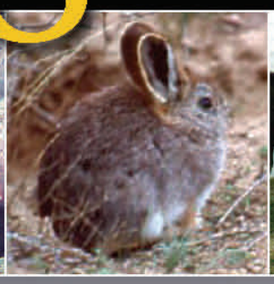
2008

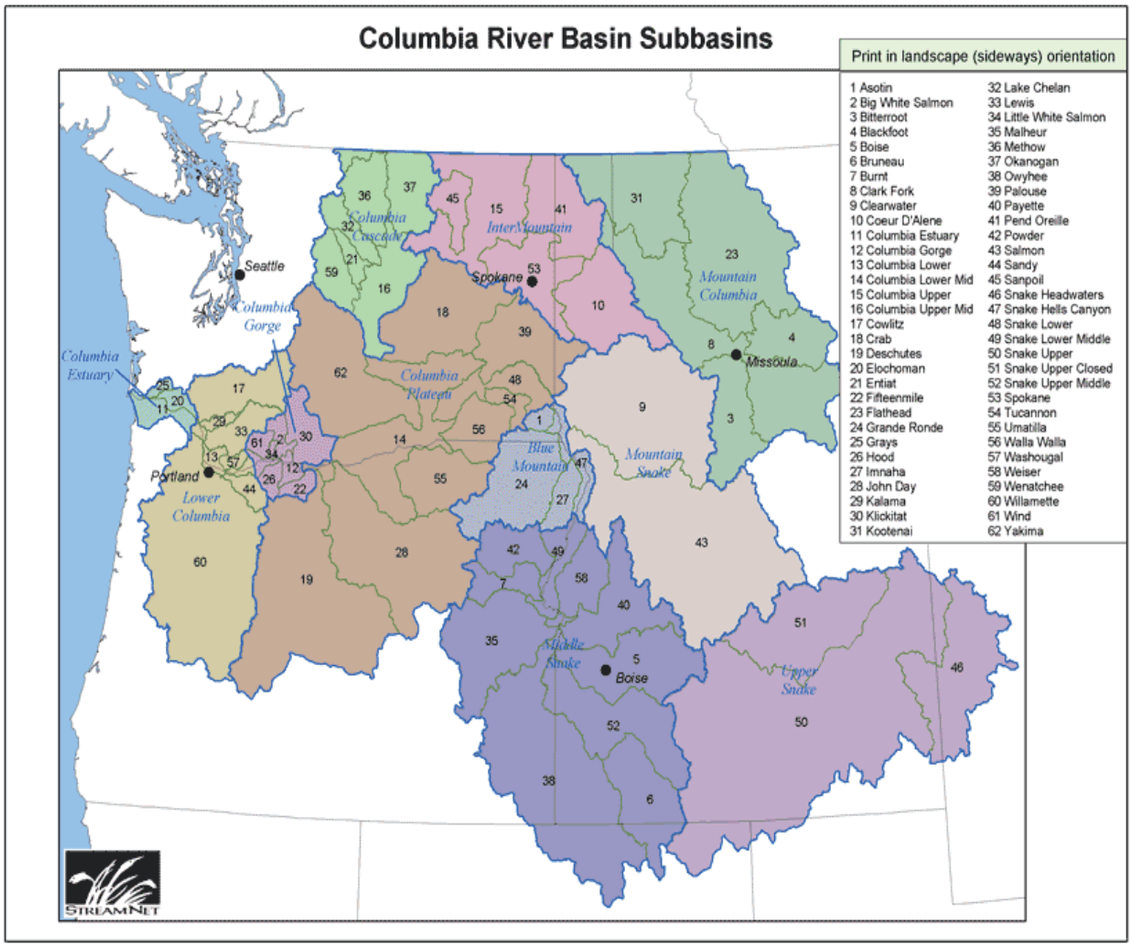
COLUMBIA BASIN FISH AND WILDLIFE AUTHORITY



Northwest Power and Conservation Council

BONNEVILLE POWER ADMINISTRATION

Status of Fish and Wildlife Resources in the Columbia River Basin



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An online version of this report is available at *www.cbfwa.org/sotr*.

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2008 Status of Fish and Wildlife Resources in the Columbia River Basin

The development and completion of this report could not have been possible without the assistance of the fish and wildlife managers from throughout the Columbia River Basin.

This report was developed for informational purposes and was not prepared for legal or surveying purposes. Users of this report should review or consult the primary data sources to determine the usability of the information contained within this report.

