted from SPMDs deployed prior to impacts from the *Deepwater Horizon* accident to elicit CYP1A responses in standardized test organisms, such as rainbow trout, is an especially powerful approach for evaluating the effects of potentially confounding background contaminants.
3. It is likely that the sea surface microlayer fauna will be greatly affected, so sampling it (control and impact) may provide measures of damage, especially to floating fish eggs and larval stages of fish and crustaceans. We missed this in EVOS.
4. Take advantage of those organisms and habitats that have the best baselines and timelines of data and research prior to the spill as possible indicators of pre-spill conditions. Such information can permit application of the rigorous and potentially powerful statistical assessment approach, the Before-After-Control-Impact design (known as BACI).
5. Documenting the physical properties and chemical composition of the oil from the reservoir tapped by the *Deepwater Horizon* is crucial to anticipating the behavior and biological effects of the oil, as well as for confirming the provenance of oil collected from impacted environments. These tests and analyses should be conducted on oil samples collected before and after contact with seawater. Physical tests on oil collected prior to seawater contact should include measurements of viscosity, compressibility and density as functions of temperature and pressure. Chemical composition analyses should include measurements of normal alkanes, beginning with methane through at least

tetracontane ( $n$ -C<sub>40</sub>), aromatic hydrocarbons from benzene through 6-ring polycyclic aromatic hydrocarbons (PAH), including alkylated homologues bearing up to four alkyl carbon atoms, and alicyclic biomarkers analyzed by gas-chromatography/mass spectrometry at  $m/z$  191, 217 and 218. These measurements also should be done on samples at various states of weathering to document how composition changes.

6. The most useful pre-impact information on baseline levels of exposure to organic toxicants includes documentation of basal levels of the liver enzyme cytochrome P4501A1 (CYP1A), which requires excision of liver tissue and immediate storage in liquid nitrogen. This enzyme is induced in response to exposure to many of the toxic components in crude oil and is one of the most sensitive indicators of exposure available. Other environmental contaminants also can induce CYP1A (e.g., PCBs), so documenting pre-impact levels will be extremely valuable for detecting induction of oil contaminants in fish habitat. For fish, the most useful species would be one that is easily collected, abundant and widely distributed along the coastal estuaries, but don't forget the pelagic environment, especially given the widespread use of dispersants, which is presumably dispersing oil widely in the water column. In the case of EVOS, some of the best documented lingering effects were found in harlequin ducks, a diving species that feeds largely off benthic mollusks that were associated with oil-contaminated sediments.
7. Pre-impact samples of benthic infauna on Gulf beaches, tidal flats, and salt marshes are very important. These invertebrates in sedimentary habitats are largely sessile, thus showing clearly any spatially explicit oiling impact, and serve as prey for many bottom-feeding fishes, shorebirds, ducks, and crustaceans, such as the commercially important blue crab. The statistically most powerful design for sampling impacts to shoreline communities involves pairing oiled and control sites, where pairing is done to ensure environmental similarity in all physical, chemical, and sedimentary conditions prior to the spill. Such paired designs, using replicate pairs of oiled and control sites, can minimize confounding due to differences in the pre-existing environment.
8. Identify any ongoing biological sampling efforts (e.g., National Status and Trends Mussel Watch, bird surveys, etc.), and especially those for species at risk and of special concern, and then maintain and enhance the sampling effort in the context of creating a sampling design that permits a rigorous assessment of spill impacts.
9. The obvious bears stating: longer time series and more frequent sampling will enhance statistical power to detect change. Monitoring programs need to be designed to distinguish oil-spill responses from unrelated spatial and temporal variation in the ecosystems that are affected.
10. Coordinate offshore chemical and biological sampling with onshore efforts, so that when the wide scope of initial studies is eventually scaled back, you will be able to collapse the effort and retain maximum logistical efficiency. Stated another way, all other considerations being equal, co-locate as many different chemical/biological studies as possible at the same stations. This approach is essential to integration of studies that must be done to provide the ecosystem-based approach, which is the only means of inferring broader indirect effects of the spill. The routine models used to estimate natural resource impacts of oil

spills by matching oil concentrations, transport, chemical transportation, and fate to spatial distribution of biological resources only address short-term acute impacts of separate species, thereby seriously underestimating ecosystem impacts of the spill.

11. Make sure QA/QC procedures are in place. It is perhaps best to adopt those of the NOAA NRDA group rather than inventing new ones.
12. Typically, only a small proportion of the marine birds, mammals and turtles that are killed by a spill are ever recovered at sea or ashore. Given that a number of factors, such as oil type, wind patterns, distance from shore, scavenging rates, and taxon-specific buoyancy of carcasses affect the recovery rate, it is necessary to rigorously design and implement carcass recovery efforts and experiments to estimate loss rates and enable accurate estimates of the total numbers of wildlife mortalities.
13. Given evidence of subsurface oil in the deeper waters of the Gulf of Mexico, much more attention should be focused on the size and trajectory of the submerged oil plume, its impacts to deepwater benthic communities, and the associated deepwater use of chemical dispersants. The impacts of the *North Cape* oil spill at Point Judith, Rhode Island, should be examined to help design impact assessment studies for the *Deepwater Horizon* spill because this spill occurred during windy and wavy conditions that mixed and dispersed the oil throughout the water column, resulting in substantial mortality of lobsters and crabs from the sea floor. Some crustaceans are highly sensitive to oil and other toxicants, making the blue crab and shrimps of the Gulf coast important targets of impact studies.
14. Initiate laboratory studies of toxicity in mesocosms that can best reproduce natural field conditions to augment the field assessment studies. These toxicity studies should involve collection of freshly released *Deepwater Horizon* oil and also deploy oil at various stages of aging and weathering in the testing. Experiments should run tests of oil alone and, very critically, oil combined with dispersants. The tests should not end with the typical short-term 3-5 day acute toxicity tests, but should include treatments to assess chronic impacts of longer-term (months) exposures, perhaps pulsed so as to replicate the continuing delivery of *Deepwater Horizon* oil into the Gulf.

#### **Contributors to these recommendations**

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Senator MERKLEY. Thank you very much.  
Mr. Senner.

**STATEMENT OF STANLEY SENNER, CONSERVATION SCIENCE  
DIRECTOR, OCEAN CONSERVANCY**

Mr. SENNER. Thank you, Senator Merkley, and I am proud to call Oregon home.

And Senator Vitter, I am getting to know your wonderful State much better than I ever thought I would. So I am enjoying that as well.

I am Stan Senner, Director of Conservation Sciences for Ocean Conservancy.

Welcome back, Mr. Chairman.

A comprehensive damage assessment is essential to restoration of the Gulf of Mexico following the BP Deepwater Horizon disaster, and it could serve as a cornerstone to a broader restoration plan such as the President has called for.

The NRDA Program in the Gulf is still in a pre-assessment phase to determine whether there has been damage to publicly owned natural resources. Presumably they will next move to injury quantification and finally to a plan and a claim for the cost of restoring, replacing, rehabilitating, or acquiring the equivalent of the natural resources injured by the spill and the lost services.

It is too soon to evaluate this NRDA Program in the Gulf, but drawing on the *Exxon Valdez* experience we offer the following comments.

First, restoration is the goal, but we should learn the whole story of impact and recovery which requires comprehensive and long-term research. Without such an approach following the *Exxon Valdez*, we would, for example, not have known that still toxic oil would linger on Prince William Sound beaches 20 years later and that that oil could compromise salmon reproduction and waterfowl survival.

Given that the *Exxon Valdez* is well studied, why invest more in Gulf research at this time? First, it is necessary to know what the injury is in order to seek full restoration. Second, in Alaska we repeatedly heard from the public that they want to know what harm was caused and when recovery is achieved. Third, Prince William Sound and the Gulf of Mexico are very different environments, and the conditions of the spills are different. The contrasting information we can learn in the Gulf of Mexico is critical to helping us all assess risks of offshore drilling and to improve responses to future spills. Regardless of whether restoration funds are obtained through a strict NRDA process or through a settlement, we should fully document the long-term injury and if necessary seek additional restoration funds.

Second, damage assessment studies must be carried out rigorously, as Dr. Spies has mentioned. NRDA trustees should call on outside experts to review individual studies. And most importantly, those experts need to look at the whole array of studies so they can view this as one large program and make sure that there are no gaps in that overall effort. Besides weeding out ineffective studies, peer review helps promote integration and coordination among agencies and across studies.

Third, part of restoration is sharing information about the damage assessment with people. It is part of making people whole following this disaster. We appreciate that the trustee agencies are doing more in regard to transparency, such as posting pre-assessment study plans on the Internet, but we don't think that at present they have a clear plan for public communication and stakeholder engagement, and we would like to see that outlined.

Following the *Exxon Valdez* the Government maintained strict confidentiality about impact studies for 2 and a half years prior to the settlement with Exxon. While the need for that secrecy can be debated, in Alaska it left a legacy of bitterness that continues to this day.

Fourth, there are concerns that BP's participation may influence the scope and nature of NRDA studies and in some way limit funding.

And Senator, you addressed that with some of the previous witnesses. All I will say is that any delays in obtaining funds may compromise time-sensitive research, and that will only make it more difficult to achieve full restoration.

Beyond the Gulf spill per se we encourage the Subcommittee to explore the readiness of trustee agencies to carry out NRDA work. Budgets for damage assessment and restoration activities have declined, and trustee agencies are drawing on valued staff from throughout the country to respond to the Gulf. That is good, but we need to consider what this does to their capacity to work on dozens of ongoing restoration projects and to respond to new disasters should they arise. Being prepared to conduct damage assessments should be part of the cost of doing business.

Finally, ecosystems are dynamic, and harm from various environmental incidents tends to accumulate, making it hard to tease out the effects from any one event. Similarly it may be difficult, or it is difficult to restore just one resource from one event without addressing the underlying causes of degradation. This is one reason why the President's call for a broad approach to restoration in the Gulf makes sense.

This concludes my oral statement, and I will be happy to respond to your questions.

[The prepared statement of Mr. Senner follows:]

United States Senate  
Committee on Environment and Public Works  
Subcommittee on Wildlife and Water

Written Testimony of Stanley Senner, Ocean Conservancy

**"Assessing Natural Resource Damages  
Following the BP *Deepwater Horizon* Disaster"**

July 27, 2010

Chairman Cardin, Ranking Member Crapo, and Members of the Subcommittee, thank you for the invitation to participate in today's hearing. My name is Stan Senner, and I am Director of Conservation Sciences for Ocean Conservancy, a national marine conservation organization that has promoted healthy and diverse ocean ecosystems since its founding in 1972. Ocean Conservancy is supported by more than 500,000 members and volunteers, and our headquarters is in Washington, DC. I am currently based in Portland, Oregon.

I have worked on natural resources conservation issues for more than 35 years; much of that time was in Alaska. Most relevant to the Subcommittee and today's hearing, I worked on the *Exxon Valdez* oil spill for nearly seven years, including two-and-one-half years as the State of Alaska's Restoration Program Manager following the spill and then more than four years as Science Coordinator for the *Exxon Valdez* Oil Spill Trustee Council, which was the state-federal body set up to administer the \$900 million civil settlement among Exxon, the State of Alaska, and the Federal Government. Much farther back, I had the privilege of working for three years as a Professional Staff Member for the U.S. House of Representatives Committee on Merchant Marine and Fisheries. I have a M.S. degree in biology from the University of Alaska at Fairbanks.

In his Oval Office address to the nation on June 15, the President made a commitment to a long-term restoration plan for the Gulf of Mexico: one which not only restores the beauty and bounty of the Gulf Coast, but also addresses decades of environmental degradation in the region. That is a vitally important commitment, and one which will require a sustained investment of time, expertise, and treasure over many years. It will mean restoring the Gulf of Mexico ecosystem and communities from the harm caused by the BP *Deepwater Horizon* disaster. But it also will require enhancement of the ecosystem's long-



term health and biodiversity through improved management and conservation of fish, wildlife and their habitats.

With two offices and multiple staff members in Gulf Coast states, Ocean Conservancy has worked for more than two decades in the Gulf of Mexico to rebuild depleted fish populations. Since the BP *Deepwater Horizon* explosion and blowout, we have marshaled and reallocated staff and other resources to respond to this disaster. We believe that in response to the BP *Deepwater Horizon* tragedy, the nation must chart a different course in the Gulf of Mexico, a course that will benefit the people who live, work, and play in the region and who enjoy its bounty, such as Gulf shrimp, throughout the country.

With reference to the topic of today's hearing, our objectives are to 1) understand the impacts of this disaster on people, fish and wildlife, and the environment, 2) ensure that the governments and others carry out a vigorous and rigorous natural resources damage assessment (NRDA) and other studies necessary to fully document injury and recovery from this event, and 3) ensure that the subsequent restoration program is not only fully compensatory, but that it more broadly and systemically restores the health and productivity of the Gulf of Mexico ecosystem. The Gulf ecosystem supports rich and productive commercial and recreational fisheries, millions of migratory birds, and a wide array of sea turtles and marine mammals, some of which are threatened or endangered.

