# 2013 Report to Congress

Pacific Coastal Salmon Recovery Fund
FY 2000–2012

## NATIONAL MARINE FISHERIES SERVICE

*Science, Service, Stewardship*

NOAA

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

# The Economic Benefits of Salmon Restoration

Salmon restoration not only benefits fish populations and their habitat, but also local communities. While the benefits are largely local, they also are felt in surrounding communities and counties (especially ecosystem benefits). Between 2001 and 2010, an estimated 6,400 jobs and more than $977 million were generated in Oregon due to habitat restoration projects.[1] Recent analyses suggest that on average 17 new "green" jobs[2] and $1.86 million[3] in additional economic activity result for each $1 million investment of PCSRF and state-matching funds. PCSRF state and tribal grantees contract with local watershed groups, conservation agencies, land trusts, and other entities to manage habitat restoration projects. In turn, those agencies contract with local businesses and suppliers to carry out the work. These partners often bring their own dollars to the table. This cost-sharing increases the economic benefits and helps the federal investment go much further. This restoration work also has longer-term economic benefits, including future job creation in rebuilt fisheries and coastal tourism, higher property values in coastal communities, and better water quality.[2] The jobs and economic benefits of salmon restoration activities are largely realized in the local and rural communities most in need of them. Approximately 80% of habitat restoration investments are spent locally in the county in which the project sponsor is located, and over 90% is spent within the state, supporting local jobs and local economies, often in rural and economically distressed communities.[4]

**Economic Effects per $1 Million Invested in Forest and Watershed Projects[5]**

| Project Type | Definition | Jobs/$1M | Economic Output/$1M |
|---|---|---|---|
| In-stream | Enhancing stream habitat and function | 14.7 | $2,203,851 |
| Riparian | Enhancing and restoring native riparian vegetation | 23.1 | $2,310,128 |
| Wetland | Restoring wetland and estuarine habitat | 17.6 | $2,259,422 |
| Fish Passage | Removing barriers to fish passage (culverts and dams), screening to protect fish from water withdrawals | 15.2 | $2,240,281 |
| Upland | Managing agricultural water, juniper, and noxious weeds | 15.0 | $2,476,290 |
| Others | Undertaking multiple activities in one comprehensive restoration project | 14.7 | $2,270,862 |
| **Average** | | **16.3** | **$2,311,468** |

## PCSRF Timeline

**1989**
Sacramento River winter-run Chinook are listed as threatened by National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA).

**1991**
Snake River sockeye are listed as endangered.

**1992**
Snake River spring/summer-run Chinook and Snake River fall-run Chinook are listed as threatened under ESA.

**1994**
Sacramento River winter-run Chinook are listed as endangered under ESA.

NMFS begins a complete review of the ESA status for salmon and steelhead along the West Coast.

**1996**
Central California Coast coho are listed as threatened.

**1997**
Upper Columbia River steelhead are listed as endangered. Snake River steelhead, S. Oregon/N. California Coasts coho, Central California Coast steelhead, and South-Central California Coast steelhead are listed as threatened.

**1998**
Southern California steelhead are listed as endangered. Lower Columbia River steelhead, Oregon Coast coho, and Central Valley steelhead are listed as threatened.

**1999**
Upper Columbia River spring-run Chinook are listed as endangered. Hood Canal summer-run chum, Ozette Lake sockeye, Puget Sound Chinook, Lower Columbia River Chinook, Columbia River chum, Upper Willamette River Chinook, Upper Willamette River steelhead, Middle Columbia River steelhead, California Coastal Chinook, and Central Valley spring-run Chinook are listed as threatened.

Pacific Salmon Treaty Agreement is signed by the U.S. and Canada.

**2000**
Northern California steelhead are listed as threatened.

PCSRF is funded by Congress, dedicating funds to WA, OR, CA, and AK and regional tribes* to protect declining salmon populations.

# 2013 Report to Congress

## Pacific Coastal Salmon Recovery Fund
## FY 2000–2012

**2002**
Species' range for endangered Southern California Coast steelhead is extended to the Mexico border.

**2004**
Idaho is added as a PCSRF recipient recognizing upstream spawning habitat as critical to Pacific salmon and steelhead survival.

**2005**
PCSRF Performance Framework of goals and measures is developed and implemented.

Central California Coast coho are reclassified as endangered. Lower Columbia River coho are listed as threatened.

**2006**
Upper Columbia River steelhead are upgraded to threatened status.

**2007**
Puget Sound steelhead are listed as threatened.

NMFS implements a competitive selection process to allocate PCSRF funds among grantees to improve the likelihood that funded projects address limiting factors.

**2009**
Nevada is added as a PCSRF recipient, recognizing the historic geographic extent of anadromous fish in the Columbia Basin.

**2010**
PCSRF implements a second phase of performance metric reporting to more comprehensively track project implementation data to support scientific analyses and adaptive management.

**2012**
Congress adds Alaska Tribes to the pool of applicants eligible for PCSRF funding.

* Pacific Coastal Tribes include the Northwest Indian Fisheries Commission (NWIFC) on behalf of twenty western Washington treaty tribes (Hoh Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Lummi Nation, Makah Nation, Muckleshoot Tribe, Nisqually Indian Tribe, Nooksack Tribe, Port Gamble S'Klallam Tribe, Puyallup Tribe of Indians, Quileute Indian Tribe, Quinault Indian Nation, Sauk-Suiattle Tribe, Skokomish Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Tribe, Swinomish Tribe, Tulalip Tribes, and Upper Skagit Tribes); the Klamath River Inter-Tribal Fish & Water Commission (KRITFWC) on behalf of four Klamath Basin tribes (Hoopa Valley Indian Tribe (CA), Karuk Tribe (CA), Klamath Tribes (OR), and Yurok Tribe (CA)); and tribes not associated with a tribal commission (Round Valley Indian Tribes (CA), the Chehalis Tribe (WA), Coquille Indian Tribe (OR), the Confederated Tribes of the Grand Ronde (OR), and the Confederated Tribes of Siletz Indians (OR)). Begining in 2012, Congress expanded the definition of Pacific Coastal Tribes to include approximately 229 federally recognized tribes in Alaska.

Columbia River Tribes include the Columbia River Inter-Tribal Fish Commission (CRITFC) on behalf of four tribes (Nez Perce Tribe (ID), Confederated Tribes of the Umatilla Indian Reservation (OR), Confederated Tribes of the Warm Springs Reservation (OR), and the Confederated Tribes and Bands of the Yakama Nation (WA)); and tribes not affiliated with a tribal commission (Confederated Tribes of the Colville Reservation (WA), and the Shoshone-Bannock Tribes (ID), Shoshone Paiute Tribes of the Duck Valley Indian Reservation (NV)).

# Overview

Human activities have placed intense pressure on salmon populations for decades. Salmonids[6] are complex species, with diverse habitat requirements at various life stages, including small streams, main-stem rivers, coastal estuaries, wetlands, and the Pacific Ocean. They are adaptable species, but more than one hundred years of human land- and water-uses, harvest, and hatchery practices have decreased their populations and increased their vulnerability to extinction. Populations have declined to levels necessitating active intervention and protection as threatened or endangered species under the federal Endangered Species Act (ESA).

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in fiscal year (FY) 2000 to address the general decline of populations coast-wide as well as the recovery needs of the listed species. The goal of PCSRF is to restore, conserve, and protect Pacific salmon and steelhead habitats and populations. PCSRF also seeks to maintain the healthy populations necessary for exercising tribal treaty fishing rights and native subsistence fishing. Under PCSRF, the National Marine Fisheries Service (NMFS) provides competitive funding to states (California, Oregon, Washington, Alaska, and Idaho) and tribes of the Pacific Coast region to implement habitat restoration and recovery projects that contribute to the sustainability of the species.

This 2013 Report to Congress documents the activities and progress under PCSRF over the last thirteen years, highlighting example activities of the states and tribes, summarizing results, and displaying the geographic extent of projects. Limiting factors affecting salmon and steelhead populations throughout the Pacific Coast and interior river basins are also described.

PCSRF provides a critical source of stable funding that supports the ability of managers to conduct all phases of restoration and recovery activities including assessment, planning, implementation, and monitoring. NMFS' total PCSRF awards have averaged $79 million annually for the last 13 years (Exhibit 1).

