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COLLABORATIVE SOLUTIONS TO WILDLIFE AND HABITAT MANAGEMENT

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

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C O N T E N T S

COLLABORATIVE SOLUTIONS TO WILDLIFE AND HABITAT MANAGEMENT

TUESDAY, APRIL 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 10:03 a.m. in room 406, Dirksen Senate Office Building, Hon. Benjamin L. Cardin (Chairman of the Subcommittee) presiding.

Present: Senators Cardin, Inhofe, and Whitehouse.

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

Senator CARDIN. Welcome to the Subcommittee on Water and Wildlife of the Committee on Environment and Public Works. It is nice that Senator Inhofe is with us today. Senator Crapo, who is responsible for today's hearing, this was his contribution to have this hearing.

I was very excited to do this, but Senator Crapo has been called to a higher calling today. He has been called to the White House in regards to the Debt Commission. So I think Senator Inhofe and I would rather be here than at the White House dealing with the Debt Commission, but we thank Senator Crapo for his incredible leadership on this subject.

I know he has an opening statement that he wants to put in the record, and without objection, his opening statement will be made part of the record.

[The prepared statement of Senator Crapo follows:]

STATEMENT OF HON. MIKE CRAPO,
U.S. SENATOR FROM THE STATE OF IDAHO

Good morning. Thank you, Mr. Chairman, for holding this very important hearing on collaborative solutions to wildlife and habitat management. As you know, this issue is of great importance to me—particularly with regard to the collaborative model of problem solving—and so I am very grateful for this opportunity.

Idaho is home to some of the most remarkable and pristine ecosystems and landscapes that the United States has to offer. While Idaho's vast tracts of lands are known for accommodating many uses, one of the most important functions for these lands is hosting the countless wildlife species that can be found within our borders. Idaho is at the front of the pack for its number and diversity of wildlife species.

Given the abundance and complexity of wildlife issues in Idaho, local, State, Federal and a variety of non-governmental entities have devoted significant time and resources to managing our wildlife populations and the lands that accommodate them in ways that make the most sense for our State, landowners and in compliance with wildlife and environmental protections. Over the years, such efforts have been contentious—both in Idaho and across the United States—and at one point we

were doing a lot less managing and a lot more fighting than we should have been doing. For years, efforts to effectively address public land, habitat and wildlife issues ended up in the courts; groups drew lines in the sand and continued to fight, and unfortunately that continues to be a problem today. However, significant improvements have been made in the form of collaborative partnerships, so this hearing is very timely.

Senseless fighting over the management of our treasured natural resources can be a thing of the past. Wildlife management partnerships have been utilized for quite some time, but I am talking about taking it even further. The collaborative model—which requires all parties to come to the table and be willing to compromise—has proven successful and will continue to do so. With this model, local communities can come together with all of the stakeholder groups and produce solutions that work for the people, the wildlife, the lands and the government. Furthermore, the collaborative model has shown that people from entirely divergent backgrounds and with differing beliefs can, in fact, work together. I am hopeful and confident that this model will continue to pick up steam and that it will one day be used across the country to help address these challenging issues.

Thank you again, Mr. Chairman, for holding this hearing.

Senator CARDIN. And we certainly want to acknowledge the work that has been done on the private partnerships on environmental issues that the Senator has been one of the leading voices in that regard, as Senator Inhofe has. And it is important that we get both the public and private sector working together on environmental issues.

The vast majority of our Nation's land is privately owned, and the majority of fish and wildlife resources. Some of our most treasured migratory birds, fish and animals are located on those private lands. If we are going to be successful in our efforts to protect these species and these places, we all—private, public, individual and organizations, businessmen and conservationists, farmers and fishermen—we all have to work together to make this happen.

This hearing will focus on several initiatives at the Fish and Wildlife Service that promote collaborative solutions to wildlife and habitat management. For more than 20 years, the Fish and Wildlife Service has initiated collaborative arrangements with public and private entities to conserve or store and enhance critical habitats.

Today's hearing will focus on three programs: Candidate Conservation Agreements, the Partners for Fish and Wildlife Programs, and the Coastal Program. We in Maryland know the importance of all these programs. They have been critically important to protect our most valuable lands.

I want to comment briefly, if I might, on the Coastal Program. Coastal wetlands provide essential nutrients, food and shelter for shellfish, waterfowl, migratory birds and more than half of commercial fish. They protect coastal areas from storm damage, help stabilize shorelines and improve water quality by filtering waste and pollution that end up in our waters. The estimated national economic value of coastal wetlands is in the hundreds of billions of dollars.

In Maryland, we depend on coastal wetlands for our livelihood and our way of life. So we are grateful for the work the Coastal Program has done in my State to protect these vital natural resources. In fact, the Chesapeake Bay was the home of the first coastal project.

Since 2000 the Coastal Programs have completed 203 projects in Maryland alone to protect 66,000 acres of Maryland's treasured

wetlands. So we are particularly interested in this critical program. It has been very successful, and I look forward to hearing from all of our witnesses on these three initiatives that are important for the protection of our environment.

With that, I would turn to Senator Inhofe.

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

Senator INHOFE. Thank you, Mr. Chairman.

Back in 2005 when Republicans were a majority, I chaired this Committee and was pleased to author and see enactment of the Partners for Fish and Wildlife Act. That was in October 2006. I held a field hearing in Tulsa in April 2005 which featured one of the witnesses today, the Grove Valley Principal Debbie Straughn. Ms. Straughn established an outdoor classroom through the Partners Program. Former Fish and Wildlife Director Dale Hall, who was, I might say, an Okie, testified along with landowners who have benefited from the program.

The hearing also explored how Partners Program and conservation projects were being developed alongside the agriculture community and others.

I remember, Mr. Chairman, we had some people from out in the western part of Oklahoma, and they actually won awards in this Partnership Program for the types of things they developed and the results they are getting with conservation programs. So often, Government gets in the habit of telling everybody what to do instead of going and drawing out the fact that people who are landowners, they are proud, and they want to conserve. They want to do the things that Government generally is demanding of them, but I would rather come from that way.

So you remember that, Debbie, because that was a great program. We had all those witnesses from western Oklahoma, and so it was good. So I believe all conservation problems could create a positive incentive, and that is why this program is a model for cooperative conservation, collaborating with landowners in voluntary agreements to conserve and even create habitat for a species.

I support adequate funding for the Partners Program, but I am concerned that the funding Congress provides may be controlled by a political agenda, and I don't want that to happen. The Partners Program received $60 million in fiscal year 2010, which was around $7 million more than fiscal year 2009 levels. However, $6 million of the fiscal year 2010 funding was newly designated for assistance in response to climate change. Again, in the fiscal year 2011, the President's budget submission another $2 million has been requested for the same purpose.

Consistently, Congress has not enacted climate change legislation for a variety of very legitimate reasons. I just don't like the idea that the Partnership Program, which is working so well, is being used for a different agenda.

The Partners Program has developed more than 41,000 private landowner agreements, resulting in positive ecological and economic effects of tens of thousands of acres nationwide, including nearly 800,000 acres of wetlands, nearly 2 million acres of grassland and prairie habitat, and over 7,000 miles of in-stream habitat.

In Oklahoma alone the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program has provided nearly $5.5 million, while private landowners have contributed over $16.5 million to restore over 300,000 acres of habitat. That is a four to one ratio, and that is what we want. We want people to want to cooperate and to put private dollars in, and that is exactly what the Partnership Program has been successful in doing.

So I look forward to the hearing, to the witnesses today, and promoting this program to a greater extent and other programs like it.

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

In 2005, as Chairman of the Senate Environment and Public Works Committee, I was pleased to author and see the enactment of the Partners for Fish and Wildlife Act in October 2006. I held a field hearing in Tulsa, Oklahoma, in April 2005, which featured one of our witnesses today, Grove Valley Principal Debbie Straughn. Ms. Straughn established an outdoor classroom through the Partners Program. Former FWS Director Dale Hall testified along with landowners who have benefited from the program. The hearing also explored how Partners Program conservation projects were being developed alongside agriculture, ranching and oil and gas development. The Partners Program demonstrates that conservation, oil and gas development, and agriculture are not mutually exclusive.

I believe all conservation programs should create positive incentives to protect species and above all should hold the rights of private landowners sacred. That is why this program is the model for cooperative conservation, collaborating with landowners in voluntary agreements to conserve and even create habitat for species. I support adequate funding for the Partners Program, but I am concerned that the funding Congress provides may be constrained by political agendas. The Partners Program received $60 million in fiscal year 2010, which is around $7 million more than fiscal year 2009 levels. Six million of the fiscal year 2010 funding, however, was newly designated for "assistance in response to climate change." Again in the fiscal year 2011 President's budget submission, another $2 million has been requested of Partners Program funding for the same purpose. Consistently, Congress has not enacted climate change legislation for a variety of very legitimate concerns. It is important that the Partners Program remain focused on conservation and that otherwise eligible projects for the Partners Program are not rejected simply because the Administration wishes to impose a new climate nexus to Partners projects.

The Partners Program has developed more than 41,000 private landowner agreements, resulting in positive ecological and economic effects on tens of thousands of acres nationwide, including nearly 800,000 acres of wetlands, nearly 2 million acres of grassland and prairie habitat, and over 7,000 miles of in-stream habitat. In Oklahoma alone, the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife program has provided nearly $5.5 million, while private landowners have contributed over $16.5 million to restore over 300,000 acres of habitat in Oklahoma through over 1,000 individual voluntary agreements with private landowners. The rate of public to private investment is 4 to 1.

On that high note, I welcome all the witnesses to the Committee and look forward to hearing more about your collaborative efforts.

Senator CARDIN. Thank you.

Senator Whitehouse, from the coastal State of Rhode Island.

OPENING STATEMENT OF HON. SHELDON WHITEHOUSE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator WHITEHOUSE. Thank you, Mr. Chairman. I am honored to be here, and I appreciate your keen interest in coastal matters.

For those of you in the audience, Senator Cardin and I have a friendly rivalry about the Ocean State, which is mine, and Maryland. We have more of a sailing and ocean presence.

Senator INHOFE. And I am not in on either one of those deals. [Laughter.]

Senator WHITEHOUSE. He has some lovely photographs of sailing in his office that I contend were actually taken in Rhode Island. But this is an important hearing, and I appreciate him very much holding it.

I also want to thank Senator Crapo who was one of the instigators, who couldn't be here right now, but his interest in this is very considerable.

Senator Cardin and I share the characteristic of representing States that get a climate change double whammy. Not only do we face the terrestrial effects of climate change, and we see it in our orchard, for instance, blooming unseasonably in the winter because temperatures are unprecedentedly warm, but we also face it at sea along our coasts.

We see it through sea level rise, which even small increments of sea level rise can produce really significant effects when, say, driven by storm surge and changing velocity zones under the Coastal Zone Management Act and changing development patterns, and putting infrastructure at risk.

We see it in habitat shift as warming coastal waters change the habitat and the species that can live there, and we lose our traditional fisheries, and they are replaced with other species that come in to take advantage of the changed climate.

And finally, we are both at risk of ocean acidification, which may prove to be the most damaging feature of climate change in terms of its effect on our species and on our planet.

So for those of us getting that or vulnerable to that climate change double whammy, the role of the Coastal Program is very significant, and I am pleased that Mr. Frazer is here, and we will have the chance to discuss it.

So thank you for your leadership, Senator Cardin.

Senator CARDIN. Well, thank you, Senator Whitehouse.

Our first witness is Mr. Gary Frazer. Mr. Frazer is the Assistant Director for Endangered Species at the U.S. Fish and Wildlife Service. He is responsible for carrying out policy development and management of all aspects of the Endangered Species Act.

Mr. Frazer started his career with the Service in 1984. He has served that Agency in many critical capacities and in many places across this country. We want to welcome him back to the Environment and Public Works Committee where he spent a year as a Fellow. We will not hold that against you.

What year were you the Fellow here? We can start with that.

Mr. FRAZER. Senator, many years have passed since then. That was in the late 1980s, so about 1988, 1989. I remember very well my first time sitting back behind the dais.

Senator CARDIN. Right. That is before, I think, the three of us got to the U.S. Senate, so welcome. It is nice to have you back.

Mr. FRAZER. Thank you, Mr. Chairman.

Senator CARDIN. And your entire statement will be made part of the record, as will all of the witnesses', without objection, and you may proceed as you wish.

STATEMENT OF GARY FRAZER, ASSISTANT DIRECTOR FOR ENDANGERED SPECIES, U.S. FISH AND WILDLIFE SERVICE

Mr. FRAZER. Good morning, Chairman Cardin and Members of the Subcommittee. I am Gary Frazer, Assistant Director for the Endangered Species Program with the U.S. Fish and Wildlife Service. Thank you for the opportunity to be here today to testify on collaborative solutions to wildlife and habitat management.

My testimony will focus on several programs through which the Service works in partnership with Federal, State and private land managers to conserve wildlife through habitat protection, restoration and management.

These programs include the Coastal Program, the Partners for Fish and Wildlife Program, and several landowner tools within the Endangered Species Program.

The Coastal Program was established in the Chesapeake Bay in 1985 and has since expanded to 23 coastal areas around the country. Through the Coastal Program, the Service partners with coastal communities to conserve and restore coastal ecosystems for the benefit of fish, wildlife and people. The Coastal Program provides technical and financial support through a variety of partnerships that conduct coastal habitat assessments and planning, protection and restoration activities.

One of the Coastal Program's greatest strengths is its boots on the ground approach to achieving these conservation goals. Through these partnerships, the program leverages a minimum of one Federal dollar to four non-Federal dollars.

A recent Chesapeake Bay success story is the Hail Cove Living Shoreline Project at the Eastern Neck National Wildlife Refuge in Kent County on the Eastern Shore. The Service, the Maryland Department of Natural Resources, Ducks Unlimited, and the National Aquarium led a partnership of 20 organizations to restore 1,600 feet of shoreline and protect over 200 acres of sea grass beds and wetlands that are one of the most important wintering areas for waterfowl in the Chesapeake Bay.

The Coastal Program also co-administers the National Coastal Wetlands Conservation Grant Program in concert with the Service's Wildlife and Sport Fish Restoration Program. The program annually provides grants to coastal States to acquire and restore coastal wetlands. Since 1992 it has awarded nearly $240 million to States to protect, restore and enhance 260,000 acres of coastal wetlands. In 2010 the program awarded $19.2 million to support 25 projects in 11 different coastal States.

Another flagship collaborative program, the Partners for Fish and Wildlife Program, first took root in the Midwest in the mid-1980s to restore wetlands on private lands that were severely degraded by agriculture development and recurring droughts. The Partners Program is a voluntary citizen and community-based stewardship program for fish and wildlife conservation. The program provides technical and financial assistance to private landowners for habitat improvement and restoration projects on private lands that benefit Federal trust fish and wildlife species.

In 2006, with the support of Senator Inhofe and other Members of Congress, the Partners for Fish and Wildlife Act specifically au-

thorized the assistance to private landowners that the Service carries out through the Partners Program.

The Partners Program is also working to develop schoolyard habitat projects such as the Outdoor Classroom at Deer Creek Elementary School in Edmond, Oklahoma. Principal Debbie Straughn, a witness here today, has led the effort to plan, implement and maintain the Outdoor Classroom since 1997. Projects like this one provide the students with a powerful example of land stewardship and provide families and local businesses the opportunity to get involved in creating and maintaining wildlife habitat.

Finally, the Service's Endangered Species Program has several tools that have been successful in creating partnerships with landowners to conserve species that are listed as threatened or endangered under the Endangered Species Act or that are candidates for listing.

Candidate conservation agreements, or CCAs, are agreements between the Service and one or more landowners who voluntarily commit to manage in a way that removes or reduces threats to candidate species on Federal and non-Federal lands. The Service has entered into 110 CCAs over the last 15 years, primarily with other Federal agencies and States. Over 160 species of plants and animals have benefited from these agreements.

Candidate conservation agreements with assurances, or CCAAs, are available only to non-Federal landowners and address the concern of these landowners about potential future land use restrictions if the candidate species should become listed under the ESA. CCAAs provide assurance that should the species become listed in the future, additional land use restrictions or mitigation commitments will not be required.

Currently, there are 22 CCAAs in place, including one signed recently with Idaho Fish and Game for the greater sage grouse.

Safe Harbor Agreements are voluntary agreements available to any non-Federal landowner that wants to aid in the recovery of species that are listed under the Endangered Species Act. In return for agreeing to implement management actions that will contribute to the recovery of listed, the landowner receives regulatory assurances that he or she can alter or modify the enrolled property and return it to the original baseline condition at the end of the agreement, even if that means incidentally taking the listed species.

Through Safe Harbor Agreements, landowners could put their conservation ethic to work, confident that their voluntary efforts will not result in increased restrictions on how they use their land.

Strong partnerships such as those I have described here are the cornerstone for the Service's work and mission. By building strong partnerships and initiating early and collaborative conservation efforts, we can best conserve fish and wildlife and restore and protect the habitat upon which they depend.

The Department of the Interior and the Service appreciate your interest in these issues and thank you again for the opportunity to appear before you today. I would be happy to respond to any questions you may have.

[The prepared statement of Mr. Frazer follows:]

TESTIMONY OF GARY FRAZER, ASSISTANT DIRECTOR, ENDANGERED SPECIES, U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, ON COLLABORATIVE SOLUTIONS TO WILDLIFE AND HABITAT MANAGEMENT, BEFORE THE U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS SUBCOMMITTEE ON WATER AND WILDLIFE

April 27, 2010

Chairman Cardin and Members of the Subcommittee, I am Gary Frazer, Assistant Director for the Endangered Species program within the U.S. Fish and Wildlife Service (FWS). Thank you for the opportunity to be here today to testify on collaborative solutions to wildlife and habitat management. My testimony will focus on three innovative programs that allow the Service to partner with federal, state, and private entities to collaboratively conserve wildlife through habitat protection, restoration and management. These programs include the Coastal Program, the Partners for Fish and Wildlife Program, and Candidate Conservation within the Endangered Species Program.

The Department of the Interior (DOI) is a lead federal agency responsible for conserving and protecting the Nation's fish and wildlife resources, and the habitats upon which they depend. DOI has long recognized that successful protection, management and conservation of wildlife species depend on partnerships. Such cooperative conservation provides numerous benefits; including engaging the public and localities in stewardship, leveraging federal dollars, maintaining private property rights, and utilizing localized knowledge. Partnerships contribute significantly to our work.

Partnerships with local municipalities, private landowners, school groups, corporations and numerous other interests are important because fish and wildlife do not recognize political boundaries and jurisdictions. Partnering can avoid duplication of effort, provide for pooling of scarce resources, and promote coordinated, focused and consistent mutual efforts toward conservation and outdoor recreation successes.

For example, the FWS Coastal Program and Partners for Fish and Wildlife Program are voluntary, locally-based habitat protection and restoration programs. Through both programs, FWS works with willing partners on a landscape scale to protect, restore, and enhance priority habitats that support FWS trust species, including migratory birds, fish, marine mammals, threatened and endangered species, and species of international concern.

Through the Candidate Conservation program, the FWS, in partnership with State and Federal agencies, Tribes, private organizations, and landowners, works to reduce the threats to declining species and thus prevent the need for listing. By acting early before a species requires protection under the Endangered Species Act (ESA), DOI can maintain management flexibility for landowners and reduce the costs of recovery.

Our challenge is to apply these outstanding conservation programs within a strategic framework, so that they are integral elements of a national and international design. We are currently

building a network of partner-based Landscape Conservation Cooperatives to provide this capacity.

Coastal Program

More than half of the U.S. population lives in coastal counties that comprise only 17 percent of the contiguous United States. Coastal populations are projected to increase to 75 percent by 2025. Increasing development and corresponding human activity will put enormous pressure on coastal ecosystems. The Coastal Program was established in the Chesapeake Bay in 1985 to begin address this concern and the resulting impacts to fish and wildlife. Since its inception, the program has expanded to 23 priority coastal areas around the country, including the Great Lakes and the U.S. Commonwealths and Territories.

Through the Coastal Program, the FWS partners with coastal communities to conserve and restore coastal ecosystems for the benefit of fish, wildlife, and people. The program is designed to help conserve and recover FWS trust species by protecting, restoring and enhancing priority habitat in coastal areas.

The Coastal Program provides technical and financial support through a variety of partnerships with federal, state, and local governments, tribes, non-governmental organizations, academia, private enterprise, and private landowners to conduct coastal habitat assessments, and planning, protection, and restoration activities. One of the Coastal Program's greatest strengths is its "boots on the ground" approach to achieving conservation goals. The program is delivered through a network of locally-based field staff who possess expertise in habitat conservation and restoration. Through these partnerships, the program leverages a minimum of one federal dollar to four non-federal dollars.

The Coastal Program is implemented strategically with other FWS and partner programs, such as the National Wildlife Refuge System, the North American Waterfowl Management Plan, the National Fish Habitat Action Plan, the National Invasive Species Management Plan, and numerous threatened and endangered species recovery plans. Delivery of the Coastal Program is guided by five-year regional strategic plans that identify fish and wildlife conservation challenges, restoration priorities, geographic focal areas, and partnership opportunities. These plans are developed collaboratively with partners and integrate the goals and priorities of State Wildlife Action Plans, National Estuary Comprehensive Conservation and Management Plans, Special Area Management Plans, and other coastal ecosystem management plans.

The Coastal Program's impact in the Chesapeake Bay is indicative of its success. In the last five years, the FWS has worked with partners in the Chesapeake Bay and Coastal Bays watersheds to acquire over $17 million in federal, state, local, and private funding to protect 5,000 acres of fish and wildlife habitat; restore 2,000 acres of coastal wetlands; restore 4,000 feet of shoreline; and restore 3 miles of stream and riparian habitats; and open over 40 miles of coastal streams and rivers through dam removals. The FWS manages the Maryland Nutria Project, which has eradicated the destructive invasive exotic nutria from over 150,000 acres of wetlands. The Chesapeake Bay Coastal Program is also engaged in restoring eel passage in the Potomac River,

assessing waterfowl populations and habitat, and conducting stream restoration trainings for hundreds of conservation professionals.

A recent Chesapeake Bay success story is the Hail Cove Living Shoreline Project at Eastern Neck National Wildlife Refuge in Kent County on the Eastern Shore. The FWS, Maryland Department of Natural Resources, Ducks Unlimited and the National Aquarium lead a partnership of 20 organizations, including Vulcan Materials Company, Washington College, and Rock Hall Elementary School, to restore 1,600 feet of shoreline, protecting over 200 acres of sea grass beds and wetlands that are one of the most important wintering areas for waterfowl in the Chesapeake Bay. This project included construction of reef habitat for oysters and mussels that are important food sources for diving ducks and Striped bass. The project was the recipient of a Coastal America Partnership Award, awarded by the President.

The Coastal Program also co-administers the National Coastal Wetlands Conservation Grant Program in concert with the FWS Wildlife and Sport Fish Restoration Program. The National Coastal Wetlands Conservation Grant Program annually provides grants to coastal states to acquire and restore coastal wetlands. Since 1992, the program has awarded nearly $240 million to states to protect, restore, and enhance 260,000 acres of coastal wetlands. In 2010, the program awarded $19.2 million to support 25 projects in 11 coastal states.

Partners for Fish and Wildlife Program

In carrying out our mission to conserve, protect, and enhance the Nation's fish, wildlife, and plants, the protection and management of the habitat on which they depend is essential. Over 60 percent of our Nation's fish and wildlife habitat is in private ownership, and therefore, it is imperative that DOI look for opportunities to partner with private landowners to protect species and enhance their habitat while working cooperatively with the landowners to maintain their private property rights.

To achieve this goal, the FWS established the Partners for Fish and Wildlife Program in 1987 under the broad authority of the Fish and Wildlife Coordination Act and the Fish and Wildlife Act of 1956. The Program began in the Midwest to restore wetlands on private lands that were severely degraded by agriculture, development, and recurring droughts. In 2006, thanks to the support of Members of Congress such as Senator Inhofe, the Partners for Fish and Wildlife Act was passed by Congress (Pub. L. 109-294), codifying the FWS's Partners Program.

The Partners for Fish and Wildlife Program is a voluntary, citizen and community-based stewardship program for fish and wildlife conservation. The program provides technical and financial assistance to private landowners for habitat improvement projects that benefit federal trust species, as well as provides technical assistance to other public and private entities regarding fish and wildlife restoration on private land. The program is based on the premise that fish and wildlife conservation is a responsibility shared by citizens and government. The program works directly with private landowners and communities to protect and conserve pristine habitat, and to restore degraded wetland, stream, grassland, and upland habitats.

Like the Coastal Program, the Partners Program is implemented strategically with other FWS and partner programs. Restoration and enhancement efforts are guided by regional strategic plans and support the objectives of other Service plans and programs. The Partners Program also collaborates with U.S. Department of Agriculture National Resources Conservation Service (NRCS), other federal programs, state agencies, tribal and local governments, non-governmental organizations, the private sector, and private landowner partners. Projects are often developed at a landscape scale priority geographic focus areas to maximize program resources. Most importantly, the views and involvement of stakeholders continue to provide valuable guidance.

The voluntary landowner agreements under the Partners Program also serve to strengthen the role of citizens in the public/private natural resource conservation partnership. In addition to providing benefits for the Nation's fish and wildlife resources, these initiatives are cost-effective and stretch the federal dollar by leveraging non-FWS dollars at a ratio of four to one.

Projects range in size and scope, depending on local needs and priorities and the goals of the landowner. For example, along the Warm Creek in Teton County Idaho, the Partners for Fish and Wildlife Program is working with a private landowner, Teton Regional Land Trust, and the NRCS to address habitat improvement needs for a variety of wildlife species. This project will create prime wintering and brood rearing habitat and will protect and improve an important migration corridor for wildlife. Species that will benefit from this project include Columbian sharp-tail grouse, trumpeter swans, waterfowl and other migratory birds and a variety of other species including deer, elk, and moose.

The Partners for Fish and Wildlife Program is also working to develop Schoolyard Habitat projects. These projects provide students with a powerful example of land stewardship and provide residents and local business with opportunities to get involved in creating and maintaining wildlife habitat. Students create these projects with technical assistance from the Partners for Fish and Wildlife Program for teacher training and project guidance. Students are fully engaged, from planning and design through planting, providing every student at a school the ability to observe, learn from, and experience nature, enhancing their connection to the outdoors and instilling a sense of environmental stewardship.

The Arthur Middleton Elementary School in Maryland transformed an unused part of their schoolyard and storm drain into a wetland that can also be used as an outdoor classroom. More than 600 students planted over 13,000 Maryland native plants, creating a wetland that will also be used as a teaching area, which will allow the students to conduct experiments, create art or write essays. The project provides a vegetative buffer and integrates into the County's effort to reduce pollutants that runoff from impervious surfaces into local waterways and the Chesapeake Bay. More than 600 schools have been involved in this program nationwide.

The Partners for Fish and Wildlife Program has grown tremendously since its inception and is recognized as a model in the new era of collaborative conservation. Over 42,000 private landowners throughout the country are currently involved with the program. The voluntary, incentive-based approach to restoring habitat on private lands has led to the restoration of more than 3 million acres of upland habitat and 975,000 acres of wetlands.

Candidate Conservation

Candidate species are those plant and animal species for which the FWS has enough information regarding their biological status and threats to propose protection under the Endangered Species Act (ESA), but whose listing is precluded by higher priority listing activities. Candidate species are not subject to the legal protections of the ESA. Therefore, DOI focuses on proactive conservation efforts for these species that can, in some cases, eliminate the need to list them under the ESA.

Implementing conservation efforts before species are listed and their habitats become highly imperiled increases the likelihood that simpler, more cost-effective conservation options are available and those conservation efforts will succeed. By taking early conservation actions before a species is listed, resource managers and property owners have more flexibility to manage these species and use their land.

One approach that is proving successful in benefiting candidate species is the development of formal voluntary conservation agreements. The FWS employs two types of volunteer agreements, Candidate Conservation Agreements (CCAs) and Candidate Conservation Agreements with Assurances (CCAAs). CCAs are agreements between the FWS and one or more parties who voluntarily commit to implement specific actions designed to remove or reduce threats to the covered species on federal and non-federal lands. To date, the FWS has entered into over 100 CCAs over the past 15 years, primarily with other federal agencies and states. Over 160 species of plants and animals have benefited from these agreements. Some CCAs have been sufficiently effective in removing threats that listing the covered species was ultimately not necessary. Federal, state and local governments, as well as tribes, private property owners, and other entities are currently participating in CCAs.

Conservation of candidate species on non-federal lands is also essential because many species rely heavily, or even entirely, on such lands. CCAAs address the concern of these landowners about potential future land use restrictions. A CCAA provides non-federal property owners who engage in voluntary conservation activities for a particular species with the assurance they will not be required to implement additional conservation measures. Should the species become listed in the future, additional resource use limitations will not be required unless they agree to such additional conservation actions. Currently, there are more than 100 CCAs signed with the FWS in 21 states and 15 multi-state agreements.

Both CCAs and CCAAs can apply to a single species or multiple species and vary widely in size, scope, structure, and complexity, and in the activities they address. These voluntary agreements reduce or remove identified threats that are imperiling the identified species. Examples of beneficial activities include reducing habitat fragmentation rates, restoring or enhancing habitat, expanding or establishing habitat connectivity, reestablishing populations or augmenting existing populations, and control of competitive, invasive plants or animals.

Recently the National Park Service and FWS prepared a CCA to cooperate on the conservation of Guadalupe fescue. Guadalupe fescue is a rare grass found only on one site in the United States - at Big Bend National Park in Texas. The agreement calls for monitoring the known population,

establishing a conservation team of experts for the species, educating staff and visitors, and monitoring and controlling exotic plants and animals. The plan also calls for cooperating with Mexico to conserve its known populations and search for new ones. Studies to determine the possible need for prescribed burns or other management activities to maintain and improve habitat will be conducted. The agreement also calls for performing genetic studies. In situations where a candidate or at-risk species is found on both non-Federal and Federal land, a CCA and a CCAA can be used in a complementary fashion to address threats and management needs on both ownerships. An example is the innovative New Mexico agreement for the lesser prairie-chicken and the sand dune lizard between the FWS and the Bureau of Land Management. The agencies and the Center of Excellence for Hazardous Materials Management are administering CCAs for oil and gas lease holders on federal lands and CCAAs for state and private landowners to benefit these two species. Partners are now taking actions to reduce or eliminate threats to both species on all land ownership types. In return, private landowners receive assurances that their operations will continue regardless of whether the species come under the protection of the ESA, and operators on federal lands will receive a greater degree of certainty that their operations will not change.

Several examples of CCAs and CCAAs include:

- In Idaho, the Soulen Ranch is proving that sheep and cattle can coexist with the southern Idaho ground squirrel on 43,000 acres. This 2002 CCAA with a single family led to a programmatic CCAA in 2005 for the same species that will facilitate other ranchers in four counties providing conservation management. Also in Idaho, the Idaho Department of State Lands has a 22-year CCAA for the Columbia spotted frog, another candidate species.

- On February 12, FWS approved the nation's first CCAA for the greater sage grouse in Washington, Adams, Gem, and Payette Counties, Idaho. This CCAA will be administered by the Idaho Department of Fish and Game and was the result of a cooperative effort undertaken by a voluntary "local working group" established to help conserve the sage grouse.

- The Oregon Department of Fish and Wildlife has a 20-year CCAA for the Columbian sharp-tailed grouse on 156 acres of land they manage. Also in Oregon, Three Mile Canyon Farms has an agreement for 25 years for three listed species and one candidate, the Washington ground squirrel on 95,000 acres.

- The State of Montana has a 50-year programmatic CCAA for the Western cutthroat trout on private land and is enrolling multiple ranchers under this umbrella agreement. Also in the State, multiple landowners are participating in a 20-year agreement for the fluvial Arctic graying, a fish, on over 13,000 acres along the Missouri River. The Service's Partners for Fish and Wildlife Program has been a major facilitator of this agreement which is receiving substantial funding from the Natural Resources Conservation Service.

- The Three Forks CCAA will benefit the Colorado River cutthroat trout in Colorado and Wyoming for 10 years on 27 acres. The Four W Ranch in Wyoming has a 10-year

agreement for three listed bird species and a candidate mammal species, the black-tailed prairie dog, on 3370 acres.

Candidate Conservation Agreements are most successful when the threats that lead to candidate status are clearly understood and addressed early enough so that practical, economically feasible solutions can be implemented by interested land managers and owners. These voluntary cooperators must be willing to address threats, modify their management actions, and implement necessary conservation activities on the lands they control. Only in a few instances are the efforts of a single party sufficient to preventing listing of a candidate species.

Regional or range-wide conservation efforts that identify threats and essential management needs of a species are more likely to be comprehensive enough to prevent listing. Time, resources, and commitment are needed in order for candidate conservation agreements to be successful.

Safe Harbor Agreements

Safe Harbor Agreements are voluntary agreements with private and other non-federal landowners to improve habitat or otherwise aid the conservation of endangered or threatened species. Currently, the several hundred landowners who participate in these agreements have enrolled more than four million acres in such agreements. Many of these agreements are programmatic in nature, enrolling multiple landowners in programs administered by state agencies, resource conservation districts, conservation organizations, and other partners. Safe harbor agreements have contributed significantly to the ongoing recoveries of species such as the northern aplomado falcon and black-capped vireo in Texas, and the red-cockaded woodpecker in the Southeastern United States.