A thoughtful, comprehensive and fully funded damage assessment is central to understanding the harm, identifying appropriate restoration alternatives, and claiming the funds necessary to restore injured natural resources and lost services following the BP *Deepwater Horizon* disaster. It could also serve as the cornerstone to any broader efforts, such as the President has called for. Sustained Congressional oversight is vital to this process, and we believe that today's hearing on the NRDA is timely as we take stock of what is in place, how it is being conducted, and where it is going.

Under the regulations adopted pursuant to the Oil Pollution Act of 1990 (OPA), the aim of the NRDA process is to develop and present a claim to the responsible parties for the costs of restoration and lost uses. The NRDA is supposed to determine the cost of restoring, replacing, rehabilitating or acquiring the equivalent of the natural resources injured, and services lost, as a result of the spill. The goal is supposed to be restoration to pre-spill conditions—or at least to

the conditions that would have existed had there not been a spill event. Although the aim is restoration, the process rests on an assessment of damages.

At present, we understand that the BP *Deepwater Horizon* damage assessment is still largely in the “pre-assessment” phase of the NRDA process. During this phase, the governments, in cooperation with the responsible parties, are working to determine whether damage to publicly owned “trust” natural resources, such as water, fish and wildlife, and their habitats, has occurred. In this phase, lots of samples are taken and surveys conducted, documenting the presence or absence of oil, gathering and tallying carcasses of birds, turtles, and other wildlife, and recording, at least at a qualitative level, the extent of damage to marshes and other habitats. One of the responsible parties, BP, is represented on all the NRDA teams in the field. The resulting data are shared among the governments and BP, though my understanding is that the data will be analyzed separately. For the governments’ part, if sufficient harm to trust resources is detected, they will elect to move forward with the “injury quantification” phase of the NRDA process.

In the injury quantification phase, more rigorous work is undertaken to document the nature, extent, and significance of the harm, including the loss of services provided by injured natural resources, such as recreation, fisheries, and hunting. Restoration alternatives will be identified and vetted. With public input, a restoration plan is developed and a claim for the necessary funds is presented to the responsible parties. At that point, the responsible parties can carry out the restoration program, provide the funds so that the governments can implement the restoration plan, or challenge the claims.

We appreciate how very difficult it is to design and field a damage assessment during the initial, often chaotic emergency response to a spill, and we know that NRDA teams in the Interior and Commerce departments, as well as in resource agencies in the affected states, are working very hard to do just that. We know that personnel from the U.S. Fish and Wildlife Service and National Oceanic Atmospheric Administration (NOAA) have been pulled in from around the country, and they have been putting in extremely long hours to design and launch the necessary preliminary assessment work, even while the oil has continued to leak and the story of the BP *Deepwater Horizon* unfolds.

Before diving into the specifics, I would offer the general observation that the NRDA process under OPA works best in relatively small, contained situations, such as a ruptured pipeline resulting in the release of a few thousands of gallons of oil into tens of acres of salt marsh. In such cases, the NRDA process is rather

straightforward and even standardized, with heavy reliance on models to quantify injury and lost uses, and the public's interests in the natural resources of that salt marsh are protected. With mega-disasters, such as the *Exxon Valdez* and the BP *Deepwater Horizon*, everything is vastly more complicated, and the standardized approaches may or may not serve the public interest. Of course, the *Exxon Valdez* preceded the NRDA regulations adopted under OPA, and the damage assessment, civil settlement, and restoration program were carried out on an unprecedented scale and there was no road map. In the case of the BP *Deepwater Horizon*, we don't yet have sufficient information to evaluate whether the current NRDA is on the right track. However, given the massive quantities of oil released deep under water and dispersants used under water and on the surface, the huge area affected, and the complexity of the ecosystem and the services it provides, this damage assessment and what follows will also break new ground. Ocean Conservancy has a particular concern about the quantification of injury in the Gulf of Mexico marine environment, where so much of this story is unfolding under water and out of sight, and the development of restoration alternatives for that environment.

Based on my own *Exxon Valdez* experience, and that of other Ocean Conservancy staff and our scientific advisors, including my colleague Dr. Robert Spies, who is participating in this hearing today, we offer the following perspectives, concerns, and suggestions in regard to the status and process of the BP *Deepwater Horizon* damage assessment:

**1. Ensure that NRDA studies are integrated, ecological, and long-term in approach.**

Under OPA, the purpose of a NRDA process is restoration, not just assessment of damages. While the focus on restoration is admirably forward looking, we strongly recommend that NRDA studies—and other studies being carried out by government agencies, the responsible parties, and academic and other institutions—be designed to document the full extent of injuries and recovery from those injuries. In other words, we must ensure that we know the “whole story” of environmental impact and recovery from the oil released into the Gulf of Mexico, no matter whether that takes 5, 10, or 25 years. This approach requires studies that are comprehensive in scope, integrated in design, ecological in approach, designed to detect indirect, chronic, and cumulative effects, and carried out long enough to detect injuries that are delayed or long-term in nature.

With the *Exxon Valdez*, we never anticipated that partially weathered—and still toxic—oil would linger on Prince William Sound beaches more than 20 years after the spill. We did not know ahead of time, for example, that there would be reduced ocean survival of salmon coming from eggs that had been exposed to concentrations of hydrocarbons of less than one part per billion. And we did not know, for example, that chronic exposure to certain long-lived fractions of oil (the PAHs: polycyclic aromatic hydrocarbons) would compromise the fitness of adult female harlequin ducks and reduce their overwintering survival in oiled parts of Prince William Sound for six to nine years after the spill (even a small reduction in survival rates makes a huge difference in the trajectory of a population over time). We never would have learned of these impacts if we had designed studies that were limited to the most obvious and short-term of injuries.

The *Exxon Valdez* event was the best studied oil spill in U.S. history, so why is it so important now to tell the whole story of the BP *Deepwater Horizon* disaster? First, we will not be able to seek fully compensatory restoration from the responsible parties unless we thoroughly and patiently explore potential injuries. Second, following the *Exxon Valdez* spill, we repeatedly heard from the public—whether it was from a fisherman in Cordova or an armchair naturalist in Miami—that they wanted to know what harm was caused by the spill and when recovery was achieved. For the public, obtaining this information is in and of itself a form of restoration. Third, the *Exxon Valdez* spill took place in an environment that is very different from the Gulf of Mexico, and the releases of oil are themselves very different. The water in Alaska is cold, there is less sunlight, and wind, wave, and microbial action, and the oil was released on the water surface and quickly made contact with shorelines. The Gulf of Mexico is warm, and there is lots of sunlight, and wind, wave, and microbial action. In addition, the oil was released deep under water and far from shore. Hence, we should learn everything we can about impacts to and recovery of the Gulf of Mexico ecosystem following the BP *Deepwater Horizon* disaster and use this knowledge to help us better assess the risks of offshore drilling and improve our responses to future oil spills.

It is possible that the BP *Deepwater Horizon* NRDA will be short-circuited by a civil settlement, such as was negotiated in 1991, about two-and-one-half years after the *Exxon Valdez* oil spill. Regardless of whether a settlement is reached or restoration claims are fully pursued through a NRDA process, there must be provision made and resources available to fully pursue and document long-term injury and to seek additional restoration funds, if necessary. The *Exxon Valdez*

settlement explicitly included a “reopener” clause for this purpose, though I would not recommend use of the *Exxon Valdez* language verbatim, which I think is too restrictive. In 2006, the Federal Government and State of Alaska invoked the *Exxon Valdez* reopener clause and submitted an additional claim of \$92 million; four years later there has been no substantive action on this claim.

**2. Ensure that external peer review is incorporated into the NRDA process as early as possible.**

It is essential that impact studies, whether part of a NRDA process or not, are carried out as rigorously as possible to ensure the quality and credibility of the results. And, of course, it is possible—if not likely—that the damage assessment studies and their results will end up as subjects for argument in court.

As the NRDA process moves from pre-assessment studies to more sophisticated and longer-running injury quantification studies, we strongly encourage the federal and state trustees to empanel a team of outside experts to look at individual studies and, most importantly, at the overall suite of NRDA studies. Review by outside experts—people who themselves are not carrying out projects or competing for project funding—will help improve the quality of individual studies, facilitate cooperation and integration among agencies and across the whole suite of studies, and identify gaps which perhaps are not so evident to people who are immersed daily in carrying out the program.

External peer review was an integral part of the *Exxon Valdez* science program, and it contributed immeasurably to the value of that program. With the *Exxon Valdez*, we used a panel of “core” peer reviewers who looked at the science program as a whole, plus special reviewers, who had the specific expertise needed to review some of the more highly technical study designs. Besides promoting integration and synergy among studies and agencies, systematic external peer review along these lines can facilitate a tighter, leaner program by flagging studies that may not be contributing effectively to what should be a rigorous, adaptive science program.

**3. Ensure that federal and state governments are as transparent as possible—as quickly as possible—with the public in regard to what studies are being conducted and what is being learned.**

In my visits to the Gulf Coast and in calls from the news media, I am repeatedly asked what the federal and state governments are doing in the way of impact

studies and what they are learning. The information gathered and analyzed through NRDA studies is a critical part of the response to the BP *Deepwater Horizon* disaster and should be highly visible. The people from whom we are hearing understand that it is too early to know what the injuries are beyond the oiling of habitats and immediate, acute mortality, but they want to know what the governments are studying.

There has been progress made in this regard, and we acknowledge and appreciate that recently we are seeing some of the pre-assessment study plans posted on the internet. Nonetheless, there is a widely perceived dearth of information on the part of the scientific and conservation communities, and the public more broadly. In the long run, the fear of the unknown only contributes to the stress brought on by this disaster. Hence, we strongly encourage the federal and state trustees to lay out clear plans for public communications about and stakeholder engagement in the NRDA process, make study plans available as quickly as possible, and provide briefings on the content and results of the program.

The federal and state governments maintained strict confidentiality about the *Exxon Valdez* damage assessment studies and what was being learned about impacts for the two-and-one-half years prior to the civil settlement with Exxon. And to this day we still only know the results from the Exxon studies that the corporation has chosen to disclose. While the rationale for secrecy on the part of the governments and Exxon is matter for debate, I can tell you that it left a legacy of bitterness that lingers today, just like the oil does on some beaches in Prince William Sound. Going forward, beyond the BP *Deepwater Horizon*, it would seem more than sensible to clearly define agency policies and protocols in regard to public communications in relation to NRDA cases, and there is much that can be learned from the *Exxon Valdez* event.

**4) Ensure that there are sufficient resources for federal agencies to carry out the necessary NRDA studies.**

Pursuant to the current statutory and regulatory scheme, much of the funding for the NRDA pre-assessment work comes from BP as the primary responsible party. Many people have expressed concerns about whether the participation of a responsible party may somehow influence the scope and nature of NRDA studies, and we believe those concerns are legitimate, especially given the scale and potential financial liability of the BP *Deepwater Horizon*. There also are concerns about whether trustee agencies are unduly constrained by funding.

Timing is everything in designing and executing an effective damage assessment for an event on the scale and complexity of the BP *Deepwater Horizon* disaster. The necessary studies must be implemented quickly, with sufficient sampling intensity to detect change, and they must be done properly from the outset. Delays in the approval of funding for NRDA work, whether due to the necessity of obtaining BP's approval, agency fiscal policies, or limitations in access to funds from the Oil Spill Liability Trust Fund, may compromise time-sensitive studies. Documenting impacts is all about detecting change. Having insufficient funds to fully implement timely field studies only makes it more difficult to detect change, which may then lead to erroneous conclusions about lack of injury, when indeed there was injury but we failed to detect it. And if that is the case, injured natural resources won't be restored and the public interest won't be served.

Beyond the BP *Deepwater Horizon* disaster *per se*, we encourage the Subcommittee to explore more fully the readiness of federal trust agencies to respond with the science necessary to document harm to publicly-owned natural resources. My understanding is that the budgets for damage assessment and restoration activities in agencies like NOAA, for example, are steadily shrinking, and we question whether federal trustee agencies have the capacity, either "in house" or in cooperation with universities and other institutions, to conduct research on damage assessment and restoration techniques and to plan in advance. We are aware that the federal trustee agencies are drawing on personnel from offices throughout the country. What does this do to their capacity to continue work on other NRDA cases and restoration projects already underway, to say nothing of responding to new disasters, such as a large spill in a remote place like Arctic Alaska?

**5) Ensure that there are funds to fully restore injured natural resources and lost services following the BP *Deepwater Horizon* disaster in the context of a larger program aimed at restoring and enhancing the long-term health and productivity of the Gulf of Mexico ecosystem.**

Ecosystems are dynamic and injuries from one environmental insult, such as the oil from the BP *Deepwater Horizon* blowout, tend to be cumulative and interact with injuries from other insults and with natural variation. Hence, it can be very hard to tease out the effects from any one event or insult, especially as the time from the original insult grows longer. For this reason, it can be hard to focus on the restoration of just one resource from just one event, especially if underlying causes of degradation and lost productivity are not addressed. This is why it

makes sense and indeed seems entirely appropriate to look at restoration of the Gulf of Mexico ecosystem as something that must be broader than the oil spill impacts per se.

