

# National Fish Passage Program

*Creating Aquatic Possibilities*



*2011 Annual Report and Future Outlook*

## A Message from the Assistant Director for Fisheries and Habitat Conservation

Man has been forever fascinated by the beauty and sheer power of rivers. Since the beginning of our nation's history we have been utilizing our ingenuity to harness the energy of rivers, used them as flowing roads, enjoy their biological bounty, and taken advantage of their life giving water. This country was founded by settlers of the New World following the path of rivers. We are who we are because of rivers and it is because of what we have done to those rivers that we are at risk of losing the precious aquatic life they hold.

There are over 6 million barriers within the rivers of the United States. These barriers range from small and large dams, dikes, levees, and road culverts. All of these structures were constructed with good intentions: energy, irrigation, water supply, and transportation to name a few. Unfortunately many of these structures are old, outdated, no longer serve their intended purpose and therefore have become one of the top reasons why the American people have lost whole populations of fish and are at risk of losing more aquatic species. Some of these barriers have also become hazards to human health and safety.

The U.S. Fish and Wildlife Service's Fisheries Program have been addressing this problem for 12 years through the National Fish Passage Program. The program works with partners on a voluntary basis to help communities restore their natural resources by reconnecting aquatic habitats. What these communities have discovered and continue to realize is the myriad of benefits gained from removing barriers: their fishing flourishes, they can canoe and kayak, their water is cleaner, roads are safer, local economies flourish, and they get their beautiful rivers back.

It is important to realize that investing in fish passage is a win for the environment and for the American people. For every river mile reconnected more than \$500,000 in economic benefit is returned to local communities, jobs are maintained and created, and the potential for aquatic species to be resilient in the face of urban expansion, climatic change, and other external pressures is greatly increased. The purpose of the program is to focus on aquatic species and habitat restoration to ensure self-sustaining populations on a landscape level within the context of the Service's overall resource conservation mission. Our efforts in the Service have flourished since the program began in 1999. Our success is based on robust and unique science expertise, on the ground restoration experience, and a partnership approach. The National Fish Passage Program continues to mature and adjust to new opportunities and challenges and with our partners we will successfully meet those challenges head on to achieve our shared goals for the aquatic resources of this nation for the American people. Together, we are "creating aquatic possibilities."



**Bryan Arroyo**  
Assistant Director, FHC

### ***The National Fish Passage Program has a plan for the future:***

*We will build on past success;  
capitalize on in-house engineering  
and technical capacity; and lead the  
way to improved science, increased  
on-the-ground results, and ecological  
benefits for our nation's waterways,  
fish, and the American public.*

Report produced for the Fisheries and Habitat Conservation-National Fish Passage Program by Colin Hume

#### **On the Cover:**

*A fish ladder being constructed on the Cosumnes River, California.*

Photo Credit: Donald Ratcliff, USFWS

# National Fish Passage Program

## *What is it?*

The National Fish Passage Program (NFPP) provides funding and technical assistance in all 50 states to eliminate or bypass barriers that inhibit movement of fish and other aquatic species. Fisheries science demonstrates that in-river movement is the key to survival and sustainability for these animals. Addressing the decline of aquatic species populations is the motivation for the creation of this voluntary, non-regulatory Fish Passage Program in 1999.

Housed within the Fisheries Program and administered by Fish and Wildlife Conservation Offices (FWCO), a national network of U.S. Fish & Wildlife Service (Service or USFWS) biologists and fish passage engineers has been created to follow the Service's Strategic Habitat Conservation (SHC) model when implementing fish passage. Following the SHC model means the Program identifies, prioritizes, funds, plans, designs, reviews, inspects, monitors, and evaluates projects, to remove obsolete dams, replace impassable culverts, build bypasses, construct low-water crossings, and install fishways and fish screens in cooperation with State and Federal agencies, non-government organizations, universities, and individuals.

The National Fish Passage Program has a strong track record reconnecting our nation's rivers. The Program has resulted in the removal of over a **thousand** barriers, restoring more than **17,683 miles** of stream access and **118,000 acres** of wetlands.