CONCLUSION

Strong partnerships are a cornerstone of DOI's work and mission. DOI welcomes the myriad of partners who share common goals and interests in conserving the nature of America. By building strong partnerships and initiating early and collaborative conservation efforts, DOI can best conserve endangered and threatened species and restore and protect the habitat upon which they depend.

Chairman Cardin and Subcommittee Members, DOI remains committed to building partnerships and collaborations with other federal, state, tribal, and local agencies, and other partners. We appreciate your interest in these issues and thank you again for the opportunity to appear before you today. I would be happy to respond to any questions you may have.

Senator Benjamin L. Cardin

1. As was noted in the written testimony, the Service has several programs involved in coastal habitat management and restoration. Will you describe in more detail the unique role the Coastal Program plays and how its efforts are coordinated with other programs within the Service as well as at EPA and NOAA working on coastal habitat restoration?

The U.S. Fish and Wildlife Service's (Service) Coastal Program was established in 1985 to integrate the Service's activities in high-priority coastal watersheds. The Service has several grant programs involved in coastal habitat protection, restoration, and management such as the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Act Grants. In contrast, to these grant programs the Coastal Program is a direct Federal assistance program that is primarily delivered through cooperative agreements. The Coastal Program works with partners on a voluntary basis to carry-out coastal habitat protection and restoration projects. By providing technical and financial assistance, the Coastal Program collaborates with partners to design and implement conservation projects that benefit Federal trust species.

EPA and NOAA also have programs to support coastal habitat restoration that include nationally competitive grant programs. The Service takes a comprehensive landscape-scale approach to conservation design and delivery that can be described as community-based. The Coastal Program is delivered through locally-based field staff with restoration expertise. These staffers see a project through from start to finish. Implementation of the Coastal Program is guided by regional and watershed strategic plans developed collaboratively with Federal, State, local and non-governmental partners (e.g., other Service programs such as the Endangered Species Program and the Joint Ventures, the 28 National Estuary Programs funded by EPA, State Departments of Natural Resources, The Nature Conservancy, NOAA, etc.) These plans integrate the priorities and goals of partners, and include geographic focal areas in the 23 coastal areas where the Coastal Program works. The Coastal Program field staff is also engaged in working with numerous regional teams, where they bring the Service's coastal protection and restoration priorities to the broader conservation and coastal management communities.

2. The Coastal Program provides critical assistance to our coastal communities that are feeling the effects of climate change and its importance will only increase as these impacts worsen. Our coasts are the nation's first line of defense against the impacts of a changing climate including sea level rise and stronger storms. Yet, the Department of Interior did not include the Coastal Program in its climate change initiative. Can you assure me that the Coastal Program will be included in future Interior initiatives including the Landscape Conservation Cooperatives and the Great Outdoors Initiative recently announced at the White House?

Congress provided in FY 2010, $20 million for the Climate Change Adaptation Initiative. The funds will be used to stand-up the first 9 of 21 Landscape Conservation Cooperatives (LCCs). LCCs are conservation-science partnerships between the Service, federal agencies, states, tribes, NGOs, universities, and other entities. They are fundamental units of planning and science capacity to help us carry out biological planning, conservation design and delivery, monitoring, and research we need to inform a strategic response to climate change. The Coastal Program works with partners to deliver conservation at the landscape scale. The LCCs will help the Coastal Program to accomplish the right things, in the right places, at the right times, based on sound science. The Coastal Program's emphasis on community-based conservation and collaboration, leveraging non-Federal and private sector funds, flexibility to work on public and private land, and schoolyard habitat program embodies many of the core principles of the Great Outdoors Initiative.

3. Please provide the subcommittee with a state by state funding history for the Coastal Program.

The Coastal Program supports 23 offices in high-priority coastal areas in 15 of the 36 U.S. coastal States, Commonwealths and territories. Thus, not all coastal States have a Coastal Program office, however, some offices focused on large coastal ecosystems service more than one state. The Service allocates Coastal Program funds to the Regions and the Regions distribute their allocations to the 23 Coastal Program field offices to address regional priorities. Below is a chart showing the Regional allocations FY 2006-FY 2010.

	R1	R2	R3	R4	R5	R7	R8	R9	Total
FY06	1,769,828	1,256,204	682,896	2,780,403	3,783,787	685,826	1,028,659	892,000	12,879,602
FY07	1,836,024	1,299,101	722,945	2,908,458	3,906,207	724,425	1,089,046	923,409	13,409,615
FY08	1,866,750	1,278,478	734,137	2,792,449	4,027,296	733,663	1,108,564	1,398,097	13,939,433
FY09	1,932,522	1,324,107	777,761	2,923,857	4,147,752	775,309	1,174,278	1,552,347	14,607,934
FY10	2,039,669	1,392,146	840,462	3,118,712	4,334,753	835,504	1,720,469	1,496,573	15,778,287

R1: WA, OR, HI, GU, AS, CNMI
R2: TX
R3: WI, MI, IL, IN, OH
R4: NC, SC, GA, FL, MS, AL, LA
R5: ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA
R7: AK
R8: CA
R9: Washington Office

Senator James M. Inhofe

1. As I mentioned in my opening statement, the Partners Program has received several million dollars newly designated for "assistance in response to climate change." The President's Budget for FYII requests another $2 million of Partners Program funding for the same purpose. Can you please provide some examples of

"climate change adaptation" projects undertaken with grants from the Partners Program, and how these differ from past grant awarded projects? Have new project eligibilities been created to accommodate this new funding set-aside?

In FY 2010 the Partners for Fish and Wildlife Program received $6 million in funding to assist in responding to climate change. Partners for Fish and Wildlife Program habitat restoration projects represent a key component of a strategic, on-the-ground response to climate change, enhancing ecosystem and population resiliency to predicted changes. The requested increase of $2 million in FY 2011 will be targeted at delivering projects on private lands that provide adaptation to and mitigation for climate change. These projects implement cost-effective measures to restore, enhance, and manage fish, wildlife and plants and their habitats. Emphasis will be placed in focus areas identified in the strategic planning process. These projects will be designed to help achieve population and habitat objectives established at landscape scales for species the Service considers most vulnerable and sensitive to climate change.

This increase will enable the Partners for Fish and Wildlife Program to expand implementation of habitat restoration and enhancement projects in cooperation with private landowners within Landscape Conservation Cooperatives created through the Service's Climate Change program. To accomplish this, the Program will continue work with the States and Territories in support of their Comprehensive Wildlife Conservation Strategies, and with universities and other partners to assess the benefits of habitat restoration and enhancement practices on private land for the benefit of Federal Trust Species.

For example in Oklahoma, Partner funds were used to control invasive species in Lesser Prairie Chicken habitat through individual landowner agreements and through a cooperative agreement with the Oklahoma Department Wildlife Conservation. Removal of invasive juniper improves the sustainability of the native grassland as habitat for the Lesser Prairie Chicken by reducing habitat fragmentation, increasing carbon sequestration rates, and reducing ground water transpiration which contributes to maintaining ground water and live water streams. In Wyoming, funds have been targeted at work on river and riparian restoration projects that will help to reduce the temperature of cold-water streams to benefit high priority native cutthroat trout species that may be threatened by warming water temperatures.

Climate change projects are cooperative, partnership-based projects typical of the Partners Program habitat conservation business model and thus it was not necessary to create new eligibility requirements to accommodate climate adaptation funding. What differentiates these projects is that they are directed toward species that are most likely to be impacted by climate change. i.e., the priority of species most sensitive to climate is raised.

Senator CARDIN. Well, Mr. Frazer, first thank you for your testimony, but more importantly, thank you for your service, your longstanding service on these issues. We very much appreciate that.

In your statement, you talked about one of the important coastal program in Maryland, and we could duplicate that in many other parts of the Chesapeake Bay and the watershed. It has been a critically important partner in our Chesapeake Bay efforts. The wetlands are critical to our efforts to restore the Chesapeake Bay and to maintain the wildlife balance. So I thank you for bringing that up.

I want to talk a little bit about the need for authorization. The Coastal Program is not authorized. The Partners for Fish and Wildlife Program was authorized in 2006. From a congressional point of view, authorization allows us to speak with definitive authority as to what we intend the program to be and to give it some permanency.

But from the point of view of the Administrator, could you tell us how the authorization of the Partners for Fish and Wildlife Program in 2006 has worked? And whether there would be an advantage to get congressional authorization for the Coastal Program?

Mr. FRAZER. The Service has found that the codification of support for the Partners for Fish and Wildlife Program has helped to, first, institutionalize the program within the organization, as you said, but also clarify the congressional intent; helped us to focus our budget requests and our program delivery along those lines; and also to help us respond to requests from parties to have us take the program in different directions and to respond to other things that may not be central to the core mission.

So we have found actually that organic legislation, that authorizing legislation helped us to maintain the focus and priorities that we had and that Congress established for the program.

Senator CARDIN. I think that is helpful. We are now looking at an authorization for the Coastal Program, and we will be reaching out to get not only the input from Members of the Senate and the House on this, but also the Administration to see whether we can't establish the more permanency of the program through an authorization. So we invite your participation in that.

Mr. FRAZER. We would be happy to work with the Committee on that.

Senator CARDIN. Thank you.

I want to talk a little bit about the candidate conservation agreements. This was added to the Endangered Species Act as a common sense way to try to work out private agreements that could preserve wildlife diversity and perhaps even avoid the need for listing if we can do enough private conservation agreements. It was looked upon, as you suggested, as another tool in the tool box in dealing with protecting diversity in the species in this country.

What I want to just explore a little bit, if I might, is how you go about goal setting and accountability as you look at these candidate conservation agreements to make sure that they in fact carry out the congressional intent of preserving diversity and are not used just as a way of avoiding the need to list where listing is essential.

Mr. FRAZER. When we enter into discussions with any landowner or land manager on developing either a candidate conservation agreement or a candidate conservation agreement with assurances, it is with biological goals in mind up front, to address the threats that those candidate species face, to the extent that we understand them, and to reach agreements on a management of individual parcels such that if all habitat within the range of the species was managed in a similar manner, that there is at least a strong likelihood that those threats would be remediated such that the species would no longer be facing the need for listing.

So we have those clear biological goals and kind of a conservation design in mind before we solidify any agreement with a landowner, recognizing that individual landowners are contributing their slice, their piece to that overall effort. But it is important for us to have those clear expectations and objectives in mind.

Senator CARDIN. And I take it based upon that science available, these are not political judgments. These are scientific judgments.

Mr. FRAZER. They are not. And because these are candidate species, oftentimes we don't know everything that we want to know, and so we are using the best information available and exercising professional judgment as well as creativity in developing these agreements.

Senator CARDIN. So where is the accountability? What type of review process is in place to make sure that the expectations are reached?

Mr. FRAZER. Well, it is an explicit agreement between the landowners and the Fish and Wildlife Service. The CCAAs, the conservation agreements with assurances, actually have associated with it a permit that would become effective once the species is listed. And so there is a regulatory aspect as well. And so certainly the Service would look to ensure that the conservation agreement was carried out, consistent with the original terms, before that permit would become valid.

We have not had issues of enforcement or lack of compliance as a significant problem in our delivery of the program thus far. We find in general that landowners are very supportive of doing work. They want to have assurance about what their future commitments and liabilities will be, but they are strong land stewards and find these tools to be helpful to them to understand what it is that they can do to contribute to conservation, and then what return the commitment from the Fish and Wildlife Service will be.

Senator CARDIN. Thank you very much.

Senator Inhofe.

Senator INHOFE. Thank you, Mr. Chairman.

I appreciate you have been there for a long time, so you have worked in these programs, and that helps us out a little bit up here. You looked at things in the past that have worked and worked very well. My concern is if something is working real well, I don't want to change it. And you happened to be involved in something that is working well.

You made a brief reference to some of the things like Safe Harbor agreements. Would you like to elaborate on that or give us any examples that might be helpful?

Mr. FRAZER. We have a number of successful examples of safe harbor agreements, one most recently that we entered into is in the State of Idaho, where the Hixon family enrolled 7,800 acres of their lands on the Ox Ranch into a 10-year agreement to benefit the species. It is one that serves to address conservation of this small ground squirrel, with ongoing ranching.

We find in many cases the interest of ranchers to stand their ground on the land, be able to run economically viable ranching operations is very compatible with the long-term conservation of listed species.

Senator INHOFE. So what you are saying is, if they are doing it, and it is successful, that is where the safe harbor would come in. You are not going to interfere with something that is working well.

Mr. FRAZER. Right, and there may be some cases in which they would manage their land in a slightly different way, put in a rotational grazing system, do some restoration of water resources of other sorts of things that are very much consistent with the ranching operation, but that will also benefit listed species, and that would bring those in reconciliation. And then to have assurance that those programs, those activities will be in compliance with the Endangered Species Act.

Senator INHOFE. And that is exactly what we experienced in 2005 in our hearing. Because, you know, I think you would agree with me, landowners want to do this. They are interested in the conservation, whether it is species or anything else, as opposed to someone saying you are not going to do it unless we force you to do it.

Mr. FRAZER. It has.

Senator INHOFE. I mentioned that I was concerned that several millions of dollars have been newly designated for "assistance in response to climate change." What climate change are you talking about, or are they talking about? I am not blaming you for this because you inherited this, so tell me how you are spending those millions of dollars.

Mr. FRAZER. Senator, as you know, we are facing some very difficult and constrained budget environments, and so the Fish and Wildlife Service last fiscal year and in the current fiscal year request has had to put together some pretty tightly constrained requests.

The fact that we included funding in our budget request for the Partners Program to support climate change adaptation I think is really a reflection about the utility, the value and the performance of that program and the importance of habitat management on private lands to accomplish the conservation goals of protecting wildlife and maintaining wildlife into the future in the face of a rapidly changing physical environment.

Senator INHOFE. Well, yes, if it is rapidly changing, and that is my point. I won't ask you, because there isn't time to get into this, but for the record in writing if you would respond as to how specifically you are spending that money, and to what you are observing in terms of rapid changes and all that. Would you do that?

Mr. FRAZER. We would be happy to.

Senator INHOFE. That would be good.

One of the things you are doing real well, in my experience, and I keep lauding these compliments on what is going on in your department, is working with the State people. My State people tell me that you have a relationship that is very, very good and very cooperative. Would you agree with that? How do you happen to be doing this? Because I know that I hear just really good things from all of our State people on how this is being run.

Mr. FRAZER. We do work very hard. The State Fish and Wildlife Agencies are the other entity in our larger governmental system that really has responsibilities, like the Fish and Wildlife Service, for conservation of fish and wildlife. They, in most cases, have actually the management authority for many of the species that we deal with in the Endangered Species Act before they actually get listed.

They are great partners in every aspect of any other program that we do. We work very hard through the Association of Fish and Wildlife Agencies and through other just personal contacts to communicate effectively, to make sure there are no surprises and to talk about our common goals.

Senator INHOFE. And that is the partnership we are talking about. You have the Federal, you have the State and you have the landowners, the stakeholders. I think that is working very well.

Just real briefly, are there any bureaucratic obstacles out there that have inhibited your fully implementing your Partners Program?

Mr. FRAZER. Well, Senator, we can always use more resources to support more partnerships and such. But in terms of the bureaucratic obstacles, this program was designed from the very inception to be creative, to be flexible, to be able to be responsive to the need and has done a tremendous job in doing so. It continues to reinvent itself and take new directions every day.

Senator INHOFE. OK. Thank you very much.

Thank you, Mr. Chairman.

Senator CARDIN. Senator Whitehouse.

Senator WHITEHOUSE. Mr. Frazer, I have a couple of questions that relate back to my home State of Rhode Island. As you know, Rhode Island's rivers were our workhorse in the industrial revolution. A lot of damage was done to them in that role, and now we are developing them as a resource for a modern economy with an important quality of life component for businesses that seek to relocate to Rhode Island and bring jobs there.

Restoring the rivers is a real priority, and things like fish ladders are very important. Your program has supported a fish ladder at the Palmer River, which is one of the last two shad runs off of the Narragansett Bay, and projects like that that are actually on the ground we find very helpful and tangible and real. And I am wondering what part of the budget goes to those sorts of projects? If you have a hard dollar number and a percentage number, I would be interested in that. And if you don't have it off the top of your head, I would be happy to have you take that back as a question for the record.

Mr. FRAZER. I will have to get back with you. We do, through the Coastal Program, those boots on the ground, those biologists that really are trying to identify the needs and developing the conserva-

tion design and bringing partners together. And those partners involve multiple sources of funding even within the Fish and Wildlife Service.

So there are several different funding lines that are in many cases brought together to support some of those fish passage projects that you referred to. We would be happy to try to give you a good estimate of where those dollars are and how much.

Senator WHITEHOUSE. That would be helpful. Fish passages, eel grass beds, those sorts of things that are really tangible make a significant difference and I appreciate you getting back to me on that.

It means a lot to Rhode Island. Over the weekend, I was at a dam on the Providence River in East Providence with a guy named Keith Gonzalez, who has organized a group of people. There must have been 30 or 40 there that day to literally stand in the water below the falls with nets and scoop herring. And then a fireman's bucket brigade style passed the net up the dam and around and into the slack waters behind the dam so that the herring can move on to their traditional spawning grounds. The tide wasn't quite right for it, but they wanted to do it as an activity around the 40th anniversary of Earth Day.

So these things really matter to us, and I would appreciate all of the attention that you can give to them. And we have an awful lot of dams in Rhode Island from times gone by that could use this attention.

The other question I have for you has to do with the Department of Interior Climate Change Planning and Funding Initiative. We don't find the Coastal Program explicitly included in DOI's Climate Change Initiative. And for the reasons I spoke to at the beginning of the hearing, that is quite a concern.

Rhode Island, like Maryland and other coastal States, not only suffers the terrestrial effects of climate change. We see it in changing habitat patterns. We see it in our orchardmen seeing winter blooms, potentially putting at risk their crops. But we also have to face the coastal consequences of climate change, and it is a little bit discouraging if the Coastal Program is being overlooked in that context, because for a coastal State, the coastal effects of climate change could actually be the most severe ones.

Even if you get a few inches of sea level rise, in Rhode Island, for instance, Narragansett Bay is a triangular wedge driving northwards up into Rhode Island, and just a little bit of additional sea level, if it is all being driven northward by a storm or hurricane and it starts piling up on itself, by the time it hits the Providence hurricane barrier, that extra inch or so is now stacked up to the difference between a bad rainy day in downtown Providence and another flood and another set of plaques on our downtown buildings showing here is where the great flood of whatever year brought the waters to.

So I would encourage you to find a way to put the Coastal Program into that initiative if it is not in it already.

Mr. FRAZER. Senator, I think that that is a concern that many program people within the Fish and Wildlife Service have, but it is a function of how the Service is trying to build our climate change capabilities here. We are really focusing upon building an

organizational capability that will support all programs in the Fish and Wildlife Service to do landscape level biological planning and conservation design.

The reality is that the Coastal Program was one of the first entities that we had in the organization that actually had that as part of their core mission. So I think that the money that we are investing here in building that larger capability and reaching out to other partners—State, NGO, other Federal agencies—is going to very much involve our Coastal Program folks. And those folks are going to inform those efforts tremendously.

And then the other significant investment is in science, to address climate change impacts and needs. And again, those are needs and benefits are going to accrue to the Coastal Program I think disproportionately to some others because of the character and nature of the environment they work in and the mission that they have.

We don't have a specific label for the Coastal Program. We expect that those investments that we are making for climate change are going to benefit all parts of the organization, and the Coastal Program in particular I think is going to be a very large part of that.

Senator WHITEHOUSE. I am glad to hear that. Thank you.

Senator CARDIN. Thank you, Senator Whitehouse.

Let me just follow up on your point about these fish ladders and invite you up to the Conowingo Dam on the Susquehanna. As you know, Susquehanna headwaters are in Cooperstown, New York, and flow into the Chesapeake Bay, a major source of fresh water, the major source of fresh water for the Chesapeake Bay. It is also a great area for spawning of fish.

The problem is the Conowingo Dam would stop those fish from returning for spawning, and a fish elevator was put in. And it is an incredible sight to see, and I invite you up to take a look at it, because you have dams and this may be one of your answers. It is working very well on the Susquehanna. We always try to help our friends from Rhode Island.

It is an automatic system. It is an elevator. I don't know the biology—maybe Mr. Frazer can help me on it— but the fish go into the water and are then picked up like a traditional elevator and they swim out upstream. It works.

Mr. FRAZER. It does.

Senator CARDIN. But it is an incredible restoration of the Susquehanna.

Mr. FRAZER. We are doing many much smaller and less technologically complex fish passage projects up in Rhode Island streams. Our Directorate met there a couple summers ago, a couple of springs ago, actually, and went out to see some of the projects. And to see alewife now crowding a small stream that they had been excluded from for many years is a great sight to see.

Senator CARDIN. Mr. Frazer, thank you very much for your testimony and for your work. We look forward to continuing to work with you on this.

Mr. FRAZER. Thank you very much.

Senator CARDIN. We will now turn to our second panel. I am going to introduce the first two witnesses, and then turn to Senator Inhofe for a witness from his State.

First, Mr. Jeffrey Benoit, President and CEO of Restore America's Estuaries, an alliance of 11 community-based conservation organizations that work to restore and protect estuary habitats. Mr. Benoit began his career as a coastal geologist and went on to become Director of NOAA's Office of Ocean and Coastal Resource Management. Mr. Benoit's 28-plus years of leadership in coastal conservation make him an invaluable resource for us in protecting our coastal lands in Maryland and beyond.

I would also introduce Ms. Robyn Miller. We welcome Ms. Miller, Conservation Manager from The Nature Conservancy in North Idaho. You have come a long way, so we thank you for making the effort to share your expertise in this area and we look forward to hearing your testimony.

With that, I would recognize Senator Inhofe.

Senator INHOFE. Thank you.

I have already mentioned a couple of things about Ms. Straughn. It is very unusual, Debbie, that we have the witness coming back. And so it shows that we hold you in a very high regard.

I say to my panel members that Ms. Straughn, she headed up the Outdoor Classroom thing at a school called Deer Creek, and it was so well done that she has now moved over to the current Grove Valley Elementary School and is doing the same thing. But to show you the cooperation we are getting, I hope in your opening statement you will touch upon what is happening with Tinker Air Force Base, how they are working in here with you also.

And so this really is a partnership in what is going on, so she has done a great job, and now we are just expanding her talents to other institutions.

Senator CARDIN. Thank you.

We will start with Ms. Miller.

STATEMENT OF ROBYN MILLER, INLAND NORTHWEST CONSERVATION MANAGER, THE NATURE CONSERVANCY

Ms. MILLER. Good morning, Mr. Chairman and members of the Subcommittee. On behalf of The Nature Conservancy, I appreciate the opportunity to provide testimony on collaborative approaches to habitat and wildlife management.

I am Robyn Miller, Conservation Manager for The Nature Conservancy in northern Idaho. And today my comments are going to focus on three areas. Why collaboration is a valuable tool for fish and wildlife habitat management. I will provide an example of a collaborative partnership in Idaho called the Clearwater Basin Collaborative, and also mention a couple of programs of the U.S. Fish and Wildlife Service that support local collaborative efforts.

The Nature Conservancy is an international nonprofit organization that is dedicated to the conservation of biological diversity. Our mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Our on the ground conservation work is guided by science and occurs in all 50 States and 35 other countries.

Our science has shown that there is great overlap between rural landscapes where people live and work and priority areas important for fish and wildlife. Even in a State like Idaho with large

tracts of public lands, it is the private working lands, the farms, ranches and forests, that offer disproportionate value for wildlife.

In these landscapes, the fate of wildlife and the fate of our rural communities are often intertwined. Therefore, effective conservation must find a way to address the needs of both the human and natural communities.

True collaboration is not easy, and it is not quick, and frequently is it quite humbling. However, the results of collaboration can and should be conservation that takes a broad view and sees humans as an integral part of the landscape and provides more widely accepted, and hence stronger protections for fish and wildlife.

My written statement provides you with several concrete examples of how this works. Today, I am going to highlight one of these collaborative efforts in Idaho, the Clearwater Basin Collaborative.

The Clearwater Basin in north central Idaho is one of the most biologically rich and diverse drainages in the Columbia Basin. It supports over 19 native fish species and 340 wildlife species. In 2008 Senator Crapo convened the Clearwater Basin Collaborative and continues to play a key role in fostering dialogue to address the natural resource challenges of this spectacular landscape.

For the past 2 years, representatives of local government, the Nez Perce Tribe, timber industry, recreation, conservation organizations, and economic development have come together working toward broad-based solutions to preserve our rural economies, protect our intact landscapes, and restore healthy forest ecosystems for fish and wildlife.

I can tell you that sitting at the table with the Clearwater Basin Collaborative is an incredibly powerful experience. It is moving to see people who have literally spent decades fighting each other, coming together and instead building trust around a vision for the landscape, a vision of healthy, resilient forests, clean rivers, ample opportunity for recreation, and thriving local communities. The challenges are great, but it is our commitment to this broad vision that ensures our collective success.

Last, I would like to highlight two programs of the U.S. Fish and Wildlife Service that also support collaborative efforts on the round. We heard some of that from the previous witness. The National Coastal Wetlands Conservation Grant Program is a competitive grant program providing support to collaborative partnerships focused on the acquisition, restoration and enhancement of coastal wetland habitats. Although we don't have any coastal wetland habitats in Idaho, The Nature Conservancy has been successful in other areas of the country, and my written testimony talks about some of those examples.

Likewise, the Partners for Fish and Wildlife Program is based on the premise that fish and wildlife conservation is a responsibility shared by citizens and government. It has exemplified cooperative conservation as an innovative, non-regulatory voluntary partnership program that helps private landowners restore important fish and wildlife habitat. Again, examples of how our organization has been involved with that program are included in my written testimony.

Thank you again for the opportunity to talk about our experience working collaboratively to create solutions for fish and wildlife

management. Collaborations are far from perfect, but they are essential in developing strategies that are adapted to local conditions, gain broad community support, and ultimately produce more sustainable and more effective outcomes for fish and wildlife.

Thank you.

[The prepared statement of Ms. Miller follows:]

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Statement of Robyn Miller
Conservation Manager, North Idaho
The Nature Conservancy
Before the Subcommittee on Water and Wildlife
Committee on Environment and Public Works
April 27, 2010

Mr. Chairman and members of the Subcommittee, on behalf of The Nature Conservancy I appreciate the opportunity to provide testimony on collaborative solutions for wildlife and habitat management.

I am Robyn Miller, Conservation Manager for The Nature Conservancy in North Idaho. My comments today will draw from my experience serving on the Steering Committee for the Clearwater Basin Collaborative, which has brought together community, timber industry and conservation leaders. Our shared goal is to conserve and restore the ecological and economic health of a four million-acre watershed in north central Idaho. Senator Crapo has played a key role in convening and fostering this dialogue.

My testimony will focus on three areas:

- Examples of our experience participating in collaborative partnerships for wildlife conservation in Idaho and Montana;
- Critical elements of successful local wildlife conservation partnerships; and
- Programs of the U.S. Fish and Wildlife Service (USFWS) that support local collaborative efforts, such as Partners for Fish and Wildlife Program and the National Coastal Wetlands Conservation Grant Program, with examples of projects in Maine, Maryland, Vermont and Washington.

The Nature Conservancy

The Nature Conservancy (TNC) is an international, nonprofit organization dedicated to the conservation of biological diversity. Our mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Our on-the-ground conservation work is carried out in all fifty states and in 35 other countries and is supported by approximately one million individual members. Our conservation work is guided by science.

The Value of Local Solutions for Wildlife Conservation

The Nature Conservancy's experience conducting biological surveys across the continental United States has documented the overlap between rural landscapes where people live and work and priority areas important to wildlife. Even in a state like Idaho, which has large tracts of public lands, private working lands—ranches, farms and forests—offer disproportionate value for wildlife.

In these landscapes the fate of wildlife and the fate of rural families and communities are intertwined. Successful wildlife conservation on private working lands depends on our ability to accomplish two critical objectives. First, lands that currently support key wildlife populations should remain in ranching, farming and forestry uses and not be converted to other uses that leave little room for wildlife. Second, we need to provide incentives to landowners willing to implement land management practices that meet the needs of wildlife. This may be as simple as building wildlife friendly fences that do not cut off animal migration corridors or as complex as prescribed burning in landscapes that are adapted to natural fire. In other words, effective conservation must find ways to address the needs of both the human and natural communities. Collaborative processes accomplish just that.

Examples of Collaborative Partnerships for Wildlife and Habitat Management

Clearwater Basin Collaborative, Idaho

The Clearwater River in north central Idaho flows west from the Bitterroot Mountains along the Idaho-Montana border, and joins the Snake River at Lewiston, Idaho. The Clearwater Basin is one of the most biologically rich and diverse drainages in the Columbia Basin supporting more than 19 native species of fish and 340 terrestrial wildlife species.

In October 1805, the Lewis and Clark Expedition descended the Clearwater River in dugout canoes, putting in at "Canoe Camp," five miles downstream from Orofino, Idaho. Today, the same rugged mountains and rivers that Lewis and Clark witnessed continue to support diverse native wildlife, world-class fisheries, and the local economies. However, management of this habitat has long been contentious among government agencies, conservation groups, timber companies, and local communities creating an environment where few interests feel they are achieving their goals. This divisive and litigious atmosphere is putting the health and viability of both our communities and forests at risk.

In 2008, Senator Mike Crapo (ID) convened the local Clearwater Basin Collaborative (CBC) to address the wildlife and natural resource needs of this spectacular landscape. For the past eighteen months, nearly 25 individuals representing local government, the Nez Perce Tribe, timber industry, recreation, conservation organizations, and economic development have come together looking for broad-based solutions that preserve the rural economies, and restore healthy forest ecosystems for fish and wildlife.

While the Clearwater Basin Collaborative aims to address a broad range of interests, the long term viability of the Basin's fish and wildlife are central to its vision. For example, the legendary elk herds of the Clearwater Basin have been in steep decline over the past two decades. All members of the CBC agree that using tools such as prescribed fire and timber management to protect and restore elk habitat are vitally important to the future of this culturally important species. Likewise, the salmon, steelhead, and native trout of the Clearwater Basin hold great value for the Nez Perce Tribe and all the communities in the Basin.

Within the next year, the Clearwater Basin Collaborative will come forward with a blueprint that will seek to sustain the local timber industry, protect intact forests, and implement landscape-scale restoration activities to enhance fish and wildlife habitat.

Owyhee Initiative, Idaho

Owyhee County covers five million acres in the corner of southwestern Idaho and is one of the largest intact expanses of sagebrush habitat remaining in the United States. Home to the Shoshone-Paiute Tribes and generations of ranching families, it sustains important populations of sage grouse, redband trout, bighorn sheep, mountain lions and mule deer. Owyhee County has also been at the center of increasingly sharp conflicts over wildlife habitat, public lands grazing, and motorized recreation.

In 2001, the Owyhee County Commission had the courage and vision to break this pattern of conflict and litigation. The County convened a group of ranchers, Tribal leaders, recreationists and conservationists with the ambitious goal of developing a plan to sustain "a flourishing community of human, plant and animal life." Senator Crapo has advised and championed the Owyhee Initiative from its outset and continues to play a key role as we move toward implementing that vision.

The Owyhee Initiative achieved a remarkable victory in March, 2009 with the passage of the Owyhee Public Land Management Subtitle of the federal Omnibus Lands Act. The Act created Idaho's first wilderness and wild and scenic river in nearly thirty years. Just as significant, the Act establishes innovative approaches for managing off-road vehicles, protecting cultural resources important to the Tribes, and providing greater science capacity to inform land management decisions. These outcomes would not have been possible without a collaborative approach.

The benefits of collaboration extend well beyond shaping federal land legislation. The relationships formed through the collaborative have led us to work together for on-the-ground actions to help wildlife in Owyhee County. The Nature Conservancy, Owyhee County and local landowners have used funding provided through the USFWS and the Idaho Office of Species Conservation to complete sage grouse habitat enhancement projects. We are also cooperating on controlling the expansion of juniper and the spread of invasive weeds – two key threats to sage grouse in Owyhee County.

Blackfoot Challenge, Montana

The Blackfoot Valley is a 1.5 million acre watershed in western Montana. The Blackfoot River is a 132 mile long free-flowing, clear and cold river that provides crucial habitat for native trout. The Blackfoot Valley is at the southern end of the "Crown of the Continent" – one of the wildest, most diverse and intact ecosystems of the world – found at the narrow waist of the Rocky Mountains where Alberta, British Columbia, and Montana meet. In the early 1890s, conservationist and Glacier National Park advocate George Bird Grinnell dubbed this transboundary region the "Crown of the Continent," highlighting the region's geographical importance as the headwaters of the continent, spilling cold, clean waters to the Pacific Ocean, Gulf of Mexico, and Hudson Bay.

The Blackfoot Valley provides important habitat for grizzly bears, wolves, Canada lynx, wolverines, and a myriad of other species found in the high density of prairie pothole wetland complexes which support a number of rare and endemic wetland dependent plant species. The Blackfoot Valley provides crucial wildlife connectivity to the Greater Yellowstone Ecosystem and the Bitterroot, Salmon, Selway Wilderness Complex. The Crown of the Continent and the Greater Yellowstone Ecosystem are among the few intact ecosystems in the lower 48 United States. To illustrate this point in the Blackfoot, Meriwether Lewis of the Lewis and Clark Expedition would be able to encounter today all the species and communities that were present on his journey east through the Blackfoot Valley in 1806.