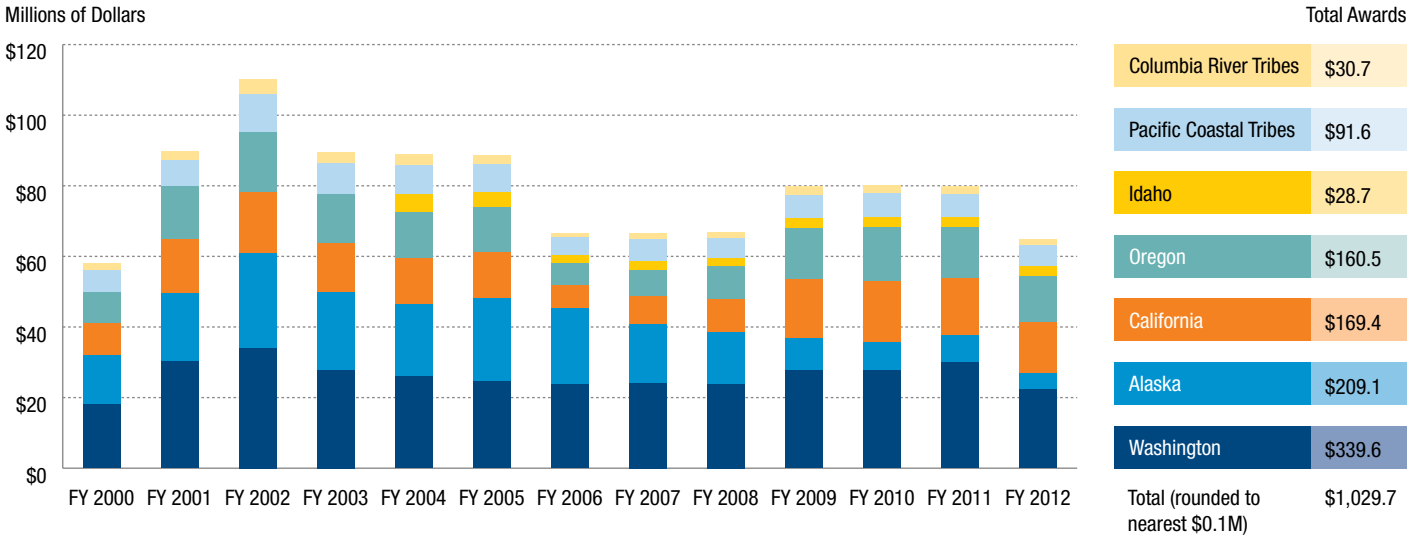
## THE ROLE OF SALMON

**Pacific salmon and steelhead are not only critical components of healthy Pacific Coast ecosystems, but for generations have supported the culture of local communities and tribal populations. Centuries of healthy salmon runs sustained native peoples, nurtured the economies of coastal and inland towns, and were an essential part of practices and traditions linking people and their natural landscapes. While few people have actual memories of year-round salmon fishing, 100 pound behemoths, and local streams choked with thousands of fish returning to spawn, the culture and economy of much of the Pacific Coast was built on this valuable natural heritage.**

With this funding states and tribes have undertaken nearly 11,000 projects, restoring and improving habitat conditions and availability, as well as establishing concrete planning and monitoring programs that support prioritization and tracking for salmon and steelhead population conservation. Exhibit 2 depicts funding allocations relative to needs in each state. Significant accomplishments from 2000 to date include:

- Over 990,000 acres of habitat improved or added for salmonid use.
- Over 7,500 miles of stream made accessible to spawning populations.
- Marking programs tagged over 303,000,000 fish, improving stock identification and supporting more effective fishery management practices.

**Exhibit 1: NMFS' PCSRF Awards to States and Tribes (in Millions)**



## PCSRF Competitive Grants Process

PCSRF conducts an annual grants competition, announced through a Federal Funding Opportunity (FFO) published on www.grants.gov. The FFO defines NMFS' PCSRF-program priorities and details the evaluation criteria that will be used to score and rank proposals. Proposals are reviewed and scored by independent, expert technical reviewers based on the overall qualifications of applicants, costs, and the relevance and scientific/technical merit of the proposed activities. The reviewers' scores, comments, and the rank order of the proposals are provided to a panel of federal employees representing the Pacific Coast regions who then recommend funding levels to the NOAA Assistant Administrator for NMFS (AA). The AA serves as the Selecting Official, making final decisions on award recipients and amounts, balancing priorities, geography, institutions, partners, research priorities, and types of projects. NMFS' rank order PCSRF priorities are projects that:

- Address factors limiting the productivity of ESA-listed Pacific anadromous salmonids as specified in approved, interim, or proposed Recovery Plans.
- Address factors limiting the productivity of anadromous salmonid populations that are necessary for the exercise of tribal treaty fishing rights or native subsistence fishing, as well as projects that support ongoing efforts to restore or maintain such populations while limiting factors are being addressed.
- Implement effectiveness monitoring of habitat restoration actions at the watershed or larger scales for ESA-listed anadromous salmonids, monitoring projects that directly contribute to population viability assessments for ESA-listed anadromous salmonids, or monitoring necessary for the exercise of tribal treaty fishing rights or native subsistence fishing on anadromous salmonids.
- Demonstrate consistency with the Congressional authorization in the need for PCSRF funding, including projects that are necessary precursors to implementing activities under the above priorities, such as outreach, planning and coordination, assessment, design, research, and monitoring.

**Exhibit 2: PCSRF Awards (FY 2000–FY 2012) Reflect the Range of Listed Salmonids and Critical Habitat Designations**

| | CA | OR | WA | ID | AK |
|---|---|---|---|---|---|
| % of Total Critical Habitat Stream Miles* in the Region | 23% | 35% | 28% | 14% | 0% |
| % of ESA-listed Salmonid Populations** in the Region | 22% | 33% | 37% | 9% | 0% |
| % of Total PCSRF Funds*** Allocated within Range of ESA-listed Salmonids | 22.5% | 21.7% | 51.3% | 4.5% | n/a |
| % of All PCSRF Funds*** (program-wide) | 17.9% | 17.3% | 40.9% | 3.5% | 20.3% |

* Main stem rivers that denote state boundaries are included in each state to calculate total percentage (double-counted)

** Listed species covering multiple states are included in species total for each state

*** Includes both state and tribal grantee funds

# Salmon Populations and Limiting Factors

Pacific salmon and steelhead[7] are anadromous fish, meaning they require both fresh and marine environments during their life cycles. They migrate up rivers from the ocean to spawn in freshwater. Many salmonid populations are listed as threatened and endangered. The migratory ranges for many populations overlap, meaning that different species make use of some of the same freshwater habitat for rearing and spawning.

Salmon recovery activities on the Pacific Coast are organized by recovery domains (Exhibit 3). Domains represent geographically-based areas within which multi-species recovery plans for anadromous salmonids have been and are being developed in Washington, Oregon, California, and Idaho. The land area affected by ESA listings of salmon and steelhead on the Pacific Coast is vast, spanning approximately 176,000 square miles in the four states (61% of Washington land area, 55% of Oregon, 32% of California, and 26% of Idaho).[8]

The ESA allows listing of "distinct population segments" (DPS) of vertebrates. NMFS developed a policy that establishes a group of salmon populations to be a DPS if it is an "evolutionarily significant unit" (ESU). Scientists consider a population or group of populations to be an ESU if: 1) they exhibit substantial reproductive isolation from other such population groups; and 2) they are an important component of the evolutionary legacy of the species as a whole.[9] Salmon are described in ESUs and steelhead in DPSs. There are 37 ESUs and 15 DPSs on the Pacific Coast. Of these, 17 ESUs and 11 DPSs are listed as threatened or endangered (Exhibits 3 and 4).

Recovery plans for each domain address all salmon and steelhead populations within the geographic area. These plans have involved extensive stakeholder input to identify the specific factors limiting the recovery and sustainability of salmon populations for each DPS and ESU (Exhibit 4). PCSRF investments are addressing these factors because they represent many of the challenges to recovery. ESUs and DPSs are comprised of individual populations which are monitored within specific reaches of watersheds. Based on counts of these populations,[10] the stability of individual populations is assessed, as is the aggregate health of the populations at the ESU/DPS level. Sixteen ESUs and DPSs with ten or more years of abundance data are assessed as "stable." Data to determine trends are not available for 12 other ESUs and DPSs.