These efforts are the first steps in addressing the more than six million remaining fish passage barriers across the country. Many of these barriers, once the drivers of the industrial revolution, are now abandoned, obsolete, and unsafe to swimmers, boaters, and flood-prone communities downstream. They represent costly burdens to small towns and individuals and they threaten aquatic species survival as well as human health.

### A 2010 USFWS study documented the economic benefit of barrier removal:

- Over \$500,000 benefit to communities for every stream mile reconnected.
- 12 jobs supported for every stream mile opened to fish passage.

## 1st Annual Fish Passage Awards

The NFPP awarded Scott Yates (below right), Director of Trout Unlimited's (TU) Western Water Project, with its "Outstanding Partner Award" for 2011. In 2011, Yates and his staff worked on eight fish projects in the Green River and Bighorn River drainages. The NFPP is pleased to commend the hard work of Scott and the TU staff that have done such great work on reconnecting rivers and streams and looks forward to partnering with them on future projects.



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Nolan Banish (below, left of trophy) and the field biologists at the Klamath Falls Fish & Wildlife Conservation Office were recognized for their exemplary work with the NFPP in 2011. This field office has been extremely effective at leveraging USFWS funds over the past four years and has completed projects that benefitted more than five listed fish species, removed five barriers, and opened over 110 miles of aquatic habitat.



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# 2011 Fish Passage Program Highlights

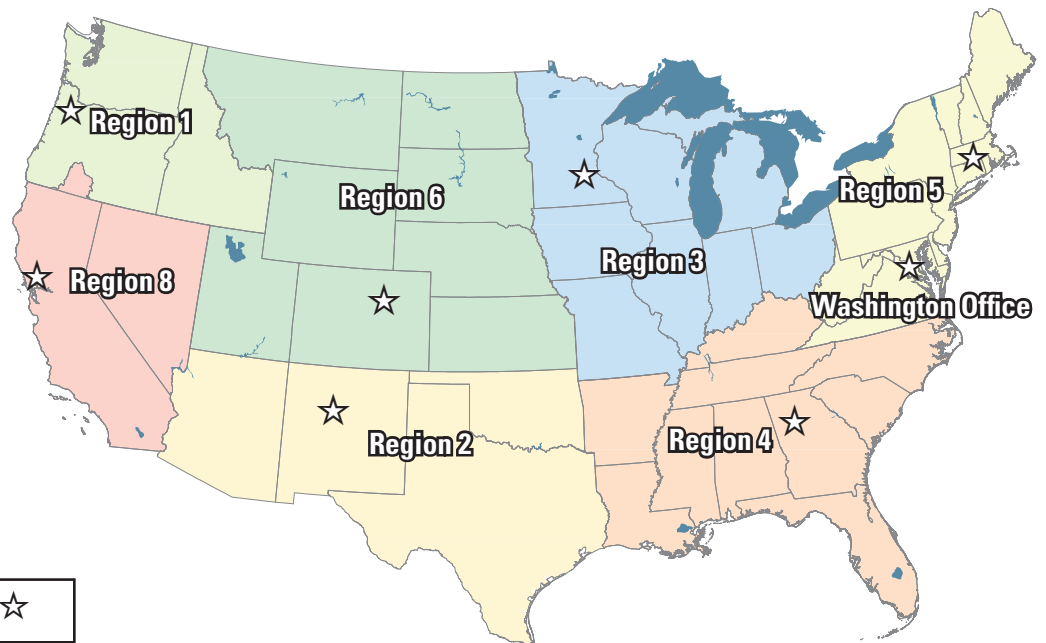
Since 1999, the National Fish Passage Program has been building successful biological and socioeconomic outcomes:

- **\$9.7 billion** in economic value to local communities
- Removed **1,118** fish passage barriers
- Reopened access to **17,683** stream miles
- Reconnected **118,824** acres of wetlands
- Benefited over **90 species** of fish and freshwater mussels
- **\$68 million** invested in projects, engineering and administration
- **70%** of the funds applied on-the-ground
- **3:1** ratio of non-federal match to NFPP funding
- Over **700** project partners
- Projects have supported **219,195** jobs