Conservation efforts in the Blackfoot Valley are successful because of the longstanding tradition of collaboration among landowners, public land management agencies, conservation organizations, businesses and other stakeholders. The Blackfoot Challenge is a landowner-based group that coordinates management of the Blackfoot River, its tributaries, and adjacent lands. It is organized locally and known nationally as a model for preserving the rural character and natural beauty of a watershed. Although its charter dates to 1993, Blackfoot landowners have played an instrumental stewardship role since the late 1970s—bringing conservation easement legislation, walk-in hunting areas and recreation corridor management to Montana. USFWS work in the Blackfoot Valley, under the Partners for Fish and Wildlife Program, was an important catalyst and cost-share partner for improving fish and wildlife habitat on private lands. Today, the Blackfoot Challenge partnership has grown to more than 100 private landowners and representatives from 27 state, federal and non-governmental organizations -- including TNC as a founding member. Educational workshops and tours throughout the year to encourage local involvement and ownership in resolving resource problems in the watershed.

Since its founding in 1993, the Blackfoot Challenge has worked to protect 89,000 acres of private lands under conservation easements, restored 38 miles of streams and 62 miles of riparian habitat on 39 tributaries of the Blackfoot, improved the conditions of 2,600 acres of wetlands and 2,300 acres of native grasslands, and removed barriers to fish passage on 460 miles of streams.

All of this was accomplished through a diverse, community-based partnership.

Elements of Successful Wildlife Conservation Partnerships

Each of these conservation stories share common elements which are key to their success:

- Local people with strong ties to the land who have looked beyond their differences to gain trust, share ideas, listen and develop the best possible outcomes.
- Members of a collaborative process commit to common goals. This requires difficult compromise. This effort is worthwhile because the end result will reflect better outcomes than any one group or individual could accomplish on their own.
- For collaboration to be effective, it must reflect improved management of natural resources and on-the-ground conservation. Sound collaboration finds practical solutions that reflect local conditions as well as governing law.
- Collaboration is rightly thought to be of a place – where people developing resource solutions live and work. The collective knowledge represented in a collaborative covers ranching and forestry, community needs, conservation biology and recreation, where migratory birds congregate and where hunters access forests, what ranchers need for their cattle and what forest companies need to stay viable.

Collaboration is frequently humbling. Often, organizations and individuals focus on one specific set of issues. Despite the best of intentions, a conservation organization may not be aware of the economic and social concerns of communities that depend on forest harvest. The industry may not know about stream conditions needed to protect a fish population. The collaborative process helps the participants move beyond their own parochial views and truly comprehend the perspectives and knowledge of partners who share the landscape. The result can, and should, be conservation that takes a broad view, that sees humans as an integral part of the landscape, and that provides more widely accepted and hence stronger protection for fish and wildlife.

U.S. Fish and Wildlife Service Programs that Support Collaboration

Local representatives of the USFWS are key members of many wildlife collaborative efforts throughout the nation. Congress has provided the Service with a range of tools and programs that can foster local collaborative solutions for wildlife habitat protection. We would like to highlight two programs of the USFWS that we believe provide key assistance to partnerships: Partners for Fish and Wildlife Program and National Coastal Wetlands Conservation Grant Program.

Partners for Fish and Wildlife Program (16 U.S.C. 3741)

Since 1987, the Partners for Fish and Wildlife Program has exemplified cooperative conservation as an innovative, voluntary partnership program that helps private landowners restore wetland and other important fish and wildlife habitat with financial and technical assistance. The

program is non-regulatory, voluntary, citizen and community-based stewardship efforts for fish and wildlife conservation. It is based on the premise that fish and wildlife conservation is a responsibility shared by citizens and government.

Example - Delmarva Bay, Maryland:

The Nature Conservancy in Maryland has a significant wetland restoration partnership that includes the Partners for Fish and Wildlife Program. The Nontidal Wetlands & Waterways Division of the Maryland Department of the Environment is also providing significant funding and support. The Partners for Fish and Wildlife Program and the USDA's Natural Resources Conservation Service provide project design and oversight services. The Natural Resources Conservation Service also provided funding through a Wetland Reserve Program easement.

The Nature Conservancy has restored more than two dozen seasonal wetlands and one large "Delmarva bay" on 330 acres of former farm fields in Caroline County at our Jackson Lane Preserve. Researchers have documented more than 50 species of dragonflies and damselflies on the site, more than 70 bird species and almost 30 species of amphibians and reptiles.

The Jackson Lane Preserve is a 300-acre forested natural area that protects almost a dozen "Delmarva bays," seasonally flooded depressional wetlands also known as coastal plain ponds. Once found in abundance across a large area of the Central Delmarva Peninsula, Delmarva bays are thought to have originated as wind-blown features at the end of the last ice age. The hydrology and chemistry of Delmarva bays is intricately and dynamically linked to local groundwater systems.

Example - Lake Champlain and Connecticut River Valley, Vermont:

The Nature Conservancy in Vermont is working to protect and restore critical waterways in the Lake Champlain and Connecticut River valleys in part through collaboration that focuses on restoring river banks on agricultural land. Farmers benefit from grants for developing alternative watering systems for livestock, fencing cattle out of streams, planting trees to stabilize the banks, and improve stream crossings. This, in turn, enhances riparian and in-stream habitat, helps to lower stream temperatures for aquatic species, improves water quality (which is a particularly high priority in the Lake Champlain basin), and reduces the threat from exotic invasive plant species such as Japanese knotweed that disrupt the delicate balance of life. Japanese knotweed, one of the worst river bank invaders in Vermont, is shunned by native insect life and ignored by deer and beaver. Even its root system fails to anchor the soil of the river bank. Fish and turtles who search for insects in its silent shade leave hungry, and during each successive rainstorm nutrient rich soil from the floodplain is washed away downstream.

Funding contributions for these restoration efforts, facilitated by the Partners for Fish and Wildlife Program, include The Nature Conservancy, the Lake Champlain Basin Program, the

Lake Champlain Committee, the State of Vermont, US Department of Agriculture Natural Resources Conservation Service and local watershed groups.

National Coastal Wetlands Conservation Grant Program (The Coastal Wetlands Planning Protection and Restoration Act of 1990 (16 U.S.C. 3951-3956 (Supp. 1991)

The goal of the National Coastal Wetlands Conservation Grant Program is to conserve important coastal wetland ecosystems nationwide. This competitive grant program provides support to collaborative partnerships focused on the acquisition, restoration, and enhancement of coastal wetland habitats in order to maintain water quality and protect valuable fish and wildlife habitat. Coastal States which border the Atlantic, the Gulf of Mexico, Pacific and Great Lakes are eligible. The only exception is the State of Louisiana, which has its own coastal wetlands program under the Act. States receiving funds include California, Florida, Illinois, Maine, Maryland, Massachusetts, North Carolina, Oregon, Virginia, Washington and Wisconsin.

Example - Puget Sound, Washington:

A recent grant in Washington State to Whatcom County and The Nature Conservancy exemplifies national benefits from a local project. The Nature Conservancy and Whatcom County will purchase a 146 acre parcel that includes 4,200 feet of natural shoreline and 94 acres of wetlands. An adjacent 130-acre parcel was recently purchased by the County and Whatcom Land Trust and provides match for the grant requirement. The two properties together will create a new County pedestrian-oriented park and natural area rivaling the best existing shoreline parks in all of Puget Sound at Lily Point -- situated on the southeast corner of Point Roberts, Washington and bordered by Canada to the north. Lily Point's strategic location, its relatively large and undeveloped natural shoreline, and its combination of mature Pacific Northwest maritime forests, riparian vegetation, eroding cliffs and ecologically rich tidelands give this project regional and international significance. The Fraser River Delta, of which it is a part, is one of the most important migratory shorebird and waterfowl areas on the West Coast of North America. Archaeologists date the earliest human occupation of this area at 9,000 years ago. A Spanish explorer reported "an incredible quantity of rich salmon and numerous Indians" at Lily Point in 1791. This site was added to the National Register of Historical Places in 1994 as a site of National Cultural, Traditional and Spiritual Significance.

Example - Kennebec Estuary and Gulf of Maine:

Many who live on the shores of the Gulf of Maine appreciate its biological wealth and bounty. Coastal watersheds like the Gulf of Maine provide concentrated habitat for endangered species, waterbirds, and diadromous fish -- and it's in coastal watersheds that increasing human population and development pressures continue to intensify. Habitat loss, fragmentation and degradation, wetland and associated upland loss, overharvesting, oil spills, pollution and other cumulative effects of development threaten the natural resource values of the Gulf of Maine watershed. Cold oxygen-laden waters subject to constant movement, mixing and upwelling

create a nutrient-laden Gulf of Maine marine environment -- historically, one of the world's most productive continental shelf communities. Coastal wetlands also purify water and help provide a defense against rising sea levels.

The Kennebec Estuary in Maine is an excellent example of how large partnerships effectively integrate USFWS partner grants for habitat restoration. The Kennebec Estuary (mid-coast Maine), is one of the largest freshwater tidal estuaries on the East Coast north of the Chesapeake Bay and is comprised of Merrymeeting Bay and the Lower Kennebec River. The project area harbors one of the nation's largest intact systems of saltwater, freshwater, and brackish tidal marshes and provides critical breeding, migrating and wintering habitat for several endangered and threatened species, shorebirds, waterfowl, wading birds, and diadromous fish.

In 2008, the Maine Wetlands Protection Coalition submitted a successful $1 million Large North American Wetlands Conservation Act (NAWCA) grant to permanently protect wetland and upland buffer habitat in the Kennebec Estuary. The USFWS Gulf of Maine Coastal Program plays an active role in the Maine Wetlands Protection Coalition, participating in strategic decisions, identifying high value wildlife habitat for protection through GIS habitat analyses, and maintaining a database to track the progress of land protection. Gulf of Maine Coastal Program also wrote the biological components of the grant proposal, edited the financial components of the proposal, and created the habitat maps that accompanied the proposal. The proposal complemented previous land protection initiatives in the Merrymeeting Bay and Lower Kennebec region (including five previous NAWCA grants, three Coastal Wetland Grants and a National Fish and Wildlife Foundation grant) to expand and link existing conservation lands. The federal grant was matched with $3,215,000 from private partners (like The Nature Conservancy) and as a result over 2,000 acres are being protected. Just last month, the partnership was also awarded a new Coastal Wetlands grant.

Conclusion

America's wildlife and their habitats face unprecedented threats from forces as diverse as invasive species, climate change, and habitat fragmentation. The scope of these threats calls upon federal wildlife managers to develop new solutions that are equal to the challenge.

The Nature Conservancy believes that collaborative approaches that harness the energies of local partners can play an important role in these solutions. True collaboration is not easy or quick. But, the examples discussed above demonstrate that collaboration is essential in developing strategies that are adapted to local conditions, gain broad community support, and ultimately produce more sustainable and effective outcomes for our fish and wildlife.

Senator CARDIN. Thank you, Ms. Miller, for your testimony.
Mr. Benoit.

STATEMENT OF JEFFREY BENOIT, PRESIDENT AND CEO, RESTORE AMERICA'S ESTUARIES

Mr. BENOIT. Good morning, Chairman Cardin and members of the Subcommittee. I am Jeff Benoit, President and CEO of Restore America's Estuaries. I am pleased to be here today to discuss our collaboration with the U.S. Fish and Wildlife Service Coastal Program, one of the vital programs woven into the fabric of working partnerships needed to restore and maintain the water quality and ecological integrity of our Nation's coasts and estuaries.

Restore America's Estuaries has been working since 1995 to restore our Nation's greatest estuaries. We are a national alliance of 11 community-based organizations that protect and restore coastal and estuarine habitat. Our 11-member organizations represent such estuaries as the Chesapeake Bay, Narragansett Bay, Long Island Sound, Puget Sound, San Francisco Bay and Tampa Bay.

As you know, estuaries are among the most biologically productive and economically valuable places on Earth. Unfortunately, estuaries are in a perilous state due to increasing levels of stress from development and climate change. Our challenges may be daunting, but through collaborative efforts like the partnership that we have with the Coastal Program, significant progress has been made, and we know this is only the beginning.

But what makes for a successful partnership? First, it is important to realize that successful partnership does not just happen. It takes hard work and requires planning, dedication and constant nurturing.

There are three essential components that must exist for a partnership to be successful: a long-term commitment to work together; a willingness to share knowledge, expertise and/or capacity; and shared goals. If any of these elements are missing or weak, the partnership is doomed to fail.

Fortunately, we have enjoyed a strong partnership with the Coastal Program for many years, and we offer the following recommendations which, if implemented, would significantly strengthen the effectiveness of the program both within the Service and for working with partners on the ground.

Our first recommendation: authorize the program. We believe that authorizing the Coastal Program into law is the most important action the Congress could take to improve the effectiveness of this important program. Congress would declare that protecting, restoring and enhancing habitat for the Service's coastal dependent trust species is a priority and that the Coastal Program plays a vital role in that effort.

And further, authorizing the program would provide assurance to Coastal Program partners like ourselves that the program will continue to be around for time to come. And through codification, Congress also would help ensure the fidelity of annual Coastal Program appropriations. As we work to increase the pace and scale of restoring habitat nationwide, funding fidelity is crucial to ensure that Coastal Program dollars are spent wisely and for the purposes intended by Congress.

Recommendation two: enhance the commitment to partnerships. Currently, each region of the Fish and Wildlife Service has individual discretion over whether they employ dedicated Coastal Program coordinators or liaisons, thus creating a confusing lack of order and access to the program across the regions. We believe that in order for the Coastal Program to be truly national in scope, each region must have full-time liaisons that are dedicated solely to the Coastal Program.

Recommendation three: better integration with Department of the Interior initiatives. As part of the DOI's Climate Change Initiatives, the Service has launched an integrated effort to strategically link science, planning and conservation services through the landscape conservation cooperatives. Since coasts will experience the first signs and impacts of sea level rise and other climate change impacts, the Coastal Program is uniquely situated to translate the science of LCCs and to deliver on the ground habitat restoration to priority habitats.

And the recently announced Great Outdoors Initiative is another opportunity to integrate Coastal Program services with Department of the Interior programs.

And fourth, our final recommendation: realign responsibilities for the Coastal Barrier Resources Act. A somewhat odd relationship has developed over time between the Coastal Program and the Coastal Barrier Resources Act, or CBRA. Implementation of Service responsibilities for preparing maps under CBRA is administered by the Service's Branch of Resource Mapping and Support, but funding for CBRA, over $700,000 for 2010, comes out of the Coastal Program. The annual funding level for CBRA is never explicitly expressed by the Service, which adds additional uncertainty to funds actually available for the Coastal Program.

We strongly recommend that all budget and implementation responsibilities within the Service for the Coastal Barrier Resources Act be aligned under the Branch of Resource Mapping and Support.

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

[The prepared statement of Mr. Benoit follows:]

WRITTEN TESTIMONY OF
JEFF BENOIT
PRESIDENT AND CEO, RESTORE AMERICA'S ESTUARIES

LEGISLATIVE OVERSIGHT HEARING BEFORE THE
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
SUBCOMMITTEE ON WATER AND WILDLIFE

Collaborative Solutions to Wildlife and Habitat Management
April 27, 2010

Good morning Chairman Cardin, Ranking Member Crapo, and Members of the Subcommittee. I am Jeff Benoit, President and CEO of Restore America's Estuaries. I am pleased to be here today to discuss Restore America's Estuaries' comments regarding coastal and estuarine protection and restoration through our collaboration and partnership with the USFWS Coastal Program (CP). We believe that the CP is one of the vital programs woven into the fabric of working partnerships needed to restore and maintain the water quality and ecological integrity of our nation's coasts and estuaries. Most of our accomplishments at Restore America's Estuaries are due to working in partnership with government, non-profit, and for-profit entities. We are proud to consider the CP as one of our leading Federal partners.

We strongly urge the authorization of this program, but before I present our full set of recommendations, I would like to provide you with a little background about Restore America's Estuaries and discuss several issues of interest to our organization.

RESTORE AMERICA'S ESTUARIES

Restore America's Estuaries has been working since 1995 to restore our nation's greatest estuaries. Our mission is to preserve the nation's network of estuaries by protecting and restoring the lands and waters essential to the richness and diversity of coastal life. Restore America's Estuaries is a national alliance of 11 community-based organizations that protect and restore coastal and estuarine habitat. Our 11 member organizations include: American Littoral Society, Chesapeake Bay Foundation, Coalition to Restore Coastal Louisiana, Save the Sound—a program of the Connecticut Fund for the Environment, Conservation Law Foundation, Galveston Bay Foundation, North Carolina Coastal Federation, People For Puget Sound, Save The Bay—San Francisco, Save the Bay—Narragansett Bay, and Tampa Bay Watch. Collectively, we have over 250,000 members nationwide.

Restore America's Estuaries is results-oriented. We join with government agencies, corporations, civic organizations, scientists, and local volunteers to conduct restoration projects with real impacts. Since its creation, Restore America's Estuaries and its 11 member organizations have:

- Invested about $36 million in local restoration projects;
- Restored more than 56,000 acres of estuarine habitat;

- Built more than 300 oyster reefs and planted over 2.6 million oysters;
- Mobilized more than 250,000 volunteers, including more than 80,000 young people in coastal restoration and education activities each year; and
- Convened the largest biennial national conference for the coastal restoration community.

At the national level, Restore America's Estuaries has been a leader in bringing all sectors of the restoration community together to advance the knowledge, science, policies, and best practices in coastal and estuarine habitat restoration. Restore America's Estuaries engaged in a 2-year initiative to create a multi-sector consensus document, *A National Strategy to Restore Coastal and Estuarine Habitat*, which outlines the objectives and methods for reaching the goal of restoring one million acres of our nation's coastal and estuarine habitats. In a previous effort, we worked closely with the Coastal and Estuarine Research Federation to build a consensus framework for habitat restoration through a collaborative process between scientists and field practitioners to define scientifically sound and technically feasible principles of estuarine habitat restoration. These principles are delineated in the publication, *Principles of Estuarine Habitat Restoration.*

Recently we have convened two Blue Ribbon Panels of Experts that are helping to advance the pace and scale of coastal habitat restoration. One panel is investigating requirements for establishing nationally recognized carbon offset protocols for carbon sequestration through coastal wetlands restoration. The second panel is considering methodologies for quantifying the economic benefits associated with coastal habitat restoration.

IMPORTANCE OF ESTUARIES

Estuaries—where freshwater from a river mixes with saltwater from the ocean—are essential both ecologically and economically. Estuaries are among the most biologically productive, economically valuable, aesthetic, and densely populated places on earth.

Ecological

Some of the invaluable ecological services they offer include: providing vital nursery habitat for two-thirds of the commercial shellfish and finfish populations and habitat for nesting and foraging coastal birds; stabilizing shorelines and buffering against erosion; and providing flood control. In addition, they provide opportunities for people to recreate and to appreciate and learn about the natural environment. We would like to submit for the record a recent RAE publication, *Hope For Coastal Habitats: People, Partnerships & Projects Making A Difference*, which profiles people, organizations, and projects that have drastically improved ecological services through habitat restoration in watersheds across the United States.

Economic

Restore America's Estuaries convened a panel of internationally renowned experts to help us understand the economic value of coastal and estuary resources. These authors were asked to research and summarize our knowledge of coastal economic value. We would like to submit the Executive Summary of this report, *The Economic and Market Value of Coasts and Estuaries: What's at Stake*, for the record.

Their findings were astonishing—far beyond commercial fishing and tourism, healthy coasts and estuaries are essential for protecting more than $800 billion of trade each year, tens of billions of dollars in recreational opportunities annually, and more than 45 percent of the nation's petroleum refining capacity. Through this research, we found that with only 13 percent of the land area of the continental U.S., estuary regions of the nation comprise a disproportionate share of the nation's economy, with 43 percent of the population, 40 percent of the employment, and 49 percent of output. It is clear that much of the U.S. gross domestic product (GDP) is generated in these narrow ribbons along our nation's coasts. In fact, the U.S. Commission on Ocean Policy found that over half of the nation's GDP ($4.5 trillion in 2000) is generated in coastal counties and adjacent ocean waters.

Responding to Climate Change

Healthy estuaries help counter climate change by capturing carbon from the atmosphere and providing natural flood protection. Scientists have found that tidal salt marshes are particularly effective in helping to counter climate change, and recommend tidal salt marsh restoration as an important strategy to capture and hold carbon from the air. According to scientists, every acre of restored, healthy salt marsh captures and converts at least 870 kilograms of carbon dioxide into plant material annually—equivalent to the greenhouse gas emissions from driving 2,280 miles.

Coastal habitats will also play an important role in adapting to climate change, particularly sea level rise. Restored tidal salt marshes provide a natural buffer against erosion and reduce the need to build seawalls to protect developed shoreline areas against sea level rise. Coastal wetlands also provide natural flood control, and help shield communities from ever-stronger storm surges as a result of climate change.

THREATS TO ESTUARIES

Estuaries and their associated natural resources and important ecosystem services are in a perilous state due to an increasing level of stress. The coast is the fastest growing region in the country, with the coastal zone losing land to development at a pace faster than the rest of the country. This affects the quality of coastal watersheds and, as a result, the health of estuaries and coasts. These valuable coastal areas are threatened by coastal sprawl, which seriously degrades coastal water quality, reduces access to coastal waters, mars the aesthetic beauty, increases flood control costs, eliminates recreation opportunities, and alters estuaries.

In addition to physical impacts (e.g., wetland loss, shoreline armoring, and sea-level rise) to these ecosystems, nutrient and other chemical pollution (e.g., pharmaceuticals and personal care products), invasive species, and over-harvesting of resources are major causes of declines in the productivity and health of these systems.

Estuaries around the country have lost varying degrees of habitat and biological function. For example, between the 1950s and the 1990s, the Galveston Bay system experienced a net loss of nearly 35,000 acres of its wetlands due to a variety of human and natural causes. In addition, 70 percent of the eel grass beds and 50 percent of the salt marshes around Narragansett Bay in Rhode Island have been lost due to human activity, and the Raritan Bay area in lower New York Harbor has lost over 80 percent of its original wetlands. In New Jersey, only a mere 2 percent of the historic native oyster populations have survived after suffering from disease, over-

harvesting, and habitat destruction. In the Chesapeake Bay over 16 million bushels of oysters were harvested in the early 1900s, but the harvest has collapsed to only 45,000 bushels in 2006. In Long Island Sound more than 40 percent of the original wetlands are gone. The story continues on the west coast as well. San Francisco Bay has lost 95 percent of its original marshland, and in the Puget Sound region more than 500 streams, rivers, and lakes are impaired by poor water quality partly as a result of degraded habitats that are no longer able to filter pollutants.

A growing threat to our nation's estuaries is climate change. The impacts of climate change will exacerbate the already increasing stresses on our sensitive coastal resources. Estuary wildlife and the habitat they depend on are threatened by changes in rainfall, temperature, sea level, soil conditions and air pollution. For example, altered rain and snowfall patterns throughout the U.S. will affect the volume and timing of fresh water flowing into our estuaries, consequently changing salinity and sediment conditions, which will impact sensitive habitats and species. While no one knows how precipitation patterns might be altered, changing fresh water flows would affect the distribution and abundance of some shellfish such as oysters, as well as rare species, which depend on high salinity salt marsh habitats.

Sea level rise is of particular concern. As sea level rises, the frequency and duration of coastal flooding and inundation will increase, severely impacting sensitive coastal resources and adjacent properties. For example, in San Francisco Bay, sea level rose about seven inches over the last century at the Golden Gate, and the Intergovernmental Panel on Climate Change and the 2006 California Climate Action Team project it could rise another two to three feet by 2100, which could cause coastal flooding of Bay wetlands and shoreline cities.

Our challenges are daunting, but through collaborative efforts like the partnership we have with the USFWS Coastal Program, significant progress has been made, and we know it is only the beginning. I would like to now turn your attention to the USFWS Coastal Program, first to highlight what we consider to be successes of the program, and then identify several areas for programmatic improvements.

COLLABORATION WITH THE USFWS COASTAL PROGRAM

RAE has enjoyed a collaborative relationship, a partnership in our view, with the Coastal Program for many years. The nature and scope of our partnership spans the national and local levels as we work with CP headquarters on long-term issues, and locally the program works with our member groups through Regional CP staff to conduct on-the-ground habitat restoration.

It is critically important to realize that successful partnerships do not just happen; it is hard work and requires planning, dedication, and constant nurturing, often through personal relationships. There are also three essential components that must exist for partnership to be successful:

- A long-term commitment to work together;
- Willingness to share knowledge, expertise and/or capacity; and
- Shared goals.

If any of these elements are missing or weak, the partnership is doomed to fail.

As an example of a true partnership, the Coastal Program recently worked with RAE member Save The Bay – San Francisco as well as the San Francisco Bay National Wildlife Refuge to restore salt marsh on Bair Island. This project is helping to provide critical habitat for a variety of species, including the endangered California clapper rail and the salt marsh harvest mouse, and a number of birds that traverse the area on their journey across the Pacific.

On the East Coast, the Coastal Program assisted RAE member Chesapeake Bay Foundation to choose and prepare a site to plant redhead grass near the Magothy River in Maryland. This is a good example of the invaluable technical assistance that the Coastal Program is able to provide to a non-governmental organization, which can then better restore habitat for numerous migratory bird and interjurisdictional fish species.

In the Gulf, the Coastal Program worked side-by-side with RAE member Galveston Bay Foundation to construct geotextile tube offshore breakwaters on Snake Island Cove. This effort has led to the protection of 200 acres of estuarine marsh from erosion and the creation of a 65 acre calm shallow water area conducive to seagrass restoration.

The Coastal Program also is essential in efforts to restore fish passage of anadromous fish populations and restore riverine habitat. RAE member Conservation Law Foundation worked with the Coastal Program and other regional partners to support the removal of dams along the Penobscot River as well as install fishways to restore native Atlantic salmon.

MAKING THE COASTAL PROGRAM MORE EFFECTIVE

The Coastal Program has grown significantly in relevance and geographic scope since it first began as a pilot program in 1985 in the Chesapeake Bay. It now has a local presence in 22 locations, including the Great Lakes. It provides critical financial and technical assistance to a variety of government and nongovernmental organizations for habitat restoration and protection that contributes to the recovery and protection of USFWS Trust Species. Restore America's Estuaries is proud to be one of the many partners working side-by-side with the Coastal Program to achieve on-the-ground habitat restoration.

In a 1994 Memorandum to USFWS Regional Offices, the Acting USFWS Director referred to the Coastal Program as "...the keystone of the Services coastal activities". Now, 16 years later, it is time for the Program to be fully authorized by Congress, and embraced by the Service.

We offer the following recommendations, which if implemented, would significantly strengthen the effectiveness of the Coastal Program, both within the Service, and for working with partners on the ground.

Recommendation #1 Authorize the Program

We believe that authorizing the Coastal Program into law is the most important action that Congress could take to improve the effectiveness of this important program. First and foremost, by taking this action Congress would declare that protecting, restoring, and enhancing habitat for the Service's coastal-dependent trust species is a priority, and that the Coastal Program plays a vital role in this effort. This is incredibly important at a time of fewer funds and competing

programs. Further, authorizing the program would provide assurance to Coastal Program partners that the program will continue to be around for a long time to come.

Through codification, Congress also would help ensure the fidelity of annual Coastal Program appropriations and that the Program has the resources it needs to be effective. Transparency is a paramount concern in efforts to ensure the biggest bang for the buck in completing restoration projects. As we work to increase the pace and scale of restoring habitat nationwide, funding fidelity is critical to ensure that CP dollars are spent wisely and for the purposes intended by Congress.

In addition, Congressional authorization would help ensure that Federal efforts to protect and restore coastal habitat are complimentary and that mission creep by other Federal agencies does not jeopardize the program's efficacy and unique role. Numerous Federal agencies currently conduct restoration work on our nation's coasts, but each has a distinct mission that yields different yet meaningful outcomes. The Coastal Program's mission requires that their work specifically benefit Federal Trust Species, so they may select and conduct their restoration projects very differently than that of another agency but yield just as successful results.

Recommendation #2 Improve Capacity
Although the Coastal Program has a presence on the Atlantic, Pacific and the Gulf Coast of Texas, and in the Great Lakes, there continue to be gaps in the network. These gaps limit the Coastal Program's ability to support conservation partnerships and deliver the program in several critical coastal areas.

We applaud the addition of a new central California office which hopefully will be established this year, but a number of other regions currently lack capacity such as the mid-Gulf (LA, MS, AL). The CP is an effective, well-received program and should be represented in all coastal areas, including the Great Lakes. It is therefore critical that CP establish a long-term capacity building plan to close these gaps and provide assistance in all coastal regions of the U.S.

Recommendation #3 Enhance Commitment to Partnerships
Currently, the Coastal Program lacks a staff structure that is homogenous across the nation and reflective of a national program. Rather, each region of the Fish and Wildlife Service has individual discretion over whether they employ dedicated CP coordinators, thus creating a confusing lack of order across regions which results in CP winners and losers.

We believe that in order for the CP to be truly national in scope, each region must have full-time liaisons that are dedicated solely to the Coastal Program. Only then will the program be able to enhance partnerships equally across the regions that yield significant on-the-ground achievements.

Recommendation #4 Integrate With DOI Initiatives
Several new initiatives underway by the Department of the Interior (DOI) and USFWS provide opportunities for making use of the CP on-the-ground conservation delivery service. As part of DOI's Climate Change Initiative, the USFWS has launched an integrated effort to strategically link science, planning, and conservation services through the Landscape Conservation

Cooperatives. Since coasts will experience the first signs and impacts of sea level rise and other climate change impacts, the CP is uniquely situated to translate the science of LCC's and deliver on-the-ground habitat restoration to priority habitats.

The recently announced Great Outdoors initiative is another opportunity to integrate CP services with DOI programs. Existing and future restoration projects often involve the direct participation of volunteers. Families, school classes, scouting groups, and corporate employees turn out to help with marsh grass planting, stream clean-ups, and invasives removal. The connection between individuals and the outdoors could not be any stronger. DOI should recognize and embrace existing programs like the CP that already work so well to bring families and youth to conserve and restore the natural environment.

Recommendation #5 Provide Adequate Funding
Support for the management and stewardship of our coastal ecosystems that bridge land and sea has never been more important due to the accelerating pace of environmental change now occurring. While environmental degradation of estuaries has continued in recent years, the CP has been a key program aimed at on-the-ground habitat restoration. For a relatively small program (approximately $13 million annually) that leverages $3 non-Federal dollars for every Federal dollar spent, the CP is one of the most cost-effective habitat restoration programs within the U.S. Fish and Wildlife Service.

A challenge has been that without adequate funding, it is difficult for the CP to expand its activities and begin to tackle the more than $3 billion restoration backlog that currently exists. Thus, it is critical that the CP budget begin to narrow this gap if we hope to have a meaningful impact on habitats nationally.

As mentioned under Recommendation #1, it is also critical to improve transparency of the CP as good business practice to ensure the wisest use of taxpayer dollars.

Recommendation #6 Realign responsibilities for the Coastal Barriers Resources Act
A somewhat odd relationship has developed over time between the Coastal Program and the Coastal Barriers Resources Act (CBRA). CBRA, first enacted in 1982, designates various undeveloped coastal barrier islands, depicted by specific maps prepared under the auspices of the USFWS, for inclusion in the Coastal Barrier Resources System (System). Areas so designated are ineligible for direct or indirect Federal financial assistance that might support development. Implementation of USFWS responsibilities for preparing maps under CBRA is administered by the USFWS Branch of Resource Mapping and Support, but funding for CBRA, over $700,000 for 2010, comes out of the Coastal Program. The annual funding level for CBRA is never explicitly expressed by the Service which adds additional uncertainty to funds actually available for the Coastal Program. We find this unacceptable. We strongly recommend that all budget and implementation responsibilities within the USFWS for the Coastal Barriers Resources Act be aligned under the Branch of Resource Mapping and Support. The CBRA authorization expires this year (2010) and we believe this realignment should be considered during reauthorization.