## Exhibit 3: Recovery Domains


**Puget Sound**
1–Ozette Lake Sockeye ESU (T)
2–Hood Canal Summer-run Chum ESU (T)
3–Puget Sound Steelhead DPS (T)
4–Puget Sound Chinook ESU (T)

**Willamette/Lower Columbia**
5–Columbia River Chum ESU (T)
6–Lower Columbia River Chinook ESU (T)
7–Upper Willamette River Chinook ESU (T)
8–Lower Columbia River Steelhead DPS (T)
9–Lower Columbia River Coho ESU (T)
10–Upper Willamette River Steelhead DPS (T)

**Oregon Coast**
11–Oregon Coast Coho ESU (T)

**Interior Columbia**
12–Snake River Sockeye ESU (E)
13–Upper Columbia River Spring-run Chinook ESU (E)
14–Snake River Fall-run Chinook ESU (T)
15–Snake River Spring/Summer-run Chinook ESU (T)
16–Upper Columbia River Steelhead DPS (T)
17–Middle Columbia River Steelhead DPS (T)
18–Snake River Basin Steelhead DPS (T)

**Southern Oregon/Northern California Coast**
19–S. Oregon/N. California Coast Coho ESU (T)

**Central Valley**
20–Sacramento River Winter-run Chinook ESU (E)
21–California Central Valley Spring-run Chinook ESU (T)
22–California Central Valley Steelhead DPS (T)

**North-Central California Coast**
23–California Coastal Chinook ESU (T)
24–Northern California Steelhead DPS (T)
25–Central California Coast Coho ESU (E)
26–Central California Coast Steelhead DPS (T)

**South-Central/Southern California Coast**
27–S. Central California Coast Steelhead DPS (T)
28–Southern California Steelhead DPS (E)

*Recovery domain coloring matches domain coloring in Exhibit 4.*

**Exhibit 4: Limiting Factors of ESUs and DPSs**

| Geographic Area | Recovery Domain | ESU/DPS Number | ESU/DPS Name | Trend* | Limiting Factors: Estuarine and nearshore marine | Flood plain connectivity and function | Channel structure and complexity | Riparian areas and large woody debris recruitment | Stream substrate | Stream flow | Water quality | Fish passage | Hatchery-related adverse effects | Harvest-related adverse effects | Predation/competition/disease (Non-native species) | Mainstem Columbia River hydropower adverse effects |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northern Pacific Coast | Puget Sound | 1 | Ozette Lake Sockeye ESU (T) | Stable | | ● | ● | ● | ● | | | | | | ● | |
| | | 2 | Hood Canal Summer-run Chum ESU (T) | Stable | ● | ● | ● | ● | ● | ● | | | | | | |
| | | 3 | Puget Sound Steelhead DPS (T)** | Stable | | | | | | | | | | | | |
| | | 4 | Puget Sound Chinook ESU (T) | Stable | ● | ● | ● | ● | ● | | ● | | ● | | | |
| | Willamette/ Lower Columbia | 5 | Columbia River Chum ESU (T) | Unknown*** | ● | ● | ● | ● | ● | ● | | ● | | | | |
| | | 6 | Lower Columbia River Chinook ESU (T) | Stable | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | |
| | | 7 | Upper Willamette River Chinook ESU (T) | Stable | | ● | ● | ● | | | ● | ● | ● | | | |
| | | 8 | Lower Columbia River Steelhead DPS (T) | Stable | | ● | ● | ● | ● | ● | ● | ● | | | ● | |
| | | 9 | Lower Columbia River Coho ESU (T) | Stable | | ● | ● | ● | ● | ● | ● | | ● | ● | | |
| | | 10 | Upper Willamette River Steelhead DPS (T) | Stable | | ● | ● | ● | | ● | | ● | | | | |
| | OR Coast | 11 | Oregon Coast Coho ESU (T) | Stable | | ● | ● | ● | ● | | ● | | | | ● | |
| Interior Columbia Basin | Interior Columbia | 12 | Snake River Sockeye ESU (E) | Unknown*** | | | | | | | | | | | | ● |
| | | 13 | Upper Columbia River Spring-run Chinook ESU (E) | Stable | ● | ● | ● | ● | ● | ● | | | ● | | | ● |
| | | 14 | Snake River Fall-run Chinook ESU (T) | Stable | | ● | ● | | | | | | ● | ● | | ● |
| | | 15 | Snake River Spring/Summer-run Chinook ESU (T) | Stable | | ● | ● | ● | ● | ● | ● | | ● | | | ● |
| | | 16 | Upper Columbia River Steelhead DPS (T) | Stable | | ● | ● | | ● | ● | | ● | ● | | ● | ● |
| | | 17 | Middle Columbia River Steelhead DPS (T) | Stable | | ● | | ● | ● | ● | ● | ● | | | ● | ● |
| | | 18 | Snake River Basin Steelhead DPS (T) | Stable | | ● | ● | | ● | ● | ● | ● | ● | | ● | ● |
| California and Southern Oregon | S. OR/N. CA Coast | 19 | S. Oregon/N. California Coast Coho ESU (T) | Unknown*** | ● | ● | ● | ● | | ● | ● | ● | | | | |
| | Central Valley | 20 | Sacramento River Winter-run Chinook ESU (E) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| | | 21 | California Central Valley Spring-run Chinook ESU (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| | | 22 | California Central Valley Steelhead DPS (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | |
| | N. Central California Coast | 23 | California Coastal Chinook ESU (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | | | | | |
| | | 24 | Northern California Steelhead DPS (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | | | | ● | |
| | | 25 | Central California Coast Coho ESU (E) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | | | | ● | |
| | | 26 | Central California Coast Steelhead DPS (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | |
| | S. Central/S. CA Coast | 27 | S. Central California Coast Steelhead DPS (T) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| | | 28 | Southern California Steelhead DPS (E) | Unknown*** | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | |

(T) = Threatened / (E) = Endangered

* Trends in abundance may not be indicative of true recovery status. Other ESU risk factors such as low levels of abundance, lack of access to historical spawning habitats, extirpation of component populations, and the lack of spatial connectivity among extant component populations are significant factors in determining recovery status. See http://www.nmfs.noaa.gov/pr/listing/reviews.htm for detailed information on species status.

** Recovery planning for the Puget Sound steelhead DPS is underway; limiting factors for this DPS have not yet been identified.

*** "Unknown" means that data representative of the whole ESU/DPS are either not available or, if available, are of insufficient duration to assess trends (i.e., ten or more years of data are not available or most recent data is more than 3 years old).

## NOAA's Habitat Blueprint[11]

Protecting the earth's natural infrastructure is vital to protecting communities and their economies as well as fisheries and recreational opportunities along the nation's coasts. With continued widespread loss and deterioration of coastal and marine habitats, this infrastructure is in danger. NOAA has developed the NOAA Habitat Blueprint to help identify priority activities and partnerships to conserve, protect, and restore habitat. PCSRF is an integral component of NOAA's Habitat Blueprint. In close coordination with other programs, such as NOAA's Restoration Center, PCSRF is helping protect and restore healthy habitats, communities, and economies. The Blueprint's Guiding Principles reinforce PCSRF's activities including:

- Prioritize resources and activities across NOAA to monitor, understand, and improve habitat conditions.
- Implement innovative place-based habitat solutions to address coastal and marine resource challenges.
- Make natural resource management decisions and recommendations in an ecosystem context that considers competing priorities.
- Foster and leverage partnerships.
- Integrate and improve the delivery of habitat science across disciplines to facilitate conservation actions.
- Anticipate and address changes to coastal and ocean habitats due to environmental change; including development, climate, and other pressures.

# Tracking Funding and Measuring Progress

Since inception in FY 2000, the PCSRF program has evolved to better meet the conservation needs of Pacific salmon, including changes in the types of projects funded, the approach to allocating funding, and how progress is measured. NMFS, states, tribes, and local project managers have developed an integrated approach to track progress, measure performance, and ensure accountability of PCSRF funds. Performance metrics designed to provide consistent indicators of the activities being implemented and their accomplishments are described in the *Pacific Coastal Salmon Recovery Fund Performance, Goals, Measures, and Report Framework* (referred to as the Reporting Framework).[12] This Framework is examined periodically and updated to reflect improvements in monitoring approaches, trends in habitat conditions, and changes in limiting factors that change as projects are completed. The indicators of performance that are currently measured by the program focus on specific investments made within PCSRF for salmonid restoration and conservation. The metrics for the short-, mid-, and long-term goals shown below address the major habitat limiting factors identified across the Pacific Coast region.