## 2011 Funding Allocations

Region	Coordination & Engineering (\$)	On-the-Ground Projects (\$)	Total (\$)
1	248,750	758,489	1,007,239
2	248,750	757,242	1,005,992
3	248,750	1,360,442	1,609,192
4	248,750	1,289,600	1,538,350
5	248,750	1,086,655	1,335,405
6	248,750	1,009,010	1,257,760
7	248,750	983,579	1,232,329
8	248,750	812,763	1,061,513
Washington Office	348,250	377,830	726,000
<b>Totals</b>	<b>2,338,250</b>	<b>8,435,610</b>	<b>10,773,860</b>

## The U.S. Fish & Wildlife Service Regions



**Regional Headquarters** ☆

# Impacting Local Communities

## Tropical Storm Irene Response in Vermont

On August 28, 2011 Tropical Irene followed a westerly storm track and dumped eight inches of rain in central Vermont's Green Mountains and portions of the Northeastern United States. Overnight, Vermont rivers formed a torrent of water. Undersized road culverts failed to function properly and water backed up until the rivers spilled over their banks and onto the floodplains, peeling away highway asphalt, transporting whole trees, buckling culverts, undermining bridge abutments, blowing out road crossings, creating landslides and displacing sediment. Irene displaced whole communities bringing commerce to a halt and jeopardizing human health and safety.



NASA



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Within weeks, the USFWS immediately provided \$100,000 from the NFPP for the White River Partnership in Vermont to assist with storm recovery by targeting fish-friendly culvert replacements. Additionally, a cadre of fish passage engineers from the National Fish Passage Program and field biologists from Fisheries, Partners for Fish and Wildlife, and the Coastal Program provided technical assistance to the state of Vermont and local towns. Other partners also came to the rescue. Trout Unlimited mobilized its membership to work with

the NFPP to help towns and to provide technical assistance and oversight for ongoing projects in Vermont, New Hampshire, and New York.

Damage assessments demonstrate that culvert replacements funded by the National Fish Passage Program survived Tropical Storm Irene's catastrophic fury. Seeing this, locals recognized this disaster as an opportunity for both Vermont's rivers and road managers to replace damaged culverts with those that would withstand future flooding events. Doing infrastructure right for fish also provides overwhelming value to humans and their safety.



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*Presentation of a ceremonial check to the White River Partnership*

## Working Closely with our Partners

The Fishery Foundation of California (FFC) is a nonprofit fisheries consulting company, located in Elk Grove, CA, with five employees. It has a long history of working with the Fisheries-National Fish Passage Program. In the past three years, FFC has worked with Service funding to provide suitable spawning gravel and improve fish passage at two sites on the Cosumnes River. FFC also works with many other fisheries consultants and the State of California on a multitude of aquatic restoration and fish passage related projects.

In the last two years, the economic problems in the country have forced employees of FFC to take out personal home equity loans to make payroll for completed or active projects. The clients were unable to reimburse them in a timely manner. This year, facing similar reimbursement problems, Service support using NFPP funding has helped bridge the financial gaps for FFC by allowing them to make their payroll without having to resort to extreme measures to pay employees while they worked on two NFPP projects.



Donald Ratcliff, USFWS

*Fisheries Foundation of California constructing a fish ladder on the Cosumnes river, CA*

# National Fish Passage Program

## *What we accomplished in 2011*

In fiscal year 2011 (October 1, 2010 – September 30, 2011) projects were completed in over 40 states with 290 partners across the Nation. The types of projects conducted included fish passage barrier removals, engineering, planning and partnership coordination, monitoring and evaluation, and barrier inventories to support the Fish Passage Decision Support System.