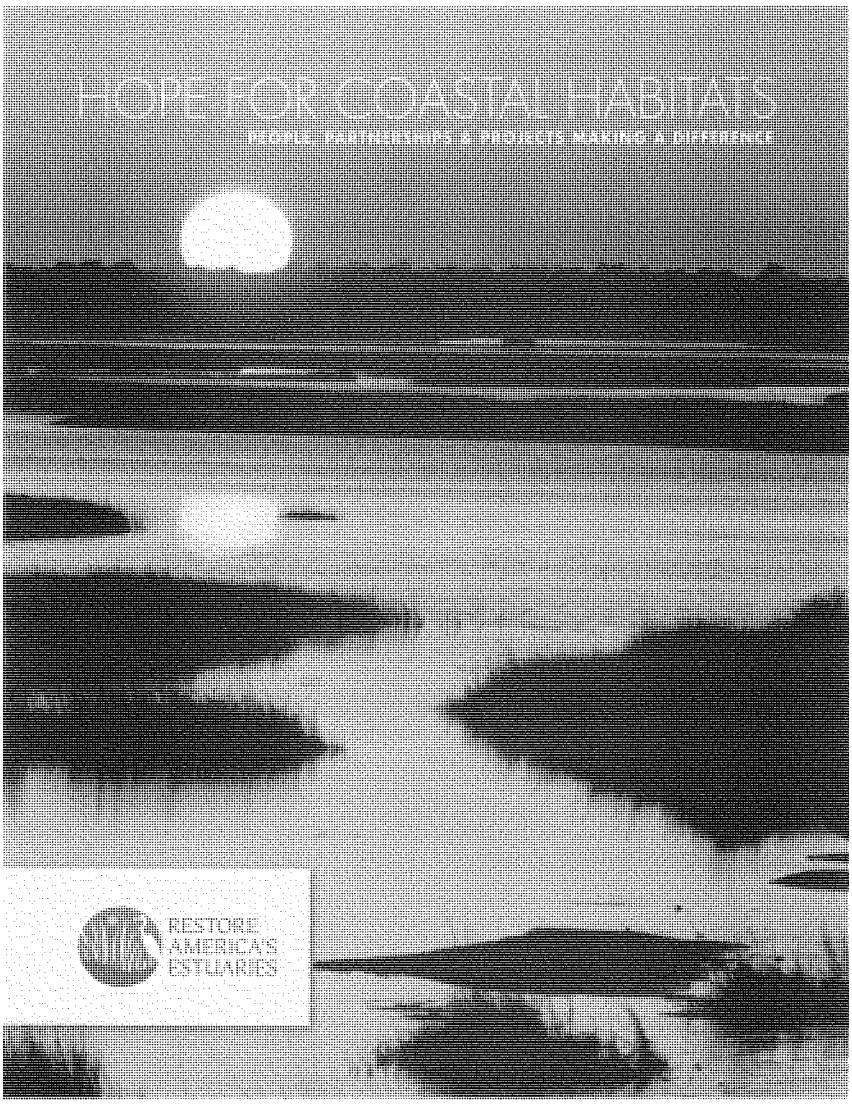
HOPE FOR COASTAL HABITATS
RESTORE AMERICA'S ESTUARIES

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Photo: Sunset on Bogue Sound in North Carolina. Courtesy of Cheryl Burke.

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We are, all of us, from the sea. We are continually lured back to its edge to share our kinship with it. Some of us set down stakes. But many come to nourish their youthful spirit by fishing, sailing or swimming. We come to relax by a placid marsh or to admire the sun rising above the ocean's horizon.

And yet, no place on earth more directly embodies the challenge of balancing our own lives with the lives of our fellow species than these special places where the land meets the sea. Here, at the coastline, the ocean reaches out for the land, with estuaries as its fingers and hands. In this unique nexus - characterized by the dynamic mixing of salt and freshwater in tidal cycles - abundant life is created and nurtured. They are renowned for the young fish and shellfish that they rear.

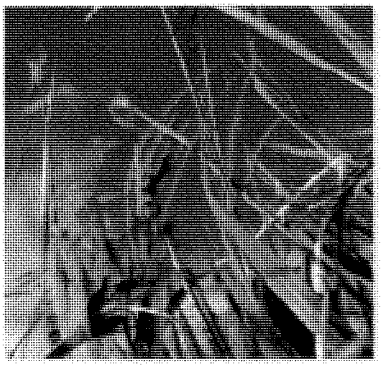
By 2075, it is estimated, three-quarters of our nation will live within 50 miles of the coast. Without delay, we must solve the conundrum of developing coastlines while also protecting and restoring the very habitat that draws us there.

The 11 conservation groups that make up Restore America's Estuaries have committed themselves to preserving and restoring the lands and waters essential to the richness and diversity of coastal life. They have undertaken hundreds of restoration projects as part of a national campaign to restore the health of our nation's estuaries. They have put thousands of volunteers to work remaking marshes, rebuilding shellfish beds or replanting underwater grasses.

In the following pages you will read about people who have made a difference locally. We hope that this publication shows that it can be done. From San Francisco Bay to the Penobscot River in Maine, people are restoring our coast's natural vitality, one river, one bay, one watershed at a time. As the stories that follow show, it takes inspiration, commitment, hard work and, yes, money. But there is still hope for our coastal habitats.

Jeff Benoit

President
Restore America's Estuaries



RESTORE AMERICA'S ESTUARIES
WWW.ESTUARIES.ORG

RAE MEMBERS

American Littoral Society
Highlands, N.J.
www.littoralsociety.org

Chesapeake Bay Foundation
Annapolis, Md.
www.cbf.org

Coalition to Restore Coastal Louisiana
Baton Rouge, La.
www.crcl.org

Conservation Law Foundation
Boston, Mass.
www.clf.org

Galveston Bay Foundation
Webster, Tex.
www.galvbay.org

North Carolina Coastal Federation
Ocean, N.C.
www.nccoast.org

People For Puget Sound
Seattle, Wash.
www.pugetsound.org

Save The Bay – San Francisco
Oakland, Calif.
www.savesfbay.org

Save The Bay – Narragansett Bay
Providence, R.I.
www.savebay.org

Save the Sound, a program of CT Fund for the Environment
New Haven, Conn.
www.savethesound.org

Tampa Bay Watch
Tierra Verde, Fla.
www.tampabaywatch.org

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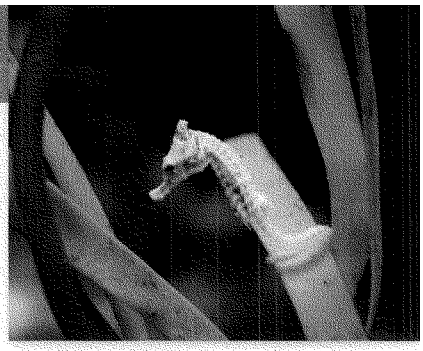


SEAHORSE & SEAGRASS © *Jeff Jeffords, www.divegallery.com*

Publications like this one are usually depressing. Coastal ecosystems in America are in trouble. Wetlands continue to be filled. Underwater grass meadows continue to disappear. Oyster and clam beds continue to be polluted. Writing about them, then, invariably leads to long lists of statistics that catalog the losses. The accompanying downward trending charts reinforce the numbers. They all combine to leave readers numb and feeling hopeless.

This isn't one of those kinds of publications. You will find plenty of bad news in the following pages. It's unavoidable, given the state of our coastal habitats. Our goal here, however, isn't to highlight what we've lost, but to celebrate what we're winning back. This isn't a publication about destruction and despair; it's more about restoration and rejuvenation.

You'll find 12 stories on the following pages. They are mainly about ordinary people who were inspired to save a piece of our coast's disappearing natural heritage. You'll read about Harry Lester of Virginia, for instance. His memories of eating oysters from the Lynnhaven River drove him to start a movement that reclaimed some of the polluted river back for the oysters. Then there are the Chums of Barker Creek. The small citizens group had formed to clean up the imperiled urban creek that flows into Puget Sound near Bremerton, Wash. Its work eventually led to the removal of a highway culvert that reopened miles of historic spawning grounds for salmon and trout. You'll also meet Phil Sander and Al Krampert. The two strangers were drawn together by their love of America's fast-disappearing prairies. They ended up working together tirelessly for 40 years to save what is now the last untouched prairie on the shores of Lake Michigan, maybe the last one in the entire Midwest.

These stories have common threads. All are about people moved by their memories and desires to ignore the grim statistics and downward trends and take action to reverse them, at least in their small parts of the coast. Many of the stories illustrate the complex partnerships among government agencies, non-profit and citizen groups, corporations and universities that are now often required to save a marsh or reclaim a river.

Money, of course, was an essential ingredient all of the restoration projects. Inspiration will get you just so far. So, many of these stories feature grant programs from the National Oceanic and Atmospheric Administration (NOAA), which provide the necessary money that allows people to put their inspirations to work. NOAA's Office of Habitat Conservation's work runs the gamut from protection to restoration; this publication highlights some of the successful restoration efforts. Since 1996, those grants have funded nearly 2,000 projects that have restored over 60,000 acres of coastal habitat and reopened more than 2,600 miles of streams to migrating fish. Since 2005 alone, NOAA provided an estimated $50 million to support nearly 800 projects to restore coastal fisheries habitat.

You'll also see Restore America's Estuaries mentioned often in the stories. The non-profit coalition of 11 conservation groups across the country is committed to restoring our nation's estuaries, one community, one estuary, one project at a time. Founded in 1995, Restore America's Estuaries has raised tens of millions of dollars for more than 1,000 community-based habitat restoration projects nationwide. RAE has mobilized more than 250,000 volunteers, and restored tens of thousands of acres of coastal habitat across the country.

Make no mistake; we're not attempting to sugarcoat reality. The transformation of our coasts began when the first humans set down stakes along them, but the degradation is accelerating at an alarming rate as more and more Americans move to the water's edge. Scientists studied 12 once-productive and naturally diverse estuaries, including San Francisco Bay, Galveston Bay, Chesapeake Bay and Massachusetts Bay, and reported in 2006 that human development has depleted more than 90 formerly important species, destroyed 65 percent of seagrass and wetland habitat and severely degraded water quality.

Carlos Duarte, a researcher at the Spanish Council for Scientific Research, noted at a conference of biologists in 2007 that the story is the same all over the world. "Coastal habitats," he said then, "are disappearing at a rate of between 1.2% and 9% a year and are now the biosphere's most imperiled systems, with rates of loss four to ten times faster than those of the tropical rainforest."

The problems are real and will likely get worse as our climate changes this century. But despair won't improve things. Instead, this publication takes Christy Everett's advice. She works for the Chesapeake Bay Foundation. You'll meet her later. "Things aren't perfect and we will all have to do more," she says. "But you have to show people that you can slow the pace of deterioration, that they can make a difference. You have to give them hope."

DAMAGES TO OUR HABITATS

Our activities can have dramatic and sometimes destructive effects on vital coastal habitats. Here are just a few of the major ways:

- Altering the landscape directly, such as draining wetlands, dredging though shellfish beds or bulldozing sand dunes.
- Contaminating water with bacteria and toxic substances from stormwater that runs off roads, parking lots and other types of constructed surfaces.
- Polluting water with excessive nutrients from agricultural and home fertilizers and from domestic sewage.
- Building dams on rivers, which block fish from migrating up or downstream.

A Tally of Habitat Losses

NATIONWIDE*

- At current rates of coastal development, more than one-quarter of the nation's coastal lands will be altered by 2025.
- More than 60 percent of our coastal rivers and bays are moderately to severely degraded by nutrient runoff.
- More than 13,000 beaches were closed or under pollution advisories in 2001, an increase of 20 percent from the previous year.
- In the U.S., a sea level rise of one foot could eliminate 17–43 percent of today's wetlands.

PACIFIC NORTHWEST

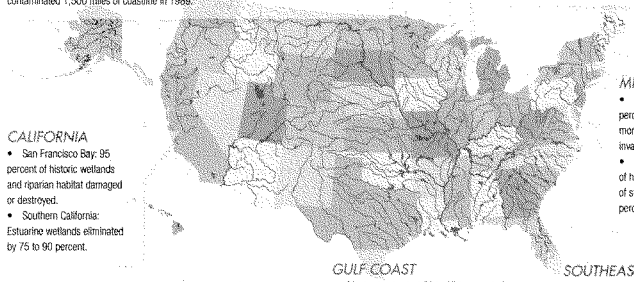
- Washington: 50 to 90 percent riparian habitat lost or extensively modified since early 1800s.
- Oregon: Nearly half of historic tidal wetlands lost.
- Alaska: More than half of culverts obstruct fish passage; Exxon Valdez oil spill contaminated 1,500 miles of coastline in 1989.

GREAT LAKES

- More than two-thirds of wetlands filled or drained.
- Southeast Michigan: 90 to 97 percent of original emergent coastal wetlands lost.
- Detroit River: 87 percent of river's U.S. shoreline filled and bulkheaded.

NORTHEAST

- About 90 percent of coastal marshes ditched to control mosquitoes by 1930s.
- Maine: Only 52 percent of spawning and nursery habitat for Atlantic salmon remains.
- Narragansett Bay: 33 percent of shellfish beds closed to harvest due to pathogens.
- Long Island Sound: Tidal wetlands decreased by more than 35 percent over the past century, and beds of submerged aquatic vegetation decreased by 65 percent since the 1950s.



CALIFORNIA

- San Francisco Bay: 95 percent of historic wetlands and riparian habitat damaged or destroyed.
- Southern California: Estuarine wetlands eliminated by 75 to 90 percent.

MID-ATLANTIC

- Delaware Estuary: More than 25 percent of historic wetlands lost and more than a third of tidal wetlands invaded with *Phragmites*.
- Chesapeake Bay: 60 percent of historic wetlands, 88 percent of submerged grass beds and 98 percent of native oyster reefs lost.

PACIFIC ISLANDS

- Hawaii: Coastal plain wetlands decreased by 31 percent over a 200-year period.
- Saipan and American Samoa: 64 percent and 25 percent of estuarine wetlands lost, respectively.

GULF COAST

- Most estuaries lost 20 to 100 percent of seagrass habitat.
- More than half of oyster-producing areas permanently or temporarily closed.
- Louisiana: Marsh the size of a football field lost every 30 minutes since 1930.
- Tampa Bay: Nearly 80 percent of seagrass and half of salt marsh and mangrove habitat lost.

SOUTHEAST

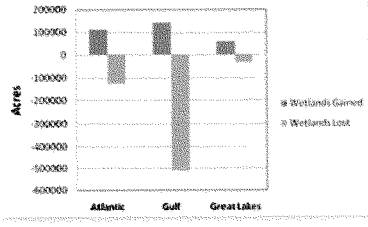
- From European settlement to 1980, 78 percent of wetlands lost.
- Nearly half of protected barrier island beaches and dunes and intact saltwater and freshwater marshes have also been lost.
- South Carolina: About one-third of shellfish areas permanently closed.
- North Carolina: Almost 68,000 acres of shellfish beds permanently or temporarily closed.

* Stedman, S. and T.E. Dahl. 2008. Status and trends of wetlands in the coastal watersheds of the Eastern United States 1998 to 2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service and U.S. Department of the Interior, Fish and Wildlife Service.

WETLANDS: The Sinks and Faucets of the Coast

William Byrd led the party that surveyed the North Carolina-Virginia state line through the Dismal Swamp in 1728. He summed up what most settlers of America's coast thought of the vast stretches of marshes, swamps and bogs that confounded them.

"Never was rum, the cordial of life, found more necessary than it was in this dirty place," Byrd wrote in his history of the survey.



WETLAND GAINS AND LOSSES IN THE COASTAL WATERSHEDS OF THE ATLANTIC, GULF OF MEXICO, AND GREAT LAKES, 1998 TO 2004 *Stedman, 2011*

WHY RESTORE WETLANDS?

Here's a list of just some of the reasons:

- Slow floodwaters
- Protect uplands from erosion
- Improve water quality
- Provide setting for recreation and study
- Help maintain strong economy
- Provide habitat for many fish, wildlife and plant species (Many endangered species inhabit wetlands or wetlands play an important part of their life cycle)
- Recharge groundwater
- Produce products used by humans: timber, peat, fish, rice, cranberries, blueberries, hay for livestock

What we now call "wetlands" were considered wastelands in Byrd's day. They were thought to be unhealthy and, thus, were avoided and given names like "Dismal." The only good swamp, Byrd and his contemporaries concluded, was a drained one.

Until rather recently, the most productive use of a swamp or marsh, it was thought, was as a soybean field, a housing development or a shopping center.

We now know and understand more about wetlands, of course. We know, for instance, that an acre of salt marsh can be more productive than an acre of corn, and we now understand that without wetlands our coastal estuaries and the abundant sea life they support wouldn't exist.

THE BENEFITS

Generally, a wetland is an area that is flooded by water frequently enough to support plants that live in wet soil. Along coastal shorelines, that broad definition embraces such diverse ecosystems as salt marshes that fringe sounds and bays to inland shallow depressions that periodically fill with rainwater.

Each type of wetland is important in keeping our coastal estuaries healthy. The salt marshes, for instance, provide food and sanctuary to countless creatures, from marsh periwinkles to Canada geese. Songbirds depend on wet prairie potholes near the Great Lakes to survive their continental migrations.

The large expanses of shallow water and thick vegetation found in wetlands provide abundant food and cover for the young of numerous creatures, making the marshes the nursery for many species of fish, shellfish and other critters.

Inland, wetlands trap stormwater long enough to allow pollutants and debris to settle out before they reach coastal waters. Such wetlands also help recharge freshwater aquifers that so many people depend on for their drinking water.

Wetlands can also be important natural areas, supporting rare plants and animals. And scientists are just beginning to understand how wetlands help filter water and move it around the estuary. They are the sinks and faucets in the estuary's plumbing system -- holding water or slowly releasing it.

THE TRENDS

We didn't always know the importance of wetlands. For much of our history, Americans have done their best to drain and fill what we judged to be wet, worthless places. How well we've done the job is hard to accurately gauge. Estimating historic wetland losses is difficult because definitions of wetlands have changed over time; methodologies and mapping techniques have differed.

But the U.S. Department of the Interior, in an exhaustive report to Congress in the late 1980s, made an effort to determine the amount of wetlands lost in America since colonial times. It determined that more than half of the 221 million acres of wetlands that colonists found in what would become the lower 48 states were gone by the 1980s. In more than 20 states more than half of the wetland acres were lost. Some states had lost almost all their wetlands. States around the Great Lakes, like Indiana and Illinois, had lost more than 80 percent of their wetlands. You will read later about a project to protect a prairie wetland on Lake Michigan. California lost 91 percent of its wetlands. The losses, the report noted, meant that the lower 48

states lost an average of 60 acres of wetlands every hour for 200 years.

Similar estimates done since the late 1980s have found that while the rate of loss has slowed, wetlands are still being destroyed. Watersheds along the Atlantic and Gulf coasts lost more than 360,000 acres of wetlands between 1998 and 2004, according to a study released in 2009 by NOAA and the U.S. Fish and Wildlife Service. These continued losses come almost two decades after President George H.W. Bush committed the country to a "no net-loss" policy on wetlands.

THE THREATS

Historically, most wetlands were drained and converted to cropland, pastures and forests. In California, for instance, almost 700,000 acres of wetlands were turned into rice fields. But the U.S. Fish and Wildlife Service attributed almost 80 percent of the recent losses of freshwater wetlands in the Atlantic and Gulf coast watersheds to development activities. The regions contain some of the fastest-growing counties in the country, as more and more people flock to the water's edge to live or vacation.

The report ends with a warning:

"The results of this study suggest that wetland protection and restoration require more attention in coastal watersheds... Public policymakers and coastal managers have been confronted with the daily task of finding a balance between benefiting from economic growth and mitigating the effects of growth on coastal environments. This task will become more challenging as the coastal population continues to grow in a limited space, thereby exacting more pressure on the remaining natural habitats, including wetlands."

WETLANDS AND CLIMATE CHANGE

Wetlands on China's Qinghai-Tibet plateau have shrunk by more than 10 percent over the past 40 years, posing a threat to agriculture and river flows. Scientists from the Chinese Academy of Sciences blame global warming. Though more rainfall is falling on the plateau, they say, water flow to the region's river has decreased because of increased evaporation from higher temperatures.

Climate change will have a similar effect on wetlands in the United States, scientists say. Flooding from rising seas will inundate many coastal wetlands. The Pew Center on Global Climate Change estimates that a 1.5-foot rise in sea level brought on by melting glaciers and ice caps - which many climate scientists consider a conservative outcome of a warming climate - would flood about 46,000 square miles of coastal wetlands – or an area equal in size to Pennsylvania. A five- to seven-foot rise could mean the loss of 30 percent to 80 percent of coastal wetlands, the U.S. Environmental Protection Agency estimates.

The Association of State Wetland Managers issued a draft report in early 2009 that predicted that increased temperatures and increases or decreases in precipitation will have severe effects on wetland ecosystems. The effects will be particularly great on coastal and estuarine wetlands, which cannot migrate inland because of steep topography, levees, seawalls or other development. The effects will also be significant for small, shallow wetlands such as vernal pools and prairie potholes, where temperatures and evaporation rates may substantially increase without corresponding increases in precipitation. Compounding this in coastal areas will be the likely increase in tropical storms and heavier and more abundant rainfall bringing increased freshwater and sediment. Changes in the hydrological cycle will affect inland wetlands too and test their abilities to contend with increased rainfall in some areas and decreased rainfall in others as well as changes in groundwater recharge and discharge.

Wetland Restoration at North River Farms

After the bears mauled the water sampling machines for the third or fourth time, the scientists decided to put up the electric fence.

HEAVY EQUIPMENT IS USED TO TRANSFORM THE FARM *Courtesy of the N.C. Coastal Federation*

The paw prints were a good sign. They meant that the bears had found the newly restored wetlands to their liking, but the wreckage of expensive machines had to stop.

Monitoring water quality is an important way of tracking the progress of the wetland restoration project on the North River in eastern North Carolina. Scientists had to document how much agricultural runoff the new wetlands removed from runoff entering the river and neighboring Ward Creek. So the curious bears had to be constrained. The electric fence did the trick.

Bears, bobcats, deer, coyotes, raccoons, a myriad of birds and blue crabs and other aquatic life have all been showing up in growing numbers since the N.C. Coastal Federation and its partners bought and started restoring North River Farms on North Carolina's central coast about a decade ago.

North River Farms is the largest wetland-restoration project ever attempted in North Carolina. When it's complete, the federation and its partners will restore about 6,000 acres of wetlands and streams. Turning the farm fields back to wetlands is expected to benefit the rich fishing waters of North River and Core Sound.

The runoff from North River Farms and the adjacent, 44,000-acre Open Grounds Farm is the main reason for the high levels of bacteria that forced the state to close shellfish beds in part of the river and several adjacent creeks. The restoration project's goal is to restore the land's natural drainage, which should improve water quality and should eventually lead

to the reopening of shellfish waters.

The newly created wetlands replace farm fields that were contributing pollutants to the river. They will also slow down and treat the contaminated runoff from Open Grounds Farm that flows through the project site. In the re-created wetlands, the runoff will soak into the ground or slowly meander through re-created streams that mimic what was there before the land was ditched and turned to farm fields in the 1970s and '80s. Much of the bacteria and other pollutants will be naturally removed before entering the river.

TOP LEFT: WETLANDS ALONG NORTH RIVER WERE FILLED AND LINED WITH DITCHES TO CREATE FIELDS TO GROW SOYBEANS, WINTER WHEAT AND POTATOES. *Courtesy of the N.C. Coastal Federation* TOP RIGHT: BULLDOZERS BEGIN THE RESTORATION BY TURNING THE UNIFORM FARM FIELDS INTO A MAZE OF FURROWS, HOLES AND HILLS THAT ARE MEANT TO MIMIC THE RANDOMNESS OF NATURE. *Courtesy of the N.C. Coastal Federation* BOTTOM: VOLUNTEERS PRUNE YOUNG BALD CYPRESS THAT WERE PLANTED AT THE FARM. *Courtesy of the N.C. Coastal Federation*

IMPROVING WATER QUALITY OPENS PORTIONS OF NORTH RIVER

Restoring wetlands at North River Farms may have paid early dividends in 2006, when the state opened portions of the river that had been closed to shellfishing for decades.

The N.C. Division of Marine Fisheries opened 209 acres of previously closed oyster beds in North River and Ward Creek, a tributary of the river. State inspectors found that bacteria levels had dropped enough to safely reopen portions of the river.

The action came after several hundred acres of wetlands had been restored at North River. This is a welcome trend. As restoration work continues, the project's partners are hoping for more good news, and more oysters.

"At the time this land was ditched and drained, no one realized how much impact runoff had on downstream water quality," said Todd Miller, the federation's executive director. "Now we know that good water quality and healthy fisheries depend on wetlands, and this project will provide a big sponge in the headwaters of coastal waters that should become cleaner and more productive."

But, first, a sizable tract of land had to be bought. Putting together the diverse partnership required to buy the farm and undertake a restoration of this size was a complex effort of its own that involved some unlikely bedfellows. The federation bought several parcels with money from the state Clean Water Management Trust Fund in 1999 and began restoration activities with grants from NOAA's Community-based Restoration Program and Restore America's Estuaries. The partnership kept expanding. The list now includes the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, N.C. State University, Duke University, farmers, private foundations and investors, a hunting group, a private mitigation land bank, students and local residents. All bring sweat equity, money or both to the effort.

Volunteers – sometimes local, sometimes from places as far away as the corn belt of Iowa – have worked for thousands of hot sweaty hours to plant hardwood trees and wetland grasses or build oyster reefs from recycled shells. Students by the droves come to the site for hands-on examples of what they're learning in science class.

The latest transformation of the land is occurring with the help of some of the same people who changed it the first time. Sarah King, the federation staff member who managed the project from 2004-2007, remembers an encounter she had out at the farm one day when she was leading a tour.

"I was taking them through the project at an interpretive sign right by the farm entrance," she recalled. "Midway through, a pickup truck pulled up and a gentleman got out.

"He asked what we were doing, and if we were part of the work that was going on here. I wasn't sure what he thought about it, but I said, 'Yes, I was with the Coastal Federation and it was our project.' "

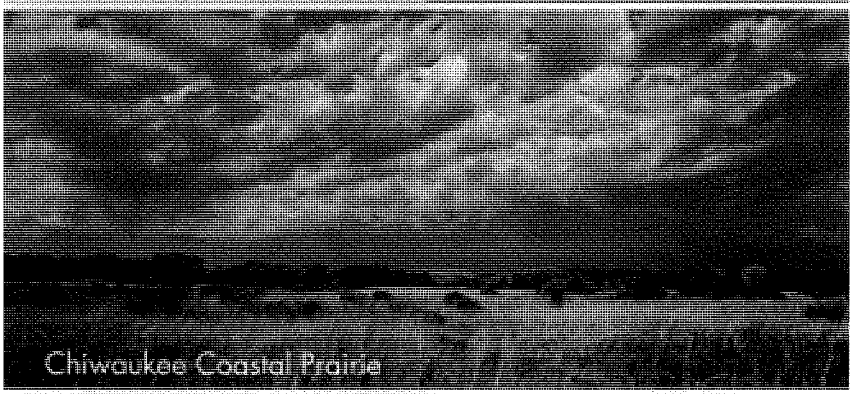
Then King got a pleasant surprise. "He came up and told us that he was so happy we were doing it. He wanted to get involved and help any way he could. He was great."

It turns out that Eric Pake Jr., the man who showed up and joined the tour that day, had a long history with the farm. Helping to drain and clear the farm was his first job out of high school in the 1980s.

As an adult, Pake went on to take up fishing, and over time watched with dismay as both water quality and the catches declined. He realized that something had to be done to clean up the water if the fishing was to revive.

That's why he was thrilled when he heard efforts were being made to restore the farm. "I love this place and what the Coastal Federation is doing here has already made a difference in the water quality of North River," he told the *Carteret News-Times* in 2005.

He continues to work on the restoration, and he's gotten his two teenaged daughters involved, as well. "It's helped everything in the quality of the North River," he explained. "I've been told by the old-timers that the oysters are back like they were in the '50s and '60s, big as your hand. And now we can take them from the water in some places. And puppy drum, they feed around oyster rocks—they're back, too."



Chiwaukee Coastal Prairie

[illegible] *Chapter of The Nature Conservancy*

The sight of the great American prairie astonished early explorers sailing along the western shore of Lake Michigan. Unending fields of tall grass came down to the water's edge, trampled in spots by wandering bison. The ground was covered by a riot of blooming native wildflowers. Their colors depended on the season – yellow puccoon and purple shooting stars in the spring, black-eyed susans and golden coreopsis in the summer and a grand show of goldenrods, asters and red, gold and brown Indian grass in the fall. Aldo Leopold, one of America's great naturalists and himself a native of the prairies, would later call it the "calendar of colors."

That prairie along the lake shore is gone now, as are most of the others. The prairie that stretched across half a continent, that was celebrated in Woody Guthrie songs and in John Wayne westerns, has been so thoroughly plowed and ditched, paved and cut that less than one half of one percent of the original still remains. It is one of the truly imperiled ecosystems in the world, and with it has gone the song birds, the mammals and the plants that had depended on it. Along the heavily urbanized lake shore north of Chicago, the old prairie now sprouts pavement and masonry, glass and steel.

But there is a place, just across the Wisconsin line, where a remnant of the virgin prairie still exists. South of Kenosha in a township fittingly called Pleasant Prairie, the calendar of colors still blooms.

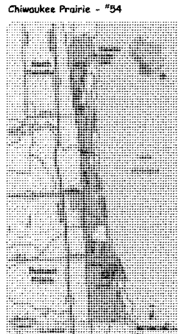
The Chiwaukee Prairie, a long, narrow treeless tract along the lake's shore, has never been plowed, planted or successfully drained, though some have tried. Local activists saved the first few acres from the bulldozers in the mid-1960s. Since then, a coalition of local people, college professors, conservation groups and state agencies has worked assiduously to piece together plot by plot the rest of the almost 600 acres that are now preserved as one of the largest prairie complexes in the state and the most intact coastal wetland in southeastern Wisconsin.

"This was one of the first projects in the state of Wisconsin where a volunteer coalition of people got together to really protect a place," noted Steve Richter, a director of conservation in Wisconsin for The Nature Conservancy. "People were a big part of this."

But, first there was the ice. The Chiwaukee is a gift of glaciation. It formed about 13,000 years ago when Lake Chicago, the predecessor of Lake Michigan, receded. The prairie is really an old beach covered by a thin layer of topsoil. The wind and waves of the receding lake left behind a series of sand dunes that now support an amazing variety of plants, noted Dr. Eugene C. Gasiorkiewicz, a retired botany professor at the University of Wisconsin's campus in nearby Parkside.

"You have these undulating sand bars and you have different species of plants at one level where there are wet sinks and other species in drier areas as you climb the grade," he said. "It makes for a very unique habitat."

Chiwaukee Prairie - #54



More than 400 species of vascular plants have been found here. The variety of habitats, coupled with their location in the extreme southeastern corner of the state, allows several rare and geographically restricted plants, amphibians, reptiles, birds, invertebrates and mammals to thrive here. Twenty-six rare plant species, 10 of which are listed as endangered or threatened, grow in the prairie. Rare plants include smooth phlox (*Phlox glaberrima ssp. interior*), Ohio goldenrod (*Solidago ohiensis*) and marsh blazing star (*Liatris spicata*). Rare animals include Blanding's turtle (*Emydoidea blandingii*) and the silphium borer moth (*Papaipema silphii*). Because of this extraor-

dinary diversity, Chiwaukee Prairie was recognized as a National Natural Landmark by the National Park Service in 1973.

Pam Holy grew up around the prairie. She's now president of the Chiwaukee Preservation Fund, Inc., a non-profit group that is descended from the committee of activists that began efforts to save the prairie. "We're the hands-on group for the prairie," she says. "We're out there frequently doing whatever needs to be done."

They diligently remove invasive species, such as clover and buckthorn. They pick up trash and cut fire breaks for the controlled fires that The Nature Conservancy conducts to maintain the prairie. When they're not getting dirty, the group's members are leading birding trips or holding workshops on the lichen of the prairie.

"They're out on the land all the time," Richter said. "They're proud of what they do, and they're proud of the prairie. Having people involved like that is the reason why this has been such a long-term success."

Money didn't hurt either. The Wisconsin Chapter of The Nature Conservancy has been one of the steadfast partners throughout the more than 40 years of preservation efforts. It loaned the first citizens group the money to buy the first parcels. Since then it has acquired most of the remaining prairie, donating much of it to the state and giving some to the University of Wisconsin. "There were hundreds and hundreds of landowners that needed to be contacted and eventually negotiated with," Richter said.

Those efforts resulted in more than 450 lots being acquired and preserved. Only 73 left to go. NOAA's Community-based Restoration Program has given the state more than $100,000 to manage its portion of the prairie.

The Spanish conquistadors, Gasiorkiewicz notes, used to complain that the tall grass of America's prairies would tickle the belly of their horses. It heartens him to know that there is still a place where a horse can go for a belly tickle.

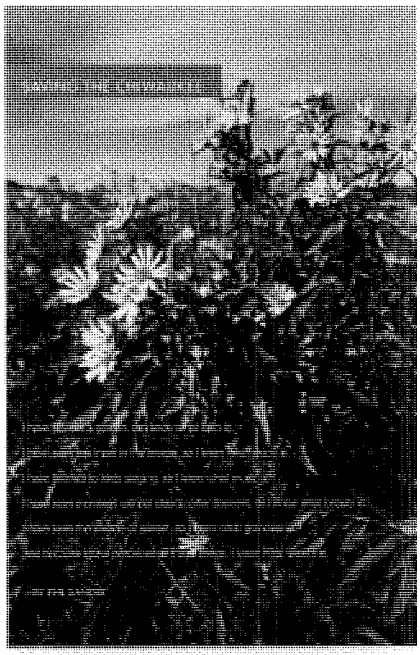
BURNING THE PRAIRIE

Before the European settlers arrived, the prairies of North America burned regularly. Lightning sparked fires that could burn hundreds of acres. Native Americans put the prairies to the torch to drive game, protect their villages, ease travel and encourage growth of nuts, berries and seeds.

As a result, the plants and animals of the prairies adapted to fire and thrive with it as part of their life cycles. Fire recycles nutrients from the thatch into the soil, so other plants can use them, and direct heating of seeds in soil stimulates germination. In the spring, fire-blackened soil absorbs the sun's heat and warms quickly, which helps plants get an early start. Burning also helps to control shrubs and trees that invade the prairie. Without burning, many of the prairies would eventually turn into forests.

Most prairies have to be burned every three to five years to ensure plant diversity and to control invading species, explained Steve Richter of the Wisconsin Chapter of The Nature Conservancy, which owns and manages a portion of the Chiwaukee Prairie. These so-called "prescribed burns" are less frequent in the Chiwaukee because of the railroad, which runs through the prairie. Sparks created by the wheels rolling along on the tracks frequently ignite fires in the prairie.