### Short-term Outcomes

- Enhanced availability and quality of salmonid habitat
- Improved management practices
- Major habitat limiting factors addressed

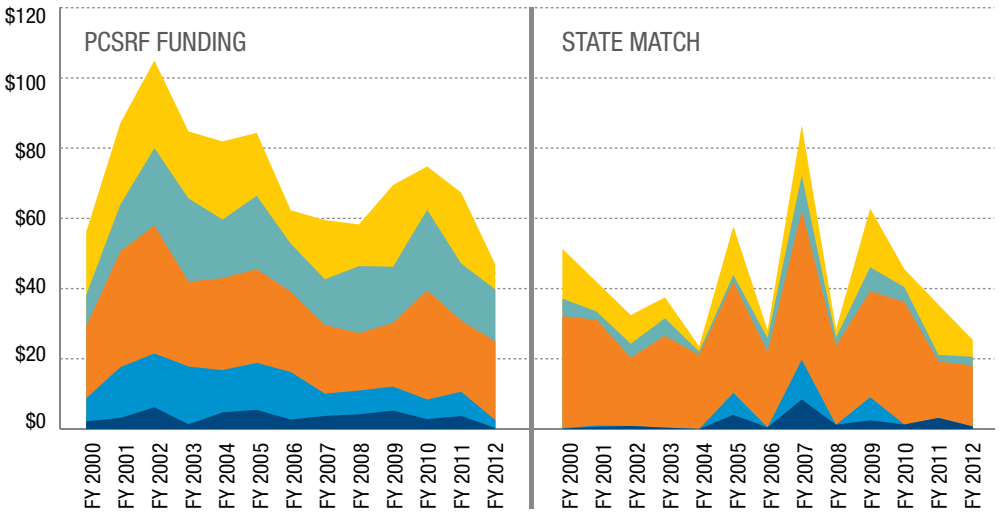
### Mid-term Outcomes

- Improved status of ESA-listed salmonids (naturally spawning populations increased)
- Maintained healthy salmon populations

### Long-term Outcome

- Overall sustainability of Pacific salmon

**Exhibit 5: Funding Allocations by Project Type**




| | PCSRF Funding | State Match |
|---|---|---|
| Watershed and Sub-basin Planning and Assessment | $227.31 | $132.78 |
| Salmon Research, Monitoring, and Evaluation | $225.46 | $46.07 |
| Salmon Habitat Protection and Restoration | $330.27 | $340.31 |
| Salmon Enhancement | $123.16 | $1.14 |
| Public Outreach and Education | $46.57 | $19.02 |
| Total (Millions): | $952.77* | $539.32 |

* The sum of total funding allocated across project types does not equal the total of PCSRF awards presented in Exhibit 1. Not all awarded funds have been allocated to projects for the more recent Fiscal Years.

The projects funded by PCSRF address concerns biologists have identified as crucial to advancing salmonid recovery and sustaining healthy populations and habitats. Instream habitat restoration projects improve the quality and quantity of salmon habitat in main stem rivers, tributaries, wetlands, and coastal estuaries, addressing water quality, water quantity, and habitat complexity for a variety of aquatic species. Upland restoration projects can reduce erosion and enhance streambed conditions necessary for successful spawning and egg survival. Coastal and estuarine projects improve availability of feeding and rearing habitat for juvenile fish as they transition from freshwater to the open ocean. Projects that remove man-made barriers to fish passage, such as culvert removal and bridge replacement, can open up hundreds of miles of pristine habitat to migrating fish. Each project is a step towards protecting or recovering salmonid populations and the habitats that support them. PCSRF and state-matching funds allocated by broad project category are shown in Exhibit 5.

All recipients of PCSRF funds are required to report on a standard list of metrics. The sum of these metrics for all projects can be described in a series of "roll-up" measures that aggregate the accomplishments of many activities funded with PCSRF and state matching funds (Exhibit 6). The following pages depict the geographic extent of projects across recovery domains and highlight specific examples of activities supported by PCSRF grantees. Metrics are summarized by each geographic area.

**Exhibit 6: Summary of PCSRF Program-wide Performance Measures, FY 2000–2012**

| Output | Regional Indicator | FY 2011 | FY 2012 | FY 2000–2012 |
|---|---|---|---|---|
| Instream Habitat Projects | Stream Miles Treated | 119 | 127 | 1,676 |
| Wetland Habitat Projects | Acres Created | 0 | 3 | 2,098 |
| | Acres Treated | 929 | 31 | 28,675 |
| Estuarine Habitat Projects | Acres Created | 933 | 52 | 2,302 |
| | Acres Treated | 960 | 403 | 4,428 |
| Land Acquisition Projects | Acres Acquired or Protected | 14,439 | 4,145 | 246,831 |
| | Stream Bank Miles Acquired or Protected | 742 | 54 | 4,052 |
| Riparian Habitat Projects | Stream Miles Treated | 973 | 522 | 7,797 |
| | Acres Treated | 16,607 | 5,134 | 90,720 |
| Upland Habitat Projects | Acres Treated | 24,998 | 22,197 | 589,852 |
| Fish Passage Projects | Number of Barriers Removed | 227 | 245 | 2,675 |
| | Stream Miles Opened | 373 | 1,088 | 7,523 |
| | Number of Fish Screens Installed | 432 | 176 | 1,892 |
| Hatchery Fish Enhancement Projects | Number of Fish Marked for Management Strategies | 33,232,238 | 31,306,260 | 303,182,273 |
| Watershed Planning and Assessment Projects | Number of ESUs and DPSs with Factors Limiting Recovery Identified | 1 | n/a | 28 of 28 |
| Research, Monitoring and Evaluation Projects | Miles of Stream Monitored | 86,319 | 5,716 | 351,216 |
| | Number of Assessments Completed | 17 | 13 | 576 |

## Intensively Monitored Watersheds

The complex requirements of salmon for both marine and freshwater environments add to the challenge of fully understanding their habitat needs and population dynamics. Even after many years of restoration and monitoring work, scientists still face knowledge gaps about the interactions of the fish with their habitat, especially when it comes to understanding how restoration treatments change habitat processes and thereby improve salmon survival and productivity. For example, it is difficult to predict the increase in salmon abundance and productivity that will result from multiple habitat actions in a watershed, and to detect these improvements in the face of considerable variability in marine survival. How fish use habitat as they mature or even as seasons change is not well understood. The need to understand the complex relationships that control salmon responses to habitat conditions led NOAA, in partnership with various other federal agencies, states, tribes, and local recovery groups, to establish "Intensively Monitored Watersheds" (IMWs) to comprehensively monitor fish-habitat relationships and experimentally evaluate the benefits of watershed-scale habitat restoration efforts to fish populations. IMWs are helping to:

- Assess how specific habitat improvements that boost fish density or survival in individual rivers and streams combine to improve conditions across entire watersheds and increase population-level abundance and productivity.
- Empirically verify the specific habitat features and processes that are limiting salmon populations to best focus restoration funds in those rivers and streams on the project types that will produce maximum benefits.
- Reveal how salmon respond to different types of habitat improvements to help managers select the most cost-effective restoration strategies.

Over 20 IMWs are strategically located across Oregon, Washington, and Idaho and are beginning to show results. A few preliminary findings indicate that:

- Following the reintroduction of beavers to Oregon's Bridge Creek, juvenile steelhead survival improved and fish numbers increased. Beaver dams helped increase the depth, frequency, and percentage of pools that provide important fish habitat.
- In Washington's Skagit River Delta the density of young Chinook salmon increased following restoration, helping refine plans for further habitat improvements.
- In Washington's Wenatchee River factors including water velocity, gradient, and gravel size are especially important habitat qualities for juvenile Chinook salmon. The information could help focus restoration efforts on habitat attributes that are most important to fish.

Confirming this research takes time and a rigorous commitment to ongoing monitoring, but the outcome will be improved decision-making to the benefit of West Coast salmon and their habitat.

# Geographic Area: California and Southern Oregon

The California and Southern Oregon geographic area includes four recovery domains: the Southern Oregon/Northern California Coast, North-Central California Coast, South-Central/Southern California Coast, and the California Central Valley. These recovery domains encompass large tracts of suburban, forest, and agricultural lands, as well as several major population centers. There are seven listings of threatened salmonids (four salmon ESUs and three steelhead DPSs) and three endangered listings (two salmon ESUs and one steelhead DPS). Issues in the area include habitat degradation, low water quality, limited water availability, and barriers to fish passage. Exhibit 7 summarizes metrics for projects within these four domains.