### **In 2011 the NFPP achieved:**

#### **Increasing Awareness – Getting Our Story Out**

- February 2011 - Briefed the USFWS Assistant Regional Directors for Fisheries.
- March 2011 - Published the program's first annual report with distribution across the country.
- April 2011 - Washington Office staff and Regional Coordinators met with 31 congressional representatives in Washington, D.C.
- June of 2011 - Recognized partners, fish passage engineers and Service biologists through the Program's first annual awards event.
- July of 2011 - Expanded the program's use of social media to include YouTube videos.

### **Regional breakdown of National Fish Passage Program projects completed in Fiscal Year 2011:**

Region	Barriers removed or bypassed	Miles opened to fish passage	Acres opened to fish passage	Barrier inventories conducted
1	34	151	98	
2	4	8		
3	16	230		
4	10	57	35,525	2
5	12	148		
6	5	271		
7	8	30		
8	54	71		
R5 Engineers	15	1,218		
<b>TOTALS</b>	<b>158</b>	<b>2,184</b>	<b>36,688</b>	<b>2</b>



*Left: In 2011 the NFPP supported the construction of a flume at the Bozeman Fish Technology Center that will be used in research on species-specific swimming capabilities to improve fish passage designs.*



*Left: An experimental stream used in association with the test Flume at the Bozeman Fish Technology Center.*

*“We’re doing it and we can do more!”*

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## Enhancing Professional & Technical Capacity

- October 2010 - Assessed workforce stream restoration and fish passage training needs.
- May 2011 - Hired one of the first graduates of the UMass fish passage engineering partnership while continuing to foster yet another year-class of interdisciplinary engineers.
- June 2011 - Sponsored and assisted in organizing Fish Passage 2011, the first National Conference on Fish Passage Engineering & Ecohydrology.
- September 2011 - Hosted and moderated a symposium on fish passage at the American Fisheries Society annual meeting in Seattle, Washington.
- October 2010 - September 2011 - conducted a major redesign of the Fish Passage Decision Support System (FPDSS).

## Increasing Program Resources and Outcomes

- The Fish Passage Engineers worked on 151 projects in 15 states to:
  - Remove 15 barriers
  - Reconnect 1,218 river miles
- February 2011 - President's budget request included \$1 million increase for the program.
- June 2011 - NFPP Coordinators and Fisheries Program leadership met with key partners to discuss opportunities for increased collaboration.
- August 2011 - Tropical Storm Irene recovery needs in Vermont required immediate mobilization of fish passage engineering and technical assistance to help the state with fish-friendly road and infrastructure repair.
- September 2011 - The NFPP was a partner in the removal of the Elwha Dam on the Olympic Peninsula in Washington.
- 2011 saw an increased demand by partners and other FWS programs for the NFPP engineers to design and oversee projects.
- In 2011, the NFPP provided assistance with engineering and design work for the removal and bypassing of three dams on the Penobscot River, which were purchased by the Penobscot River Trust.

## The National Fish Passage Program Helps Restore the Elwha River

Contractors broke ground to remove two Olympic Peninsula dams near Port Angeles, Washington in September 2011. The Elwha Dam, built in 1913 and 108 feet tall, and Glines Canyon Dam, built in 1927 and 210 feet tall, are the nation's two largest decommissioned dams. Dam removal and river restoration will occur over a three-year period. The completed project will provide 70 miles of habitat benefitting Pacific salmon, steelhead, bull trout, Pacific lamprey, coastal cutthroat trout, and other species. Annual salmon populations in the Elwha River are predicted to grow from about 3,000 to 400,000 returning adults.

In 2011, Fisheries staff worked with partners on dam decommissioning studies, project design, and implementation. They assisted with fish salvage operations and constructed and operated a fish capture weir below Elwha Dam to ensure successful salmon re-colonization. We will continue our efforts to monitor Elwha restoration projects and Service trust species within this iconic and now free-flowing river.