"It causes about three wildfires every year somewhere in the prairie," Richter said. "That's usually enough."



WILDFLOWERS PRODUCE A RIOT OF DIFFERENT COLORS IN THE CHIWAUKEE PRAIRIE DEPENDING ON THE SEASON. © Barbara J. Ward, courtesy of the Illinois Chapter of The Nature Conservancy

In the gathering dusk of a spring night in 1965, Phil Sander and Al Krampert stood atop the embankment that anchored the railroad line to the shore of Lake Michigan. Spread below them was the last untouched prairie in Wisconsin, maybe the last in the entire Midwest, a vast, treeless expanse that was ablaze in the purple of blooming shooting stars.

"We were struggling with our fears and trying to arrive at an important decision," Krampert remembered five years later in a written memoir. "I was seeking his support and I strongly suspect he was seeking mine. We needed the courage to move in the direction we knew we had to go. We had to make the decision to save Chiwaukee Prairie."

The two had known each other for about a year, drawn together by their love of wild places and of this place in particular. What they didn't know that night by the railroad tracks was that this prairie would keep them bound together for the next 30 years as they would tirelessly lead a coalition of citizens, scientists and conservation groups in a grassroots effort to save it.

Sander, a native of nearby Kenosha in southeastern Wisconsin, had spent his boyhood roaming what was then known as Weyhe Prairie. "In those halcyon days there were no roads or homes along the five-mile stretch of the shore south of Kenosha," Sander wrote in his own memoir of those childhood years

after World War I. "Weyhe Prairie was a mysterious stretch, an isolated land of swells and swales, tall grasses and cattails that reached over our heads. At times we felt as though we were lost in a prairie jungle."

Krampert grew up on a Midwestern farm during the Depression. Zane Grey's novels of the old West and Hamlin Garland's essays on prairie life sparked what would become a lifelong passion for the wildflowers of the fast-disappearing prairies. As an adult, Krampert traveled the West seeking them out.

On one visit to Chiwaukee in 1964, he sought out Sander instead. They touched on many things during that first meeting in Sander's house – fishing, hunting, traveling, ecology. But mainly they talked about Chiwaukee Prairie.

"Phil," Krampert asked finally, "is there anything we can do to save it?"

The railroad tracks that the Chicago and Northwestern laid through the prairie had kept early settlers at bay in the 1800s. Back in those days of steam locomotives, firemen on the Chicago-Milwaukee run regularly cleaned their stacks and fireboxes in the prairie. The resulting wildfires deterred anyone with thoughts of building a house in the prairie or even planting crops there.

The giddy exuberance of the 1920s descended on the prairie when investors from Chicago announced various plans to build a model city for the rich, an 18-hole golf course, a hotel and an enclave of sumptuous lakefront houses that they named Chiwaukee on the Lake. An electric railway would connect it all to Chicago, about 50 miles to the south. Though lots were platted and sold, the Depression intervened. A few palatial houses were built along the lake and part of the golf course opened, but most of the plans died with the stock market. About all that's left of them is a name.

"People think 'Chiwaukee' is an Indian word," explained Eugene C. Gasiorkiewicz. He's a retired professor at the University of Wisconsin-Parkside in Kenosha and published the first and most complete plant list for the prairie. "It was a marketing ploy," he went on. "The prairie is halfway between Chicago and Milwaukee. The developers came up with the word in hopes of attracting buyers from those cities. The Indians had nothing to do with it."

Over the years, other development plans for the prairie also came and went, but an announcement in early 1965 had an ominous ring. Developers said they would build a massive marina for 1,000 boats, a large motel and a golf course in part of the Chiwaukee near the Illinois state line.

That would be the end of the prairie, Hugh Iltis knew. He was a botanist at the time at the University of Wisconsin's main campus in Madison. "As someone who was very much interested in the flora of Wisconsin, I knew the Chiwaukee was absolutely fabulous," Iltis, now 84, said. "The marina would have destroyed a very special place, and I wanted to raise a little hell about it."

He started with the Kenosha county commissioners who had to rezone the prairie to make way for the marina. Iltis and Orie Loucks, another Madison professor, drove two hours in a blinding snowstorm to attend the commissioners' rezoning hearing in February 1965. Krampert remembered Iltis arriving late and standing before the board with melting snow dripping from his coat.

"You are rezoning land in Pleasant Prairie Township," Iltis told the commissioners. "Your children will ask, 'What is a pleasant prairie?' and you will have no answer - for you will have destroyed it."

Others also spoke against the rezoning. Most were local people, but some drove 10 miles from Racine or all the way from Milwaukee and Marquette. It did no good. The commissioners rezoned the land.

Meeting in the hallway afterwards, opponents formed an impromptu committee and appointed Krampert to head it. "The women liked him because he was very handsome," Iltis said. "But he was a good choice. He was a great big guy, oozing

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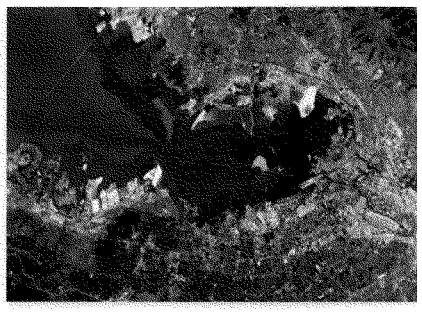
The Healing of San Francisco Bay Begins

The sluice wheel was turned on July 19, 2004, and one of the most ambitious wetland-restoration projects in the country took its symbolic first step with a rush of briny water into the southern tip of San Francisco Bay. For the first time in more than 40 years, bay waters circulated through stagnant industrial salt ponds to begin the long process of remaking marshes.



THE DISTINCTIVE SCARLET SALT PONDS MAKE CONVENIENT WAYPOINTS FOR ASTRONAUTS, WHO TOOK THIS PHOTOGRAPH FROM SPACE. *Courtesy of the National Aeronautics and Space Administration*

It will probably take three decades to finish the job, but when the project is completed 53 old salt ponds, covering more than 16,000 acres, will be transformed back to tidal marsh or bird nesting habitat, and San Francisco Bay will be a better place.

"I tell people that when we're done, the bay won't be like it was before people settled here because there have been too many changes," says Steve Ritchie of California's Coastal Conservancy, the project's manager. "We will have to work with the natural systems that we have, but restoring these lands will lead to vast ecological improvements."

San Francisco Bay and the Sacramento-San Joaquin delta form the West Coast's largest estuary, draining about 40 percent of California's land. With its blend of fresh and ocean waters, thousands of miles of rivers and streams and numerous microclimates and landscapes, the estuary is an ecological treasure that supports an enormous diversity of fish, other animals and plants. About 120 fish species, 255 bird species, 81 mammal species, 30 reptile species and 14 amphibian species live in the estuary. Nearly half the birds of the Pacific Flyway, a critical migratory route, and two-thirds of California's salmon pass through the estuary.

A century ago, the Bay Area contained almost 200,000 acres of tidal marshes and close to 100,000 acres of seasonal wetlands, creeks and streams. Today, it is surrounded by the fourth-largest metropolitan area in

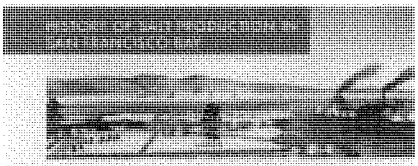
the country, and 90 percent of the bay's original tidal marshes are gone. They have been drained, filled and converted to farmlands, highways, landfills, industrial complexes, shopping malls, housing developments, commercial salt ponds and airports. Not surprisingly, populations of marsh-dependent fish and wildlife have also dwindled, while water quality has decreased and the risk of flooding has risen.

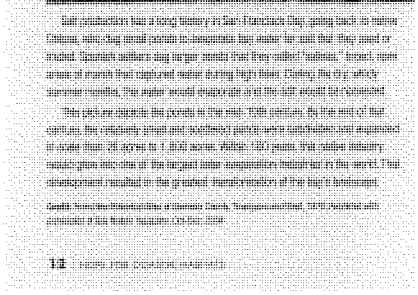
The non-profit group Save The Bay formed in the 1960s and began pushing for the bay's restoration, noted David Lewis, its executive director. "The regional movement that we started to prevent the bay from being filled in definitely led to general and widespread support for restoration," he said.

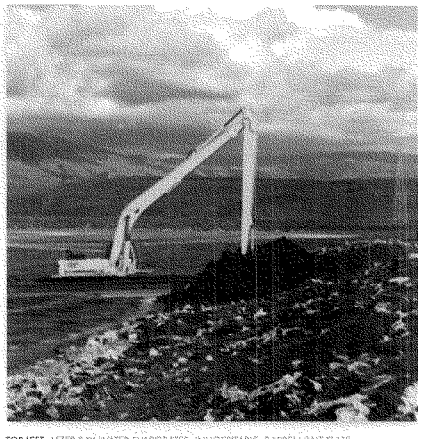
Amid much fanfare in 2003, Cargill, Inc. and state and federal agencies announced the final terms of a deal that would turn over ownership of land and mineral rights to 16,500 acres of Cargill salt ponds to the public agencies for $100 million. Cargill, a multinational food and agricultural products company, was producing at the time about a million tons a year of common salt from the vast array of huge ponds scattered along the bay.

Anyone flying into San Francisco has seen them – large red rectangles clustered along the bay's shore. So distinctive are these scarlet landmarks that astronauts use them as convenient waypoints. The color comes from the microbes and brine shrimp that thrive in the pond's high salinity waters. Every one of those rectangles was once a tidal marsh.

Returning the salt ponds to that state again isn't as simple as merely knocking down the dikes that separate them from the bay, Ritchie explains. For one thing, there are the birds to consider. The bay's natural wet flats







TOP LEFT: AFTER BAY WATER EVAPORATES, INHOSPITABLE, BARREN SALT FLATS ARE LEFT BEHIND. MIDDLE: AFTER RESTORATION, THOSE BARREN FLATS BECOME WETLANDS AGAIN. ABOVE RIGHT: A DREDGE BEGINS THE WORK OF RESTORING A SALT POND. *All photos courtesy of the California Coastal Conservancy*

disappeared long ago, and birds that need such habitat have come to rely on the artificial salt ponds as substitutes. The ponds provide critical foraging habitat and shelter for at least 20 migratory bird species, but western sandpipers are particularly dependent on them. In spring, their numbers on the ponds can swell to 700,000—a significant percentage of the population on the Pacific Flyway.

Western snowy plovers, an endangered species, breed on the barren islands of salt that form after the water evaporates. "To us those places look like moonscapes," Ritchie says, "but the snowy plovers think they're quite cool. They can see any predators coming."

The restoration also has to provide public access and ensure that the densely populated communities that ring the bay aren't flooded by storms and high tides after the levees encircling the ponds come down. "We can't flood Silicon Valley," Ritchie said. "That wouldn't be good."

All those issues were worked out during an extensive planning process, and the rest of the work on what's formally known as the South Bay Salt Pond Restoration Project was to begin in 2009 through early 2010 with three major restorations, totaling more than 2,200 acres. California's severe budget shortfall almost brought it all to a halt, though, but Ritchie found other sources of money – including $5.8 million from a NOAA stimulus grant – to keep the project on track.

NOAA has contracted with Save The Bay, to restore crucial transition zone habitat at the edge of several ponds. "The low marsh will take care of itself. It's really not necessary to do any planting," Lewis said. "Our community-based restoration is focused on restoring critical habitat in the high marsh and levees that have been overgrown with weeds and exotic plants."

The group works with landowners to develop a restoration plan and to re-establish native plants. It grows the plants from seeds collected locally and volunteers plant the seedlings.

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OYSTER REEFS: Natural Filters and Baby Nurseries

America's native oysters are excellent ecosystem engineers. The homes that they build in the shallows of our estuaries help keep the water clean, protect the shoreline from damaging waves and attract a wide array of other marine creatures that come to the oysters' home to eat, reproduce or to find shelter from predators.

These large congregations of oysters are known by various names – beds, bars, banks, reefs, rocks, hard bottom. By any name, they are among the most productive fish habitat along our coastal shoreline.

THE BENEFITS

The Eastern oyster (*Crassostrea virginica*), native to the Atlantic and Gulf coasts, is the best-known builder of massive reefs. Successive generations of oysters live atop the dead shells of their descendents. Over time, scientists estimate the mass of oysters can approach as many as 6,000, or about 45 bushels, within a single square yard of a healthy reef.

Combine a cafeteria buffet, a hospital nursery and a water filtration plant and you come close to what that reef means to the estuary. All those oysters form dense layers of shells that rise from the soft mud around it. This island is filled with nooks, crannies and crevices that are inhabited by organisms great and small. Just how many species use an oyster reef depends on its location and the water's temperature, depth and salinity. Scientists in North Carolina have documented more than 300 species of invertebrates and more than 40 species of fish and crustaceans on reefs there. Shrimp and small fish like gobies, blennies and toadfish feed on the algae, bacteria, fungi and worms that colonize the oyster reefs.

Others need the reefs to successfully spawn. Toadfish, for instance, attach their eggs to the underside of oyster shells, while gobies, blennies, and skilletfish place their eggs in the shells of recently dead oysters.

The small fish and crustaceans, of course, attract larger species in search of a meal. Red and black drum, bluefish, spot, Atlantic croaker, weakfish, spotted seatrout, summer and southern flounder and blue crab are just a few of the important species that feed at the reefs.

Newly hatched sheepshead, gag, snappers, shrimp, and stone and blue crabs find shelter among the shells, which are considered important nursery habitat for numerous species.

The oysters themselves play a vital role as the estuary's natural filter. By removing organic material and nutrients from the water, the oysters help keep the water clear and free from algae, which in turn aids the underwater grass beds.

Reefs also stabilize stream banks and decrease erosion. Large areas of oyster shells can block waves and reduce erosion and turbidity.

THE TRENDS

America's oysters were once a worldwide delicacy. They came first from the Northeast, from places like Bivalve on the Maurice River in southern New Jersey. By 1890, more than 90 railroad cars full of Delaware River oysters were leaving the little town each week. Catches steadily dropped throughout the region and nearly ceased in the 1950s after disease wiped out many of the remaining oysters. The oysters have never fully recovered.

But by then, the industry had moved south. In the late 1800s, annual oyster harvests in the Southeast routinely topped 10 million pounds a year, and peaked in 1908 when the harvest was nearly 20 million pounds. Since then, though, the oyster populations have collapsed under the weight of disease, pollution and overfishing. The commercial harvest fell throughout the 20th century and is now at historic lows. Today, yearly harvests in the Southeast average about three million pounds. Before the 1950s, Chesapeake Bay accounted for almost half the catch of the Eastern oyster; today it yields only about 2 percent.

OYSTERS BUILD UPON THE SHELLS OF OTHERS. *Photo courtesy of the N.C. Division of Marine Fisheries.*

Though they have fluctuated over the years, oyster harvests along the Gulf Coast haven't shown a similar collapse. The Gulf States are now the leading producers of Eastern oysters.

On the west coast, overfishing and pollution have all but wiped out the native Olympia oyster (*Ostreola conchaphila* or *Ostrea lurida*).

THE THREATS

Fishing for oysters with towed dredges is the greatest physical threat to oyster reefs. Studies have shown that using dredges for one season can reduce the height of an oyster reef by 30 percent. Trawling for shrimp, crabs and clams and dredging channels can do similar, but less dramatic, damage to the reefs.

Water pollution and diseases are more widespread threats. Sediment washed off the land during storms can bury oyster shells. Without the shell on the bottom, oyster larvae can't attach themselves, or "set." Excessive sedimentation can also harm shellfish by clogging their gills. Sediment was the largest cause of water-quality degradation in the Albemarle-Pamlico estuary. Excessive nutrients, such as phosphorus and nitrogen, can also lead to layers of water so devoid of oxygen that oysters, which are unable to move to better water, suffocate. Polluted stormwater runoff can contaminate the shallow water where oysters grow with high levels of bacteria that the oysters ingest and then become unsafe to eat.

Profile of the Amazing Oyster

They aren't the prettiest things in the water, but oysters have long been one of the most important – ecologically and gastronomically – on both sides of the Atlantic.

When they arrived on the shores of North America, the first white settlers were most impressed with the abundance, size and succulence of oysters, whose thick rafts of reefs were hazards to unwary navigators in their small wooden boats. Friendly Indians reportedly brought oysters along with wild turkeys to the first Thanksgiving. They taught these strangers how to hunt for the fat shellfish with leather tongs and how to dry them for winter food. Settlers on the other side of the continent found large mounds of oyster shells scattered about what they would come to call San Francisco Bay, attesting to the natives' affinity for the shellfish.

Across the Atlantic, oysters had been a prized food since the pre-Christian era. The ancient Romans served large quantities at their banquets, learned to cultivate them and even made a monetary unit, the *denarius*, equal in value to one oyster.

Quite an illustrious history for a critter that doesn't even have a backbone. In fact, oysters are scientifically classed as *mollusks*, a word from the Latin meaning "soft." Protecting those soft bodies is a hard shell made up of two valves that are joined by a hinge and held together by a strong muscle. Except in the earliest stage of their development, oysters even lack the power of locomotion. They spend much of their lives lying still on the floor of brackish bays, coves and estuaries, usually attached to rocks, other oysters or some other hard, submerged object, sometimes in great clusters.

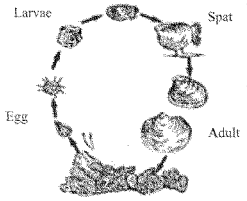
Many different species of oysters live in the inshore waters of the world's temperate and tropical seas. The one native to the Atlantic and Gulf coasts, *Crassostrea virginica*, is commonly known as the American oyster, the Atlantic oyster and the Eastern oyster. It is a hardy species that can live in waters as varied in salinity and temperature as those found from Nova Scotia to the Gulf of Mexico.

The Olympia oyster, *Ostrea conchaphila*, that the Native Americans of our Pacific coast so loved were all but wiped out by overharvesting and pollution and are now the subject of an active restoration effort that NOAA is helping fund. Most of the oysters commercially harvested on the West Coast were introduced from Japan.

THE SEXY OYSTER

The separate sexes of the American oyster ripen in early summer. When the water warms to about 68 degrees, they release eggs and sperm into the water. During the spawning season, a single female, by clapping her shells gently, will puff out many millions of buoyant eggs, and a male will release an even greater number of sperm. The fertilized egg develops into a microscopic larva, which swims and drifts in the tidal currents for about three weeks. The larva may travel far from the spawning area, feeding on microscopic plants and, in turn, being eaten by other animals. Less than one percent of the young larvae reach the next stage of development.

When it's about the size of a grain of pepper, each larva extends a probing foot and seeks a permanent place to live. Once it finds a suitable clean, hard surface, the foot gland ejects a tiny pool of cement-like adhesive. The little oyster then turns on its left side, cements itself to the object, and remains immobile for the rest of its life. From then on, it can feed only on what food the water brings and is unable to escape overcrowding, pollution or its enemies.



Oyster Reef

TOP: YOUNG OYSTERS, CALLED SPAT, SET ON A CLAM SHELL. *Courtesy of Bill Mook, American Littoral Society*
LEFT: LIFECYCLE OF THE OYSTER

The small oyster, or *spat*, now the size of a dime, grows by pumping water through its body and filtering out its food – mostly algae and decaying plant material. In this way it cleans the waters. A healthy three-inch-long oyster can filter approximately 50 gallons of water a day. Oysters provide other ecological benefits as well. Oyster reefs, with their many folds and crevasses, can have fifty times the surface area of a similarly extensive flat bottom. Its convolutions provide habitat for an enormous range of other animals, such as worms, snails, sea squirts, sponges, small crabs and numerous species of fishes.

STORMWATER AND SHELLFISH

Rain washing off streets, driveways, parking lots and other constructed surfaces carries with it a witch's brew of pollutants, including bacteria, which can have a devastating effect on shellfish beds.

This "stormwater runoff" is now the largest source of water pollution in most of our coastal watersheds, accounting for as much as 80 percent of the pollution in our estuaries and ocean. Runoff contaminated with bacteria is responsible for closing hundreds of thousands of acres of oyster and clam beds to harvesting.

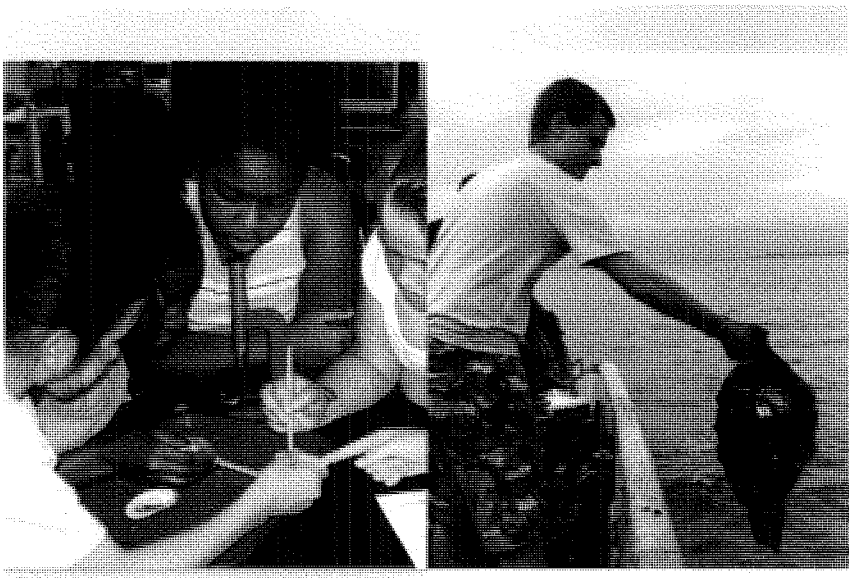
continued on page 31

N.Y./N.J. Baykeeper

That they will grow was another sign of progress. Now there are indications that they are naturally reproducing on at least one reef.

Similar programs pin their ultimate success on the re-opening of polluted shellfish waters. That's not likely to happen anytime soon around New York, so Comi's final measurement is broader and less defined..

"We have educated thousands of people about oysters and the pollution of the estuary," she said. "The watermen and baymen want to see this work. They are our biggest advocates. Our gardeners also become big advocates for controlling pollution. Those are all measures of our success."



History and Science Through Oysters

In southern New Jersey, along the shores of Delaware Bay, there are dozens of reminders of the region's long connection to the Eastern oyster: Old boat-building sheds that once turned out the sturdy schooners that plied the bay's waters for oysters, remnants of shucking houses and packing plants, towns with names like Shellpile and Bivalve. Talk to the old-timers and they will tell you about the work songs chanted around the shucking tables, about the boxcars heading north packed with oysters, about oyster stews hearty enough to ward off the cold of the darkest December night.

They are all part of a rich history when the oyster was king. Sadly, it is a story unknown to most of the children who attend the area's schools. Lisa Calvo is trying to change all that.

Calvo had an idea in 2006. At the time she was a researcher at Rutgers University's Haskins Shellfish Research Laboratory in southern Jersey. The oyster, she thought, could be a way to reach out to kids and teach them about a healthy Delaware Bay and about the importance of restoring its habitat. It also could put them in touch with their history and culture.

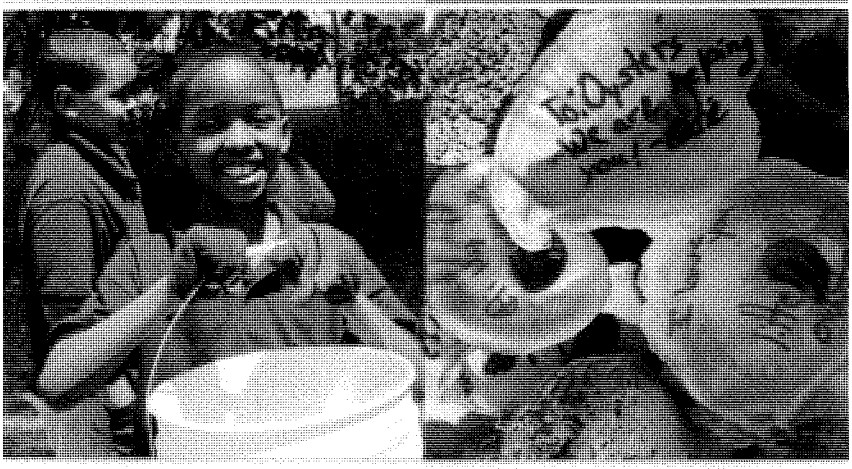
"I have always been interested in science education," she said. "I love research but I felt a connection to education. I just thought it was a good opportunity to do some education."

With federal funding, including some NOAA money through Restore America's Estuaries via the American Littoral Society, Calvo took her Project PORTS (Promoting Oyster Restoration Through Schools) to 10 schools in 2007. She has added four more since.

She goes mainly to elementary and middle schools, offering pupils and their teachers a wide variety of activities that cross curricula and grade levels. She works with individual teachers and their classes or with entire schools. "For kindergartners, it may just be a touch tank," Calvo explains. "Older children get to hold oysters and examine them on the inside and outside and learn about invertebrates."

Her curriculum guide allows teachers to use the oyster as a vehicle to teach basic math and science concepts and history and language arts. By incorporating science with local history, pupils can better appreciate and understand the complexity of an important local environmental problem–the decline of the Eastern oyster.

After the kids have learned that lesson, Calvo puts them to work filling mesh bags with recycled shells. She then moves the bags to the Haskins Lab where they are placed in the bay to attract baby oysters, called spat. Getting students directly involved in an oyster-habitat restoration project greatly enriches the educational value of the classroom



lessons, she said. "I have to grab the kids off the shell pile so the next group can bag," Calvo said. "It's hands on, it's dirty and it smells a little bit. The kids love it."

Calvo, who now works as the watershed coordinator for the Jacques Cousteau National Estuarine Research Reserve in Bridgeton, figures in this way she has reached more than 1,500 kids in two years. Those children have filled more than 3,500 bags of shells, which then attracted more than four million oyster spat. Some of those spat survived and are now growing on a sanctuary reef in the bay. The kids also know how Bivalve got its name.

"This has been a very rewarding experience," Calvo says.

FAR LEFT: FOURTH-GRADE STUDENTS AT FRIENDS SCHOOL MULLICA HILL IN MULLICA HILL, N.J., PARTICIPATE IN PROJECT PORTS' "THAT'S GROSS ANATOMY, THE INS AND OUTS OF OYSTERS" SCIENCE ACTIVITY. LEFT: JEFF SIOGREN, PROJECT PORTS VOLUNTEER, EMPTIES THE SHELL BAGS CONTAINING OYSTER SPAT AT THE CONSERVATION AREA IN DELAWARE BAY. ABOVE: STUDENTS FROM WEST AVENUE ELEMENTARY SCHOOL IN BRIDGETON, N.J., BUILD SHELL BAGS AT THEIR SCHOOL FOR PROJECT PORTS. ABOVE RIGHT: FOURTH-GRADE STUDENTS IN CUMBERLAND COUNTY, N.J., CREATE SIGNATURE OYSTER SHELLS FOR PROJECT PORTS. THE MESSAGES ARE OFTEN DIRECTED TOWARD THE OYSTERS THEY HOPE TO HELP. THE SHELLS ARE LATER PLACED IN MESH BAGS AND USED ON OYSTER REEFS IN DELAWARE BAY. *All photos courtesy of Project PORTS*

"ARSTERS" HE-STEW

- Mess of bacon
- 8 Large onions
- 2 Hefty stalks of celery
- 48 Oysters
- Oyster liquor
- Tapioca powder
- Milk
- Saffron
- 1/2 lb. butter

From James A. Michener's *Chesapeake*® 1978, Random House, Inc., Chapter 22, "The Waterman."

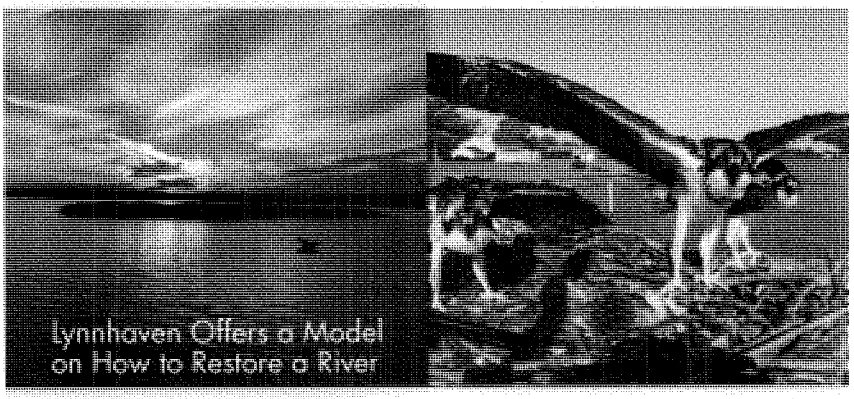
An excerpted conversation between the cook, Big Jimbo, and the crew aboard the Skipjack Jessie T. as she prepared for her maiden trip to dredge for "arsters" in Maryland's Choptank River.

A She-stew is the traditional one: Eight oysters per person boiled slightly in their own liquor, then in milk thickened with flour, flavored with celery, salt and pepper. A great opening course, but not a meal for a working man.

A He-Stew is quite different, as Big Jimbo prepared his version. First he took a mess a bacon and fried it crisp. As it sizzled, he chopped eight large onions and two hefty stalks of celery. Deftly he whisked the bacon out, tossing the vegetables into the hot oil to saute. Soon he withdrew them, placing them with the bacon. Then he tossed the forty eight oysters into the pan, browning them just enough to implant the flavor, then he quickly poured in the liquor from the oysters and allowed them to cook until their gills wrinkled.

Next Big Jimbo did two things that made his stew unforgettable. Taking a small pinch of tapioca powder, he tossed it into the oysters and liquor and in a few minutes the finely ground tapioca powder had expanded it into a large translucent, gelatinous mass. When he was satisfied he poured the oysters into the milk, which he had already brought to a simmer, tossed in the vegetables, then crumbled the bacon between his fingers, throwing it on top.

The sturdy dish was almost ready. Finally, Big Jimbo dusted the top of the stew with Saffron, giving it a golden richness, which he augmented with a hollowly of butter at the last moment. When the crew dug in, they found one of the richest, tastiest "Arster" stews a marine cook had ever devised.



Lynnhaven Offers a Model on How to Restore a River

LEFT: SUNSET ON THE LYNNHAVEN RIVER. *Courtesy of Lynnhaven River Now*
RIGHT: OSPREYS GUARD THEIR NEST ON THE LYNNHAVEN RIVER. *Courtesy of Lynnhaven River Now*

Hap Chalmers proudly pulled from his pocket a sheet of paper with the names of all the restaurants that have bought oysters from his son Cam, who has an aquaculture business on the Lynnhaven River in Virginia Beach, Va. It was an impressive list. On it were the names of restaurants in Philadelphia, Baltimore, Las Vegas, New York, even San Francisco. More impressive was the fact that anyone at all was buying Chalmers' Lynnhaven oysters.

Just a few years ago, the river was so contaminated by bacteria that almost all of its oyster beds were off-limits to shellfishing. What few oysters grew in the river were unsafe to eat and illegal to sell.

"We're back!" Hap told a newspaper reporter in late 2008 after showing off his list, a broad smile spreading across his face.

The Lynnhaven seems to have made at least a partial comeback after decades of abuse. Almost a third of its oyster beds have recently been reopened for harvesting – a sign of improving water quality – and Lynnhaven oysters are once again on local restaurant menus – a financial boon to local watermen.

To get this far, the river needed a great deal of help from a great many people. City officials had to commit themselves to stanching the flow of stormwater that was poisoning the Lynnhaven with bacteria. State and federal agencies had to rebuild the river's oyster beds that had been covered by sediment. Non-profit groups had to advocate tirelessly on its behalf and teach people about the river's problems, and those who live along the river had to roll up their sleeves and volunteer to join committees, attend meetings, grow seed oysters for the new reefs, pick up after their pets and generally think about the river in a new way. The combined efforts could serve as a model for how to resuscitate a comatose river, said Tommy Leggett of the Chesapeake Bay Foundation.

"It was a combination of everybody doing something," noted Leggett, a former commercial fisherman who is now the foundation's oyster restoration and fisheries scientist in Virginia. "A whole lot of different folks contributed towards the success we've seen on the Lynnhaven."

The river was once highly prized for its oysters, but unchecked and largely unregulated development in the 1960s and '70s gradually took its toll. The Lynnhaven's watershed covers 64 square miles of Virginia Beach. Within it live almost 250,000 people, or roughly half of the city's population. At least 35 percent of the watershed has been covered with roads, parking lots, rooftops and other hard surfaces, which increased runoff after every rain. More than 1,000 pipes direct that untreated stormwater to the river, which became laden with sediment and overloaded with nutrients, toxins and bacteria.

"It's basically an urban river and its watershed has been totally developed," explained Karen Forget, executive director of the advocacy group Lynnhaven River Now. "It's been a major challenge because most development took place when there were virtually no limitations on development or controls on stormwater."

By 2002, 98 percent of the river's oyster beds were closed to shellfishing because of high bacteria levels and it seemed the Lynnhaven was destined to go the way of other polluted urban rivers. But that was the year Harry Lester, Andy Fine and Bob Stanton decided to do something about it. The three businessmen got together with other prominent city leaders to form what became Lynnhaven River Now. Their goal was simple: Bring back the oysters. "We were all novices at this," Lester recalls. "We had no idea what it would take or how long it would take. We only knew that the river needed help."