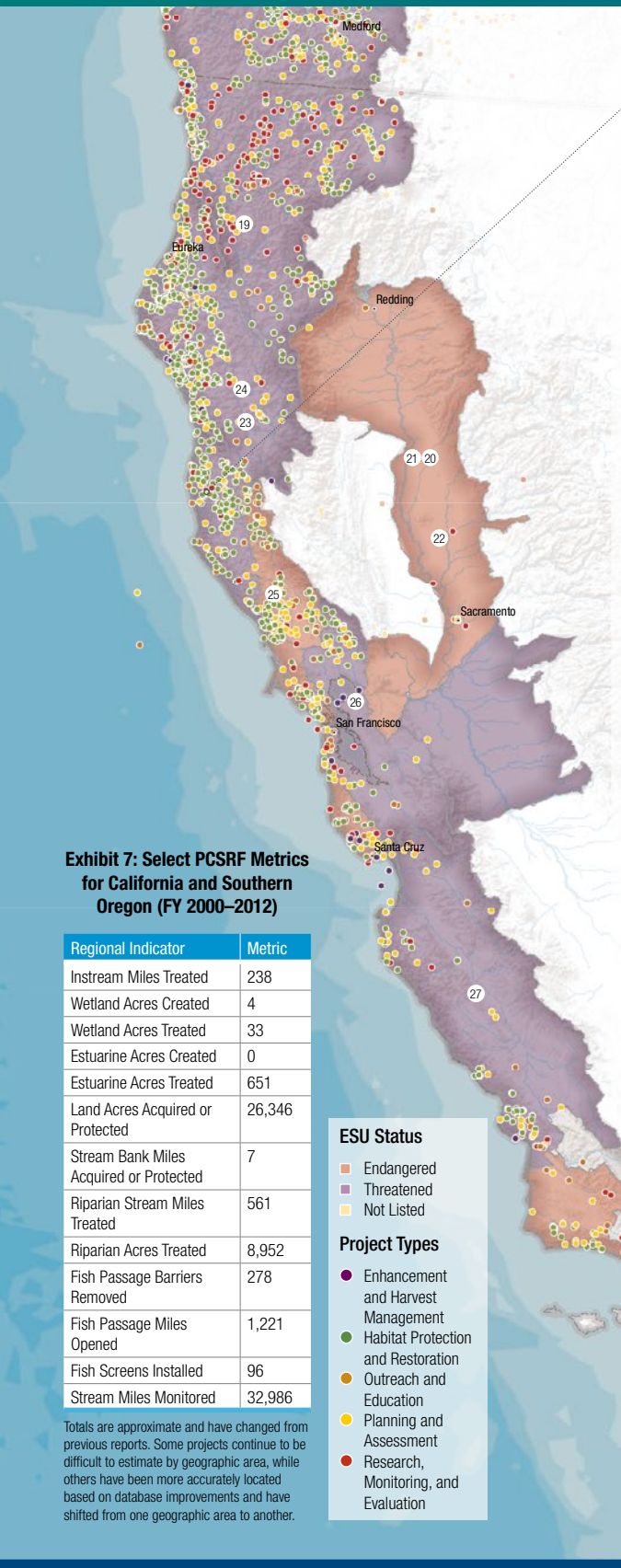



**Exhibit 7: Select PCSRF Metrics for California and Southern Oregon (FY 2000–2012)**

| Regional Indicator | Metric |
|---|---|
| Instream Miles Treated | 238 |
| Wetland Acres Created | 4 |
| Wetland Acres Treated | 33 |
| Estuarine Acres Created | 0 |
| Estuarine Acres Treated | 651 |
| Land Acres Acquired or Protected | 26,346 |
| Stream Bank Miles Acquired or Protected | 7 |
| Riparian Stream Miles Treated | 561 |
| Riparian Acres Treated | 8,952 |
| Fish Passage Barriers Removed | 278 |
| Fish Passage Miles Opened | 1,221 |
| Fish Screens Installed | 96 |
| Stream Miles Monitored | 32,986 |

Totals are approximate and have changed from previous reports. Some projects continue to be difficult to estimate by geographic area, while others have been more accurately located based on database improvements and have shifted from one geographic area to another.

## Glenbrook Gulch Anadromous Fish Habitat Restoration Project

**The California Department of Fish and Wildlife opened up several thousand feet of salmonid habitat through dam removal at a total cost of $450,000. After just three years, spawning and rearing has been observed in the re-opened habitat. The PCSRF contribution was $100,628 for this project targeting Habitat Protection and Conservation (California, Mendocino County, Albion River – Glenbrook Gulch).**

Glenbrook Gulch is a small tributary located about eight miles up the lower Albion River from the Pacific Ocean in California's Mendocino County. In 2007, the Glenbrook Gulch dam, located a little more than ¼ mile up the gulch, was identified as a probable complete migration barrier to adult salmon and steelhead due to the 6-7 foot drop over the spillway. No fish were present in the upstream channel or the pond created by the dam.

California State Parks worked collaboratively with the California Geologic Survey and a fisheries consulting firm to develop a proposal that included dam removal, installation of 23 instream habitat structures within the lower ¼ mile of the gulch, decommission of 1,400 feet of legacy logging road along the gulch, and re-contour of another 2,000 feet of road to restore natural hydrologic function. The project was funded by PCSRF through the California Department of Fish and Wildlife and in partnership with NOAA Fisheries' Restoration Center.

The dam was removed in September 2010 and newly accessible salmonid habitat in the watershed now includes approximately 3,600 feet in the Kaisen Gulch and 4,800 feet in Glenbrook Gulch. During the summer of 2011, the 23 instream habitat structures were installed. These included large woody debris structures to improve juvenile rearing habitat and rock weirs to retain bedload after dam removal to improve spawning habitat.

The following were seen as successful project accomplishments:

- Movement of juvenile/resident salmonids upstream of the former dam site during the first post-project spawning season.
- Successful winter spawning of coho salmon redd above the former dam site in newly installed instream structure during the third post-project spawning season (winter 2012–2013).
- Mobilization and redistribution of sediment from behind the dam to weirs throughout the lower Glenbrook Gulch during winter storms.
- Elimination of motorized off-road vehicle use due to road decommissioning and re-contouring.

Photo 1. Glenbrook Gulch dam outfall during elevated storm flow on 1/26/10, before removal

Photo 2. Glenbrook Gulch channel above dam removal location on 2/21/11 spawner survey

Photo 3. Glenbrook Gulch channel above dam removal location on 3/22/13 spawner survey

# Geographic Area: Northern Pacific Coast

The Northern Pacific Coast geographic area includes Washington and Oregon from the Cascade Mountains to the Pacific Ocean. As shown in Exhibit 3, this area is divided into three recovery domains, including Puget Sound, Willamette/Lower Columbia, and Oregon Coast, encompassing 11 listed populations: 8 salmon ESUs and 3 steelhead DPSs. The geography of this area includes several major metropolitan centers where habitat loss and degradation of stream, estuarine, riparian, and upland ecosystems has occurred and is severely limiting salmon and steelhead sustainability. Exhibit 8 summarizes metrics for projects within the three domains.

## Miami River Wetlands Restoration

**The Tillamook Estuaries Partnership restored 58 acres of wetlands on the Miami River to support habitat for out-migrating salmon, for a total cost in excess of $2,000,000, with contriubtions from over 15 partners. The PCSRF contribution was $653,563 for this project targeting Wetland Restoration (Oregon, Tillamook County, Tillamook Bay – Miami River).**

In 2010 funding provided by the Oregon Watershed Enhancement Board, PCSRF, and others contributed to an extensive wetland restoration effort led by the Tillamook Estuaries Partnership. Historic logging and farming practices, infrastructure development, and the introduction of non-native plants had resulted in degraded habitat quality and quantity in the estuary of the Miami River on Tillamook Bay. Through the efforts of over 25 partners and two private land owners, the natural hydrology was restored by filling in ditches and channels to raise groundwater levels and provide additional flow to adjacent waterways. About 4,500 feet of new sinuous stream and tidal channels were developed that increase the salmon-rearing habitat by more than 50%. The stream channel was relocated out of the Highway 101 right-of-way and a longer sinuous channel was created in the wetland. Large woody debris was placed in the channel and floodplain to provide refuge areas and foraging habitat for rearing fish. The 58-acre Miami Wetlands Enhancement Project enhances tidal/freshwater wetlands along the Miami River to support out-migrating salmon, including the largest remaining chum population on the Oregon Coast. Additionally, the project contributed $1.7 million to the local economy and supported 30 full-time family wage jobs.