*The Elwha Dam during the initial release of water that will reconnect the upper and lower stretches of the Elwha River.*



*The Elwha Dam during the first phase of deconstruction.*

# 2011 Fish Passage Projects

## The NFPP Helps a Community Remove a “Killer”

In October 2011, the people of Front Royal, VA watched as their efforts to remove a “killer” in their town was complete. The town of Front Royal had suffered multiple human casualties by way of a low head dam “drowning machine” on the Shenandoah River. The town worked with the Fisheries-National Fish Passage Program to remove the non-operational Riverton Dam and now residents enjoy fishing and canoeing on a safe river.



*Riverton Dam before the removal*



*Deconstruction of Riverton Dam*



**Before**

This project on the Maple River in Pellsoton, Michigan involved replacing existing culverts that were a barrier to fish, with a free-span, 40 foot timber bridge structure, which accommodates the natural flow of the river and opens ten miles of stream. In addition, the embankments were stabilized and road runoff was properly managed to reduce sedimentation at the crossing.



**After**

USFWS



**Before**

With support from the NFPP, the Oceana County Road Commission completed culvert replacement projects on Cobmoosa Creek, Michigan, in August 2011. Aluminum D-shaped bottomed culverts were used at both road stream crossings, providing fish passage and safer motor vehicle travel due to a widened road and installed guardrails. The two projects opened four miles of quality habitat for brook trout and other important aquatic organisms.



**After**

USFWS

Jan Rowan, USFWS



**Below:** Fisheries used the NFPP to improve fish passage at several irrigation diversions on Eagle Creek in northeastern Oregon. The Nash Ditch Diversion was one of six fish screen projects that prevent entrainment for important coldwater species such as redband trout and Bull trout, both listed by the ESA.



*Nash Ditch, a man-made diversion before screen construction.*



*Construction of the fish screen.*



*The finished diversion that prevents entrainment by fish in the irrigation canal.*



*The perched culvert before replacement prevented fish passage.*



*Construction of the new fish friendly culvert.*



*The finished culvert has a natural streambed and allows for fish passage.*

*Homer Soil and Water Conservation District*

**Above:** An undersized culvert blocking juvenile and adult fish at a tributary to Stariski Creek was removed on the Kenai Peninsula, Alaska in 2011. A larger culvert was put in place using the stream simulation design method at the same grade as the natural stream.

# 2011 Fish Passage Projects

## Tribal Youth Restore Fish Passage in the Mid-Klamath

There are many illegal barriers on the Mid Klamath river basin in northern California used both to create swimming areas and provide residential irrigation. To address these problems, the Yreka Fish and Wildlife Office, utilizing NFPP funds, entered into Cooperative Agreements with the Mid-Klamath Watershed Council (MKWC) and the Karuk Tribe to continue work that began in 2008 and restore fish passage on ten miles of stream during 2010 and 2011. The MKWC and the Karuk Tribe collaborated with the Salmon River Restoration Council (SRRC) and the U.S. Forest Service on this project.

According to Will Harling, Executive Director of the Watershed Council, *“Our economy is largely based on recreational tourism around our productive fishery. In addition to direct job creation, benefits to the resource will eventually result in more recreational and retail income to our rural communities.”*

MKWC and SRRC played a critical role in organizing volunteer workdays, providing outreach to landowners, and organizing workforce to implement surveys and remove barriers to fish passage. Employing manual labor and small machinery, MKWC staff and volunteers identified and addressed 48 barriers throughout the mid Klamath Basin. In some cases this required tearing down dams and in other cases creek beds were altered to provide easier passage through difficult areas. This allows juvenile coho salmon, steelhead, and outmigrating juvenile Chinook to move more freely throughout the basin.

*“This project provides meaningful jobs for tribal youth seeking gainful summer employment in an area with high rates of drug and alcohol abuse,”* commented Harling. *“It also connects them to their ancestral territory, provides positive role models, and trains them in fisheries sciences so they can apply for natural resource management positions in the area.”*



Will Harling, MKWC

**Above:** Mid-Klamath Watershed Council creating a step-pool fishway with Junction Elementary School students, opening up high quality juvenile coho rearing habitat.