The group's members did have the ear of the city council, remembers Bob Johnston, Virginia Beach's permit administrator. "The council members realized how important it was to clean up the river," he said.

Things began to happen. The council, in 2003, declared restoration of the Lynnhaven River to be a high priority, and the city set out to reduce

pollutants entering the river. The Department of Public Utilities, for instance, completed more than 40 projects, costing almost $46 million, to extend, repair or rehabilitate the public sewer system in the watershed. The city spent more than $6 million on other environmental projects, ranging from installing solar powered aerators to boost oxygen levels in lakes draining into the river and building wetlands to treat stormwater to bacterial monitoring and modeling.

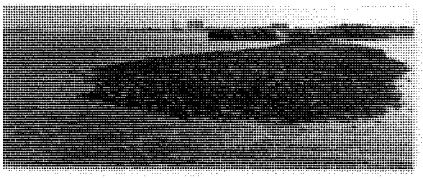
The city now has a task force made up of section heads that meets monthly to discuss water-quality issues, noted Clay Bernick, Virginia Beach's administrator for environmental management. "It's gotten everybody on the same page, and we're moving in the same direction," he said. "We're seeing far less fall through the cracks."

Plans to manage stormwater in each of the 33 watersheds in the city are being devised, and the city is beginning to implement the recommendations of a Green Ribbon Commission that looked at city ordinances, codes and procedures to make them more environmentally friendly. It also gave Army Corps of Engineers half of the cost of a $3 million study to restore the Lynnhaven. The study is looking at ways to rebuild wetlands and essential fish habitats and re-establish underwater grass beds.

"I think the city deserves a pat on the back," said Christy Everett, the Chesapeake Bay Foundation's assistant director in Virginia. "They've put amazing resources toward this. They're doing much more than any other city."

The Corps of Engineers' Norfolk District also played a role. It built almost 60 acres of oysters reefs in the river that are now sanctuaries where harvesting is prohibited. Along with the Virginia Institute of Marine Science and the state's Marine Resources Commission, the corps has also built more than 100 acres of artificial oyster reefs and seeded them with disease-resistant oysters.

Leggett estimates that the Chesapeake Bay Foundation probably planted 2-3 million oysters in the Lynnhaven. Many were supplied by volunteers in the foundation's program that helps people grow oysters under their docks. Those oysters are then used in restoration projects.



A REEF IS EXPOSED DURING LOW TIDE ON THE LYNNHAVEN RIVER. *Courtesy of Lynnhaven River Now*

Most people, though, give much of the credit for the river's rebounding fortunes to Lynnhaven River Now. Its educational programs teach people about the problems facing the river and how their actions affect the Lynnhaven. It has partnered with the city on a range of activities, from producing television ads to upgrading sewer systems. Its advocacy has led to a ban on discharges from marine toilets into the Lynnhaven and more effective controls on stormwater. "Lynnhaven River Now has just been a fantastic partner," Johnston said. "I wish I had one of those organizations in every watershed in the city."

Everybody's work seems to be paying off. About seven percent of the river's oyster beds were open to harvesting by 2006. More than 1,400 acres were opened the following year and another 112 acres were added in 2008. Harvesting is now allowed in about 31 percent of the Lynnhaven.

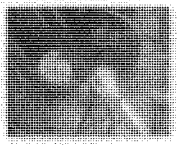
Whether these gains are long-term may be debatable. Some argue that the falling bacteria levels are due to abnormally low rainfall and the resulting decreased runoff, which carries the bacteria to the river. Everett's not one of them. The Lynnhaven has turned a corner, she thinks. But even if some of the reopened oyster beds have to eventually be closed again, the work everyone has done has already paid dividends, she says.

"Now there are signs of hope," Everett said. "You can now eat Lynnhaven oysters. You've got to give people some hope. While everything's not perfect, it shows that you can slow the pace of deterioration and that you can begin to turn things around."

[redacted]

SUBMERGED AQUATIC VEGETATION:
Underwater Gardens Nurture Young of Many Species

They clean the water, provide a haven for young fish and are food for scores of different birds and sea creatures. These small flowering plants, known to scientists by the utilitarian moniker "SAV" for submerged aquatic vegetation, grow mostly unseen beneath the water and help keep our coastal estuaries healthy.



THE BENEFITS

This underwater garden is an important part of the estuary's ecosystem. The plants are top-notch recyclers, for instance. They take nutrients such as phosphorus and nitrogen from the sediment and release them into the water when they die.

Within seagrass communities, a single acre of grass can produce more than 10 tons of leaves a year. This vast biomass provides food, habitat and nursery areas for a myriad of adult and juvenile vertebrates and invertebrates. A single acre of seagrass may support as many as 40,000 fish and 50 million small invertebrates. Because seagrasses support such high biodiversity, and because of their sensitivity to changes in water quality, they are important indicators of the overall health of coastal ecosystems.

More than 40 different species of fish and invertebrates have been collected from grass beds, which are busy nurseries for the young of many marine species including striped bass, red drum, salmon, flounder, blue crabs and pink shrimp. Grass shrimp, spotted seatrout and weakfish spawn in the grass, and the Atlantic bay scallop needs grass meadows to survive. The grasses are also important food sources for many types of birds.

PROFILE OF COMMON UNDERWATER GRASSES

About 60 species of seagrasses grow in coastal waters worldwide. Here's a look at four that are commonly found in U.S. coastal waters.

EEL GRASS *(Zostera marina)*

U.S. coastal distribution: Maine to North Carolina, Washington to California. **Habitat:** Found in sheltered bays, salt ponds, inlets, tidal flats and creeks and at the mouth of estuaries. It prefers shallow, high-saline waters and sandy mud. **Description:** Slender, ribbon-like leaves with rounded leaf tips that grow along joints of the stem. **Ecological significance:** Important habitat for numerous marine species, including blue crabs, Dungeness crabs, spider crabs, scallops, juvenile salmon, seahorses, pipefish and speckled trout. It is also an important food source for Brant geese.

SAGO PONDWEED *(Potamogeton pectinatus)*

U.S. coastal distribution: Widespread along the Atlantic, Gulf and Pacific coasts and along the Great Lakes. **Habitat:** Generally found in fresh to moderately brackish water and prefers silty or muddy sediments. It tolerates strong currents and wave action better than most other underwater grasses because of its long roots and rhizomes. It can also grow in polluted water. **Description:** Long, narrow, thread-like leaves that taper to a point. Branched stems create bushy clusters that fan out and float on the surface. Sheath at the leaf is pointed like a bayonet, and the clustered flowers look like beads. **Ecological significance:** Considered one of the most valuable food sources for waterfowl in North America. Its highly nutritious seeds, tubers, leaves, stems and roots are consumed by numerous species of ducks, geese, swans and marsh and shorebirds.

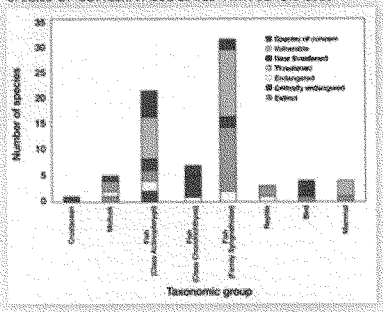
SHOAL GRASS *(Halodule wrightii)*

U.S. coastal distribution: North Carolina south though the Gulf of Mexico, California coast. **Habitat:** As the name implies, it grows in shallow water, close to shore where other grasses can't grow. It's a relatively fast-growing species that colonizes barren sandy areas in quiet waters. **Description:** Ribbon-like flat leaves that, exposed at low tide, look like grass in a lawn. **Ecological significance:** Because it is hardy and fast-growing, the grass is useful in restoring areas damaged by erosion. Transplants of shoal grass colonize the damaged areas relatively quickly, preventing further erosion and allowing for the establishment of other species of seagrass and marine life.

TURTLE GRASS *(Thalassia testudinum)*

U.S. coastal distribution: Central Florida south to the Gulf of Mexico. **Habitat:** Requires high salinity water sheltered from extreme wave action. It reaches depths of 60 feet in clear water and can stand brief exposure to air at low tide. **Description:** Erect, green leaves that arise in clusters from short stalk. They are finely veined and rounded at the tips. The flowers are large, greenish white to pale pink and produce prominent seed pods that often wash ashore. It grows in large mats throughout its range. **Ecological significance:** The common name of this plant refers to green sea turtles that graze on large fields of this seagrass. Many fish also feed on the plant.

SPECIES OF CONCERN ASSOCIATED WITH SEAGRASSES



Hughes, A. et al. Associations of concern: declining seagrasses and threatened dependent species. 2009. *Front Ecol Environ* 2009; 7(5): 242–246, doi:10.1890/080041 (published online 16 Oct 2008)

FAR LEFT: DIVERS GO THROUGH THE SLOW PROCESS OF HAND PLANTING EELGRASS. *Courtesy of Save The (Narragansett) Bay* ABOVE: A HEALTHY SEAGRASS BED LIKE THIS ONE PROVIDES FOOD AND SHELTER FOR MANY FISH AND OTHER CREATURES. © *NOAA, Heather Dine*

Plant beds also tend to reduce shoreline erosion by sheltering the land from waves. And they help cleanse the water, with their leaves acting as screens to remove sediment.

THE TRENDS

Though they are an invaluable part of our marine environment, seagrasses are disappearing at an alarming rate. Scientists, in a study published in June 2009*, found that 58 percent of the seagrass meadows around the world are in decline. Some of the losses in U.S. waters are staggering: Galveston Bay in Texas, the seventh-largest estuary in the country, has lost 89 percent of its grass beds since 1956. Mobile Bay in Alabama, which was designated as a National Estuary by the U.S. Environmental Protection Agency, has lost 82 percent of its grasses since 1981. Tampa Bay in Florida lost lost 63 percent since 1879. More than a third of the grasses have disappeared in the East River in New York since 1937 and more than a quarter in Nantucket Harbor since 1994.

The researchers also found that about 30 percent of the world's seagrasses have disappeared over the last three decades and that since 1990 the annual rate of loss worldwide has increased from four to seven percent a year.

Dr. William Dennison of the University of Maryland's Center for Environmental Science and the report's co-author offered a sobering analogy when the report was released "Globally, we lose a seagrass meadow the size of a soccer field every thirty minutes," he said in a statement at the time.

THE THREATS

The reasons for the historic decline are many. Natural events, such as regional shifts in salinity because of drought or excessive rainfall, animal foraging, storms, or disease all play a role.

Other factors may be more significant, however. Dredging channels for navigation or marinas can destroy seagrasses by removing them or covering them with sediment. Docks built over seagrass beds can shade them out. Boat propellers can shear off plants or dig them up by their roots, as can some types of fishing gear, such as oyster or clam dredges.

Those kinds of physical damage tend to occur in specific areas and at certain times of the year. Degraded water quality, however, can affect grass beds over larger areas and longer periods of time. Like any plant, the grasses need light to photosynthesize. Too much sediment in the water can block sunlight from reaching the plants. Water enriched with too many nutrients can trigger algal blooms, which have the same effect. The sediments and nutrients come from many sources – sewage plants, eroding stream banks, rural and urban stormwater.

Runoff can also increase the amount of freshwater entering the estuaries, which can decrease salinity and harm the plants.

*Waycott, Michelle, et al. **Accelerating loss of seagrasses across the globe threatens coastal ecosystems.** *Proceedings of the National Academy of Sciences*, June 29, 2009

BRINGING THE MEADOWS BACK TO LIFE

Eelgrass, a major source of food and shelter for countless marine creatures, has all but disappeared from the inshore waters of the Northeast, but scientists and volunteers hope to restore these underwater gardens that are so vital to the health of the region's estuaries.

Narragansett Bay in Rhode Island is like so many of the area's coastal waters. Eelgrass meadows were once thought to cover as many as 100,000 acres of the bay's bottom. Less than 200 acres remained in 2001 when Save The Bay, a non-profit group, put an army of volunteers to work in a large-scale effort to turn the tide.

With initial funding support from NOAA's Community-based Restoration Program and Restore America's Estuaries, the group chose three of the most successful sites from an earlier test program for a more concentrated restoration effort. Initially, there were successes, but there was also a fair amount of heartbreak. There was, for instance, the cold winter of 2004 when ice sheets moving across the shallow water sheared off the transplanted grass, or the hot summer two years later that led to an invasion of hermit and green crabs, which uprooted the plants.

Lessons were learned and methods perfected. "All of the sites we currently plant are above 50 percent survival," noted Maria Martinez, Save The Bay's restoration ecologist. "We consider that a great success."

She's particularly encouraged by the results at Hog Island, the northernmost restoration site. The bay's northern waters are the most polluted and the eelgrass losses there the highest. The grass is very susceptible to turbidity in the water, which blocks the sun's rays, preventing photosynthesis. "The success at Hog Island is important because it may be an indication of improving water quality," Martinez said.

Ultimate success is far from assured, but there's no lack of trying. More than 200 people volunteer each year to help plant the grass. They show up, starting each spring, to help remove grass from existing healthy stands and then again to move them to the restoration sites. Each planting is a four-day exercise. "Once we harvest the eelgrass, it has to be transplanted pretty quickly," Martinez said.

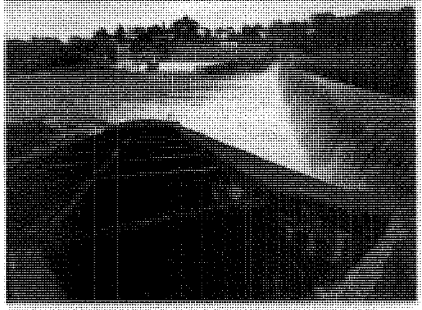
Volunteers sort the harvested grass, sticking their hands in the smelly bundles hoping to avoid biting crabs and slimy sea worms. Some bring kayaks to transport the baskets of shoots to the waiting volunteer divers, who do the actual planting.

In this way, they planted more than 120,000 eelgrass shoots in 2008, the largest planting to date.

"All ages come. Entire families come," Martinez said. "There's really something for everyone to do. Without the volunteers, we couldn't do the work. It also brings an awareness of the bay and how important it is to all of us in Rhode Island."

The eelgrass restoration project in Narragansett Bay is just one of several that NOAA and RAE have helped fund. Some of the others include New Bedford Harbor in Massachusetts; tidal ponds at the Ninigret Park and National Wildlife Refuge in Charlestown, R.I.; California's Channel Islands; New Hampshire's Great Bay; San Francisco Bay; and Puget Sound.

Some Dams Have Devastating Effects on Rivers and Fish



DAMS IN THE U.S.

[illegible]	[illegible]	[illegible]
Recreation	31.3	23,185
Fire & farm ponds	17.0	[illegible]
Flood control	14.6	10,801
Irrigation	13.7	[illegible]
Water supply	9.4	[illegible]
Tailings & other	8.1	[illegible]
Hydroelectric	2.9	2,166
Undetermined	2.3	[illegible]
Navigation	0.3	243

[illegible]

For more than a century, America led the world in building dams. We built them to power sawmills and gristmills, to provide water for irrigation, to control flooding, to store drinking water. No one really knows how many dams stretch across our rivers, streams and creeks. The Army Corps of Engineers in the most comprehensive accounting puts the number at 75,000, but that only includes dams over six feet tall. Adding smaller dams could raise the estimate to over 2.5 million. All those dams once caused Bruce Babbitt, the former U.S. Interior secretary, to observe that we have been building, on average, one large dam a day since the Declaration of Independence.

THE VEAZIE DAM IS ONE OF THE TWO DAMS ON THE LOWER PENOBSCOT RIVER THAT WILL BE REMOVED. © *Bill Curtsinger, courtesy of Penobscot River Restoration Trust*

A DAM'S DAMNING EFFECTS

Blocking a moving river with a dam inherently changes the ecosystem by destroying the natural processes. Here are just a few of the effects a dam has on a river:

- Permanently inundates wildlife habitat
- Reduces water levels
- Blocks or slows river flows
- Alters timing of flows
- Alters water temperatures
- Negatively effects fish respiration
- Obstructs the movement of gravel, woody debris and nutrients
- Blocks or inhibits upstream and downstream fish passage
- Alters public river access
- Negatively affects the aesthetics and character of a natural setting

Most of those dams once served a need. Thousands were built generations ago to power mills that ushered in the Industrial Age, but the old mills are gone now or have switched to other sources of power. Some dams provided water to irrigate crops that fed a growing nation, but the cropland has been turned into shopping malls and subdivisions. Many dams are now too old to meet current safety requirements and have been abandoned by their original owners. And some dams are merely L.D.Ds, which in the dam business means "little dinky dams." No one would miss them.

Yet, thousands of obsolete and old dams remain, capturing rivers behind stone, concrete and wood and forever changing them. "Nothing more fundamentally changes a river's ecosystems than a dam," notes Selena McClain of American Rivers, a conservation group that advocates for our country's rivers.

THE THREATS

Dams do more than hold back water. They change how that water flows. They lead to increases in its temperature and alterations of its chemical composition. They can change the river's depth and even its path. Every plant and animal species that lives along and in the river is affected, probably none more so than anadromous fish, which are ocean fish that move up freshwater rivers to spawn. The populations of salmon, steelhead trout, American shad, striped bass, sturgeon, alewife and other species have been devastated, in large part because of the dams we've thrown in their way.

Most of those dams have the obvious effect of stopping the fish from swimming upstream, thus blocking off more than 600,000 miles of spawning habitat nationwide. Some dams have been fashioned with fish ladders or other types of mechanisms to allow fish to pass. Many fish, however, have trouble finding the ladders or die when exposed to high water temperatures in them. Scientists believe that many of the adult fish that eventually reach their spawning grounds are often too exhausted from the journey over the dams and through the unnaturally warm reservoirs behind them to spawn successfully.

Their offspring don't have it any easier on the return journey. Dams can significantly delay them by turning fast-flowing rivers into languid reservoirs. This delay is very harmful to the young fish as their bodies undergo physiological changes that prepare them to survive in saltwater. The stagnant

reservoirs also expose the juveniles to predators, disease and often lethally high water temperatures. If they can survive all that, the babies then risk getting cut to pieces when forced through the power turbines of hydroelectric dams.

The numbers reflect the reality. In the Pacific Northwest, Chinook, sockeye, pink, chum, and Coho salmon, along with steelhead and cutthroat trout, have all experienced dramatic declines on dammed rivers. Salmon runs that numbered in the millions before the era of dam building have now dwindled to only hundreds, and on many rivers and streams have been completely wiped out.

The story is much the same in other regions of the country. The U.S. Fish and Wildlife Service estimates that 91 percent of migratory fish habitat in northern New England is blocked by dams. These dams have contributed to the reduction of Atlantic salmon populations to less than one percent of historic levels, with the native salmon fully eliminated from many of New England's rivers. American shad and herring, which were once cultural icons in the Mid-Atlantic and Southern states, have been decimated to the point that people no longer realize how historically important they once were.

THE TRENDS

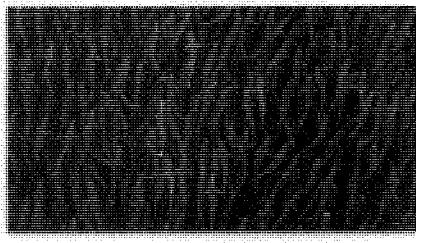
Then the Edwards Dam came down. The dam stretched across the Kennebec River in Maine, severely affecting one of the richest and most varied fisheries in the country. A coalition of four environmental groups, led by American Rivers, fought the renewal of the dam's federal license and pushed for its removal. The federal licensing agency agreed, marking the first time that it had ordered a dam be removed solely for ecological reasons. It was a turning point for river conservation.

Edwards Dam came down on July 1, 1999, opening 17 miles of the Kennebec. For the first time in 160 years, the river flowed freely from Waterville to the sea. The river's health rebounded quickly, revitalizing populations of shad, sturgeon, Atlantic salmon and striped bass. Since then, more than 600 outdated dams have been removed nationwide, and the number of recorded dam removals has grown each year, McClain said.

NOAA's Habitat Protection Division and Restoration Center, among others, have played leading roles. Through one program, its Open Rivers Initiative, regional experts are working to protect and restore access to historic migration routes and to encourage communities to help in the restoration process. NOAA also engages a large coalition of conservation organizations and community groups – including The Nature Conservancy, American Rivers, Restore America's Estuaries and the California Conservation Corp. – to work with communities during the restoration process and leverage funding for projects.

The real importance of these programs, says McClain, is felt far beyond the riverbank. In communities where dams have been removed, there is an overwhelming excitement and pride, she said.

"Removing a dam is a great opportunity for us to restore the natural environment, give something back to the community and educate people about what a natural river looks like," she says. "To see the concrete come down and watch a river flow free again is really quite a thrill."



ALEWIVES MIGRATE UPSTREAM. © Margaret Pizer/The Nature Conservancy, courtesy of Penobscot River Restoration Trust

THE BENEFITS OF DAM REMOVAL

Not all, or even most, dams should be removed. But removing those that are obsolete, dangerous or too expensive to maintain can be beneficial to a river, its inhabitants and those who live along it. Those benefits include:

- Restoring river habitat
- Improving water quality
- Re-establishing migratory fish runs
- Restoring threatened and endangered species
- Removing dam safety risks and associated liability costs
- Saving taxpayer dollars
- Improving aesthetics of the river
- Improving fishing opportunities
- Improving recreational boating opportunities
- Improving public access to the river
- Improving riverside recreation
- Increasing tourism

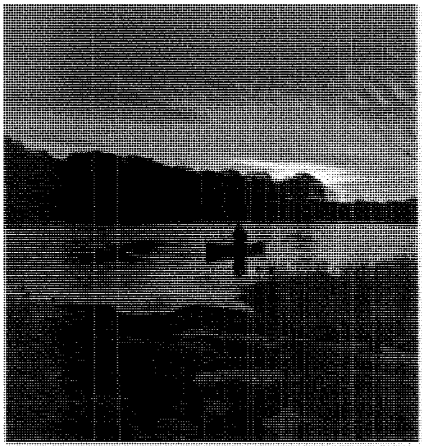
AMERICAN RIVERS LEADS DAM REMOVAL EFFORTS

American Rivers, a nonprofit conservation group, has for more than a decade been at the forefront of restoring the nation's rivers by helping remove outdated dams.

The group first got involved with dam removal with the Edwards Dam on the Kennebec River in Maine. It was the first time that the Federal Energy Regulatory Commission ordered a dam removed solely for ecological reasons. The removal in 1999 revitalized populations of migratory fish such as shad, sturgeon, Atlantic salmon and striped bass.

Since then, removing old dams has become a major project of American Rivers, noted Serena McClain, associate director of the group's river restoration program. She figures that since Edwards Dam the group has been directly involved or provided technical assistance in the removal of 147 dams across the country.

NOAA has helped with that effort. Since 2001, it partnered with American Rivers to help communities around the country restore their local rivers by removing unnecessary dams. This program has provided more than $3 million in financial assistance and hours of technical assistance to more than 100 river restoration projects. The program focuses on projects that benefit anadromous fish – those that migrate between freshwater and saltwater during their life cycle, such as alewife and Atlantic salmon.



Project Hopes to Save Last Wild Atlantic Salmon in America

Most Americans probably aren't aware that the salmon they buy in stores or order at restaurants were most likely raised on farms. These relatives of a magnificent wild fish that migrates 2,500 miles through the frigid waters of the North Atlantic spent their short lives in pens, swimming in endless counter-clockwise circles on a journey to nowhere.

Commercial fishing for Atlantic salmon has all but ended in the United States because so few wild fish remain. Once native to almost every river north of the Hudson, salmon have disappeared entirely from the rivers that feed Long Island Sound or drain central New England. Maine's three big rivers – the Androscoggin, the Kennebec and the Penobscot – are the last places in America where wild salmon return in any numbers to spawn, but even there they're considered endangered, as they are in the rest of their U.S. range.

The reasons are many: water pollution, changes in land uses, disappearance of the fish salmon eat, predators eating a smaller and smaller population of salmon, overfishing in the early 20th century. A map of the dams built in just Maine provides a graphic illustration of another major reason. More than 650 dams stretch across the state's rivers and streams, 116 in the Penobscot watershed alone. The dams block the returning salmon from reaching thousands of miles of spawning habitat.

In a few years, two of those dams along the lower Penobscot should disappear from the map and a fish bypass will be built around a third, opening up more than 1,000 miles of habitat for returning salmon, American shad, river herring and seven other species. The ambitious project to remove the dams, said Andy Good, may be the salmon's last hope.

"This is the best and last chance to save Atlantic salmon in the U.S," said Good, the vice president of U.S. programs for the Atlantic Salmon Federation. "I know that's a pretty dramatic statement but the situation is dire for salmon in the U.S., and we've put a lot of chips in this restoration project."

The federation is an international non-profit group that works to conserve wild salmon and its environment. For years, whenever a hydroelectric dam in Maine came up for relicensing, the federation and other conservation groups fought for fish passages and other concessions. In one memorable battle in the 1980s, opponents defeated a proposal to build a hydroelectric dam on the last free-flowing section of lower Penobscot.

That victory had a cathartic effect, noted Laura Rose Day, the executive director of the Penobscot River Restoration Trust. The non-profit group is coordinating the dam-removal project. "During those days, dam removal was discussed but was it beyond the sights of anyone at that point. People were facing a dam that dwarfed anything else on the river. Their main concern was stopping it," she explained. "That success then enabled people to think beyond one dam and to start thinking about what we can do to restore the river back to health."

The thinking turned to talking when PPL Corporation, a power company based in Pennsylvania, bought nine hydroelectric dams in Maine in 1999 and 2000. The company wanted to avoid more contentious relicensing fights, Good said.

"Because of the history on the river, there was an antagonistic relationship between my group and other groups and the dam owners. It was sort of scorched earth," he said. "But new owners brought a new dialogue."

From the talking came a groundbreaking agreement in 2003 between PPL and state and federal agencies, several conservation groups and the Penobscot Indian Nation. The company would sell three of its dams to the coalition for $25 million and improve fish passage at four others. In return, PPL would be allowed to increase energy output at its remaining dams to make up for the loss and the groups would drop their opposition to the re-licensing.

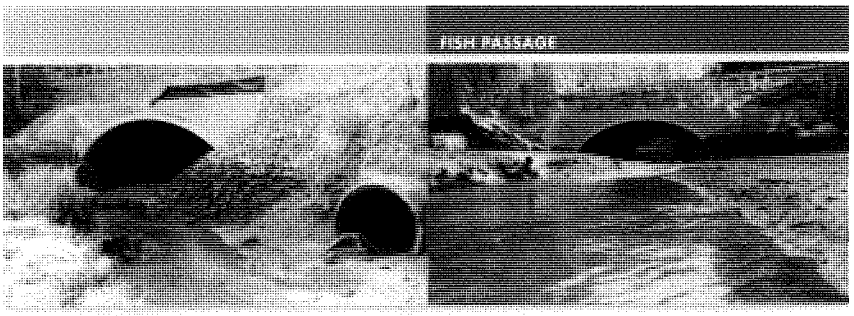
Two of the dams would come down – the Veazie, which is the first barrier on the river that returning salmon encounter, and Great Works, about eight miles upstream. The dam farthest upriver, Howland, would remain but would be decommissioned and a fish passage built around it.

The announcement had special significance for Barry Dana, who was chief of the Penobscot Nation at the time. Atlantic salmon are woven into the culture of native American tribes in Maine. Yet for more than 100 years, the Penobscots couldn't exercise their tribal fishing rights to catch fish such as salmon because the river is virtually devoid of native sea-run fish.

"For 10,000 years, we have drawn our sustenance, culture and identity from this river that bears our name," Dana said at the time. "Reconnecting the Penobscot River and our reservation to the Atlantic Ocean repairs an important cycle of nature that historically allowed our tribe to survive and prosper."

The tribe and the conservation groups formed the trust to see the project though. It has successfully raised the money to buy the dams and is actively pursuing the remainder – an estimated $30 million for dam removal and modifications, economic development and mitigation. NOAA gave the trust a $6.1 million economic stimulus grant in 2009. It will be used to help remove the first dam, Great Works, and to pay for scientific monitoring.

The trust has applied for the necessary federal and state permits, Day said, and hopes to take down Great Works in the summer of 2010.



LEFT: THE OLD CULVERT, RIGHT, WAS REPLACED BY A MUCH WIDER CULVERT THAT ALLOWS SALMON AND TROUT TO MIGRATE UP BARKER CREEK. RIGHT: BARKER CREEK FLOWS THROUGH THE NEW, WIDE CULVERT. *All photos courtesy of People For Puget Sound*

Removing or Reconfiguring Culverts Can Improve Fish Runs

It doesn't take tons of concrete or stone stretched across a river or stream to block fish from reaching upstream spawning grounds. Sometimes a simple pipe does the job just as well.

For decades, road engineers have commonly used culverts – concrete or corrugated metal pipes – to bridge small streams. Thousands, like the one that carried Tracyton Boulevard across Barker Creek near Bremerton in western Washington, dot the Pacific Northwest. And like the Barker Creek culvert, many cut off historic spawning grounds used by salmon and trout and are contributing to their decline.

"The philosophy behind much of the landscape development of the Puget Sound region was to turn a hilly, rocky landscape flat enough to live on," explained Doug Myers, director of science for the advocacy group People For Puget Sound. "Most of our natural water bodies were filled. Ninety-seven percent of the marshes in central Puget Sound were filled in the first 100 years of statehood. With that kind of development legacy, there are many stream crossings that were obliterated, paved over or rerouted."

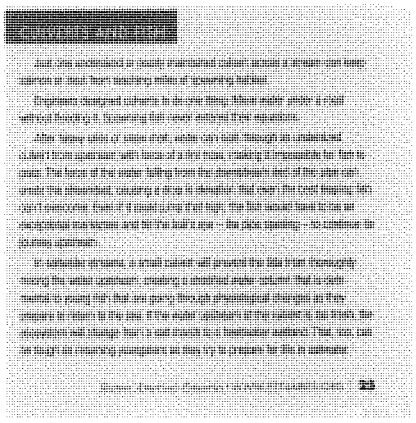
State officials estimate that in Washington alone more than 1,800 culverts along state highways block more than 3,000 miles of potential stream habitat. Add county and town roads and those on private and federal property and the number of culverts approaches 10,000. The problem is widespread across the region. Studies found that as much as 85 percent of the culverts in western Montana blocked fish passage. Two-thirds of the culverts across salmon streams and 85 percent of those crossing trout streams in the Tongass National Forest in Alaska were found to be inadequate. Salmon biomass – the total mass of salmon – in streams in California, Oregon and Washington is 3-4 percent of historic levels. Habitat loss because of culverts is considered to be a major cause.

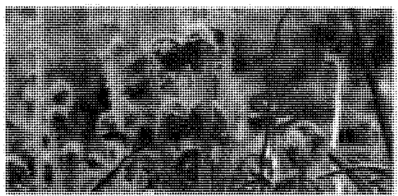
The Chums of Barker Creek couldn't do much about culverts in Alaska or Montana, but it could try to fix the one up the road on Tracyton Boulevard. The citizens group of about 60 people had formed in 1993 to protect a small, urban tidal creek that flows into Dyes Inlet between Bremerton and Silverdale. A bridge built in the 1800s carried the road across the creek. It was replaced in 1939 by a 90-foot long, five-foot diameter concrete pipe. The culvert was blocking Coho, chum and Chinook salmon and steelhead and cutthroat trout from moving upstream.

The Chums called the Mid Puget Sound Fisheries Enhancement Group, one of 14 regional non-profit groups that the Washington state legislature had created to help people leverage state money with private donations for projects to improve the salmon and trout populations.

"They are a small organization with no paid staff," said Troy Fields, the enhancement group's executive director. "They had never applied for the grant, but right from the get-go there was a local grassroots organization that was a proponent for that project. They were vital at the beginning to get the project going."

The two groups soon found willing partners: the People For Puget Sound, Kitsap County, the Suquamish Native American tribe, Silverdale, RAE and NOAA. Using $417,000 in state money and $83,000 in matching contributions, they began making plans to plug the old culvert and replace it with one that is more than six times wider and 20 feet shorter. Work began in the fall of 2008 and was completed the following February.





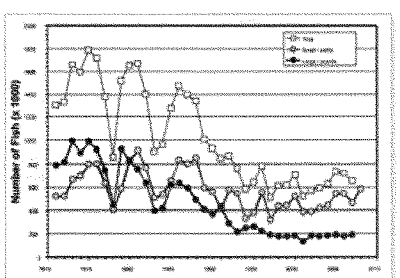
People For Puget Sound organized volunteers to plant native plants on either side of the culvert to help control runoff from the hillside and the roadway. In time, Myers said, the plants will mature and their branches will provide shade and ideal water temperatures for salmon traveling to and from the ocean. The plants will also be a source of food, as insects drop from the branches into the water below.

The plans for Barker Creek don't end with the culvert. The groups hope to restore the degraded creek by protecting quality habitat when possible, reducing stormwater runoff entering the stream, adding wood structures to the stream and clean gravel to some stretches to provide suitable salmon spawning habitat and restoring adjacent wetland connections to the stream.

"It's too early to know how well all this has worked," Fields said in the summer of 2009. "We have not had a fish run with the new culvert. But we expect to see an improvement."