As noted earlier, Ocean Conservancy supports the goal articulated by President Obama in his June 15, 2010, speech from the Oval Office:

Beyond compensating the people of the Gulf in the short-term, it's also clear we need a long-term plan to restore the unique beauty and bounty of this region. The oil spill represents just the latest blow to a place that has already suffered multiple economic disasters and decades of environmental degradation that has led to disappearing wetlands and habitats. And the region still hasn't recovered from Hurricanes Katrina and Rita. That's why we must make a commitment to the Gulf Coast that goes beyond responding to the crisis of the moment.

## Conclusion

In the wake of the BP *Deepwater Horizon* disaster, the nation has an obligation to chart a different course in the Gulf of Mexico. We need to:

- fully and aggressively document impacts from this release of oil and the time required until recovery is achieved;
- seek funds for a restoration program that fully compensates for the harm caused by the oil;
- seek funds to restore and enhance the larger Gulf of Mexico ecosystem after decades of degradation; and
- improve safety, environmental protections, marine spatial planning, and spill responses associated with development of energy resources on the outer continental shelf.

Specifically in regard to the NRDA, we need a BP *Deepwater Horizon* NRDA that is comprehensive in scope, integrated in design, ecological in approach, designed to detect indirect, chronic, and cumulative effects, and carried out long enough to detect injuries that are delayed or long-term in nature. We need rigorous external peer review, especially at the programmatic level, and we need greater public transparency. Providing information to the public is part of healing and restoration, and there should be clear guidelines and strategies in place for how



to do so. Now is too soon—and there is not yet enough information available—to say whether the present course of the NRDA following the BP Deepwater Horizon disaster is sufficient for the task. The scope and complexity of the event are daunting and have stretched depleted agency resources. Finally, we encourage the Subcommittee to consider whether natural resources trustee agencies have the resources needed to respond to this event, and other NRDA cases in various stages of progress, much less to additional events that inevitably will occur. Being prepared for oil spills and other events that require damage assessments is part of the cost of doing business when it comes to the development, production, and transportation of energy and other resources.

Senator Benjamin L. Cardin

1. The Oil Pollution Act of 1990 specifies four damage remedies: restoration, replacement, rehabilitation, and the acquisition of equivalent resources to those damaged? Did the Exxon Valdez Trustees make use of each of these? What role did habitat protection and acquisition of equivalent resources play trustee's efforts to restore injured wildlife to its pre-incident state?

Senner Response: The terms of the settlement among Exxon, the Federal Government, and Alaska required that restoration funds be used "...for the purposes of restoring, replacing, enhancing, or acquiring the equivalent of natural resources injured as a result of the Oil Spill and reduced or lost services provided by such resources..." In broad terms, the *Exxon Valdez* Trustee Council made use of each option, though there was relatively little that could be done in a direct, hands-on way to speed recovery. Most restoration activities were indirect or compensatory and probably fell into the categories of replacement, enhancement or acquisition of equivalent resources. There were two major themes to the *Exxon Valdez* restoration program: 1) gathering scientific information and developing tools to improve management of natural resources injured by the spill, and 2) acquiring and protecting upland habitats in order to facilitate recovery of injured natural resources. Gathering scientific information enabled more careful management of injured species during their time of natural recovery, while also improving management and conservation over the long term. Acquiring and protecting habitat accounted for the single greatest expenditure of restoration funds: to date, roughly \$375 million was spent acquiring or otherwise protecting more than 645,000 acres of habitat in the spill area. Habitat protection played a key role in ensuring that fish and wildlife injured by the spill would not experience additional setbacks due to degradation of the habitats on which they relied during their time of recovery from spill injuries. Habitat protection also was responsive to the reduction or loss of services as a result of the spill by providing public access to what had been private lands and by maintaining opportunities for subsistence hunting and fishing.

Senator James M. Inhofe

1. Having worked on the trustee council and restoration program for Alaska following the *Exxon Valdez* spill, which was wholly contained in one state, what additional difficulties do you see arising in the gulf process with multiple states involved in the restoration and trustee process?

Senner Response: Planning and implementing a restoration program on the Gulf coast will be more complex than it was following the *Exxon Valdez* in Alaska because there are likely to be at least five states, plus the Federal Government, engaged in the process. Even under the best of circumstances and with the best of intentions, this means that a Gulf restoration program will have more voices to be heard and more, possibly competing, agendas and priorities, etc. Ocean Conservancy believes that a restoration program in the Gulf will be most effective if there is a shared vision for what must be accomplished, a comprehensive plan that is integrated across the region, and a clear structure and process for implementing the plan. The plan should be science based, developed and implemented with full public participation, and carried out on a Gulf-wide—rather than on a state by state—basis. Otherwise, there will be great danger that resources will be allocated for projects on a piecemeal basis and will ultimately be ineffective or even harmful to the environment that should be restored.

Senator CARDIN [presiding]. Thank you very much.

We will now turn to Dr. Rifkin. Let me just say, if I might, Dr. Rifkin represents the National Aquarium, which in Maryland we take a great deal of pride. The National Aquarium is a wonderful asset in Baltimore, but it also has an incredible Conservation Center which Dr. Rifkin is the Acting Director.

So it is a pleasure to have you here, and we welcome your testimony. Your entire statement will be made part of the record, as will all of the witnesses'. You may proceed as you wish.

**STATEMENT OF ERIK RIFKIN, INTERIM EXECUTIVE  
DIRECTOR, NATIONAL AQUARIUM CONSERVATION CENTER**

Mr. RIFKIN. Thank you for the kind statement, Senator. Good afternoon.

I am Erik Rifkin, interim executive director of the National Aquarium Conservation Center. I am a marine biologist and environmental scientist with over 30 years of experience in conducting and interpreting ecological and human health risk assessments. I have published articles in peer-reviewed journals, and I am the co-author of a recently published book which discusses in part the uncertainty inherent in ecological risk assessments.

I welcome the opportunity to appear before you today and discuss assessing natural resource damages resulting from the BP Deepwater Horizon disaster. This is an important and timely hearing given the likelihood that acute and chronic natural resource damages will continue to occur in the wake of this devastating oil spill.

It is essential to ensure that pre- and post-impacts status to sensitive aquatic ecosystems is documented as rigorously as possible. Understanding the relationship between levels of petroleum contaminants in water, sediment, benthic biota, fish, and mammals is a prerequisite to effective and objective assessment of damages to our natural resources.

This is why the National Aquarium is conducting an independent, comprehensive NRDA in close cooperation with Mote Marine Laboratory and Johns Hopkins University in Sarasota Bay, Florida, an area which may well be compromised by this oil spill. This study is designed to assess causality between the release of oil and impacted natural resources.

The institutions involved in this effort are committed to sharing their findings as they become available. This study's in-depth, site-specific experimental design should probably be considered for other Gulf Coast areas which have been or are likely to be affected by the BP spill.

While we learned valuable lessons from the *Valdez* spill regarding short-term or acute effects on aquatic ecosystems, chronic impacts on the organisms within those affected areas are not well documented, as has been mentioned earlier. Persistent toxic effects were evident in Prince William Sound over the years resulting in mortality, lower growth rates, decreased reproduction, and compromised immune function for plants and animals that call it home.

This assessment will provide data essential for evaluating potential short-term and chronic environmental impacts in Sarasota Bay from the Deepwater Horizon oil spill. The approach used in this

study, as I mentioned a moment ago, could easily be implemented in a number of other sites along the Gulf Coast which may be impacted by this spill in the future. By doing so it would create a consistent, coordinated data set for all threatened areas.

The first phase of this project will involve looking at sediment, water found in sediment which is called porewater, and the water column by using something called a semi-permeable membrane device, the acronym of which is SPMD. This device mimics the bio-concentration of petroleum in fish and other biota over time.

Water flow through these virtual fish permits the detection of background petroleum concentrations at very low levels. An analysis of petroleum in these devices will provide necessary quantitative and qualitative information on oil constituents in Sarasota Bay before and after any potential impacts. Without this kind of data it will be extremely difficult to determine potential damages with the necessary level of certainty.

Research scientists from Mote Marine Laboratory will begin deploying these devices this week in approximately 50 locations throughout Sarasota Bay. Sampling biota to obtain baseline information began on June 28 of this year and will continue for a number of months.

Bottom dwelling organisms like clams and blood and tissue samples from spotted eagle rays and bottlenose dolphins will also be obtained and analyzed. All of these samples will be analyzed for levels of petroleum before the spill and if necessary after the oil impacts the bay. This all-inclusive effort is necessary since the consequences to Sarasota Bay could include substantial long-term damage to beaches, estuaries, salt marshes, and the organisms residing there. Researchers at Johns Hopkins University will then use this evidence to develop mathematical accumulation models.

We face a daunting task but also an enormous opportunity to apply what we have learned from oil spill tragedies as well as a range of sampling, analysis, and toxicological assessments that allow for a greater ability to evaluate accumulated sub-lethal chronic impacts.

Thank you for the opportunity to testify today and to share what the National Aquarium Conservation Center and our partners are doing in Sarasota Bay. I am encouraged by your interest and confident in your oversight, and I urge you to seize the opportunity at hand and protect the future of the Gulf of Mexico.

Thank you, and I would be happy to answer any questions.

[The prepared statement of Mr. Rifkin follows:]



## **Assessing Natural Resource Damages Resulting from the BP Deepwater Horizon Disaster**

Written Testimony of  
**Erik Rifkin, PhD**  
Interim Executive Director  
National Aquarium Conservation Center  
National Aquarium  
Testimony before the Senate Committee on Environment and Public Works  
Subcommittee on Water and Wildlife  
Washington, DC

Submitted on July 23, 2010

**NATURAL RESOURCE DAMAGE ASSESSMENT  
(NRDA) FOR SARASOTA BAY ECOSYSTEM:  
  
APPROACH FOR ADDRESSING POTENTIAL  
IMPACTS FROM THE *DEEPWATER HORIZON*  
OIL SPILL**

**Erik Rifkin, PhD  
Interim Executive Director  
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Senior Scientist and Program Manager  
Mote Marine Laboratory  
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**Yongseok Hong, Post-doctoral scholar  
Professor Edward Bouwer  
Director, Center for Contaminant Transport, Fate and Remediation  
Geography and Environmental Engineering  
Johns Hopkins University  
Baltimore MD**

**July 27, 2010**

## I SUMMARY AND SIGNIFICANCE OF RESEARCH

The National Aquarium, in collaboration with Mote Marine Laboratory and Johns Hopkins University, is conducting a comprehensive study designed to ensure that pre- and post-*Deepwater Horizon* oil spill impact status of Sarasota Bay is documented as rigorously as possible. This will enable scientists to demonstrate causality between the release of oil and injured resources and/or lost human use of those resources and services.

The first phase of this research will provide vital information needed to evaluate the status of this sensitive aquatic environment before potential contamination by the Deepwater Horizon Gulf of Mexico oil spill. Oil from the BP Deepwater Horizon oil disaster has spread significantly from the ruptured well-head and impacted numerous coastal communities in four different states so far with further significant damage expected. The National Aquarium, which provided seed funding for this research in Sarasota Bay, developed an approach in conjunction with its partners which could be used in other Gulf coast regions to ensure a consistent data set for all threatened areas.

It's critical to gather robust, baseline information about the current state of any aquatic ecosystem that may ultimately be impacted by this oil disaster. This ecosystem-based approach, which includes the deployment of sophisticated petroleum contaminant samplers, will help to ensure that important long-term natural resource damages can be properly evaluated. Without a well thought-out experimental design, findings may have an unacceptably high level of uncertainty.

Implementation of this study's experimental design will make it possible to reduce the level of uncertainty and, therefore, increase the ability to predict the magnitude and extent of impacts to the Sarasota Bay habitat and biota. Research scientists from Mote Marine



Laboratory are collecting and analyzing samples from approximately 50 locations throughout Sarasota Bay. Sampling to obtain baseline information began on June 28, 2010 and will continue for a number of months.

Analysis of these samples will begin in a few weeks and a schedule for obtaining additional data will depend on the likelihood of oil entering this ecosystem. Sediment, water found in sediment (called porewater) and the overlying water are being analyzed using integrative water quality samplers called semi-permeable membrane devices (SPMDs) to mimic the bioaccumulation of organic contaminants found in oil over time. These devices will provide quantitative and qualitative information on petroleum contamination.

Mote is also collecting bottom dwelling organisms (e.g., clams) and taking blood and tissue samples from spotted eagle rays and bottlenose dolphins. All of these samples will be analyzed for levels of petroleum before the spill and, if necessary, after the oil impacts the Bay. This all-inclusive effort is necessary since the consequences to Sarasota Bay could include substantial long-term damage to beaches, inlets, estuaries, salt marshes and the organisms residing there.

Researchers at Johns Hopkins University's Center for Contaminant Transport, Fate and Remediation will use this empirical evidence to develop mathematical bioaccumulation models. These models will demonstrate how contaminants in oil move through the food chain and accumulate in marine plant and animal tissues. Understanding the relationship between levels of organic contaminants in water and in fish and dolphins will give government agencies a powerful tool to quantify natural resource damages. These models will also provide insights into how humans will be impacted if exposed to contaminated seafood.

Scientists from the National Aquarium Conservation Center have been instrumental in developing the experimental design for this research and will continue to play a key role in the interpretation, characterization and communication of the study's findings.