**Left:** Volunteers creating a breach in an illegal swimmers dam on Walk Creek to provide juvenile fish passage.



*Above: The box culvert on Bitter Creek preventing fish passage.*

*Above: The fishway was named after the property owner who was a strong supporter of the project.*



George Jordani, USFWS

In 2011, a nature-like fishway was constructed on Bitter Creek, Wyoming. This bypasses a box culvert that the creek passes over, creating a fish passage barrier. The project opened 39 miles of stream that were no longer accessible for migrating Yellowstone Cutthroat trout, mountain whitefish, and Western silvery minnow, all species of Special Concern.

*Before*



Bill Rice, USFWS

*After*



*A culvert replacement project on the Little Susitna River in Alaska reopened four miles of coho salmon habitat.*

# Fish Passage Decision Support System

The Fish Passage Decision Support System (FPDSS) is a web-based application developed by the U.S. Fish and Wildlife Service to support the conservation actions of the National Fish Passage Program and provide management tools for the broader fisheries conservation community. The application contains multiple types of data sets relevant to the conservation of aquatic ecosystems, including a comprehensive national inventory of stream barriers (i.e., dams, culverts, etc.) collected from multiple sources across the nation.

The FPDSS significantly improves the planning, design, and decision-making process of fish passage conservation actions by using geographic information systems (GIS). This represents one USFWS approach to embracing the National Geospatial Strategy and the Geospatial Line of Business Initiative. By providing the Service, its partners agencies, and the general public with critical information for communicating conservation needs, this enhances collaborative efforts and helps make efficient and transparent decisions regarding how to expend resources that will result in maximum benefit for aquatic species.

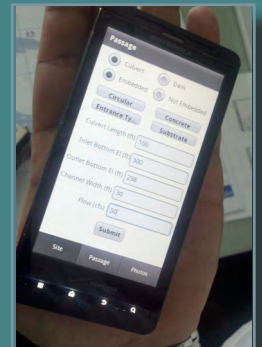
## 2011 saw major advancements of the FPDSS such as:

- The system was moved to an upgraded ESRI-based system providing options for different base maps to view data on satellite and terrain landscapes.
- Enhanced drawing and mapping applications.
- National Fish Habitat Partnership assessment data that indicates the risk of habitat degradation throughout the United States.



## Barrier Inventory Efforts Go Mobile with a New App

With support from the NFPP, the U.S. Geological Survey has developed a smart phone application that can be used by the USFWS and designated partners to inventory fish passage barriers in the Southwest. The application will allow the user to fill out an informational form, include digital pictures of the barrier, and upload them to a web-based mapping system. This will greatly expand the ability of Service staff to inventory barriers and prioritize restoration activities in Texas. The Fisheries Program is looking to expand this application to other areas of the country and integrate it with the Fish Passage Decision Support System in the future.



Visit FPDSS at:  
<http://fpdss.fws.gov/home.jsessionid=155C8DD0D04132C7D6C7FC75B9E8E82D>

# Advancing the Profession of Fish Passage

## The First Annual Fish Passage Engineering Conference in Amherst Massachusetts

In June of 2011, the Fisheries-National Fish Passage Program teamed up with the University of Massachusetts College of Civil & Environmental Engineering, the National Oceanic and Atmospheric Administration, and several other sponsors to hold the first ever National Conference on Engineering & Ecohydrology for Fish Passage. Events such as these are an excellent forum for enhancing the network of fish passage professionals and academics, facilitating collaboration, and cross-pollination of ideas. The three-day conference brought in researchers, educators, practitioners, funders, and regulators who have an interest in fish passage advancements. Topics included technical fishways, stream restoration and stabilization, dam removal, road ecology, and the myriad of funding, safety, climate change, and other social issues affecting such projects. Hosted by the University of Massachusetts, the conference was a resounding success with participants from around the world calling for a follow-up. The organizers have agreed to continue the conference and are already planning to hold the 2012 conference in Amherst. Expansion of the conference to other locations will occur in 2013 when it will be held on the west coast.