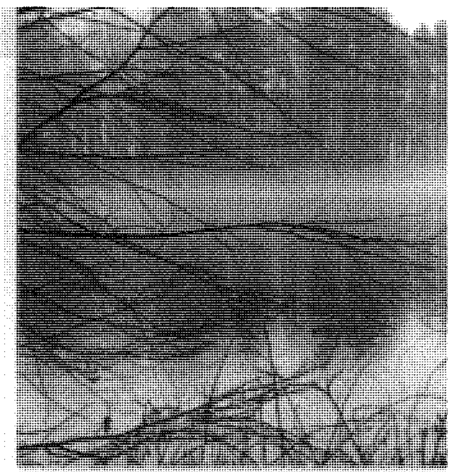
Steve Jonn of the Chums of Barker Creek certainly hopes so. He likes to bring his four-year-old grandson to the stream to show him the salmon running, and he is eager to see the runs increase for future generations to witness.

"Hopefully we can keep this (stream) alive so my grandkid can show his kids salmon spawning in the middle of an urban area," Jonn told a newspaper reporter in early 2009.



Numbers of large and small salmon returning to North American rivers have declined markedly since 1975. The large salmon are especially important for their ability to spawn large numbers of eggs. However, numbers remain low.

Source: Atlantic Salmon Federation



Courtesy of Save The (Long Island) Sound

Herring Making the Climb from Extinction

The pine forests that surround Branford, Conn., the soil that nurtures those trees and even the underlying bedrock itself imprint a particular scent on the waters of Queach Brook. Each spring, alewives and blueback herring, driven by internal biological forces, recognize that scent as the birthplace of their ancestors. The foot-long, silver-sided fish emerge from the salty waters of Long Island Sound and swim up the freshwater stream in search of their natal spawning grounds. For more than a century, their journey ended in vain four miles later where they ran up against civilization.

A 16-foot-high dam, built in 1899 to control flooding and store drinking water for the town, presented an impassable barrier. Thousands of dams just like it stretch across innumerable rivers and streams along the Atlantic coast. They have contributed to the decimation of alewives and blueback herring. Populations in streams and rivers that once numbered in the hundreds of thousands are now down to single digits.

River herring – the collective term for the two species – are among America's founding fisheries and are an important food for almost every fish, bird and mammal that shares the same habitat. Ospreys, bald eagles, harbor seals, sea otters, striped bass, cod and haddock are just a few of the predators that depend on these fish for their survival. Entire ecosystems could be in danger as these once abundant fish continue to vanish from their home waters.

In response, more and more obsolete dams are being removed to reopen historic spawning grounds. That wasn't an option in Branford, a town of about 30,000 a few miles east of New Haven. It still relies on the 17-acre impoundment behind the dam for its drinking water. If the herring were to continue their journey, a way had to be found around the dam.

Oddly, the idea of a herring revival sprang from the town's effort to protect its source of drinking water. A developer in the late 1990s proposed building an 18-hole golf course and a residential subdivision on 240 acres about a half-mile upstream from the dam. The tract was in the middle of the cleanest water remaining in the Branford River basin. Three natural ponds dotted the area, including Linsley Pond, where Dr. G. Evelyn Hutchinson, the legendary limnologist from nearby Yale University, conducted many classic research studies in the 1930s and '40s. Opponents feared that sedimentation during construction on the steep, hilly land and stormwater runoff from the completed development would foul the town's drinking water source.

The local wetlands agency denied the developers' request to build in the wetlands on the property. The developers sued, and the case attracted conservation groups like Save The Sound and land preservationists, which supported the town. The Connecticut Supreme Court ultimately upheld the agency's decision, and the developers eventually sold most of the land to the town and the Branford Land Trust.

"It's an interesting evolution," noted Chris Cryder, director of restoration and stewardship for Save The Sound, now part of the Connecticut Fund for the Environment. "A development issue that non-profits advocated against and intervened in support of the town's decision ultimately led to protection, and citizens rallied around that."

Once the land was saved, attention shifted to saving the river herring. The land trust joined with the Branford Rotary Club in 2003 to begin planning to install an artificial channel, called a fish ladder or fishway, to allow the herring to bypass the dam. Other partners soon joined the effort, including the town, Save The Sound, Restore America's Estuaries, the U.S. Fish & Wildlife Service, Yale University and the state's Inland Fisheries Division, which identified the waters above the dam as one of its priority sites for restoring fish populations. Grants from the NOAA Restoration Center, in partnership with RAE, matched by corporate contributions through the Connecticut Corporate Wetlands Restoration Partnership provided the $203,000 for the project.

The 90-foot-long aluminum fish ladder was completed in the spring of 2006, connecting Queach Brook to almost 100 acres of open water and five miles of river and stream habitat behind the dam. The ladder consists of a series of baffles that slows down the flow to allow the fish to navigate upstream. The tiered design also gives them level pools to rest in while making the journey.

An electronic counter installed by scientists at Yale University has recorded more and more herring passing through the ladder each spring. About 4,000 made the trip in 2009. Those numbers are expected to grow dramatically in the next few years as the herring born above the dam since the ladder opened return to spawn.

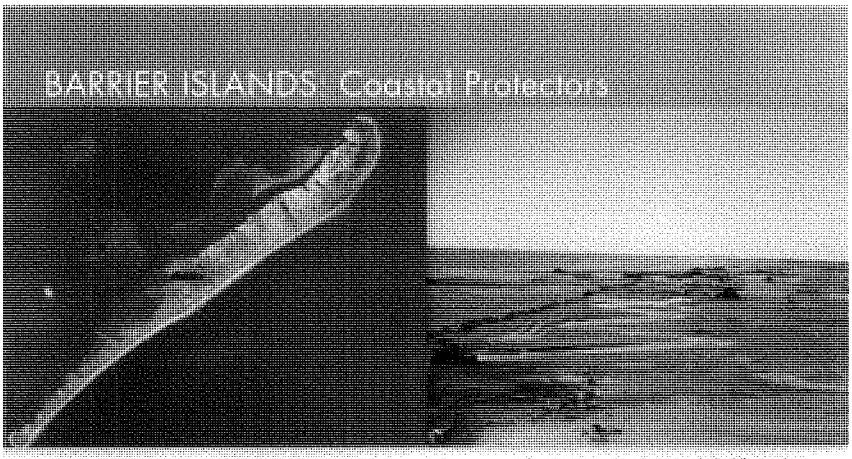
"The numbers are now small but the increase is in a positive direction," said Curt Johnson, director of programs for Save the Sound and the Connecticut Fund for the Environment. "It's often a 20-year process. It took decades to screw this up and it will take time to bring things back."

SALMON ENTER THE FISH LADDER AT THE VEAZIE DAM. © *Bill Carninger, courtesy of Penobscot River Restoration Trust*

FISH LADDER DESIGNS

Fish ladders are also known as fish steps or fishways. They are artificial structures built around barriers in a river or stream, such as dams or locks, that allow fish to get around the barrier. There are five main types:

- BAFFLES: Uses a series of symmetrical close-spaced baffles in a channel to redirect the flow of water, allowing fish to swim around the barrier. Pools can be included to provide a resting area or to reduce the velocity of the flow. Baffles come in variety of designs. The original design was developed in 1909 by G. Denil, a Belgian scientist. It has since been adjusted and adapted in many ways. The "Alaskan Steeppass," for example, is a modular prefabricated Denil-fishway variant originally designed for remote areas of Alaska.
- POOL AND WEIR: One of the oldest styles of fish ladders, this design uses a series of small dams and pools of regular length to create a long, sloping channel for fish to travel around the obstruction. The channel gradually steps down the water level, and fish must jump from pool to pool in the ladder to head upstream.
- ROCK-RAMP: Uses large rocks and timbers to create pools and small falls that mimic nature. These are used to bypass relatively short barriers because of the length of the channel needed for the ladder.
- VERTICAL-SLOT: This design is similar to a pool-and-weir system, except that each dam in the ladder has a narrow slot in it near the channel wall, which allows fish to swim upstream without leaping over an obstacle.
- ELEVATOR OR LIFT: As its name implies, this design provides a sort of elevator to carry fish over a dam. Fish swim into a collection area at the base of the dam. When enough fish enter the area, they are nudged into a hopper that carries them into a flume that empties into the river on the other side of the dam. It's usually used for tall dams.



BARRIER ISLANDS: Coastal Protectors

They have been likened to jewels, praised as paradises and described as restless ribbons and lonely sentinels. Whatever you call them, however, America's barrier islands are among the country's most important coastal features.

Running more than 3,500 miles along the Atlantic and Gulf coasts, these islands are just what their name implies: barriers. They guard our coastlines, providing invaluable buffers to vulnerable shores and inland areas from violent storms and waves.

A barrier island is a narrow island of sand that forms parallel to the shoreline. They aren't anchored on bedrock; like their smaller cousins, spits and shoals, they are essentially big sandbars.

In its simplest form, a barrier island consists of shallow beach facing out into open ocean; a central dune (or dunes) running the length of the island and dividing it in two; a low-lying overwash area – often a mud flat; and a salt marsh forming on the landward side of the island, abutting a shallow lagoon, sound or bay separating it from the mainland. These salt marshes are among the most ecologically productive places on Earth.

Barrier islands are relative newcomers to the world stage. While theories vary, many geologists believe that barrier islands began forming at the end of the last ice age, 15,000 years ago. As the glaciers receded and sea levels rose, new coastlines formed, leaving shallow dunes offshore. Rising waters, waves and currents fed sediments to these newborn islands.

Though we like to think that these islands are permanent, they are not. In fact, barrier islands are among the most changeable environments on Earth.

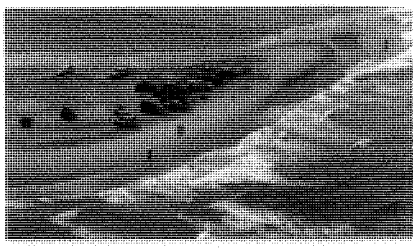
Because they are loose aggregations of sand and fill, barrier islands are dynamic. Tides and storms routinely rearrange them, shifting and removing sand, forming and reforming the shape and structure of each island. Geologically ephemeral, the islands wax and wane in response to the rise and fall of sea levels. As ocean levels rise and the continental coast behind the islands retreats, barrier islands can "migrate" toward the receding shoreline, losing ocean-side beach as the waters rise, particularly during storms, and gaining new sand on the landward side, following the coast in a millennial rhythm.

And, occasionally, they disappear altogether. In one famous recent instance, an entire chain of uninhabited barrier islands off the Louisiana-Mississippi coast, the Chandeleurs, vanished almost completely in a relative heartbeat, a victim of Hurricanes Dennis and Katrina in 2005. Today the Chandeleurs, a fraction of their former selves, consist mostly of tattered islets and underwater shoals.

While we often think of their central role as protectors of our coasts, barrier islands are also havens, providing refuge and habitat for thousands of species of plants and animals, and serving as stopovers for many kinds of migrating birds who depend on the islands for rest, food and water during their journeys.

TRENDS AND THREATS

Increasingly, these fragile islands are also providing havens for Americans in the form of homes, resorts and vacation spots.



TOP LEFT: GRANDE ISLE TOP RIGHT: BARRIER ISLAND PLAQUEMINES PARISH
BOTTOM: CAPE HATTERAS NATIONAL SEASHORE *Courtesy Bill Rea*

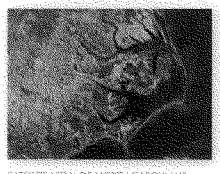
More than 400 major barrier islands line the East and Gulf coasts, from New England to Mexico. Among the most notable are Cape Cod in Massachusetts; New Jersey's Long Beach; Assateague Island in Maryland and Virginia; North Carolina's famous Outer Banks; South Carolina's world-class resorts, Hilton Head and Pawley's islands; Jekyll and the Sea Islands in Georgia; Amelia, Captiva, Key Biscayne, Palm Beach, Sanibel and Miami Beach in Florida; and Galveston, Matagorda and Padre islands in Texas.

Some of these barrier islands are among the most populated, most developed and, consequently, some of the most threatened inhabited sites in North America.

In fact, over the past 60 years, America's barrier islands have been at the center of a real-estate boom. Between 1950-1975—a period that coincides with the post-War economic boom—urban development on coastal islands in the United States increased 150 percent. More than half of the U.S. population now lives in coastal counties. According to one recent study, the permanent population of those counties is increasing by an astounding 3,600 new residents a day.

Barrier islands are at risk from natural erosion from tides and storm and, increasingly, from rising sea levels due to climate change.

While estimates vary, many scientists peg current sea-level rise at about an eighth of an inch annually, imperceptible to the casual observer, but very noticeable on low-lying barrier islands that seldom top-out at more than a few feet above sea level. As the air temperature rises this century, so will the ocean level, though more slowly. Every careless cook who failed to keep an eye on a pot of boiling spaghetti water knows all about thermal expansion. Add water from melting glaciers, and sea level could rise as much as 10 inches by 2030 and three feet by 2100 – about twice the current rate.



SATELLITE VIEW OF NORTH CAROLINA'S BARRIER ISLANDS

Although a foot or two of sea level rise may not sound like much, the effect could be severe. For example, computer models done at Duke University show that a 13.7-inch sea level rise would inundate about 770 square miles of the N.C. coast, an area nearly the size of Great Smoky Mountains National Park. North Carolina's coastal wetlands and other low-lying areas could be inundated, much of the Outer Banks would disappear, and the Albemarle and Pamlico sounds could merge with open waters that Dr. Stan Riggs, a geologist at East Carolina University, calls "Pamlico Bay."

A warmer world also means warmer seas which generate more storms and more violent storms. The Atlantic seaboard and Gulf Coasts are too often ground zero for hurricanes which erode, rearrange, move and occasionally destroy barrier islands outright.

As the islands have thinned, we have tried to prevent the migration, and sometimes the outright loss, of beach and land, through groins, levees, jetties, and breakwaters. As beaches have eroded, we have replaced them wholesale by pumping sand on them, a process known as "beach nourishment."

In the end, these may be temporary "fixes."

Chaland: Rebuilding Barrier Islands

Shielding our coasts from Maine to Texas, barrier islands play an essential role in protecting America's coastlines and providing habitat for wildlife. Their importance is recognized all over the world, but barrier islands are most beneficial in areas where rising sea levels and storms affect coastlines.

Because of frequent hurricanes in the Gulf of Mexico, development, oil and gas activities, diminishing sediment deposition from the Mississippi River and other Gulf feeders and climate change, Louisiana has one of the highest rates of shoreline erosion in the world, ranging from twenty to 100 feet a year.

As a result, the Chaland Headland barrier islands in Plaquamines Parish about 60 miles south of New Orleans have almost completely vanished. NOAA, with partners that include the Louisiana Department of Natural Resources, the Army Corps of Engineers, Plaquemines Parish and the University of New Orleans, undertook the largest barrier island restoration projects ever attempted by the agency.

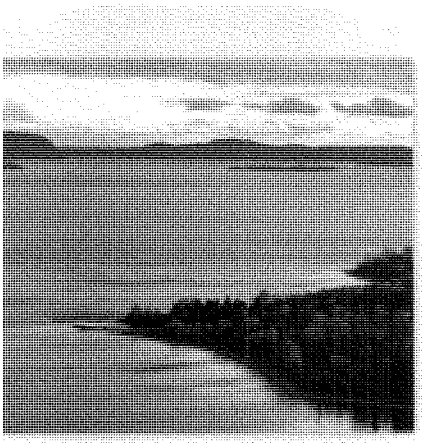
This three-mile long project's primary purpose is to prevent breaching of the barrier shoreline and to protect and create habitats. The Chaland Headlands provide shelter and food for a variety of shoreline birds and wildlife that are vital to coastal Louisiana. Reconstructing the system of wetlands nourished by the Mississippi River is critical for estuarine fish and shellfish populations and will help protect coastal communities.

The Chaland Headlands project will ultimately restore about 180 acres of dune and beach, along with 246 acres of inter-tidal salt marsh. Sand and silt will be mined from an offshore area in the Gulf of Mexico to restructure the dunes and marsh.

In early 2007, NOAA completed the first phase of the project by pumping more than 1.7 million cubic yards of sand to reconnect the three island sections that were left after Hurricane Katrina roared through two years earlier. This phase saw more than 1,200 acres of coastal habitat restored, and the Chaland Headlands Restoration project was named one of America's Top Restored Beaches by the American Shore and Beach Preservation Association.

The Chaland Headlands Restoration project certainly has had its fair share of challenges. The project began just four days before Katrina made landfall just eight miles away. Human factors and ecological changes have helped divide the islands into three small fragments, increasing the tiny archipelago's vulnerability to storm surge and erosive forces that threaten to wear away coastal wetlands.

Over a 20-year period, the Chaland Headlands Restoration project should restore more than 330 acres of barrier island and coastal wetlands at a cost of $76 million. Fighting both the destructive capabilities of human- and storm-caused agencies is likely to be an ongoing battle with this project, but restoring these crucial barrier islands is and will be a great asset for the critically threatened Louisiana coast.



Protecting a Scenic Highway and Restoring a Lakeshore

Lake Superior, with the largest surface area of a freshwater lake in the world, is often overlooked as having a pristine, stunning shoreline; but if you ask any of the occupants of the 3 million cars that travel alongside it every year, they will tell you otherwise.

The lake's natural beauty has been evident for centuries. In 1919, the Michigan State Highway M-28 was built beside the southern shore of Lake Superior stretching from Wakefield to near Rosedale. M-28, together with U.S. 2, forms a pair of main highways connecting the Upper Peninsula from end to end, providing a major access route for traffic from Michigan and Canada.

Because of its vicinity to the shoreline, M-28 is considered to be part of the Superior Lake Circle Tour; where travelers can drive beside the lake. In addition to incredible scenic shoreline views, the highway also passes through woodland forests, swamps and urban areas.

The Pictured Rocks National Lakeshore and the lakeside town of Marquette are directly off of M-28, offering dramatic sceneries, public rest areas and easy shore access; which in return, leads to millions of visitors each year.

In recent years, the wear and tear of the highway near the lake's shoreline has been threatening public safety. Gusting winds from the lake carry sand and snow onto the road causing severe erosion. Road closures are a frequent occurrence, as is damage to nearby homes and dune habitats.

Local organizations and the public began to take note of these problems, and with funding by NOAA, created the Lake Superior Dune Restoration and Public Access Project. This project has restored sand dunes and planted seagrass, trees and other native plants to control erosion and prevent the strong winds from further damaging the highway and harming the public.

The project also took the public's interest into account and constructed a scenic overlook and pedestrian access to Lake Superior's shoreline.

While maintaining the efforts of the Lake Superior Dune Restoration and Public Access Project, the southern shore of Lake Superior should continue to attract visitors for years to come. These steps should allow the growth of wildlife habitats, endless scenic views and public enjoyment to flourish.

SAVING THE CHIWAUKEE *continued from page 11*

confidence, and he was very good at organizing people."

It is gave Krampert his files on the Chiwaukee and his marching orders. "It's up to you people now to save that prairie," he told him.

But how?

The Chiwaukee gave them the answer. Sander and Krampert spent that May day in 1965 walking through the tall grass and shooting stars, studying maps that showed the 1,200 privately owned lots in the prairie. Above them, upland plovers plunged to earth in majestic dives. Bobolinks and marsh hens chattered incessantly all around them.

They identified a thin strip of land, about 15 acres, in the middle of the proposed marina development. Somehow, the developers had overlooked it. Buying it could stop the marina.

They stood at the railroad tracks in the fading light debating how to raise the money. Would people donate to save what many considered a patch of noxious weeds? It was the kind of challenge no one had taken up before.

"Al, we've got to start somewhere," Sander said, "and the only way we'll ever know if it can be done is by trying."

The Wisconsin Chapter of The Nature Conservancy, which would remain a steadfast partner over the next four decades, agreed to lend Krampert's committee $5,500 to buy the errant strip. By the end of 1966, the committee raised more than $26,000, and 74 acres of the precious prairie were preserved. The marina project fizzled.

It was only the beginning. "The number of owners involved was the greatest obstacle," Krampert wrote. "They were literally scattered all over the four corners of the Earth."

Most were contacted over the next 40 years, and little by little, acre by acre, the prairie was saved. More than 500 acres are now preserved and owned by the state, the conservancy or the University of Wisconsin.

The Chiwaukee Prairie exists today because of the will of determined people like Phil Sander and Al Krampert who had a vision of the possible, noted Richter. "They had a great combination of passion and advocacy. And they could build a coalition," he said. "These people had no scientific background, but they knew this was a very special place and they could excite the academics in the 1960s to really go to bat for them."

Krampert died in 1994 and the main road into the prairie was renamed in his honor.

Forever a student of nature and natural history, Sander unearthed a fossil that led to the discovery, some 30 years later, of two complete woolly mammoth skeletons near Kenosha that are now major attractions at the town's museum. He died in 2006 at age 99. The University of Wisconsin created a scholarship in his honor, and birding trails and natural areas around Kenosha bear his name.

STORMWATER AND SHELLFISH *continued from page 15*

In a natural coastal setting, the ground soaks up rain. It is taken up by plants, evaporates or slowly makes its way to underground aquifers. Very little of it overflows into waterways. In our cities, towns and neighborhoods, we cover the land with concrete and asphalt and have devised an elaborate system of pipes and ditches designed to get the rain off our property and streets as quickly as possible. We have become very good at it.

The rain running off these hard surfaces mysteriously disappears down a drain and re-emerges untreated from a pipe at a river, creek or bay. It brings with it the fertilizers, pesticides, petroleum products, bacteria and other pollutants that it has picked up on its journey. If enough of this stormwater enters the water, the oysters and clams growing there will become unsafe to eat because of high bacteria levels, forcing state health officials to close the contaminated beds for harvest.

Found in the digestive tracts of all warm-blooded animals, these bacteria are everywhere, as Dr. Bill Kirby-Smith has learned during a career spent studying stormwater's effects on coastal estuaries. People too often focus on the sources of bacteria, said Kirby-Smith, a professor and researcher at the Duke University Marine Lab near Beaufort, N.C. They are ubiquitous and mostly natural. Except from the occasional failing septic tank or malfunctioning sewer plant, the bacteria don't normally pollute the water because on an undisturbed, natural landscape they usually don't make it there.

"I focused on the sources when I first started," Kirby-Smith said. "It's only after I started working on this that I learned that, yes, you can concentrate sources. These are sources that are present in an unaltered watershed but the bacteria just didn't get transported to the water. The alteration of the landscape conveys the bacteria in some fashion."

Research done at the University of North Carolina-Wilmington, the College of Charleston (S.C.) and elsewhere shows that roads and other types of impervious surfaces are the kind of landscape alterations that can create runoff and move it quickly to the surrounding water. Pave over enough of a watershed and the water becomes so laden with bacteria, regardless of the sources, that the oysters and clams are unsafe to eat. Those studies show that bacteria concentrations in the water and shellfish closures increase with the amount of hard, or impervious, surfaces in a watershed. Water quality begins to deteriorate when as little as 10 percent of the watershed is paved and stormwater isn't controlled. Bacteria levels get high enough to close shellfish beds at 12 percent to 15 percent impervious surface.

THE HEALING OF SAN FRANCISCO BAY BEGINS *continued from page 12*

Converting the salt ponds to tidal marsh will begin to restore the natural balance of San Francisco Bay, Lewis said, but 100,000 acres of marsh is needed to make the bay ecologically healthy again. Save The Bay's report, *Greening the Bay*, gives a detailed look at what it would cost to restore the remaining acres. The report is available online at www.savesfbay.org.

Ritchie figures that the first phase of the South Bay project will cost $38 million. It should be done by 2015, he said, and then the project will be evaluated to see what methods and types of restoration work best. It will probably take 30 years to finish, he said, and the cost will approach $1 billion.

"In a way we're lucky that these lands were converted to salt ponds," he said. "If they hadn't been, the land would have been turned into residential or commercial developments, and we would now have nothing to save."

RESOURCES

WANT TO KNOW MORE?

- NOAA Office of Habitat Conservation: www.nmfs.noaa.gov/habitat
- Restore America's Estuaries: www.estuaries.org
- American Littoral Society: www.littoralsociety.org
- Chesapeake Bay Foundation: www.cbf.org
- Coalition to Restore Coastal Louisiana: www.crcl.org
- Connecticut Fund for the Environment: www.ctenvironment.org
- Conservation Law Foundation: www.clf.org
- Galveston Bay Foundation: www.galvbay.org
- North Carolina Coastal Federation: www.nccoast.org
- People For Puget Sound: www.pugetsound.org
- Save The Bay – San Francisco: www.savesfbay.org
- Save The Bay – Narragansett Bay: www.savebay.org
- Tampa Bay Watch: www.tampabaywatch.org

Wetlands

- U.S. Geological Survey: www.npwrc.usgs.gov/resource/wetlands/wetloss/
- National Wetlands Inventory: www.fws.gov/wetlands/Data/index.html

Chiwaukee Prairie

- Chicago Wilderness Magazine: chicagowildernessmag.org/issues/summer2002/IWchiwaukee.html
- Prairie Pages blog: prairiepages.blogspot.com
- Chiwaukee Prairie Preservation Fund: www.chiwaukee.org
- Wisconsin Department of Natural Resources: www.dnr.state.wi.us/org/LAND/er/sna/sna54.htm

North River Farms Restoration

- N.C. Coastal Federation: www.nccoast.org/restoration-education/
- Restoration Systems: www.restorationsystems.com/news/index.asp?ID=16
- North Carolina Shellfish Sanitation and Recreational Water Quality Section: www.deh.enr.state.nc.us/shellfish/shellfish.htm
- North Carolina State University Biological and Agricultural Engineering Department, Dr. Michael R. Burchell II: www.bae.ncsu.edu/people/faculty/mrburche/
- Duke University Marine Laboratory, Dr. Bill Kirby-Smith: fds.duke.edu/db/Nicholas/msc/faculty/wwks/research.html
- NOAA Community-based Restoration Center: www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/index.html

San Francisco Bay Salt Ponds

- South Bay Salt Pond Restoration Project: www.southbayrestoration.org
- Cargill Salt: www.cargill.com/static/sb/

Seagrasses

- Encyclopedia of the Earth: www.eoearth.org/article/Seagrass_meadows
- World Seagrass Association: wsa.seagrassonline.org
- Proceedings of the National Academy of Sciences: www.pnas.org/search?fulltext=seagrasses&submit=yes&go.x=6&go.y=8

Narragansett Bay Restoration

- Save The Bay: www.savebay.org
- YouTube video: www.youtube.com/watch?v=xoeDHHf09tg

Dam Removal

- American Rivers: www.amrivers.org

Penobscot River

- Penobscot River Restoration Trust: www.penobscotriver.org

Senator CARDIN. Thank you very much for your testimony.
Ms. Straughn.

STATEMENT OF DEBBIE STRAUGHN, PRINCIPAL, GROVE VALLEY ELEMENTARY SCHOOL, EDMOND, OKLAHOMA

Ms. STRAUGHN. Good morning, Chairman Cardin and members of the Subcommittee. I am Debbie Straughn, Principal of Grove Valley Elementary in Edmond, Oklahoma.

Thank you for the invitation to testify at today's hearing and share with you my involvement with the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program.

As you know, I am the Principal at Grove Valley Elementary, a brand new school in the Deer Creek School District located in Edmond, Oklahoma. I first became involved with the Partners for Fish and Wildlife Program in 2002 while serving as an elementary Principal at Deer Creek Elementary School.

As a leader of our school, I was looking for a program to involve all children in hands-on learning opportunities while working with the environment. It was very important to me to be able to add environmental studies for our students. We began by forming a task force for teachers, parents and students. This task force visited outdoor classrooms throughout the State of Oklahoma. We came back from these visits with a vision of what we wanted our outdoor habitat to look like. Plans were created, and I contacted contractors to build our wetland and frog pond.

We quickly learned that we were being taken advantage of and that the job was not being completed correctly. Out of desperation, I began making phone calls throughout the State of Oklahoma. It was at this point that we contacted Terry Dupree and Jontie Aldrich with the Oklahoma Partners for Fish and Wildlife Program. They were able to provide us with assistance and training with an outdoor classroom. Resources, contacts and a new design were given to us so our dream of an effective outdoor classroom could come true. The outdoor habitat became a reality because of their guidance.

I feel it is very important for our children to be involved in an outdoor classroom because it gives them an opportunity to be outside and learn about their environment. The outdoor classroom provides an ideal structured learning for the children and promotes ideal wildlife habitat.

The teachers, students and parents take ownership in their outdoor classroom. Every child at Deer Creek Elementary was involved in the outdoor habitat. For example, the kindergarten students constructed a bird sanctuary. The first grade students developed a flower garden; second grade, a butterfly garden in the shape of a butterfly; and third grade, a vegetable garden; and fourth grade, a flower garden in the shape of Oklahoma; and fifth grade built a bird blind and a frog pond.

We also built a gazebo with help from the U.S. Fish and Wildlife Service, and students utilized the gazebo for hands-on science experiments. They also helped us design wetlands, walkways with animal tracks, and artificial nesting structures for wildlife.

This outdoor habitat gave children an interactive learning environment. The U.S. Fish and Wildlife Service nominated us for the

U.S. Department of Interior Pride in America Award. I was honored to accept this award in Washington, DC, several years ago for my school.

I am now the Principal of a new elementary school, Grove Valley Elementary. I am in the process of once again building a new outdoor classroom. I am fortunate as there is a natural wetland onsite. Tinker Air Force Base is providing my school with a large grant. We have a new design after many hours of preparation to improve the outdoor habitat. Enhancements to the wetland began several months ago. We will be adding trails, bridges and walkways to the area, too.

One hundred percent of the Grove Valley Elementary children will be involved in designing their own areas to care for and nurture. We hope to begin this project in the fall.

The Partners for Fish and Wildlife Program is once again helping us with this new habitat. Jontie Aldrich has visited the site and given us advice, along with Tinker Air Force Base. They plan to work with us as the project is being completed and offer assistance as needed.

The Oklahoma County Conservation District is also working as a partner with the Tinker Air Force Base and our school, and they helped us in the initial program. This outdoor classroom is going to be shared with the community neighborhood. We even plan to have fishing opportunities.

As you can see, I am passionate about teaching children about the environment. Approximately 2 percent of our schoolchildren in the United States have an opportunity to work at an outdoor classroom, compared to the early 1900s where almost every child had an opportunity to work the land or understand wildlife.

I am dedicated to teaching children about the environment. I thank all of the Senators that support the Partners for Fish and Wildlife Program, especially Senator Inhofe who championed the Partner Program into law.

I want to represent all children in schools in the United States so they, too, can experience outdoor classrooms and hands-on learning opportunities with our environment. Children are our future, and environmental studies for them are disappearing or unavailable. Please, please continue supporting Partners for Wildlife Programs so that children everywhere continue to explore and understand their environment. This is one Government program that truly benefits all.

Thank you very much for your time.

[The prepared statement of Ms. Straughn follows:]

STATEMENT OF DEBBIE STRAUGHN, PRINCIPAL, GROVE VALLEY ELEMENTARY SCHOOL, EDMOND OKLAHOMA

Good morning Chairman Cardin and Ranking Member Crapo and Chairwoman Boxer and Ranking Member Inhofe and members of the committee. Thank you for the invitation to testify at today's hearing and share with you my involvement with the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program.

I am the principal at Grove Valley Elementary School, in the Deer Creek School district, located in Edmond, Oklahoma. I first became involved with the Partners for Fish and Wildlife Program in 2002 while serving as an elementary principal at Deer Creek Elementary School. As a leader of our school, I was looking for a program to involve all children in hands-on learning opportunities while working with the environment. It was very important to me, to be able to add environmental studies for our students. We began by forming a task force with teachers, parents, and students. This task force visited outdoor classrooms throughout the state of Oklahoma. We came back from these visits with a vision of what we wanted our outdoor habitat to look like. Plans were created. I contacted contractors to build our wetland, and frog pond. We quickly learned that we were being taken advantage of and that the job was not being completed correctly. Out of desperation I began making phone calls throughout the state of Oklahoma. It was at this point that we contacted Terry Dupree and Jontie Aldrich with the Oklahoma Partners for Fish and Wildlife Program. They were able to provide us assistance and training with our outdoor classroom. Resources, contacts, and a new design were given to us so our dream of an effective outdoor classroom could come true. The outdoor habitat became a reality because of their guidance.

I feel it is very important for our children to be involved in an outdoor classroom because it gives them an opportunity to be outside and learn about their environment. The outdoor classroom provides an ideal structured learning for the children and promotes ideal wildlife habitat. The teachers, students, and parents take ownership in their outdoor classroom. Every child at Deer Creek Elementary was involved in the outdoor habitat. For example, the kindergarten students constructed a bird sanctuary, the first grade students developed a flower garden, second grade a butterfly garden in the shape of a butterfly, third grade a vegetable garden, fourth grade a flower garden in the shape of Oklahoma, and fifth grade built a bird blind and a frog pond. We also built a gazebo, with help from the U.S. Fish and Wildlife Service. Students utilized the gazebo for hands-on science experiments. They also helped us design wetlands, walkways with animal tracks, and artificial nesting structures for wildlife. This outdoor habitat gave children an interactive learning environment. The U.S. Fish and Wildlife Service nominated us for the U.S. Department of Interior Pride in America Award. I was honored to accept the award in Washington D.C. several years ago for my school.

I am now the principal of a new elementary school, Grove Valley Elementary. I am in the process once again of building a new outdoor classroom. I am fortunate as there is a natural wetland on the site. Tinker Air Force Base is providing my school with a large grant. We plan to come up with a new design, and improve the outdoor habitat.