In addition to determining levels of petroleum in water, sediment and biota, bioassays and toxicological studies will be conducted to assess damages to natural resources. Tests will include typical short term 3-5 day acute toxicity tests, as well as, an assessment of chronic impacts on long-term exposures (e.g., pulsed as to replicate the continuing delivery of Deepwater Horizon oil into the gulf).

This type of independent, in depth, site-specific research should probably be considered for other Gulf coast areas which have been, or are likely to be, impacted by the BP spill.

## **II INTRODUCTION**

This scope of work has been prepared to assess natural resource damages to the south west Florida Gulf coast that could result from the Deepwater Horizon oil spill. Oil from this spill has spread significantly from the ruptured well-head and impacted numerous coastal communities in four different states so far with further significant impacts expected. The consequences to south west Florida could include substantial long-term damage to beaches, inlets, estuaries and salt marshes, either from floating oil sheen, mousse, tar balls residual oil slicks, and/or from subsurface oil and dispersed oil-containing water masses.

These insults could occur not only on the west coast of Florida, but if and when the oil from the spill reaches the Gulf Loop Current, the impacts may be felt in the Florida Keys, up the east coast of Florida and beyond to Georgia, the Carolinas, Virginia and Maryland. In anticipation of this exposure, it is critical to understand the current status of the fragile ecosystems within these potentially impacted areas.

### III LESSONS LEARNED FROM THE EXXON VALDEZ SPILL

While valuable lessons have been learned from the Valdez spill regarding short-term effects on the ecosystem, long-term population effects on the organisms within those affected areas are not well documented. According to a review of long-term response to the Valdez spill (Peterson et. al, 2003), chronic exposures persist years after an oil spill particularly in sediments. These persistent toxic effects were evident in fish, sea otters and sea birds over the years due to mortality, lower growth rates, decreased reproduction and compromised immune function.

Indirect effects on communities were substantiated, as well, from the exposure to oil and were considered as important as direct trophic interactions (Peterson et. al, 2003). Probably one of the most important lessons learned from the Exxon Valdez spill was a significant change in standard paradigms regarding oil ecotoxicology.

#### **Previously Accepted Models:**

- a) Oil on shorelines will be rapidly degraded microbially and by exposure to the sun.
- b) Oil effects on fish are short term in nature and are restricted to only the volatile fraction of oil.
- c) Impacts on birds and marine mammals occur solely through coating of fur and feathers resulting in hypothermia, smothering, drowning or ingestion of oil, a short-term response.
- d) Only the short-term mortality from exposure to oil is important for anticipated losses to submerged aquatic vegetation and invertebrates.

**The emerging appreciation:**

- a) Oil degradation depends upon each unique environment and therefore contamination could occur for years.
- b) Long-term exposure of fish embryos shows population level consequences through impaired growth, deformities, reduced reproduction and behavioral changes.
- c) Effects of oil exposure on marine mammals and sea birds will compromise health and reproduction, and magnifies environmental stressors with severe consequences.
- d) Clean-up attempts (either physical or chemical) can be more damaging than the oil itself by interfering with the strong biological interactions of the cascade of communities, thereby delaying recovery.

There is now an opportunity to apply what has been learned from past oil spill tragedies. Support now exists for the inclusion of a range of physiological, biochemical, and histopathological evaluations of toxicity, facilitated by rapid development of molecular tools to assess sub-lethal effects (NRC, 2002). It is now acknowledged that there is a significantly important cascade of indirect effects on oil exposed ecosystems. These effects need to be assessed thoroughly for understanding impacts to the communities from delayed, chronic and indirect effects of petroleum contamination in the marine environment. By knowing this information and advancing the predictive capacity of ecology, a more confident model of long-term, delayed effects of stressors through ecosystem-based frameworks can be created (Peterson, et. al, 2003).

**IV ASSESSING AND PRESERVING SARASOTA BAY**

The Sarasota Bay is located on the southwestern coast of Florida, spreading across two counties, Manatee and Sarasota. The bay is characterized by stretches of barrier islands such as Siesta Key and Longboat Key. It is a coastal lagoonal system formed by a necklace of barrier islands to the west and the mainland of Manatee and Sarasota Counties to the east.

This coastal lagoon, with its unique ecological character of small embayments, tidal tributaries and small creeks, coves, inlets and passes, is bounded by Anna Maria Sound to the north and stretches all the way to just north of the Venice Inlet, which serves as its southern boundary. More than 1,400 different native species of plants and animals inhabit the 445 square mile Bay area, 56 miles long with an average depth of 6.5 feet.

Sarasota Bay is made of a series of smaller bays or embayments. Each of these embayments is unique from one another. They differ in overall size, shape and water depth, shoreline features, habitat and sediment characteristics. These unique characteristics lead to differences in water circulation, freshwater inputs, nutrient loads, as well as other consequences for health and vitality. Because of these differences, each embayment must be analyzed and managed independently from the others at the same time recognizing their connectivity (Sarasota Bay Estuary Program, 2010).

This special ecosystem is a small, subtropical estuary currently classified as an outstanding Florida water body and an estuary of national significance. The region is home to a wide variety of marine life, including dolphins, manatees, black mullet, red drum, spotted sea trout, snook, blue crab, stone crab and bait shrimp, oysters, clams, loggerhead turtles, as well as, spotted eagle rays.

However, devastating impacts could occur which significantly alter the biodiversity and integrity of the Sarasota Bay ecosystem as a result of the Deepwater Horizon oil spill. The three main passes (Big Sarasota, New, and Longboat) leading from the Gulf into the Bay will expose the sensitive environments to potential oiling from the spill. Seagrass habitats are among some of the most important habitats in Florida's estuarine environments, indispensable for the role they play in nutrition cycling, primary production, sediment

stabilization and habitat for juvenile and adult finfish and shellfish. Oil from the spill could impact all facets of this and all other habitats with significant long-term effects.

## V THREATS TO SARASOTA BAY

Recently, concerns have arisen regarding the impact to all flora and fauna residing in the Sarasota Bay area from the *Deepwater Horizon* oil spill. As of July 17, 2010, government estimates of South Louisiana Crude oil in the Gulf from the *Deepwater Horizon* well spill range from 50 million gallons to 145 million gallons. In addition, it has been estimated that BP has used 1.8 million gallons of oil dispersants in the Gulf of Mexico aquatic ecosystem.

At this point, there is no clear prognosis of the toxicity both lethal and sub-lethal, on different organisms in the Gulf environment from these chemical releases. As the oil leak continues, and as more dispersant is applied in an effort to mitigate some of the effects of the spill, there are rapidly escalating concerns over the potential environmental impact on a wide range of plants and animals which rely on the Gulf.

There will be two types of exposure on Gulf organisms from this oil spill. The first is from acute effects which are short term in duration and may have limited impact, or they may have long-term population or community level impacts depending on the timing and duration of the spill and the numbers and types of organisms affected (NRC 2002).

The second exposure is chronic or long-term exposure in which organisms are constantly exposed to low levels of petroleum concentration over a period of at least two years or longer (NRC 2002). Under this latter scenario, it is likely that organisms will be affected at

least the length of a generation or even longer. For long-lived and particularly sensitive species, such as the spotted eagle ray, this may have significant consequences.

The impacts of oil spills on subsurface aquatic populations are difficult to measure, and are usually estimated from counts of mortalities observed immediately afterwards. However, individuals suffering from sublethal effects may not be counted among the number of mortalities, despite potential impacts on the individuals' probability of surviving and reproducing. These impacts, which are normally difficult to measure, would be most profound in populations exposed during early developmental stages (Rosenthal & Alderdice 1976).

Some impacts identified (e.g. NRC 2002) that can occur in the marine environment include: 1) biochemical and cellular; 2) organismal, including the integration of physiological, biochemical and behavioral responses; 3) population, including alterations in population dynamics; and 4) community, resulting in alterations in community structure and dynamics.

Sublethal effects from oil exposure can take the form of reduced growth rates or fertility (alteration of gametes), or increased mortality in larvae and juvenile stages. They can disturb communication between individuals or between them and the environment, causing, for example, an alteration in their migratory behavior. They can also lead to stunted growth, either through a loss of appetite or a reduction in their capability of transforming food into energy. Finally, they can produce various physiological or behavioral changes. These changes can generate a reduction in resistance to stress and the capacity to find or consume food (Heintz, et.al. 2000). The exposure of marine organisms to sites with elevated PAH loads is therefore a cause for concern.

## VI STRATEGY FOR ASSESSING OIL CONTAMINATION SARASOTA BAY

### *Sample matrices*

We propose a comprehensive approach to defining the existing petroleum levels in Sarasota Bay. By understanding and documenting the current conditions of the Bay, we can determine qualitatively and quantitatively changes resulting from the *Deepwater Horizon* oil spill and predict possible impacts to the Bay environment and organisms. This plan proposes to collect petroleum level data from pore-water, water column, sediments and selected spotted eagle rays and bottlenose dolphins along with benthic organism filter feeders such as clams and sea-grasses. Once the data from these different matrices are determined, petroleum contamination bioaccumulation and biomagnification models will be developed to demonstrate how these organic pollutants are transported through the food chain.

The proposed method for assessing and water column petroleum concentrations is using a semi-permeable membrane device (SPMD) which was developed by Huckins et al. (1990, 1993) to mimic the bioaccumulation of organic contaminants without the limitations of using bivalves. The SPMDs consist of thin, low-density polyethylene lay-flat tubing filled with 1 g of triolein, a naturally occurring lipid material, and sealed at the ends, with a total surface area of 400 cm<sup>2</sup> placed in a protective housing (Figure 1). When placed in aquatic environments, the SPMD mimics the bioconcentration process of aquatic animals based upon the comparability of its octanol/water partition coefficient, since this membrane device collects hydrophobic organic pollutants from the surrounding area and integrates the levels over the entire time



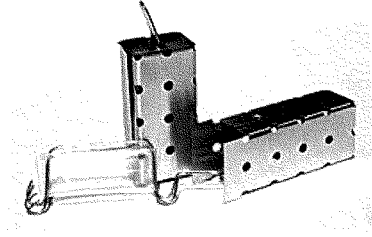


Figure 1. SPMD in deployment housing.

of exposure (Palowitch 1994, Ellis et al. 1995, Gale 1998).

This technique passively replicates the partitioning and accumulation potential found in sentinel organisms while providing consistent availability of a pollution monitoring device without the impediments associated with using live organisms. Possible metabolization and depuration, bias in absorption of contaminants, size, age and sex-related differences influencing body burden and site-to-site variations among bivalves, particularly in highly polluted, areas diminish the utility of using sentinel organisms as ubiquitous monitors in environmental assessment (Buhler and Williams 1989, Prest et al. 1992). Chiou (1985) demonstrated that for a wide variety of organic compounds, a close correlation exists between triolein-water equilibrium partition coefficients ( $K_{tw}$ ) and octanol-water equilibrium partition coefficients ( $K_{ow}$ ). The partition coefficient,  $K$ , is analogous to the partitioning that occurs from an aqueous phase to an organic solvent in liquid-liquid extraction processes:

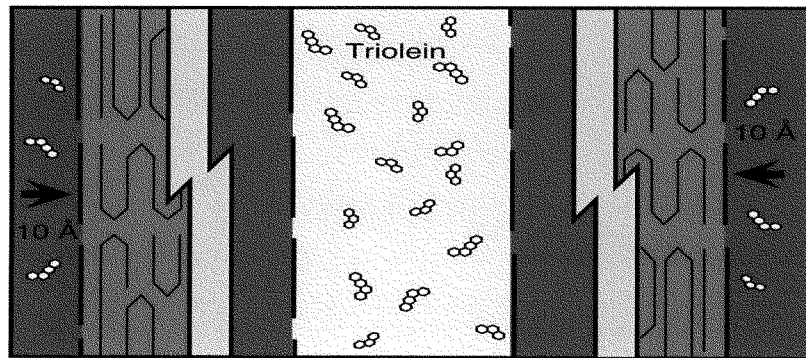
$$K = \frac{\text{[analyte in organic solvent]}}{\text{[analyte in water]}}$$

In the case of the partitioning coefficient  $K_{tw}$ , the organic solvent is triolein; for  $K_{ow}$ , the organic solvent is octanol. It has been shown that a compound's  $K_{tw}$  should closely approximate its  $K_{ow}$  (Chiou 1985). Since  $K_{ow}$  values are large for hydrophobic organic

contaminants, the capacity of triolein-containing SPMDs to accumulate these contaminants is correspondingly large (Huckins et al. 1993).

The low-density polyethylene, used to make SPMDs, and gill membranes appears to exhibit similar steric exclusion limits with respect to the uptake of hydrophobic organic contaminants (Lebo et al. 1992). The pore size of the membrane is approximately 10 angstroms, thus excluding contaminants with a larger diameter (Figure 2). Analytes that fall below this size exclusion limit pass through the SPMD and accumulate in the triolein lipid interior of the membrane, and can then be easily extracted and analyzed.

By using a sorbent that mimics the lipid/water partitioning that occurs in sentinel organisms, this new tool may potentially provide a consistent and reproducible pollution monitoring method that would overcome several of the disadvantages of using living organisms.