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*Attendees of the first annual National Conference on Engineering & Ecohydrology for Fish Passage in Amherst, Massachusetts.*

## The American Fisheries Society Fish Passage Symposium

The USFWS used the National Fish Passage Program to take advantage of the American Fisheries Society annual meeting during September 2011 in Seattle, Washington to bring added focus to solutions regarding fish passage. The USFWS used the NFPP to sponsor and moderate a full day symposium that was among the most well attended at the conference. Sponsoring such symposia at the biggest and most prominent fisheries-related conferences in the world exposes students, academics and fisheries professionals to the science, engineering, and technical aspects of reconnecting aquatic systems, allowing for much needed information exchange.

## The New Ecohydrology Program at the UMASS Amherst Celebrates its First Graduating Class

The partnership between the University of Massachusetts at Amherst and the U.S. Fish and Wildlife Service has begun to pay dividends with the first graduate Bryan Sojkowski beginning his career in 2011. Bryan was hired by the USFWS Region 5 office where he will join the ranks of their current fish passage engineers and continue to develop his expertise while contributing to the vital mission of reconnecting rivers and streams.



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# National Fish Passage Program

*Where are we going?*

## Increasing Awareness – Getting Our Story Out

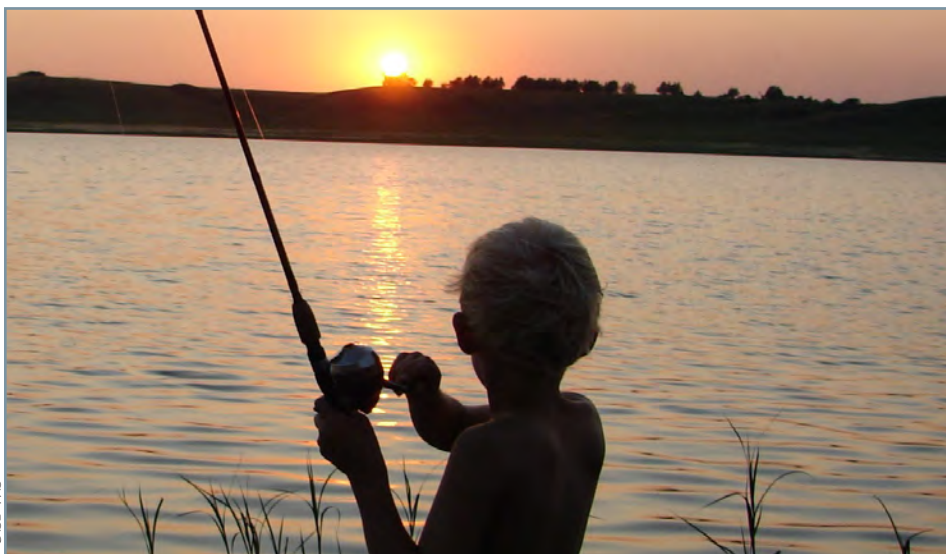
- Expand the use of social media to include Facebook and Twitter
- Enhance support and collaboration through strategic briefings with key staff in and out of the Service (all year)
- Regional program coordinators to brief Congressional representatives in D.C. (March)
- Field staff to brief Congressional representatives in District Offices and conduct field site visits (all year)
- Participate in Fish Passage 2012 in Amherst, Massachusetts (June)
- Provide national recognition to key partners and Service staff involved in the program (July)
- Demonstrate social relevance of the program by linking resource outcomes with socioeconomic benefits

## Enhancing Professional and Technical Capacity

- Support development of Service fish passage expertise through academic partnership
- Develop a training plan to expand in-house technical capacity for aquatic habitat restoration using the workforce stream restoration and fish passage training needs assessment
- Add additional modeling and mapping components to the Fish Passage Decision Support System to enhance user-value for the system
- Launch a mobile application for iPhone and Android users throughout the southwest to increase data availability post-inventory and assessment; ideally, geographic expansion of this app will follow after initial implementation
- Promote the cost-benefit and human health and safety advantages of implementing improved fish passage standards for culvert projects throughout the States