Photo 4. Miami River wetlands prior to restoration

Photo 5. Miami River wetlands after restoration

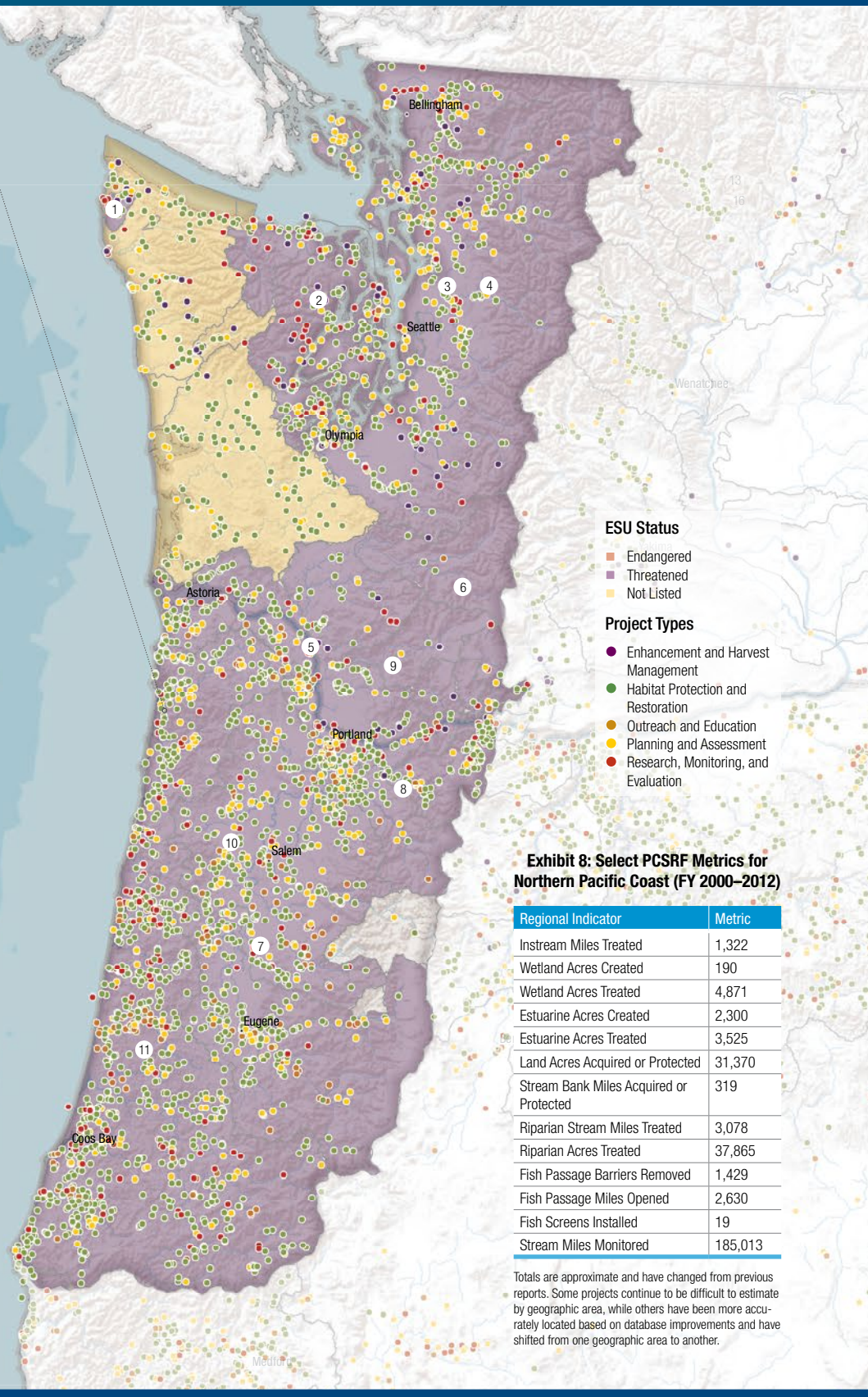



**Exhibit 8: Select PCSRF Metrics for Northern Pacific Coast (FY 2000–2012)**

| Regional Indicator | Metric |
|---|---|
| Instream Miles Treated | 1,322 |
| Wetland Acres Created | 190 |
| Wetland Acres Treated | 4,871 |
| Estuarine Acres Created | 2,300 |
| Estuarine Acres Treated | 3,525 |
| Land Acres Acquired or Protected | 31,370 |
| Stream Bank Miles Acquired or Protected | 319 |
| Riparian Stream Miles Treated | 3,078 |
| Riparian Acres Treated | 37,865 |
| Fish Passage Barriers Removed | 1,429 |
| Fish Passage Miles Opened | 2,630 |
| Fish Screens Installed | 19 |
| Stream Miles Monitored | 185,013 |

Totals are approximate and have changed from previous reports. Some projects continue to be difficult to estimate by geographic area, while others have been more accurately located based on database improvements and have shifted from one geographic area to another.

# Geographic Area: Interior Columbia Basin

The Interior Columbia Basin geographic area includes the Snake River Basin and portions of eastern Washington and Oregon and central Idaho. This area includes the Interior Columbia recovery domain with five listings of threatened salmonids (two salmon ESUs and three steelhead DPSs) and two ESUs listed as endangered. The domain is composed of agricultural, range, and federal forest lands with a number of large dams impeding natural fish passage upstream. Exhibit 9 summarizes metrics for projects within the domain.

## Sockeye Homecoming Brings Hope

**Approximately 575 sockeye have returned to the Yakima Basin three years after thousands had been released by the Yakama Nation. The total cost was $397,046, and the PCSRF contribution was $267,046 for this project targeting Fish Passage (Lake Cle Elum, Kittitas County, Washington).**

After 100 years of damming and diversions of water for irrigation, sockeye salmon had declined to extinction in the lakes of the Yakima Basin by the 1990's. But the Yakama Nation, using PCSRF funding, has been working to turn this around. In 2009, they collected 1,000 adult fish at Priest Rapids Dam and transported and released them in Lake Cle Elum for natural spawning in the watershed. The fish included sockeye from both the Wenatchee and Okanogan populations because their genetic make-up was similar to the historical Yakima Basin population. Releases increased over the last three years with 2,600 fish in 2010, 4,600 fish in 2011, and 10,000 in 2012, the maximum number authorized for release. As of summer 2013, the first adult offspring of the original 2009 release began to return to the Basin. Approximately 575 sockeye had been counted by mid-summer 2013 and transported from Roza Dam to above the dam at Lake Cle Elum. Each returned fish brings back memories of historic runs essential to the health of the Yakama people. The reintroduction is part of the Tribe's ***All Species Initiative***, being done in partnership with the Bureau of Reclamation and others to provide fish passage and resurrect essential habitat to restore both sockeye and coho populations in the lakes of the Basin. These efforts are helping to rebuild populations that support tribal treaty fishing rights and native subsistence fishing.