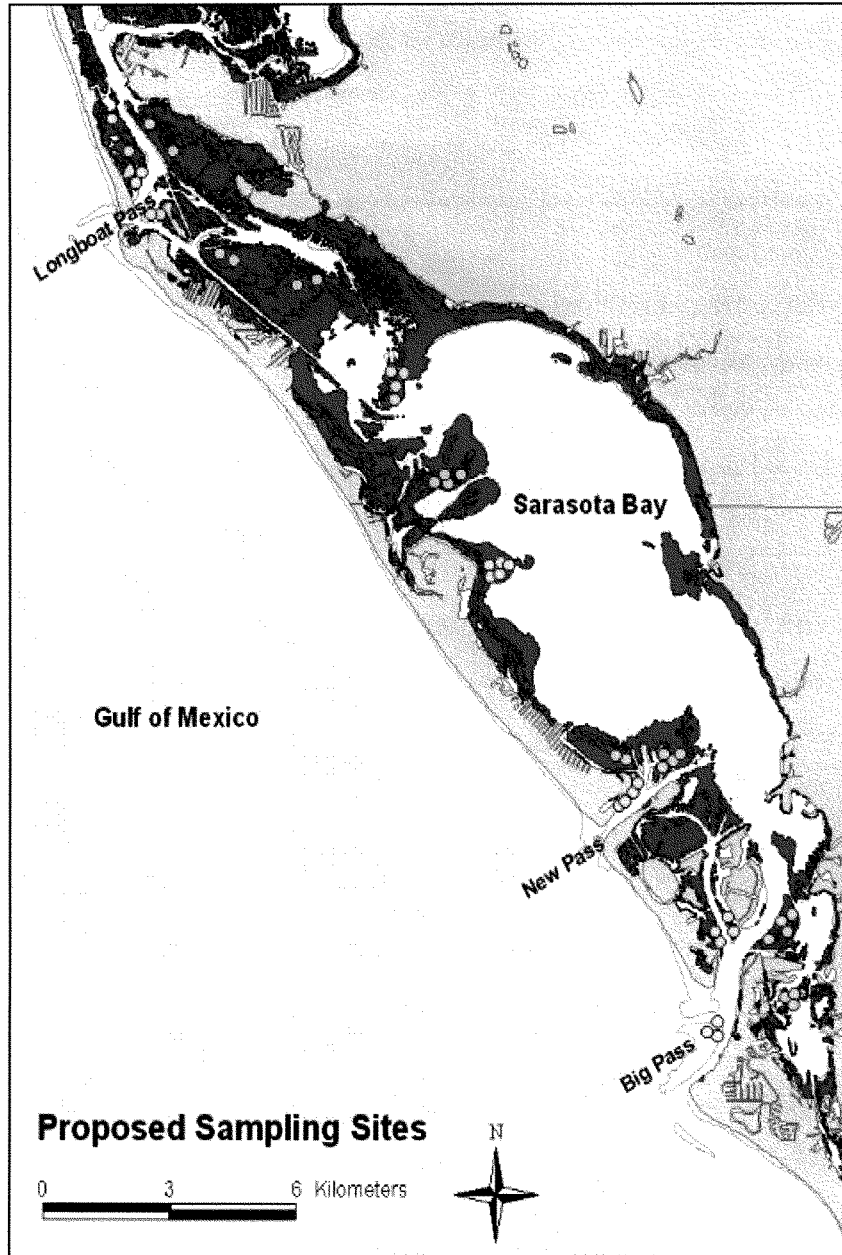


**Figure 2.** Exploded View of SPMD Device

The SPMDs will be deployed in approximately 50 sampling locations (Figure 3). These locations will be beneath the sediments for assessing pore water and in the water column for measuring petroleum compounds for a period of three weeks before recovery and petroleum analysis. Bivalves and sea grasses will be collected from the same or nearby areas for petroleum level evaluation and compared with the data obtained from the SPMDs. Additionally, tissue and blood samples will be taken from spotted eagle rays and bottlenose dolphins. These matrices will also be analyzed for petroleum contamination. Once petroleum concentration measurements have been obtained for the pore-water, water column, sediments, bivalves, sea grasses, spotted eagle rays and dolphins, the information will be used to develop a model of bioaccumulation for these toxic organics.

## VII ANALYTICAL METHODS

Sediment and tissue samples are extracted by pressurized fluid extraction (PFE) according to EPA Method 3545A. Briefly, sediment samples are ground with anhydrous sodium sulfate and packed into a 33mL stainless extraction steel cells. Samples are extracted using a 50% mixture of methylene chloride and acetone using a Dionex 300 ASE system. Sulfur interferences are removed from the extracts following EPA Method 3660B using tetrabutylammonium (TBA) hydrogen sulfite reagent. Samples are then analyzed for polycyclic aromatic hydrocarbons (PAHs) on an Agilent 7890A gas chromatograph coupled to an Agilent 5975C mass selective detector (EPA Methods 8260B and 8080). Total petroleum hydrocarbons (TPHs) are analyzed and quantified on a Varian 3800 GC using a Flame Ionization Detector (FID). Analyte separation is achieved using a HP-5MS column (30m x 0.250mm x 0.250um; J&W Scientific) with ultrahigh-purity helium as the carrier gas.



**Figure 3.** Sampling Site Locations in Sarasota Bay for SPMD deployments, sea grasses and bivalves.

After recovery from the field, the SPMDs will be sent to the manufacturer for dialysis and the extracts will be sent back to Mote Marine Laboratory for analysis. A non-exposed SPMD will be retained for both field and lab blanks and analyzed for possible background contamination. All extracts will be analyzed as above.

There will be a total of 100 triplicate SPMDs deployed in Sarasota Bay for a period of three weeks. We anticipate approximately 25 spotted eagle ray samples of both blood and tissue, and we will be analyzing dolphin tissue opportunistically. All samples will be extracted and analyzed according to standard methods and using gas chromatography-mass spectrometry for 57 parent and homolog polycyclic aromatic hydrocarbons.

#### **VIII DEVELOPMENT OF BIOMARKERS**

There is a critical need to use biomarkers for both exposure and effects of various stressors or stressor pathways. First, they empirically assess effects of a stressor, rather than simply allowing scientists and managers to acknowledge that an organism has been exposed to something potentially, but not necessarily, harmful. Second, many biomarkers are extremely sensitive, allowing scientists to document the onset of harmful effects long before the critical stage is reached.

Some of these biomarkers can be used to determine impacts on fertility potential of exposed organisms, assess negative consequences on immune function and ascertain possible DNA damage. While knowing contaminant levels in the environment is useful, understanding bioaccumulation pathways and residence times of various contaminants is critically important. It is determining the long-term costs of exposure to contaminants which is ultimately the aspiration of all environmental health investigations.

## IX MODEL FOR BIOACCUMULATION OF ORGANIC CHEMICALS IN BENTHIC ORGANISMS

Hydrophobic organic compounds <sup>1</sup>(HOCs) tend to be strongly associated with particulate organic carbon (POC) in sediments, hence sediments have been considered to be a long term source of contaminants in aquatic environments. Total HOCs in sediments have often used to estimate the accumulation of HOCs to benthic organisms using equilibrium partitioning theory (Blermann, 1990).

The theory utilizes thermodynamic relations between the POC in sediment and lipids in organisms to estimate the distribution of HOCs. The theory leads to the following biota-sediment accumulation factor (*BSAF*) as a measure of the HOC's bioaccumulation potential (McFarland, 1984):

$$BSAF_{sediment} = \frac{q_{lipid}}{q_{oc}} = \frac{q_{organism} / f_{lipid}}{q_{sediment} / f_{oc}} \quad (1)$$

Here  $q_{lipid}$  represents the contaminant lipid-phase concentration of the organism,  $q_{oc}$  is the contaminant concentration in the sediment organic matter,  $q_{organism}$  is the contaminant concentration in the organism,  $q_{sediment}$  is the contaminant concentration in sediment,  $f_{lipid}$  is the lipid fraction of the organism, and  $f_{oc}$  is the organic carbon fraction in sediment.

More recently, porewater HOCs concentrations have been developed which correspond with observed bioaccumulation of HOCs in biota (Lampert, 2010). The  $BSAF_{sediment}^*$  can be updated by a direct measurement of porewater HOCs using an *in-situ* passive sampler, such

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<sup>1</sup> Such as Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Polychlorinated dibenzodioxins (or simply dioxins), Dichloro-diphenyl-trichloroethylene (DDT), Perfluorinated surfactants including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).

as a Semi-Permeable Membrane Device (SPMD). The corresponding equation for  $BSAF_{porewater}$  is as follows:

$$BSAF_{porewater} = \frac{q_{organism} / f_{lipid}}{K_{oc} C_w} \quad (2)$$

Here  $K_{oc}$  is the organic carbon partition coefficient and  $C_w$  is the porewater concentration. Equation (2) can be derived from equation (1) using the following empirical linear adsorption model for the partitioning of HOCs to sediments (Karickhoff et al., 1979):

$$q_{oc} = f_{oc} K_{oc} C_w \quad (3)$$

Here  $f_{oc}$  is the fraction of organic carbon in the sediments. The partition coefficients ( $K_w$ ) can be estimated from octanol-water partition coefficients (Karickhoff 1981) and empirical correlations (Schwarzenbach et al., 2003). Our hypothesis is that the  $BSAF_{porewater}$  will be a better estimate of the bioavailability and bioaccumulation of HOCs in sediments, while  $BSAF_{sediment}$  can be a useful bioaccumulation indicator in areas where SPMD cannot be deployed.

## X MODEL FOR BIOMAGNIFICATION OF HOCs IN FOOD WEBS OF THE SARASOTA BAY ECOSYSTEM

HOCs tend to be biomagnified through trophic transfer resulting in higher concentrations of HOCs in predator organisms compared to their prey (Gray, 2002). To assess the biomagnification of HOCs in foodwebs of the Sarasota Bay ecosystem, the following biomagnification factor (BMF) for each organic compound will be evaluated from the data collected from the site.

$$BMF = \frac{q_{predator} / f_{lipid, predator}}{q_{prey} / f_{lipid, prey}} \quad (4)$$

Here  $q_{predator}$  represents the contaminant concentration in the predator,  $q_{prey}$  is the contaminant concentration in the prey,  $f_{lipid, predator}$  is the lipid fraction of the predator, and  $f_{lipid, prey}$  is the lipid fraction of the prey. A similar approach was recently used in the Sarasota Bay foodwebs to study biomagnification of perfluoroalkyl compounds (Houde et al., 2005). Since the foodwebs in Sarasota Bay are not yet affected by the BP oil spill, the model above employs a steady state  $BMF$  as the ratio of the lipid normalized chemical concentrations in the whole bodies of the predator and prey, respectively.

In addition to the simplistic approach described above, there exist several fugacity based bioaccumulation models, such as biomass conversion, digestion or gastrointestinal magnification, micelle-mediated diffusion, and fat-flush diffusion (Morrison et al., 1997; Fraser et al., 2002; Serrano et al., 2003; Kelly et al., 2004). The models are highly mechanistic and require many more input parameters (10 to 20 variables) and much more complex characterization studies. The models consider competing rates of chemical uptake from the gastrointestinal tract and other potential chemical elimination routes, such as respiration, gill ventilation, urinary excretion, metabolism, and growth dilution (Kelly et al., 2004).

The timeline is short for assessing the conditions before the oil spill to form a baseline for any future changes that could happen if the oil spill impacts the Sarasota Bay. Therefore, the equations above will be employed for this rapid response study. If the oil spill should impact the Sarasota Bay and transient dynamics of the  $BMFs$  are observed, the more sophisticated and mechanistic biomagnification models will be considered for future modeling efforts.



***Considerations for the experimental design to facilitate the modeling***

- In assessing biomagnification of HOCs, it will be necessary to normalize the chemical concentrations in whole fish by the lipid content of the fish. Body concentrations of organic compounds vary with lipid content, and thus in order to compare across species, normalization to uniform lipid content will be necessary (Gray, 2002).
- Appropriate relationships, approaches or calibrations are necessary to estimate the porewater HOCs concentrations from the SPMD measurements.
- A previous study (Houde et al., 2005) quantified the trophic levels in the Sarasota Bay ecosystem using stable isotope analysis ( $^{15}\text{N}$ ). Based on this analysis, the following species are recommended for target species to be sampled in this effort: zooplankton, sheepshead (*Archosargus probatocephalus*), pigfish (*Orthopristis chrysoptera*), pinfish, striped mullet and spotted seatrout, spotted eagle ray and dolphin. In addition, sediments and benthic organisms, such as crab and shellfish, are recommended to be sampled for evaluating the *BSAF*.
- A sample size of between 10 and 15 is recommended for appropriate statistical analysis.

**XI Budget**

The costs of sampling, analysis, developing bioaccumulation and biomagnification models, interpreting data and preparation of reports related to pre-existing conditions in Sarasota Bay

will be approximately \$200,000. The National Aquarium has provided the funds for this 1<sup>st</sup> phase of the project.

In the event that oil from the BP spill enters this aquatic ecosystem, there will be the need to have additional phases for this research which may last over an extended period of time. If needed, acute and chronic toxicity testing would also increase the costs of this research.

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Senator CARDIN. Thank you very much, Dr. Rifkin.

We will now hear from Mr. Young who has one of the toughest jobs, being a local official in an area that I am sure a lot of people are very upset.