Enhancements to the wetland began several months ago. We will be adding trails, bridges, and walkways to the area too. 100% of the children at Grove Valley will be involved in designing their own areas to care for and nurture. We hope to have all of this completed by June. The Partners for Fish and Wildlife Program is once again helping us with this new habitat. Jontie Aldrich has visited the site and given us advice. They plan to work with us as the project is being completed and offer assistance as needed. The Oklahoma County Conservation district is also working as a partner with Tinker Air Force Base and our school. This outdoor classroom is going to be shared with the community neighborhood. We even plan to have fishing opportunities.

As you can see I am passionate about teaching children about the environment. Approximately 2% of our school children in the U.S. have an opportunity to work in an outdoor classroom compared to the early 1900's where almost every child had an opportunity to work the land or understand wildlife. I am dedicated to teaching children about the environment. I want to thank all of the Senators that support the Partners for Fish and Wildlife Program, especially Senator Inhofe, who championed the Partners Program into law. I want to represent all children and schools in the United States, so they too can experience outdoor classrooms and hands-on learning opportunities with our environment. Children are our future and environmental studies for them are disappearing or unavailable. Please continue supporting Partners for Wildlife programs so that children everywhere can continue to explore and understand their environment. This is "one" government program that truly benefits all.

Thank you.

Senator CARDIN. Thank you, Ms. Straughn, for your testimony. First, thank you for your passion on this subject, and thank you for what you do for our children. I am convinced that you are right. If we can sensitize children to the awesome responsibilities that we have, that they will do what is right. So I thank you, and being outside is critically important.

My colleague in the House, Congressman Sarbanes, has introduced No Child Left Inside for education so that we get more than 2 percent of our children having the experience of outdoor education. I think that is critically important, and I am glad that you figured out a way to get it done in Oklahoma.

I guess my question to you is are there opportunities to share what you are doing in your classroom so that other teachers, other school systems can take advantage of the work that you did and be able to bring forward similar types of efforts and educational programs?

Ms. STRAUGHN. Yes, we have groups that visit our site throughout the school year, and we share with them what we are doing. We offer our experiences so that they, too, may be able to do the same thing that we have done.

I also have done presentations to various groups, and I share the word with anyone and everyone that I can so that other schools can develop outdoor classrooms.

Senator CARDIN. Great. I think we need to try to institutionalize that a little bit better as far as sharing with what is being done around the Nation because it is no sense reinventing the wheel. You already have a successful program that could work in other communities. We just need to get that information out. I look forward to working with Fish and Wildlife in order to promote what you have done in Oklahoma. Great work.

Ms. Miller, I am also familiar with the Clearwater River and what you have done. I find that an incredible example of cooperation. I know Senator Crapo has worked very hard on that.

I guess my question to you is, from a pro point of view, what we should be doing in our programs to encourage that type of collaborative effort in the Federal partnership. And then from the other side, are there obstacles that we should try to remove that currently work against those types of collaborative efforts?

Ms. MILLER. Thank you for your question, Senator.

The level of Federal support for habitat protection and acquisition is critical to the success of these collaborative efforts, providing incentives through programs that were mentioned here today, through other programs like the Collaborative for Landscape Restoration Act that the Clearwater Basin is developing a proposal for.

Things like that, ideas that recognize the value of collaboration and partnership between local landowners, private, State government, as well as Federal Government that can focus on broad-based and locally adapted solutions for fish and wildlife is imperative. And providing incentives to these landowners to manage their lands in ways that benefit Fish and Wildlife Service gives stakeholders the tools that they need to be successful.

Regarding your question on barriers, currently I think similar to your question regarding the outdoor classroom, I think there is a greater need for sharing, and sharing the experience and sharing

our successes and also sharing some of our challenges and failures at times. So I think we are starting to see more of that, but ultimately I think that will lead to greater successes around the country.

Senator CARDIN. Thank you.

Mr. Benoit, thank you for your testimony. You listed as your top priority the authorization of the Coastal Program. I certainly agree with you. You then list some additional points that are important for the Coastal Program. If I read your testimony correctly, you would place the highest priority on realigning the mapping responsibility with the Coastal Barriers Resources Act and suggest that be included in the authorization of the Coastal Program. Is that correct, that you would like to see that legislated as we do the authorization bill?

Whereas your other recommendations are critically important. A lot of them are budget and coordination within the Department, and you believe need to be done through a budgetary process rather than through legislation. Or am I misreading your testimony?

Mr. BENOIT. Very good question, Senator. We believe that the realignment of the Coastal Barrier Resources Act can be done administratively by the Department.

Senator CARDIN. Oh, that can be done also administratively?

Mr. BENOIT. Right. It is already authorized. It is actually coming up for reauthorization this year. And it could very easily stand on its own, and we are very confused why it is so closely aligned with the Coastal Program, except that that seems to be where they take the funding from to implement that program.

And the Coastal Barrier Resources Act is an important program. We would just like to see it have a little bit more definition in terms of where the funding is actually coming from, and not impede the progress of the Coastal Program.

Senator CARDIN. The enhanced commitment to partnership and the coordination with the Department of Interior, and the personnel issues that you are referring to, we could look at on an authorization bill, but it seems to me many of those are just relationships and budget issues, more so than spelling it out.

We could, of course, express our congressional intent to work with you closely to see whether we can't at least be supportive. I think your recommendations are right on target, and we will try to work with you to see that that's done.

Mr. BENOIT. Thank you. We appreciate your support on that, and we look forward to having an authorized program as soon as possible.

Senator CARDIN. Thank you.

Senator Inhofe.

Senator INHOFE. Thank you, Mr. Chairman.

Ms. Miller, please understand that Senator Crapo really wanted to be here. This thing that came up was at the White House and was at the last minute.

Now, I notice that you are the manager of the Northwest United States District? Is that what I understand?

Ms. MILLER. The Inland Northwest. I am responsible for the Northern Panhandle Region, from the Clearwater River north to the Canadian border.

Senator INHOFE. So that doesn't include Oklahoma?

Ms. MILLER. I am sorry. It doesn't reach all the way to Oklahoma.

[Laughter.]

Senator INHOFE. There is a great program in Oklahoma that I was active in. This has been many years ago, but it was with the Conservancy. It was in the area that is called the Tall Grass Prairie. Ever heard of that? The Tall Grass Prairie is in central, north central Oklahoma, heavy in shallow oil production. However, they went in there, and they have now, through the Conservancy, and it was headed up in Oklahoma by a guy named Williams who was also an oil producer.

And you would never know that there is production going on in there. They have buffalo, and it is exactly like it was at one time. I just want you to kind of go back and tell people that it is not just in your area that wonderful things are happening. So I appreciate what you are doing in Oklahoma.

Ms. MILLER. Thank you. We have some family ties personally to some of the lands in Kansas, but right on the Oklahoma border, so we are involved in some prairie restoration work, as well as some oil production.

Senator INHOFE. Yes, that is good.

Let me ask you, Ms. Straughn, how did you initiate your contact with Tinker? How did that work?

Ms. STRAUGHN. I am a Board Member for the Oklahoma County Conservation District, and that happened through my work with outdoor education. They have special projects that educate children about the environment. They asked me to serve on the Board. They contacted or were in contact with the Oklahoma County Conservation District. They heard about the mitigation of their wetlands. The district put me in contact with Tinker Air Force Base, and so we started some talks, and we have been dotting our Is and crossing our Ts in finding out exactly how we could do the project; as partners we have been very successful. We are now down to the finish line.

They have sent us plans that look amazing. In fact I shared them with a member of your staff. I am getting ready to go to our Board of Education to share the plans. We hope to have everything finished by the fall.

Senator INHOFE. That is really good. I spend a lot of time at Tinker. I am on the Armed Services Committee. And they do get involved in a lot of things that they really believe in. Apparently, you sold them on the idea that this is what they should be doing.

And what I am going to do is, I did it once before 5 years ago. I came by and saw what you were doing there in Edmond at the other school. I want to do that again. My regular schedule is every fifth weekend, I am either in Iraq, Afghanistan or Africa, and then the other 4 weekends I am back in Oklahoma.

I would really like to first-hand get updated on what you are doing there in Edmond, Oklahoma, at your school, and take that around the State to other places. So we will be contacting you to get together and come out there and make a visit to see first-hand what you are doing.

Ms. STRAUGHN. We would love to have you, Senator. Thank you very much.

Senator INHOFE. Now, other than Tinker Air Force Base, do you have any other partners who you either have approached or have come to you to support this program?

Ms. STRAUGHN. In my previous elementary school, we worked with many partnerships. We had a person that made a sign for us; of course, the U.S. Fish and Wildlife Service; and the Oklahoma County Conservation District. We worked with Learn and Serve America, In Service Learning, because our children were actually servicing by working in the outdoor classroom after hours and during the summer months.

Also our Deer Creek School Enrichment Foundation gave us a grant. We have been trying to partner with many, many different individuals and organizations and groups.

Senator INHOFE. Do you have any anecdotal things that maybe some of your students, how they have benefited from this that you would want to share with us?

Ms. STRAUGHN. I think it is really interesting to see children go out into a garden where they are growing various vegetables. I had a kindergarten student who one time said well, I thought you got a tomato at a grocery store. I mean, they don't really understand exactly how a tomato grows. The children were very excited to take those tomatoes in and make some salsa out of them.

It was very exciting to be able to see first-hand children making a connection of plants and how they actually grow, and then how you can utilize them by cooking.

Senator INHOFE. Well, I am looking forward to coming out and visiting you, and we will arrange that pretty quick.

Ms. STRAUGHN. Thank you very much, Senator.

Senator INHOFE. Thanks for repeating your performance up here.

Senator CARDIN. I want to thank all of our witnesses. To me, it just points out that with a very modest amount of Federal investment and encouragement, what you can do with the private sector and get done. The examples of what you have been able to do in Oklahoma in the classroom; what you have been able to do in Idaho with a major environmental treasure; and I am particularly proud of the work that has been done on the Chesapeake Bay in our region.

But all of The Nature Conservancy and the Restore America's Estuaries have been critical players in this private-governmental partnership. And I just think these are models that we need to really, first of all, let people know what is happening; and second, promote in other parts of our country. And it is really a modest Federal investment, but I would just urge us to take these models and make them available elsewhere in the country.

I think your program in Oklahoma is a model program. I can tell you there are many classrooms in my State and around the Nation where it would be very well received. They don't need too much encouragement, but they need some help to get started, the technical help. It is a little bit intimidating to get started, as you know. And you all have done that successfully in Idaho and in Oklahoma. And I would just hope we could benefit and take that to other parts of the country.

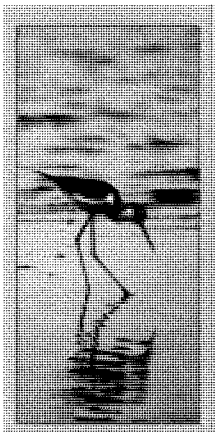
It does show, though, we do need to make sure we coordinate the programs that are available. I strongly believe that the Coastal Program, which has been very beneficial, needs congressional authorization, and I am going to work very closely with Senator Crapo on developing that legislation in our Subcommittee, working very closely with Senator Inhofe and Senator Boxer and our full Committee to see whether we can't get that bill moving forward.

With that, let me thank you again.

The hearing of the Subcommittee will stand adjourned.

[Whereupon, at 11:10 a.m. the Subcommittee was adjourned.]

[Additional material submitted for the record follows:]



"America's oceans and coasts are priceless assets. Independent of the fresh, they also contribute significantly to our prosperity and overall quality of life. For often, however, we take these gifts for granted, underestimating their value and ignoring our impact on them."

An Ocean Blueprint for the 21st Century: Final Report of the U.S. Commission on Ocean Policy, Recognizing Ocean Assets & Challenges, Chapter 1, page 1

THE ECONOMIC AND MARKET VALUE OF COASTS AND ESTUARIES: What's At Stake?

Executive Summary

By Linwood Pendleton

Our nation was built from the coast. Americans, like people around the world, are drawn to the coast because of its beauty, productivity, and because our coasts are gateways to the world. The coast nurtures our frontier spirit, our need for outdoor recreation, and the constant American appetite for sweeping ocean views and quiet bayfront vistas. Coasts, coastal oceans, and estuaries are essential to ocean fisheries and aquaculture. Coasts and their waters also generate oxygen, sequester carbon dioxide, and provide habitat to plants and animals both marine and terrestrial.

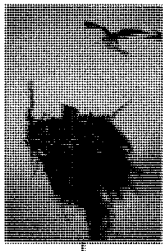
Unfortunately, we have a poor track record when it comes to taking care of our coasts and estuaries. Years of badly planned coastal housing have lead to heroic, and sometimes desperate, measures to hold back the forces of nature by using engineering rather than ecological stewardship. Seawalls have transformed once natural coasts into marine hazards unfit for the basic activities that first drew homeowners to the sea – swimming, boating, and fishing. Estuaries too have been under siege. Bays once filled with fish and oysters have become dead zones filled with excess nutrients, chemical wastes, and harmful algae. Wetlands, especially coastal salt marshes, have not fared better. America has lost millions of acres[1] of these once productive marshes as we converted them to farmland or building sites, ditched and drained them to control mosquitoes, or overwhelmed them with polluted runoff. The result has been a degradation of much of our coastline and a loss of more than half of the nation's wetlands over the last two hundred[2] years.

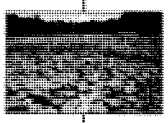
The damage and destruction borne by our coasts and estuaries has created more than physical and biological losses for our country. This damage also has diminished the economic productivity of the nation and the economic wellbeing of the millions of Americans who visit, use, and depend on the coast and the goods and services that it provides. We are only now coming to grips with the enormity of the economic value and potential that lies in our coastal resources; we are only now beginning to understand the potential economic losses we suffer each year because of underinvestment in coastal protection and restoration.

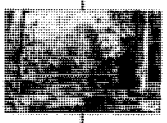
In the fall of 2006, Restore America's Estuaries convened a panel of internationally renowned experts to help us understand the economic value of coastal and estuary resources. These authors were asked to summarize the state of the art in our knowledge of coastal economic value. Their findings were astonishing – far beyond commercial fishing and tourism, healthy coasts and estuaries are essential for pro-

[1] Dahl, T.E. & Allord, G.J. Undated. *Technical Aspects of Wetlands: History of Wetlands in the Conterminous United States*. National Water Summary: Wetland Resources. US Geological Survey Water-Supply Paper 2425.

[2] http://www.nmfs.noaa.gov/habitat/habitatprotection/wetlands/index2c.htm







tecting more than $800 billion of trade each year, tens of billions of dollars in recreational opportunities annually, and more than 45 percent of the nation's petroleum refining capacity. Coasts and estuary regions support a disproportionately large share of the nation's economic output and population. The growing body of research shows that environmental damage places these values at risk, yet promoting environmental protection and expanding habitat restoration efforts are likely to increase these values substantially.

In this executive summary, we highlight some of the key findings of our panel.

The Economic and Market Value of Coasts

Economic and Employment Growth in Estuary Regions

Dr. Charles Colgan of the University of Southern Maine reports that with only 13 percent of the land area of the continental U.S., the estuary regions of the U.S. comprise a hugely disproportionate share of the national economy, with 43 percent of population, 40 percent of employment and 49 percent of output. In eight states, the estuary regions comprise 80 percent or more of the state's economy and these regions comprise more than half of the state's economy in fourteen states. Between 1998 and 2004, population growth in estuary regions was far less than non-estuary regions (5.2 percent compared to 9.3 percent), but economic growth was almost the same (29.1 percent compared to 29.8 percent). If the Great Lakes are excluded, the economic growth rate in marine estuary regions actually exceeds that for non-estuary areas (31.4 percent)

Coastal Recreation

More than 43 percent of all adult Americans visit a sea coast or estuary at least once each year to participate in some form of recreation (Leeworthy and Wiley 2001). The coasts of the Southeastern United States and California alone serve as destinations for tens of millions of Americans annually. During any given year, as many as one in ten Americans will visit coastal Florida; just over 8 percent will visit California coasts and beaches. Every coastal state hosts more than one million coastal visitors each year. Recreation not only generates

economic income for coastal businesses, but people tend to value these experiences well beyond what they pay – a concept known as non-market value. Non-market values capture our willingness to pay to use and protect coastal recreational resources, like beaches and harbors, and thus represent the net economic contribution of these opportunities to our wellbeing. Dr. Linwood Pendleton of The Ocean Foundation and the University of California estimates that, for the United States, beach going may contribute between $6 billion and nearly $30 billion annually to economic wellbeing. Recreational fishing is estimated to contribute between $10 billion and $26 billion per year and coastal wildlife viewing may generate between $4.9 billion and $49 billion dollars each year (See Table 1.).

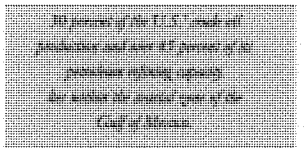
Table 1: Estimated Annual Value of Selected Coastal Recreation
(millions of US$)

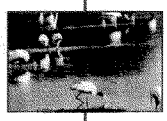
	Beach Going		Recreational Fishing		Wildlife Viewing	
	Low	High	Low	High	Low	High
Far-Western U.S.	$218	$653	$800	$3,866	$463	$4,633
Western Continental U.S.	$1,845	$9,226	$687	$2,750	$957	$9,574
Gulf-shore Southern U.S.	$1,185	$11,848	$5,645	$9,408	$1,151	$11,508
Southeastern U.S.	$1,769	$4,424	$1,632	$2,720	$645	$6,449
Northeastern U.S.	$933	$3,732	$1,109	$7,393	$1,661	$16,606
U.S. Total*	$5,950	$29,883	$9,873	$26,136	$4,877	$48,770

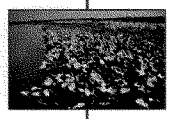
*Note, some double counting may occur when adding across states, but this double counting is likely to be a small compared to estimation error. More serious double counting could occur when adding values across different recreational activity types.

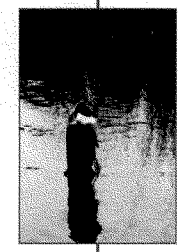
Coastal Energy Infrastructure: The Gulf of Mexico

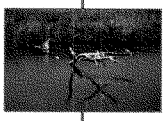
While the coast is quickly becoming home for new forms of energy - including wind, wave, and tidal power - the coastal wetlands of the Gulf of Mexico continue as sites of more traditional fossil fuel infrastructure. David Dismukes of Louisiana State University's Center for Energy Studies reports that approximately 30 percent of the United States' crude oil production, 20 percent of its natural gas production











and over 45 percent of its petroleum refining capacity lie within the coastal zone of the Gulf of Mexico – most within just a few miles of the coast.

Coastal Ports

Estuaries are the marine gateways that link American producers and consumers to the world's economy. In 2003, the last year for which we have complete data, more than $841 billion in trade passed through America's ports.

Regions	Import Value	Export Value	Total Value
California & the Pacific Islands	232,203	45,512	277,715
Northeast Atlantic	160,266	49,139	209,405
Gulf of Mexico	103,816	53,464	157,280
Southeast Atlantic	48,973	24,140	73,113
Northwest Pacific	52,491	20,411	72,903
Florida	29,817	17,504	47,321
Great Lakes	1,697	1,977	3,675
Total	629,262	212,149	841,411

Table 2: U.S. Waterborne Foreign Trade by Region 2003
(millions of US$, adjusted to 2005)

Commercial Fishing in American Estuaries

While often overshadowed by major deep ocean fisheries, coastal waters and estuaries continue to be important areas of commercial fishing. In his chapter, Doug Lipton of the University of Maryland finds that a large share of the ten billion pounds of U.S. commercial fish landings, worth over $3.8 billion unprocessed, are species that are dependent on estuarine conditions for at least some stage of their life history[3]. In a 1993 study, Houde and Rutherford put the share of estuarine-dependent commercial landings at just over 50 percent, but the Environmental Protection Agency puts the figure closer to 75 percent[4].

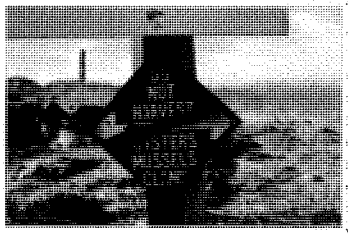
Coastal Housing Values

To date, there are no systematic estimates of the value of coastal housing. Nevertheless, in her chapter, Judith Kildow of the Monterey Bay Aquarium Research Institute finds that a number of researchers have estimated the contribution to hous-

[3]Landing statistics are for 2004 from the National Marine Fisheries Service website. http://www.st.nmfs.gov/st1/commercial/landings/annual_landings.html. The unprocessed value, known as ex-vessel value, refers to the price paid directly to fishermen; the total value added of the U.S. seafood industry is $31.6 billion.
[4]http://www.epa.gov/nep/about1.htm

ing values of proximity to coasts, estuaries, and oceans. A study by Major and Lusht (2004) found that beachfront proximity increased the value of a home by 207 percent compared to a property two blocks away; a bayfront location added 73.2 percent.

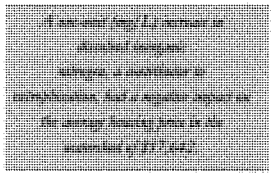
The Economic Consequences of Environmental Change

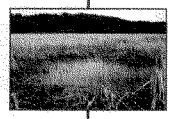


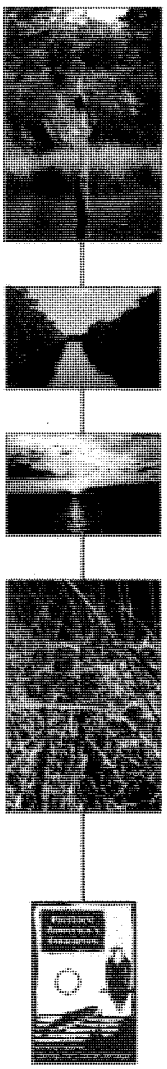
The economic value and productivity of our coasts and estuaries depend upon the ecosystem health of these sometimes fragile areas. In their research, our authors examined a growing body of literature that reveals the economic consequences of environmental change in coastal and estuary ecosystems. During the last two centuries, much of the environmental change in coastal America has been in the form of habitat loss, fecal and nutrient contamination, and sedimentation. More recently, the coastal environment has started to change for the better – restoration programs, conservancies, and improved coastal management have helped to protect pristine areas and restore those that have been degraded. Here we note a few examples of the economic impacts of environmental change in coastal areas. In doing so, we hope to highlight the potential economic value that could come from coastal and estuary restoration and the potential cost that could be avoided by better coastal and estuary protection.

Coastal Conditions and Home Prices

Several studies have estimated the link between coastal conditions and home values. Frech and Lafferty (1984) estimated the work of the California Coastal Commission raised the value of local housing in two ways: by preserving a positive externality (the coastline) that would otherwise be destroyed; and by reducing the amount of land available for housing. In 1986, the Maryland Critical Areas Commission limited residential development on land abutting the Chesapeake Bay. Prices of housing with water frontage in the "critical areas" increased by 46 to 62 percent (Parsons 1992). Housing prices in the "critical areas" without water frontage increased from 14 to 27 percent. Even as far as three miles from the "critical areas," there was a 4 to 11 percent price increase (Polis Project 2001).

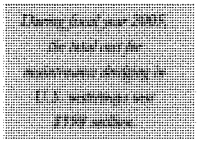






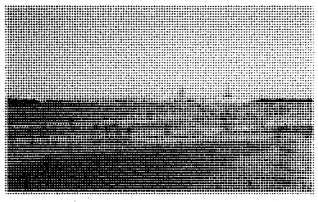
Recent research also shows just how important water quality is to home values. Researchers working in Maryland studied 494 waterfront homes and found that if water quality conditions were improved from levels found at the time of the study to the EPA/state standards the potential economic benefits would have been $12.15 million with a 95 percent confidence interval of $3.789 million to $20.501 million (Leggett and Bockstael 2000 p. 142). Poor et al. (2007), also working in Maryland, found that a one unit (mg/L) increase in total suspended solids (TSS) had a negative impact on the average housing price within the watershed of $1,086. A one-unit (mg/L) increase in dissolved inorganic nitrogen, a contributor to eutrophication, had a negative impact on the average housing price in the watershed of $17,642 (Poor et al. 2007).

The Costs Of Dredging and Damage to Trade



Keeping ports and waterways open for business has always been of prime importance to our nation's economy. Increasingly, though, sedimentation from poor land use practices and a loss of estuary habitat has made ensuring the navigability of ports physically and fiscally difficult. Di Jin, of the Woods Hole Oceanographic Institution's Marine Policy Center, reviewed the literature to find out what little is known about the potential benefits of reduced sedimentation. Dr. Jin reports that a study by Sohngen and Rausch (2001) found that a sediment reduction program in Toledo harbor would lead to a 15 percent reduction in sedimentation rate and, in turn, a 15 percent reduction in dredging cost with a total economic benefit of $1.3 million per year.

Dr. Jin writes that if Sohngen and Rausch's findings were extended to the national level, the resulting benefits may be considerable[5]. According to U.S. Army Corps of Engineers, for fiscal year 2005 the total cost for maintenance dredging in U.S. waterways was $598 million. Dredging as a result of Hurricane Katrina alone required the removal of an additional 1.3 million cubic yards at $4.29 per cubic yard (a total cost of $5.5 million).



Energy Infrastructure At Risk: Wetlands Loss and Storm Surge

Dr. Dismukes reports that wetland and coastal habitat loss in Louisiana threatens much of the nation's petroleum refining and production capabilities. Louisiana lost approximately 1,900 square miles of coastal land from 1932 to 2000 and is projected to lose approximately 700 square miles between 2000 and 2050 (absent restoration efforts).

[5]A detailed analysis of dredging costs should also consider beneficial use of dredged materials. For studies on beneficial use of dredge materials in different port areas, see Wagner (2000), Marcus (2000), and Yozzo *et al.* (2004).

A wide range of potentially at-risk energy infrastructure exists in the coastal areas of the state (See Figure 1.). There are two major refineries in this area, seven major petrochemical facilities, three gas processing facilities and numerous pipeline segments. Many of the potentially at-risk pipelines in the area are responsible for moving a major share of natural gas produced in the GOM to consuming areas in the eastern half of the country including New York, Philadelphia, and Washington, D.C., to name a few.

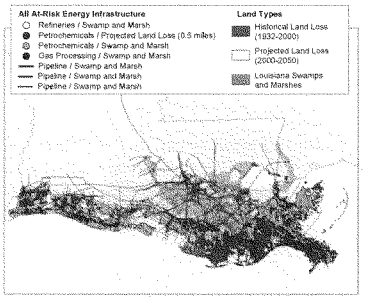


Figure 1: Potential At-Risk Energy Infrastructure

Source: (Dismukes' Construct; USGS, 2007(c); IHS Energy, 2004; Pennwell, 2004.)

Storm surge, like that experienced during 2005's Hurricane Katrina can be seriously exacerbated by wetland and coastal habitat loss. Storm surge is indiscriminate in damaging both households and industry. Figure 2, for instance, provides two photographs, one during Hurricane Katrina, and one immediately afterwards, that shows the degree of storm surge and flooding at a major South Louisiana petrochemical facility.

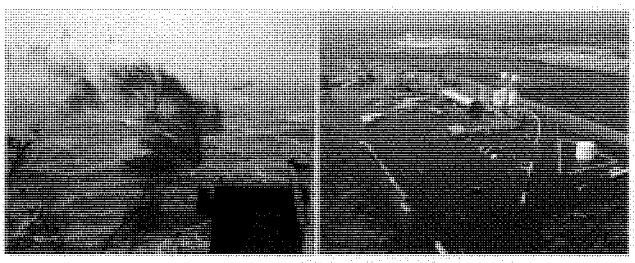
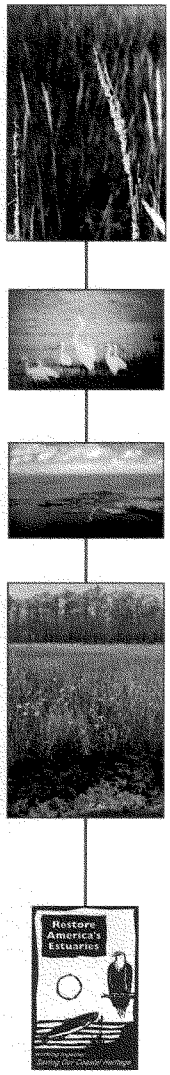
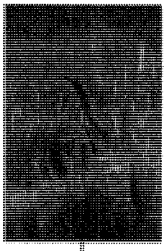
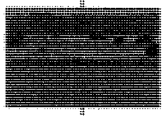


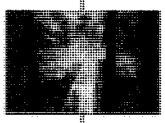
Figure 2: Storm Surge and Flooding Post-Katrina at Petrochemical Facility

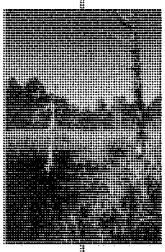
Source: (Provided to Dismukes courtesy of Air Products and Louisiana Chemical Association)











Conjectures during and since the time of the 2005 tropical season have blamed coastal erosion for aggravated storm surge levels (Stokstad, 2005).[6] In other words, had some or all of the historic land loss not occurred, storm surge impacts would have been far less than what was experienced. Increased storm surge exposure is another potential risk to energy infrastructure along the Gulf of Mexico.

Conclusion

The findings from our panel of authors indicate that we are only beginning to understand the full economic value of estuaries and coasts and how these values depend upon environmental and ecological conditions. Even with limited knowledge, one thing is clear – the value of coasts and estuaries is high, perhaps much higher than previously imagined. The high value of coasts and estuaries, and the environmentally dependent nature of so many sectors of the coastal economy, call for careful and forward thinking environmental stewardship of these resources – especially through protection and restoration. Unfortunately, much of the coast is degraded; wetlands have been destroyed and many coastal waterways do not meet the basic standards for use set by the Clean Water Act.

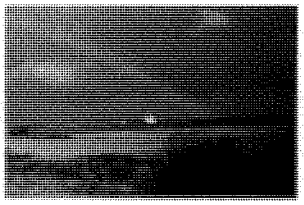
Moving Forward

This report demonstrates two things: 1) the economic value of coastal and estuary protection and restoration is likely to be in the many hundreds of billions of dollars, if not more and 2) scientific research that shows exactly how protection and restoration have affected and could affect economic outcomes is lacking. Clearly, more research is needed to understand how habitat protection and restoration can be best designed to maximize the economic value and contribution of our coasts and estuaries.

Building on the work of the authors, Restore America's Estuaries, The Ocean Foundation's Coastal Ocean Values Center, and the NOAA Restoration Center are embarking on a series of pilot projects to develop and implement a system of economic indicators that will show how restoration events have affected human uses,

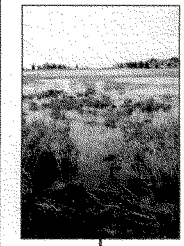
[6]While anecdotally, one could conclude that increased storm surge create by coastal erosion increased the damage suffered by many types of physical infrastructure, a comprehensive analysis has not been done to date.

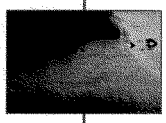
and thus the economic values, associated with coastal and estuary areas. Human use indicators measure activity (e.g. beach days), output (e.g. fish catch), and the economic impacts and values associated with human use. Much like environmental monitoring programs, indicators of human use will help to track the changing ways in which coastal conditions influence human use of the coast, understand how past restoration events have affected coastal uses, monitor the effectiveness of new restoration and protection, and identify areas where the return on restoration and protection will be the highest.

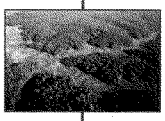


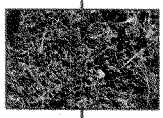
Through this empirical research, Restore America's Estuaries, The Ocean Foundation's Coastal Ocean Values Center, and the NOAA Restoration Center hope to better integrate human needs and values, both economic and social, into coastal management and restoration decision making.

This project was made possible through funding provided by the National Oceanic and Atmospheric Administration, Minerals Management Service, The McKnight Foundation, Shell—World Sponsor of America's Wetland: Campaign to Save Coastal Louisiana, and National Wildlife Federation.









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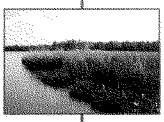

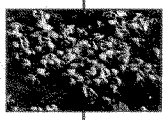

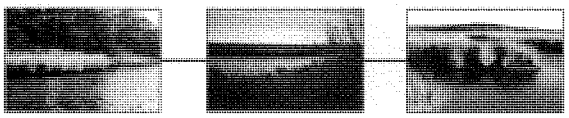

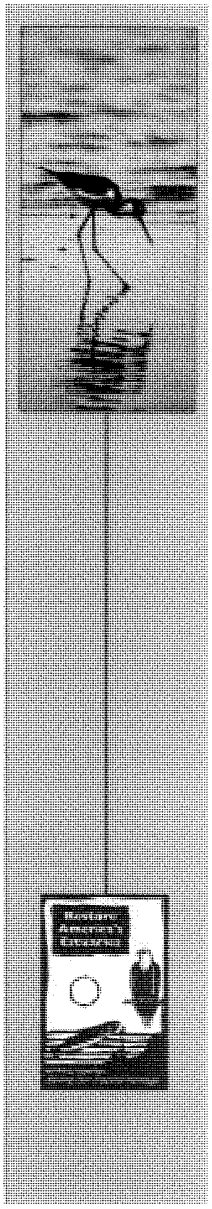

It is the mission of Restore America's Estuaries to preserve the nation's network of estuaries by protecting and restoring the lands and waters essential to the richness and diversity of coastal life.

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