Photo 6. Preparing sockeye release above Roza Dam

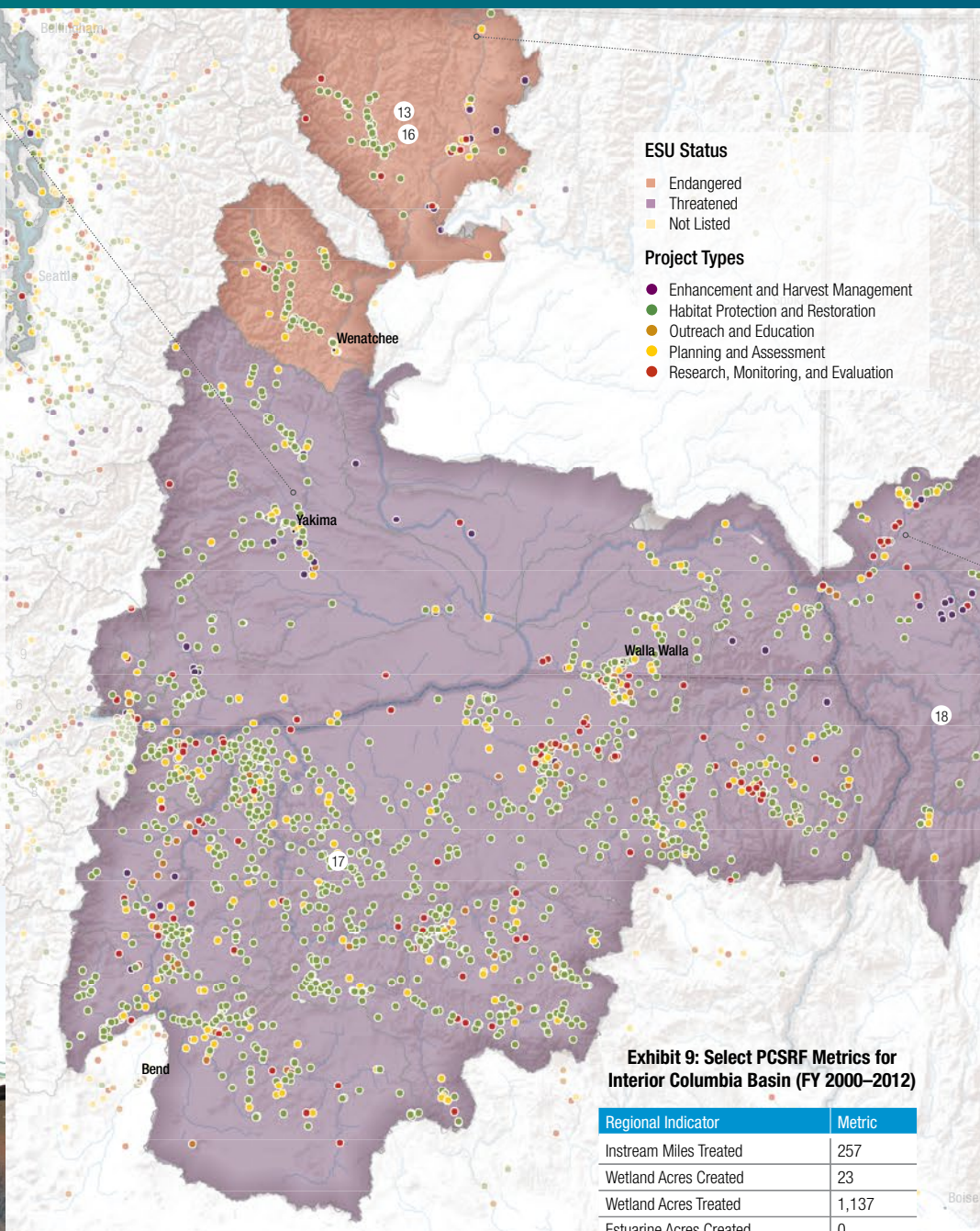



**Exhibit 9: Select PCSRF Metrics for Interior Columbia Basin (FY 2000–2012)**

| Regional Indicator | Metric |
|---|---|
| Instream Miles Treated | 257 |
| Wetland Acres Created | 23 |
| Wetland Acres Treated | 1,137 |
| Estuarine Acres Created | 0 |
| Estuarine Acres Treated | 0 |
| Land Acres Acquired or Protected | 96,688 |
| Stream Bank Miles Acquired or Protected | 3,512 |
| Riparian Stream Miles Treated | 4,470 |
| Riparian Acres Treated | 52,834 |
| Fish Passage Barriers Removed | 685 |
| Fish Passage Miles Opened | 4,090 |
| Fish Screens Installed | 1,681 |
| Stream Miles Monitored | 92,621 |

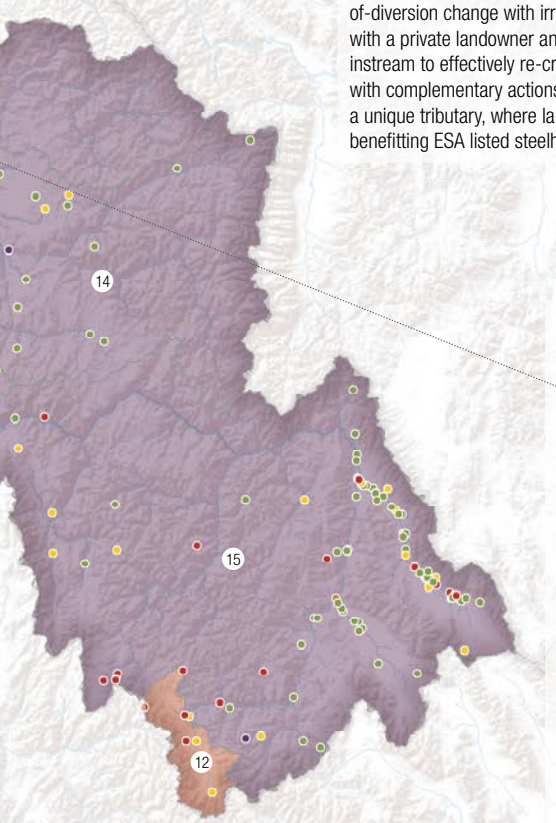
Totals are approximate and have changed from previous reports. Some projects continue to be difficult to estimate by geographic area, while others have been more accurately located based on database improvements and have shifted from one geographic area to another.

Photo 7. Ninemile Creek: Areas targeted for riparian habitat restoration

## Ninemile Creek Instream Flow Restoration

**Approximately $166,000 in PCSRF funding has been contributed to the Trout Unlimited-Washington Water Project (TW-WWP). It is a comprehensive in-stream flow project costing a total of $420,083. The effort is resulting in increased water flows for fish (Washington, Okanogan County, Ninemile Creek).**

Ninemile Creek is just below the U.S. Canadian border and is the northernmost critical anadromous tributary in the Okanogan Subbasin. It is a tributary to Lake Osoyoos and the Okanogan River. Instream flow in the creek has been limited historically and more recently, surface water diversions for agriculture, beginning in April, have exacerbated the problem. PCSRF state-matching funds awarded through the Washington Salmon Recovery Funding Board helped support work with landowners on a comprehensive instream flow restoration project, involving a permanent irrigation water-right purchase, point-of-diversion change with irrigation system upgrade, and streambank habitat restoration. In early 2012, TU-WWP, in cooperation with a private landowner and WDFW, secured all surface water flows from the historic surface diversion, adding over two cfs instream to effectively re-create a natural hydrograph for the tributary. In 2013, TU-WWP will continue to enhance this project with complementary actions, such as updating the stream crossings. This project is important because it offers restoration of a unique tributary, where land and water projects have already been completed, and maintains agricultural irrigation while also benefitting ESA listed steelhead.




## Idaho Dutch Flat Dam Removal for Steelhead Recovery

**The Idaho Department of Fish and Game removed the Dutch Flat Dam, restoring access to five miles of habitat for threatened Snake River Basin steelhead. The total cost was $1,200,000, and the PCSRF contribution was $536,800 for this project targeting In-Stream Habitat Restoration/Dam Removal (Idaho, Latah County, Clearwater River - Little Bear Creek).**

Dutch Flat Dam is located 500 miles up the Columbia, Snake, and Clearwater Rivers, blocking passage to the west fork of Little Bear Creek. The 10-foot high barrier was originally constructed to provide a drinking water supply to the city of Troy, ID, but for almost 90 years has blocked passage for steelhead returning upriver. In September 2013, thanks in part to PCSRF funds, the dam was removed.

The steelhead population was listed as a threatened species under ESA in 1997. Removing barriers and restoring access to high-quality spawning and rearing habitat are critical for the recovery of these fish. Demolition of the dam will provide steelhead trout with access to five miles of habitat, essential to complete their life cycle. NOAA Fisheries supported Dutch Flat's removal and riparian restoration work by streamlining the review and approval process and by contributing PCSRF funding for project planning and engineering. The full benefits to fish in Little Bear Creek will unfold over the coming months and years.

Photo 8. Exposing the back side of Dutch Flat Dam


Photo 9. Removal of the Dutch Flat Dam

# Geographic Area: Alaska

Alaska's program focuses on research and monitoring efforts, as well as maintaining healthy populations of salmon through habitat protection and restoration. There are no ESA-listed populations that spawn and rear in Alaska, and thus no recovery domains have been identified in this geographic area. Exhibit 10 shows metrics for projects in Alaska.