**STATEMENT OF JOHN F. YOUNG, JR., CHAIRMAN,  
JEFFERSON PARISH COUNCIL**

Mr. YOUNG. After four major storms, Senator, and the worst oil disaster in U.S. history, I got a little more than I bargained for.

Good afternoon, Mr. Chairman and members of the Subcommittee. I am John Young, Chairman of the Jefferson Parish Council. Jefferson Parish is the largest and most populous parish in the State of Louisiana and includes the coastal communities of Grand Isle and Lafitte, two of the communities most directly impacted by the BP Deepwater Horizon disaster. It is also the hometown of U.S. Senator David Vitter, and we are proud to have him as our Senator.

Mr. Chairman and members of this Subcommittee, let me begin by commending you for holding this hearing today to review and assess the natural resource damages resulting from the BP Deepwater Horizon disaster.

As we review and examine this disaster—perhaps the worst environmental and ecological disaster in U.S. history—let us not forget the 11 men who lost their lives as a result of the well explosion on April 20, 2010.

As a local elected official representing approximately 450,000 people, we marshaled our resources at the local level and monitored developments from day one. I participated in a meeting in Robert, Louisiana, on Friday, April 30, 2010. Secretary Janet Napolitano, Secretary Kenneth Salazar, Secretary Lisa Jackson, Admiral Mary Kelly and numerous other Federal, State, and local officials, as well as Doug Suttles, the COO of BP, participated in that meeting either in person or by conference call.

At that meeting we made recommendations on behalf of Jefferson Parish and specifically on behalf of the towns of Grand Isle and Lafitte that the Federal Government, in coordination with State and local governments, immediately implement a plan and mobilize the necessary equipment and manpower to execute that plan to protect our coastlines, bays, marshes, wetlands, and estuaries, as well as our economy.

It was also recommended at that meeting that although BP was the responsible party and therefore obligated to pay for all damages resulting from the disaster, that BP should concentrate all of their resources on capping the oil well and stopping the flow of oil into the Gulf of Mexico. This recommendation was met with silence by the Federal officials representing the Obama administration at that meeting.

On the next day, Saturday, May 1, 2010, the Governor of Louisiana, Bobby Jindal, convened a meeting of State and local officials for the purpose of coming up with a plan of action to protect the Louisiana coast and our coastal communities because it was apparent that the Federal Government did not have an effective plan, nor had it taken the steps to mobilize the necessary manpower and equipment to respond to the disaster.

Instead, it appeared that the Federal Government was relying too heavily on BP. BP, in turn, was clearly overwhelmed and not up to the task. The State of Louisiana, together with coastal parishes affected by the disaster, including Jefferson Parish, have been responsive for initiating and executing plans and courses of action that have produced concrete results.

For example, the Louisiana National Guard under the direction of the Governor's office built sand berms at Elmer's Island and East Grand Terre Island in early May that prevented the oil from getting into our bays, marshes, wetlands, and estuaries. You may remember the pictures of brown pelicans covered in oil on the beach. They were located just before East Grand Terre Island where oil had built up as a result of the sand berms blocking it from going any further. In fact I was on that island that day with Senator Vitter, and we saw those pelicans with our own eyes. The sand berms that were built had kept that oil from going back into our bays and estuaries.

In contrast to the successful State and local efforts, the Federal Government in various Federal agencies not only have not helped us but in some cases have actually hindered our efforts to protect ourselves. For instance, the State and local governments have put forth three separate plans. The first plan was to block the oil with skimmers and high sea booms. We were told by the Federal Government that the necessary quantity of equipment was unavailable and could not be mobilized quickly enough.

We put forth a second plan to build 18 sand berms. After several weeks this plan was denied as presented, but approval to build two sand berms was given. After further delays, an additional four berms were approved for a total of six berms. However, no sand berms were approved for the five passes near Grand Isle, so a third plan was put forth by the State of Louisiana and Jefferson Parish to protect these five passes in Barataria Bay, one of the richest estuaries in the world.

The third plan called for blocking the five passes with barges on an interim basis and then replacing the barges with rock jetties to provide more permanent protection. After weeks of delay the U.S. Army Corps of Engineers approved the barge plan for only two of the five passes. Additional information was requested on the rock jetties.

The barges were mobilized and proved to be effective at blocking the oil. Vacuum trucks were placed on top of these barges and were utilized to suck up the oil blocked by the barges. Unfortunately, Hurricane Alex became a threat approximately 1 week after the mobilization and placement of these barges. The wind and seas produced by Hurricane Alex required the demobilization of these barges and passes that were left unprotected for 5 to 7 days. Oil was allowed in these passes for 5 to 7 days.

Senator, Mr. Chairman, I understand my time is up. Could I beg you to have a couple more minutes?

Senator CARDIN. We will give you an additional 2 minutes.

Mr. YOUNG. Thank you.

This event further underscored the need for the rock jetties which would stay in place and block the oil on a 24/7 basis during even inclement weather. Unfortunately, on Saturday, July 3, the

U.S. Army Corps of Engineers denied the rock jetties. Since we had applied for an emergency permit, there was no right to appeal. We decided to modify the plan and resubmit, but to date we have not been provided with the necessary permit. This is, in our opinion, completely unacceptable.

Mr. Chairman and Senators, we have put forth three separate plans, and what really is disturbing to us is that we have been told no, but to date not one alternative acceptable plan or alternative has been produced by the Federal Government so that we can protect ourselves.

There are other examples such as OPA. The requirements of OPA could be waived so that we could get skimming vessels down and mobilize early on when we had 60 days of good weather before hurricane season hit. Again, we have 400 down there as of 2 weeks ago, but 2,000 available in the United States. Those requirements could have been waived on an emergency basis. The requirements of the Jones Act, Senators, could have been waived on an emergency basis to allow foreign skimming vessels to be mobilized. In one case, a French company had to sell their vessels to a U.S. company so that they could be mobilized.

One other example I would like to tell you is in Bay Jimmy, which is up in Barataria Bay. We had strapped vacuum trucks onto barges and were sucking up thick crude in this bay, and the Coast Guard came and shut down the operation for safety inspections to inspect the safety equipment and life preservers. I have no problem with safety inspections, but they could have done that onsite while the operation continued. Instead, they forced the barge to go to the dock, and we lost 24 valuable hours of sucking up oil.

One last thing I would like to talk about is the moratorium. The moratorium is a death blow to Louisiana. We can have safe drilling by enforcing existing regulations. We can have safe drilling without the moratorium. And Senators, even the shrimpers, fishermen, and oystermen who are out of work right now because of the oil spill, to a person are opposed to the moratorium.

That \$100 million that BP put up will last 4 to 6 weeks at most. We are going to lose 10,000 jobs, and that industry accounts for about 15 percent of the State of Louisiana's economy. We would ask that that moratorium be rescinded.

And the last thing I would like to talk about is if we can accelerate our fair share of those oil royalties, instead of them coming into play in 2017, bringing them in immediately, we could begin to restore our coastline, bays and estuaries and begin to protect ourselves.

I want to thank you for your time today, and I also want to thank you for coming down to Grand Isle. I had the pleasure of meeting you and Senator Merkley, together with Senator Vitter that day you came down to Grand Isle, and we appreciate you traveling down to Grand Isle to see it first-hand. Thank you very much.

[The prepared statement of Mr. Young follows:]

**STATEMENT OF JOHN F. YOUNG, JR.  
COUNCIL CHAIRMAN – JEFFERSON PARISH, LOUISIANA**

**HEARING BEFORE U.S. SENATE SUBCOMMITTEE  
ON WATER AND WILDLIFE ENTITLED**

**“ASSESSING NATURAL RESOURCE DAMAGES RESULTING  
FROM THE BP DEEPWATER HORIZON DISASTER”**

**TUESDAY, JULY 27, 2010**

Good afternoon, Mr. Chairman and members of this Subcommittee. I am John Young, Chairman of the Jefferson Parish Council. Jefferson Parish is the largest and most populous parish in the State of Louisiana and includes the coastal communities of Grand Isle and Lafitte – two of the communities most directly impacted by the BP Deepwater Horizon disaster.

Mr. Chairman and members of this Subcommittee, let me begin by commending you for holding this hearing today to review and assess the natural resource damages resulting from the BP Deepwater Horizon disaster. As we review and examine this disaster, perhaps the worst environmental and ecological disaster in United States history, let us not forget the 11 men who lost their lives as a result of the well explosion on April 20, 2010.

As a local elected official representing approximately 450,000 people, we marshaled our resources at the local level and monitored developments from day one. I participated in a meeting in Robert, LA on Friday, April 30, 2010. Secretary Janet Napolitano, Secretary Kenneth Salazar, Secretary Lisa Jackson, Admiral Mary Kelly and numerous other federal, state and local officials, as well as Doug Suttles, the COO of BP, participated in that meeting either in person or by conference call.

At that meeting, we made a recommendation on behalf of Jefferson Parish and specifically on behalf of the Towns of Grand Isle and Lafitte that the federal government, in coordination with state and local governments, to immediately implement a plan and to mobilize the necessary equipment and manpower to execute that plan - to protect our coastline, bays, marshes, wetlands and estuaries, as well as our economy



It was also recommended at that meeting that, although BP was the “responsible party” and, therefore, obligated to pay for all damages resulting from the disaster, BP should concentrate all of their resources on capping the oil well and stopping the flow of oil into the Gulf of Mexico. This recommendation was met with silence by the federal officials representing the Obama administration at that meeting.

On the next day, Saturday, May 1, 2010, the Governor of Louisiana, Bobby Jindal, convened a meeting of state and local officials for the purpose of coming up with a plan of action to protect the Louisiana coast and our coastal communities because it was apparent that the federal government did not have an effective plan nor had it taken the steps to mobilize the necessary manpower and equipment to respond to the disaster. Instead it appeared that the federal government was relying too heavily on BP. BP, in turn, was clearly overwhelmed and not up to the task.

The State of Louisiana, together with the coastal parishes affected by the disaster, including Jefferson Parish, have been responsible for initiating and executing plans and courses of action that have produced concrete results:

For example, the Louisiana National Guard, under the direction of the Governor’s Office, built sand berms at Elmer’s Island and East Grand Terre Island in early May that prevented the oil from getting into our bays, marshes, wetlands and estuaries. You may remember the pictures of the brown pelicans covered in oil on the beach – they were located just before East Grand Terre Island where oil had built up as a result of the sand berms blocking it from going any further.

In contrast to successful state and local efforts, the federal government and various federal agencies not only have *not* helped us but, in some cases, have actually hindered our efforts to protect ourselves. For instance, the state and local governments have put forth three (3) separate plans:

- 1) The first plan was to block the oil with skimmers and high sea boom. We were told by the federal government that the necessary quantity of equipment was unavailable and could not be mobilized quickly enough;
- 2) ) We put forth a second plan to build 18 sand berms. After several weeks this plan was denied as presented, but approval to build two sand berms was given. After further delays, an additional four berms were approved for a total of six berms. However, no sand berms were

approved for the five passes near Grand Isle, so a *third* plan was put forth by the State of Louisiana and Jefferson Parish to protect these 5 passes and Barataria Bay (one of the richest estuaries in the world).

- 3) The third plan called for blocking the 5 passes with barges on an interim basis and then replacing the barges with rock jetties to provide more permanent protection.
- After *weeks* of delay, the USACE approved the barge plan for only 2 of the 5 passes. Additional information was requested on the rock jetties.
  - The barges were mobilized and proved to be effective at blocking the oil. Vacuum trucks were placed on top of these barges and were utilized to suck up the oil blocked by the barges.
  - Unfortunately, Hurricane Alex became a threat approximately one week after the mobilization and placement of these barges. The wind and seas produced by Hurricane Alex required the de-mobilization of these barges and the passes were left unprotected for 5 – 7 days. Oil was allowed into these passes for these 5 – 7 days.
  - This event further underscored the need for the rock jetties which would stay in place and block the oil on a 24/7 basis during even inclement weather.
  - Unfortunately on Saturday, July 3, 2010, the USACE denied the rock jetties. Since we had applied for an emergency permit there was no right to an appeal. **We decided to modify the plan and re-submit but, to date, we have not been provided with the necessary permit.** This is, in our opinion, completely unacceptable.

The federal government, through various federal agencies, including the Department of Interior, EPA, USACE and OSHA, has hamstrung our state and local governments' efforts to protect ourselves, our citizens, our communities, our economy, and our way of life. Although the federal government has lacked the sense of urgency and not committed the manpower and equipment necessary to win this battle and denied, in major part, three separate plans put forth by the State of Louisiana and local governments in Louisiana, the federal government has not come forth and offered a **single effective alternative plan.**

**The federal government has simply said “NO.” This is not a plan. This is not a solution. This is not acceptable.**

The President of the United States has executive authority and should have exercised his executive authority early on to cut through the bureaucratic red tape to more effectively and expeditiously respond to this disaster and emergency situation. The President himself compared this disaster to a war and stated, “We will do what it takes for as long as takes to win this war.” Unfortunately, the federal action was lacking and ineffective. If we were being invaded by a foreign enemy, we would be occupied territory by now – and we are heavily occupied by oil.