## Increasing Program Resources and Outcomes

- The American Recovery and Reinvestment Act of 2009 (ARRA) demonstrated that the Fisheries-National Fish Passage Program could effectively utilize double its annual funding, so it is the Program goal to double its resources by 2016 which will involve working with partners to better leverage existing funds
- Fisheries personnel have identified more than 750 shovel-ready fish passage projects which have a combined funding need of \$61M
- Encourage regional hires of engineers in place of other positions to double the Program outputs by 2016
- Increase collaboration, efficiency, and effectiveness with key partners by working together to assess and address factors that limit or hinder cooperation
- Continue collaboration with Landscape Conservation Cooperatives and other Service programs to maximize fish passage resources and resource benefits
- Explore creation of cross-program and cross-agency “strike teams” to facilitate rapid emergency and recovery response after natural disasters
- Develop a long-term approach to aquatic disasters by working with FEMA and others to build disaster-resistant communities
- Removal and bypass of the Great Works Dam on the Penobscot River is slated for summer 2012 and two more dams are slated for removal which will open more than 1000 river miles



## Regional Coordinators

**Dan Shively**  
Fish Passage and Habitat Partnerships Coordinator  
Region 1  
Portland, OR  
contact: dan\_shively@fws.gov

**Quincy Pence**  
Program Analyst  
Region 2  
Austin, TX  
contact: quincy\_pence@fws.gov

**Brian Elkington**  
Deputy Program Supervisor  
Region 3  
Minneapolis, MN  
contact: brian\_elkington@fws.gov

**Walter "Tripp" Boltin**  
Fish Biologist  
Region 4  
Atlanta, GA  
contact: walter\_boltin@fws.gov

**Janice Rowan**  
Senior Fish Biologist  
Region 5  
Hadley, MA  
contact: jan\_rowan@fws.gov

**Scott Roth**  
Fish and Wildlife Biologist  
Region 6  
Denver, CO  
contact: scott\_roth@fws.gov

**John DeLapp**  
Conservation Partnerships Coordinator  
Region 7  
Anchorage, AK  
contact: john\_delapp@fws.gov

**Donald Ratcliff**  
Fishery Biologist, Habitat Restoration Coordinator  
Region 8  
Stockton, CA  
contact: donald\_ratcliff@fws.gov

## Washington Office Support

**Susan Wells**  
National Fish Passage Program Coordinator  
Region 9  
Arlington, VA  
contact: susan\_wells@fws.gov

**Jose Barrios**  
Fish Passage Decision Support System Coordinator  
Region 9  
Arlington, VA  
contact: jose\_barrios@fws.gov

## Fish Passage Engineers

**Curt Orvis**  
Regional Fish Passage & Water Resources Team Leader  
Region 5  
Hadley, MA  
contact: curtis\_orvis@fws.gov

**Brian Waz**  
Hydraulic Engineer  
Region 5  
Hadley, MA  
contact: brian\_waz@fws.gov

**Brett Towler**  
Regional Fish Passage Engineer  
Region 5  
Hadley, MA  
contact: brett\_towler@fws.gov

**Bryan Sojkowski**  
Fish Passage Engineer  
Region 5  
Hadley, MA  
contact: bryan\_sojkowski@fws.gov

**Wayne Stancill**  
Hydraulic Engineer - Fish Passage  
Region 6  
Pierre, SD  
contact: wayne\_stancill@fws.gov

**Bill Rice**  
Hydrologist  
Region 7  
Anchorage, AK  
contact: william\_rice@fws.gov



Corinne Smith, The Nature Conservancy

*USFWS Fish Passage Engineer working on a culvert project on the Little Su River in Alaska.*

**National Fish Passage Program  
U.S. Fish and Wildlife Service  
4401 N. Fairfax Drive  
Room 760E  
Arlington, VA 22203  
703/358 2523 office  
703/358 2044 fax  
susan\_wells@fws.gov**