**Exhibit 10: Select PCSRF Metrics for Alaska (FY 2000–2012)**

| Regional Indicator | Metric |
|---|---|
| Instream Miles Treated | 8 |
| Wetland Acres Created | 0 |
| Wetland Acres Treated | 21 |
| Estuarine Acres Created | 0 |
| Estuarine Acres Treated | 297 |
| Land Acres Acquired or Protected | 60 |
| Stream Bank Miles Acquired or Protected | 1 |
| Riparian Stream Miles Treated | 15 |
| Riparian Acres Treated | 127 |
| Fish Passage Barriers Removed | 42 |
| Fish Passage Miles Opened | 137 |
| Fish Screens Installed | 0 |
| Stream Miles Monitored | 108,673 |

Some projects continue to be difficult to estimate by geographic area, while others have been more accurately located based on database improvements and have shifted from one geographic area to another.

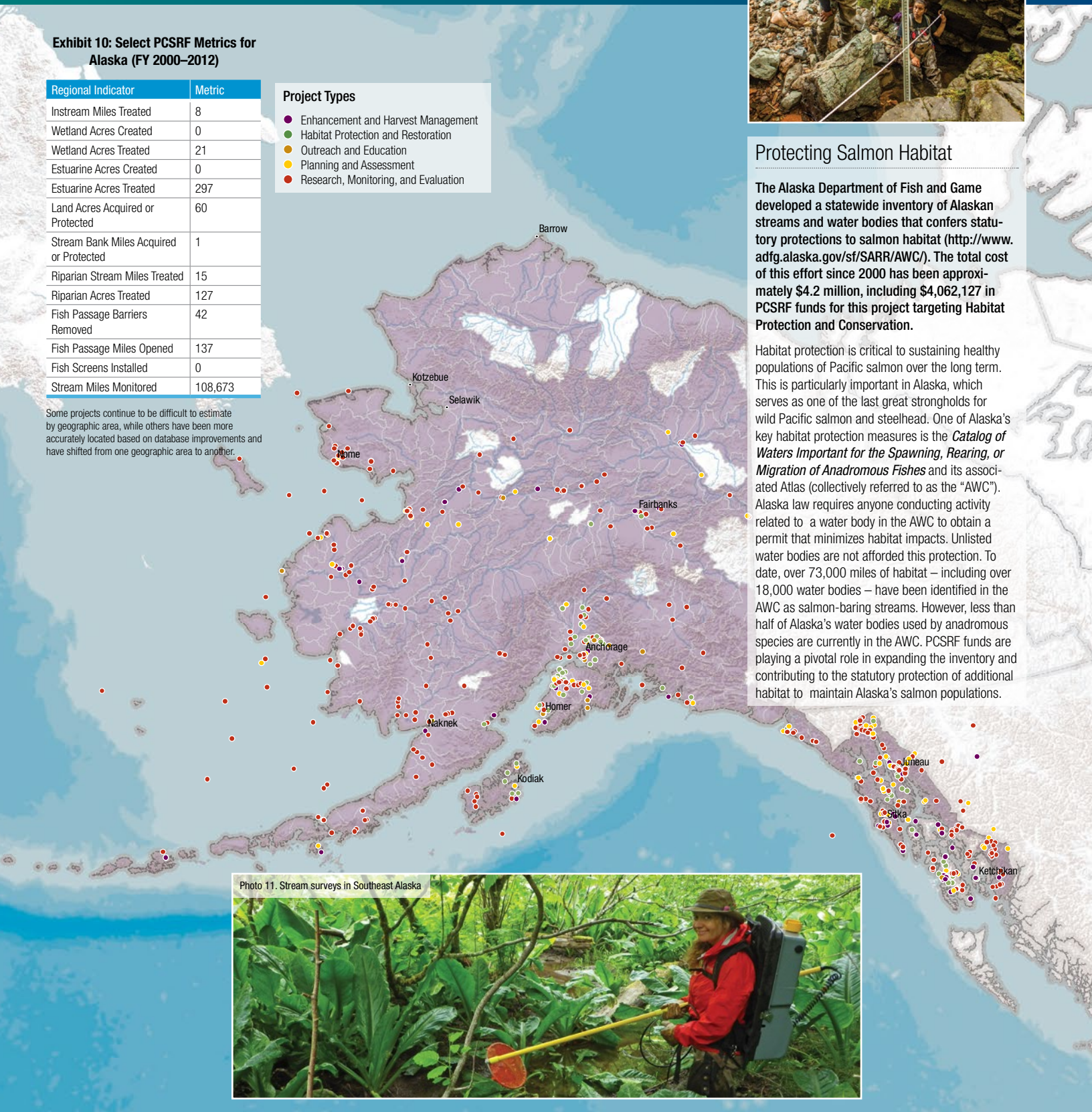



Photo 10. Haida tribe members Tony Sanderson and Sonia Ibarra perform fish surveys on Prince of Wales Island



## Protecting Salmon Habitat

**The Alaska Department of Fish and Game developed a statewide inventory of Alaskan streams and water bodies that confers statutory protections to salmon habitat (http://www.adfg.alaska.gov/sf/SARR/AWC/). The total cost of this effort since 2000 has been approximately $4.2 million, including $4,062,127 in PCSRF funds for this project targeting Habitat Protection and Conservation.**

Habitat protection is critical to sustaining healthy populations of Pacific salmon over the long term. This is particularly important in Alaska, which serves as one of the last great strongholds for wild Pacific salmon and steelhead. One of Alaska's key habitat protection measures is the ***Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes*** and its associated Atlas (collectively referred to as the "AWC"). Alaska law requires anyone conducting activity related to a water body in the AWC to obtain a permit that minimizes habitat impacts. Unlisted water bodies are not afforded this protection. To date, over 73,000 miles of habitat – including over 18,000 water bodies – have been identified in the AWC as salmon-baring streams. However, less than half of Alaska's water bodies used by anadromous species are currently in the AWC. PCSRF funds are playing a pivotal role in expanding the inventory and contributing to the statutory protection of additional habitat to maintain Alaska's salmon populations.

Photo 11. Stream surveys in Southeast Alaska

## Photo Credits

Photo 1: California Department of Fish and Wildlife
Photo 2: California Department of Fish and Wildlife
Photo 3: California Department of Fish and Wildlife
Photo 4: Tillamook Estuaries Partnership
Photo 5: Tillamook Estuaries Partnership
Photo 6: Yakama Nation
Photo 7: Trout Unlimited–Washington Water Project
Photo 8: Latah Soil and Water Conservation District
Photo 9: Latah Soil and Water Conservation District
Photo 10: Erika Nortemann/TNC
Photo 11: Alaska Department of Fish and Game

## Endnotes

[1] http://www.ecotrust.org/wwri/downloads/WWRI_OR_brochure.pdf

[2] Edwards, P.E.T., A.E. Sutton-Grier and C.E. Coyle. 2012 Investing in nature: Restoring coastal habitat blue infrastructure and green job creation. Marine Policy (2012), http://dx.doi.org/10.1016/j.marpol.2012.05.020

[3] Nielsen-Pincus, M., and C. Moseley. 2009. "A Preliminary Estimate of Economic Impact and Job Creation from the Oregon Watershed Enhancement Board's Restoration Investments." Ecosystem Workforce Program, Briefing Paper #13. Institute for a Sustainable Environment, University of Oregon. 2pp. http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/downloads/bp13.pdf

[4] Hibbard, M. and S. Lurie. 2006. "Some community socio-economic benefits of watershed councils: A case study from Oregon." Journal of Environmental Planning and Management 49:891-908.

[5] University of Oregon, Institute for a Sustainable Environment, Ecosystem Workforce Program Briefing Paper Number 23, Spring 2010 (http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/downloads/BP23.pdf)

[6] In this report, the term 'salmonids' refers to both salmon and steelhead

[7] Steelhead are the anadromous form of freshwater rainbow trout, migrating to the ocean as juveniles and returning to freshwater streams to spawn

[8] http://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/esa-land-area-10-10.pdf

[9] Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-66, 598 p.

[10] See "Salmon Population Summary" at https://www.webapps.nwfsc. noaa.gov

[11] http://www.habitat.noaa.gov/habitatblueprint/

[12] http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/pcsrf/pcsrf-perf-framework.pdf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