- The OPA regulations should have been waived to allow more domestic skimming equipment to be mobilized in the Gulf. A few weeks ago, only 400 skimming vessels were mobilized when 2000 were available in the U.S.
- The Jones Act regulations should have been waived to allow mobilization of foreign flag skimming vessels. This was not done.
- The OSHA regulations should have been waived to allow clean-up workers to work more than **20 minutes out of each hour**. Alternatively, the clean-up work force should have been tripled so 60 minutes out of each hour could have been dedicated to clean-up of the coastline, bays, marshes, wetlands and estuaries.
- The battle should have been waged on a 27/7 basis rather than just during daylight hours. The oil did not stop moving at night. The oil moved on a 24/7 basis. The U.S. Coast Guard should have used common sense and logic and not shut down a successful oil remediation process in Bay Jimmy to inspect for life preservers and safety equipment **resulting in 24-hour shutdown by ordering the barge back to the dock for the inspection instead of conducting the inspection on-site** and allowing the successful remediation process to continue during the said inspection.

There are many lessons that can be learned from the ineffective federal response to this disaster. In the future, there should be a military-style chain of command put in place immediately. The individual in charge of the operation should have full and complete authority to act and direct remediation efforts. There should also be more input from and coordination with and authority given to state and local governments.

This disaster is going to have a long and devastating environmental, ecological and economic impact not only on the coastal communities and the State of Louisiana, but also on the United States. We produce 30% of the domestic fisheries for the entire United States. We also produce 30-35% of domestic oil and natural gas consumed in the United States.

In fact, the negative impact will be felt not only in Louisiana and the entire Gulf Coast region but also throughout the entire nation. This is a national issue. The negative impact is further exacerbated by the ill-conceived and ill-advised deep water drilling moratorium. We can have safe drilling without this blanket "one size fits all" moratorium. When the autopsy of this disaster is complete, the results will show that BP was a reckless and negligent operator that cut corners. This disaster should not have happened and could have been prevented if BP had acted responsibly and MMS had enforced the existing regulations. But the moratorium is not the answer and **should be rescinded**. Otherwise, we, as a nation, will become more dependent on foreign oil, not to mention that oil-field related business in Louisiana are downsizing on a daily basis and creating massive unemployment. It is worth noting that even the fisherman, shrimpers and oystermen presently unable to work because of this disaster are, to a person, adamantly opposed to this moratorium. It must be lifted.

I would like to make one final comment with regard to the use of dispersants, specifically with regard to the use of the dispersant Corexit. This dispersant was banned in the United Kingdom. The EPA should not have allowed it to be used in the Gulf of Mexico. The long-term effects of this dispersant are unknown. This may be a case where the "solution" proves to be worse than the problem. We would ask that this issue be further investigated. I note that many people of Louisiana believe that the dispersant is utilized mostly for a BP PR campaign so that the visible devastation of approximately 184 million gallons of oil in our Gulf of Mexico is not detectable by cameras or to the naked eye. Conveniently, it is pushed underwater. Now that the oil is pushed beneath the surface, the sea booms, of course, are relatively ineffective. Oil simply travels underneath the sea booms. This is another reason the State of Louisiana's and Jefferson Parish's plans for sand berms and rock jetties are imperative.

Mr. Chairman and members of this Subcommittee, I thank you for the opportunity to testify before you today on these very important issues, and I look forward to responding to any questions you or members of the Subcommittee may have. Thank you.

**Environment and Public Works Committee Hearing  
July 27, 2010  
Follow-Up Questions for Written Submission**

Questions from Senator James M. Inhofe

1) President Obama, in his address from the Oval Office on June 15, said, "As the cleanup continues, we [the federal government] will offer whatever additional resources and assistance our coastal states may need." That statement was made almost two months ago. In the time since the President made that pledge, have you seen the federal response or allocation of resources live up to his promise?

Response: From Day 1 the federal government's actions have fallen short of the rhetoric. The allocation of resources has been inefficient, ineffective and inadequate for the most part. There has been a pronounced lack of a "sense of urgency" on the part of the federal government.

2) On the same day as President's June 15 address, the director of the White House Office of Energy and Climate Change Policy, Carol Browner, said, "We have assigned to each of the states their own command unit, so that they can go directly to those individuals, get the answers." Have you personally dealt with the Louisiana state command unit, and if so, could you speak to its efficiency in helping efforts at the state and local levels?

Response: Yes, we have dealt with the command unit at the local level. Although the command unit has, for the most part, been accessible and polite, it has not been, in my opinion, efficient and effective. It has been a disjointed effort with a lack of a clear and direct chain of command that would provide for quick and decisive action.

3) While everyone clearly wants to protect and restore the precious natural resources that could be or have been damaged by the BP spill, how much of the existing and potential future damages do you think could have been avoided or at least mitigated had the federal government acted more decisively and responsibly?

Response: In my opinion, this entire disaster could have and should have been avoided if the MMS, now the Bureau of Ocean Energy and Management, had done its job in a responsible and diligent manner by enforcing the existing federal regulations. BP operated the Deepwater Horizon in a rogue, reckless and grossly negligent manner. BP should be severely penalized and punished both civilly and, if appropriate, criminally.

Once the disaster occurred, the federal government should have immediately taken control of the situation and immediately marshaled the necessary resources, at BP's expense, to contain the oil before it threatened our coast, bays, marshes and estuaries. Again, there was a lack of a "sense of urgency" from Day 1 and this lack of a "sense of urgency" was a common theme throughout the various phases of this disaster and, to some extent, continues to this day.

4) You mentioned in your testimony that the state of Louisiana, together with the coastal parishes, have managed to "produce concrete results." Can you point to anything specific in the local efforts that have led to positive results and why are the results from local and state efforts so different than federal?

Response: The state of Louisiana and the local parishes, including the Parish of Jefferson, mobilized the Louisiana National Guard to build land bridges and sand barriers to stop the flow of oil into our bays, marshes, wetlands and estuaries. The state and local governments mobilized and utilized barges and vacuum trucks to block the flow of oil and literally remove oil from our bays, marshes and estuaries. While the federal government stood by, the state and local governments devised plans to protect our local communities. In many instances, the federal government did not only not assist in these protective measures, but actually prevented these measures from being successfully implemented by refusing to issue the necessary permits.

Senator CARDIN. Mr. Young, thank you for your testimony. I know it is extremely difficult.

We appreciated being there. I think seeing first-hand is critically important to try to at least comprehend the magnitude of what you are going through in that part of our country. So thank you for making yourself available and for the manner in which we were received during our visit.

Let me just at this point make one observation, and that is everybody is frustrated that more is not being done, but I think back to the initial estimates that BP gave us on the amount of oil going into the Gulf, 1,000 barrels a day. That may have been off by as much as a hundred-fold. It obviously affected the reaction, at least the initial reaction as to the seriousness of the spill.

I want to make sure that we get the assessment of damages right. This Committee has responsibility to look into that. That is part of our oversight. So I want to make sure that we have an accurate assessment as to how much damage has been done to our environment as a result of the spill.

And that is why in the first panel I was very concerned about the independence of the information that the trustees are using because they are working with BP. BP is signing off on a lot of the work, and they are doing their own independent work, taking a lot of the expertise of our Nation and hiring it under confidentiality agreements, meaning their information may never be made public and may not be available for the Government assessment, which has me greatly concerned.

Dr. Rifkin, that is why I am really so pleased that the National Aquarium has stepped up to do an independent review with Mote Marine, a well known research facility known in Sarasota, and Johns Hopkins. I think your work can be extremely valuable not just on the species that you are studying but that we are concerned about what impact migratory water fowl, migratory birds, and fish are going to have, mammals are having as a result of the oil spill.

In Maryland we enjoy the blue tuna. That happens to spawn in the Gulf of Mexico. We don't know what impact it is going to have on Ocean City, Maryland, on charters to go after sports fishing.

So it is an issue that we need to understand more effectively. And I think what you are doing in the study in Sarasota Bay could be influential in trying to understand the impact of the spill.

My one request to you is that we are interested to see how well you work with the trustees as to how they are using the private sector work that is being done. We have asked for peer review. Peer review is going to be difficult, as you heard from the answers in the first panel. But I do believe your information can be very valuable to the work being done under the national assessment.

So as you go through this work we would appreciate sharing with this Committee your experiences as to how the product is being used. You are funding it independently right now, and we applaud you for that. If you run into problems, let us know.

And to our other two witnesses, I want to ask you a question as to your experiences with the *Exxon Valdez* as it relates to reopening the assessment, if after the initial review are done, and I know there is going to be a lot of desire to get information out as quickly as possible. The Government's initial assessment comes out. The



trustees have a remedial plan. And lo and behold we find that there has been additional damage done that we did not know of at the time.

How easy is it to reopen this process and have a remedial plan that is modified and funded in order to deal with damages that may be discovered 5 years from now or even 10 years from now?

Mr. SPIES. Mr. Chairman, I think that is a very important point because there were a number of damages that I mentioned, some of those with pink salmon, that the damages lasted much longer than we had thought at first based on the toxicological information that was available at the time of the spill.

There was also apparent ongoing damages to harlequin ducks and sea otters as late as 2000, 2001. And those became mainly their claims for damage. There was also kind of an unanticipated persistence of the oil on what looks like very rough, very energetic beaches where the oil actually got down inside the beach below the layer of rocks and was actually in a very low energy environment, which was not fully appreciated. And so that oil lasted longer, and that became part of the claim for the reopener.

Senator CARDIN. Did Exxon challenge the reopener? Is this a legal issue that was amicable, or was there resistance as far as trying to close this chapter?

Mr. SPIES. After the claim was filed I wasn't privy to the confidential exchanges that were going on between the Government and Exxon Corporation, but they have never resolved and I don't think publicly have commented on it.

Senator CARDIN. I don't know what BP Oil's position is going to be a couple of years from now. And once a remedial plan is signed off on, I understand there may be provisions in there that provide for reopening, but it becomes more difficult as the years go by. And I want to make sure that our assessments are as transparent and open as possible today, leaving the issue of long-term remedial open so that we are not foreclosed if additional damages are discovered and additional remedial work is required.

Would that be naive to suggest that that be part of this assessment process?

Mr. SPIES. I agree. I think since OPA 90 there has been more emphasis on getting to restoration fairly quickly. I think that in the case of a big spill, I think one has to consider whether one can actually carry on the damages. Like I said in my testimony, I think it is important that you have done as thorough a job as possible in looking at the scope of damages in order to make the Gulf whole again.

Senator CARDIN. Thank you very much.

Mr. SENNER. Could I comment on the reopener? I think it is largely a matter, Senator, of what the agreements are at the time of settlement, whether it is through the NRDA process or a settlement outside that process. And in the case of *Exxon Valdez* there was a settlement outside the NRDA process, and that agreement contained explicit provision for the reopener that was agreed to in 1991 at the time of the settlement.

So the agreement was there on that provision. What Dr. Spies has pointed out, however, is that when the Government submitted a claim to invoke that reopener clause, which allowed up to an ad-

ditional \$100 million, that claim was submitted in 2006, and there has been no resolution of that claim. I consulted with people in the Attorney General's office at the State of Alaska. There have been conversations back and forth about the claim that the governments have submitted, but there has been no resolution to it 4 years after the claim.

Senator CARDIN. Thank you very much.

I will turn to Senator Vitter.

Senator VITTER. Thank you, Mr. Chairman.

Mr. Chairman, I just want to underscore something I said before. Natural resource damages assessments are extremely important, but like Councilman Young I have been more focused on natural resource damages prevention. And in that category, I think the entire Federal bureaucracy has been completely unprepared to act on the right timetable and unresponsive.

It maybe goes back to OPA 90. OPA 90 was a reaction to the *Exxon Valdez*. And that was a very different incident than we have had in the Gulf. That spill happened beginning to end in a few hours, several hours, and obviously the impacts went on far longer than that, but the spill was several hours long. This spill, this flow was months long. And I am afraid perhaps OPA 90 had this assessment-restoration model set up, but no prevention model, no model to get the bureaucracy to act quickly and prevent ongoing damages. And that is the frustration you hear not just from Councilman Young and I, but virtually anybody you talk to in the State.

Councilman, going back to your testimony, you describe very well the delays and the roadblocks in both the emergency dredging barrier island plan and the Barataria Bay plan, several versions of it. What additional damage do you think that delay and foot dragging and those vetoes or partial vetoes had to coastal Louisiana and our marshes?

Mr. YOUNG. It had devastating and serious damage, Senator, because what happened was when we finally got the barge plan put into place, then Hurricane Alex threatened, and we had to demobilize and left it unprotected for 5 to 7 days. We went out there, and big clumps of oil had come in because the dispersant—which I didn't get a chance to talk about, that solution may be worse than the problem because dispersants also put the oil underneath the water so the sea booms become relatively ineffective, another reason why you need the barges and the rock jetties.

And the rock jetties would have helped because they are going to remain there 24/7. We have to mobilize and demobilize the barges. We just went through that this weekend with the threat of Tropical Storm Bonnie. I am going down to Grand Isle on Friday morning by car and boats with Wildlife and Fishery, and all the equipment is being taken off the island because of the approaching storm. We are left unprotected.

We had oil come in again this weekend because it was being effectively blocked and sucked up by the barges, but the rock jetties were out there. And again, we can take the rock jetties out.

What our frustration is is the Federal Government is essentially saying we don't know what the adverse effects of the rock jetties may be. Well, we do know what the adverse effects of the oil are, and it is not good. And we need to be able to put those out there.

And one other thing I need to emphasize. We are not trying to do anything other than to restore the size of the coastal barriers that were there before coastal erosion. So we are not trying to add any additional land mass or rock mass, so to speak. But it will in fact block the oil.

The other frustration we had was with OSHA because cleaning up the beaches once the oil comes, they can only work 20 minutes out of an hour because of OSHA regulations. How many of us can get a job where we are paid for a full hour and work only 20 minutes? My response is either waive those regulations for this emergency or hire triple the work force so we can get 60 minutes out of an hour.

But those are the type of regulations and frustrations we have. If those rock jetties were there, Senator, we would not have additional oil coming into Barataria Bay, which is the richest estuary in the world. And to make it a national issue, we produce 30 percent of the domestic fisheries consumed in the United States. And we also produce 30 percent to 35 percent of oil and natural gas consumed by the entire United States of America. This is not just a Louisiana issue. This is a national issue.

Senator VITTER. Thank you very much.

That is all I have.

Senator CARDIN. Senator Whitehouse.

Senator WHITEHOUSE. Mr. Young, those folks who were working 20 minutes out of the hour, are those the folks who are out in the sunshine on the beaches with no shade wearing a hazmat suit?

Mr. YOUNG. Yes, sir.

Senator WHITEHOUSE. Doesn't it make sense to give them a break during the hour to cool off? Can you stand in the hot Louisiana sun in a hazmat suit and work for very long?

Mr. YOUNG. I agree it is not good conditions, Senator, but that is why I suggest maybe we triple the work force so we can get people out there working 60 minutes an hour.

Senator WHITEHOUSE. That is a different question, though, tripling the work force. But you are not suggesting that people should work straight out nonstop in the hot sun in a hazmat suit along your beaches, are you?

Mr. YOUNG. I think they can work longer than 20 minutes. Maybe not a full hour, but certainly I think if we are going to approach this, as the President himself has said, as a war, we need to fight it 24/7, and we should be fighting it at night as well. The vessels and the manpower trying to keep the oil from coming ashore is not doing that either.

Senator WHITEHOUSE. Obviously, there is immense frustration and properly so because it is a terrible circumstance. Your testimony really focuses on the Federal Government's response. I don't know if you have evaluated the State government's response itself. As I understand it the State of Louisiana gets about \$2 billion a year or so in revenues out of the oil and gas industry.

There has been a news report from the New York Times that says that the State oil spill coordinator's office shrank by half over the last decade; that the Oil Spill Research and Development Program had its annual \$750,000 in financing cut last year. That is the office that signs off on the oil spill contingency plans. And that

there are two kinds of contingency plans and action plans and that both of them are joint planning exercises between the State and the Federal Government.

And so the State has a role in developing those plans, does it not?

Mr. YOUNG. Yes, sir, Senator. And I can tell you haven't been there, at least three to four times a day, which is 2 and a half hours from the parish seat where I have an office. We have been there every day. And the State, in my opinion, and the Governor of the State of Louisiana and the National Guard have worked 24/7. We have fought every step of the way. We were trying to get these rock jetties built. We were told to go back and re-tool the plan. And every time we did what we were asked to do we were met with another request to re-tool it. And then finally on July 3d, we were told no.

Senator WHITEHOUSE. Well, if the rock jetties and island berms had been in the original planning then presumably the scientific work about whether they would actually help or not, and I believe that was what held things up. There were people who were suggesting that these berms could actually make matters worse, and presumably that is a question that is worth answering. I mean, you wouldn't want to do something that might make matters worse. Correct?

Mr. YOUNG. No, I wouldn't, Senator.

Senator WHITEHOUSE. You would want to answer that question, and the way you would answer that question ordinarily would be through the contingency planning in the first instance. You would get ahead of it, saying if there is going to be a major spill that here is what our plan is. And then people have the time through the contingency planning process to look and say, yes, berm works, yes, jetty works. And then when it happens, you are good to go, as opposed to having to start up and try to kind of design a plan over the weekend.

Mr. YOUNG. Well, I can tell you that as of early May, Senator, the State had a plan, and we tried to execute on that plan. And the plan that we executed on in Elmer's and Grand Terre Island, proof is in the pudding. It worked. It stopped the water from getting into bays and estuaries.

In terms of the sand berms, we have been fighting with the Federal Government to try to get those sand berms and restore our coastline irrespective of this oil disaster. And they have plans. And finally Secretary Mavis came down 2 weeks ago and said, we have studied this enough. We are going to do something about it. He is the Obama administration's point man on coastal restoration. We have been fighting for that, and we have had several plans on coastal restoration which would not only protect us from natural disasters but would protect us from a manmade disaster such as this.

So we have plans. We have been stymied every step of the way by the Federal bureaucracy.

Senator WHITEHOUSE. It says that, for instance, a draft action plan for a worst case is one of many requirements in the southeast Louisiana proposal, the plan, that is listed in the plan as, "to be developed." Is the news wrong that that worst case plan wasn't ac-

tually developed and was just put down as “to be developed’ in the contingency plan?”

Mr. YOUNG. What are you referring to, Senator?

Senator WHITEHOUSE. A New York Times story from June 25th.

Mr. YOUNG. I would have to defer to the Governor’s office on that particular question.

Senator WHITEHOUSE. Do you know how much boom the State had set aside for this?

Mr. YOUNG. How much boom the State had set aside? Certainly not enough. In fact, when asked in the original plan for the high sea boom from the Federal Government they said they couldn’t marshal enough sea boom to take care of it. And on that conference call, we had Governors from every State. Louisiana Governor Jindal was present. The Governor from Mississippi was on the phone. The Governor from Alabama was on the phone. Governor Crist from Florida was on the phone. And were told at that time there wasn’t enough boom worldwide to mobilize quick enough.

Senator WHITEHOUSE. Yes, what the news story here reports anyway is that the amount of hard boom that Louisiana requested, roughly 950 miles of it, was about one and a half times the entire national stockpile and more than three times what the southeast Louisiana area contingency plan said would be required to boom the State’s entire coastline.

So it appears that nobody was really ready for the extent of the booming either in terms of having boom handy or properly anticipating what the contingency plan was and that the State was a partner in the preparation of that plan. Is that correct?

Mr. YOUNG. Yes. Our coastline is very irregular. In fact, we do not have many beaches at all because of the canals that have been dug for oil exploration. But certainly that is why we came up with plan B with the sand berms and then plan C which had been the barges and the rock jetties.

Senator WHITEHOUSE. But they weren’t evaluated.

Mr. YOUNG. And there is enough blame to go around. Certainly I can tell you no one ever expected this type of disaster. But I can tell you, as I sit here as confident as I can be, that when we complete the autopsy for this Deepwater Horizon well blowout we will find that this disaster could have been prevented. We will find that BP was negligent, reckless, cut corners, cut off the alarm that was giving them information.

This disaster should not have happened in the first place.

Senator WHITEHOUSE. And I don’t have much good to say about MMS either in overseeing all this mess.

Mr. YOUNG. Right.

Senator WHITEHOUSE. So I agree with you.

If know I am a little bit over my time, but I think we have been pretty flexible about that so far.

I wanted to ask Mr. Senner a question. You make two points, and I would like to propose to you a third and ask you to discuss them.

And Dr. Spies, if you would like to chime in also.

You make the point whether the participation of a responsible party, for instance BP, may influence the scope and the nature of the natural resource damage assessment process, which I think we

agree is a legitimate concern. And also whether the trustee agencies are unduly constrained by funding, and I assume by that you mean that they have to go to the responsible party to get the money to proceed rather than being able to go on their own.

The third whether I would ask is whether it is a concern that the responsible party might go out there on their own, parallel to the natural resources damage assessment process, and basically buy up all of the major scientists, experts and universities in the field, get them to work doing things that are on the job enough to create a conflict so that they are conflicted out of the natural resource damage assessment, and leave a more vulnerable natural resource damage assessment and more vulnerable to their challenge by virtue of having basically scooped all the best scientists, universities and experts into their own pockets right at the very beginning with all of their money before the agency, which has to rely on the responsible party for the money, can get its own plan stood up and running.

Mr. SENNER. Senator Whitehouse, I think that is a very legitimate concern. I can tell you following the *Exxon Valdez*, there was indeed a bidding war for scientists, with at one point the State of Alaska, the Federal Government, and Exxon each out trying to recruit experts and in some cases probably bidding for the services of the same individuals.

Part of the Oil Pollution Act of 1990 encouraged industry participation in part as a response to that kind of a situation. Unfortunately I think what we are seeing is that this situation can still arise. I think the representative from the Department of Interior here, Ms. Dohner, indicated that the Fish and Wildlife Service and others are trying to recruit some experts as well.

It is a serious problem, and I am not sure that there is a way around that, but it is a concern. There is only a limited pool of people who have the expertise.

Senator CARDIN. But in response to Senator Whitehouse's point about the responsible party being brought into the process, doesn't that almost per se bring into question the objectivity of the work?

Mr. SENNER. That is a concern, Senator Cardin, I raised in my statement. Yes, that is a concern. I think as the stakes grow higher financially, the potential liability, the greater the concern that I have about whether the right kind of studies are being done.

Now, having said that, I do not have any evidence and I have no indication that the relationship to date between BP and the governments is inappropriate or dragging or anything of the sort. Nonetheless, that concern is there and is in fact one of the reasons that it is all the more important to have independent peer review, people who are disinterested parties with no financial stake. They are not PIs looking for research funding, reviewing the program, and helping us critique it and decide, indeed, are the right kinds of questions being asked; are the methods appropriate. That is one safeguard for that kind of a problem.

Senator CARDIN. Does Senator Whitehouse want to say anything further? You have a look on your face.

Senator WHITEHOUSE. Yes. Mr. Chairman, I just wanted to make the point that it is not unheard of in litigation, for instance, against big corporations and entities with enormous amounts of

money for them to go out and basically try to lock up all the best experts and take them out of the dispute later on so that when the plaintiff, or in this case the proponent of the natural resource damage assessment, brings their proposal forward, it is far more vulnerable to challenge by the responsible party because it does not have the best science behind it because the best scientists have been taken out of play by the responsible party from the get-go.

And that kind of strategizing and gaming around the natural resource damage assessment process I think may merit a little bit more of our attention as we go forward. And so I salute and congratulate you for holding this hearing.

Senator CARDIN. Let me just concur on your concern. Just look at the numbers. If the reported numbers are correct, we know that according to the testimony here today, BP has already agreed to somewhere around \$45 million of funding for assessment studies. We don't know how much of that has gone to experts, but about \$45 million. But now there are reports that Exxon independently is spending \$500 million on experts. That doesn't seem balanced. If you need \$500 million to assess the damages, why to date hasn't there been an agreement with BP? I said Exxon. I meant BP. Why hasn't there already been an agreement with BP to a \$500 million level for the assessment in which BP has been invited to participate in?

But instead it looks like they are covering both sides. They are working with the Government and are involved in the scope of the assessment and workload being done by the damage assessment, but they are spending at least 10 times that hiring independent experts with nondisclosure agreements. So this information will not get out unless BP wants it out.

Senator WHITEHOUSE. And it would come as no surprise to me, Mr. Chairman, if somebody from BP who was in that natural resource damage assessment process had as their task to report back to BP on the vulnerabilities of the natural resource damage assessment process so that they were prepared to challenge it and knock down the number later on.

Senator CARDIN. Well, certainly the objectivity here is of concern, and that is why I think we made it clear on the record that we want to be notified by our Government agency trustees if they feel that the independence has been compromised.

Dr. Rifkin.

Mr. RIFKIN. Yes, I don't think this is a new issue. Whether you are talking about environmental impact statements under NEPA or ecological risk assessments or natural resource damage assessments, you basically go through the same process.

My comment as a person who has been an environmental consultant for over 30 years is that it is virtually impossible for industry consultants to be totally objective if their funding is coming from industry. The ecological risk assessment process, NRDA process, is replete with uncertainty. And so how the samples are collected, how they are analyzed, whether toxicity tests are taken, what kind of tests are taken, how the information is interpreted, how it is statistically presented can all be done differently.

And unless one is absolutely sure that the scientists doing the research do not have affiliations with those individuals who are pro-

viding them funding, it becomes problematic. Motives are always suspect. I would offer great care needs to be taken to make sure that whatever is done is done independently with transparency and objectively.

Senator CARDIN. This Committee, the Subcommittee as well as the full Committee, will be monitoring this as one of our highest priorities to make sure we get this right. This is the Environment Committee of the U.S. Senate, and this is the Water Subcommittee of that Environment Committee. So we will be doing everything we can to make sure we get the assessment right so that the remedial plans are accurate.

And although we haven't had a chance to really question on this, I know some of our panelists are concerned that remedial sometimes means replacement. And that it has to be broad enough to deal with the broad scopes of trying to repair the environment. And we will be monitoring that very, very closely.

I see that Mike Batza is in the audience. I just want to acknowledge the Chairman of the Aquarium Board in Baltimore, who has volunteered a great deal of time to the environment. It is nice to have in our Committee room.

And with that, the Subcommittee will stand adjourned.

[Whereupon, at 4:38 p.m. the Subcommittee was adjourned.]