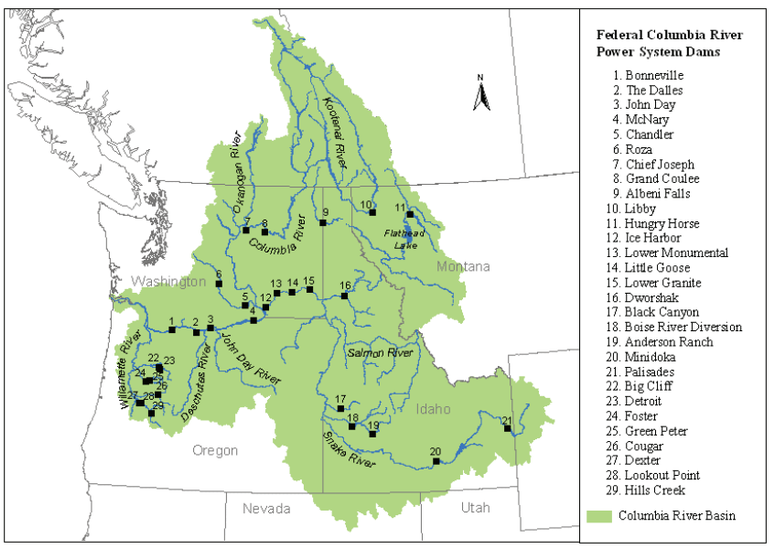
Chapter 1: Introduction

COLUMBIA RIVER BASIN: BACKGROUND

Historically, salmon and steelhead migrated through much of the Columbia River Basin, an area the size of France that includes portions of seven states and British Columbia. These fish once spawned as far upriver in the Columbia as the headwaters at Columbia Lake, British Columbia, 1,200 miles from the mouth of the river near Astoria, Oregon. Salmon and steelhead migrated up the Snake River, the Columbia's largest tributary, as far as Shoshone Falls, 615 miles from the confluence and more than 900 miles from the Pacific Ocean. The Columbia River Basin also supported numerous populations of resident fish - those that don't migrate to the ocean - and wildlife.

Beginning in the late-1800s and increasing from the 1930s on, there was a large decline of salmon and steelhead in the Columbia River and its tributaries, from an estimated peak of 10-16 million adult fish returning to the basin each year to about 1-3 million in recent years. While loss of habitat, harvest, and variable ocean conditions have all contributed to this decline, it is estimated that the portion of the decline attributable to the construction and operation of hydroelectric dams in the Columbia River Basin is, on average, about 5 to 11 million adult fish. Hydroelectric dams also adversely affected resident fish and wildlife in the basin.

THE POWER ACT



In 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act (Power Act), which authorized Idaho, Montana, Oregon and Washington to create the Northwest Power Planning Council, now the Northwest Power and Conservation Council (Council). The Power Act directs the Council to prepare a program to protect, mitigate and enhance fish and wildlife of the Columbia River Basin that have been affected by the construction and operation of the hydroelectric dams (dams operated through the Federal Columbia River Power System (FCRPS)) while also assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply. The Power Act also directs the Council to inform the public about fish, wildlife, and energy issues and to involve the public in its decision-making. The Power Act directs the Bonneville Power Administration's (BPA) Administrator to use BPA funds in a manner consistent with the Council's Columbia River Basin Fish and Wildlife Program (Program).

COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM

The Council's Program is the largest regional effort in the nation to recover, rebuild, and mitigate impacts on fish and wildlife. The Council adopted the first Program in November 1982 with the most recent amendment to the Program in 2009. The 2000 Program marked a significant departure from past versions, which consisted primarily of a collection of measures directing specific activities. The 2000 Program established a basinwide vision for fish and wildlife — the intended outcome of the program — along with biological objectives and action strategies that are consistent with the vision. In 2004, the Program began to be implemented through subbasin plans developed locally in the more than 60 subbasins of the Columbia River Basin. The plans are considered to be consistent with the basinwide vision and objectives in the program, and its underlying foundation of ecological science.

The development and implementation of the Council's Program relies on close coordination between the Council and the fish and wildlife managers of the Columbia River Basin (Figure 1). The Power Act created the Council to provide the balance between the needs of fish and wildlife and power users. The Power Act calls for a high level of deference to the fish and wildlife managers in crafting the measures for the Program. A key feature of the Program is the development of an adaptive management framework that allows the evaluation and redirection of activities to provide the greatest benefit to the resources with the greatest efficiency. The Status of the Resource Project provides a foundation for the adaptive management framework and is constantly being modified to meet the reporting demands as the Program moves forward with adoption of clearly defined biological objectives at the population, subbasin, province, and regional scales.

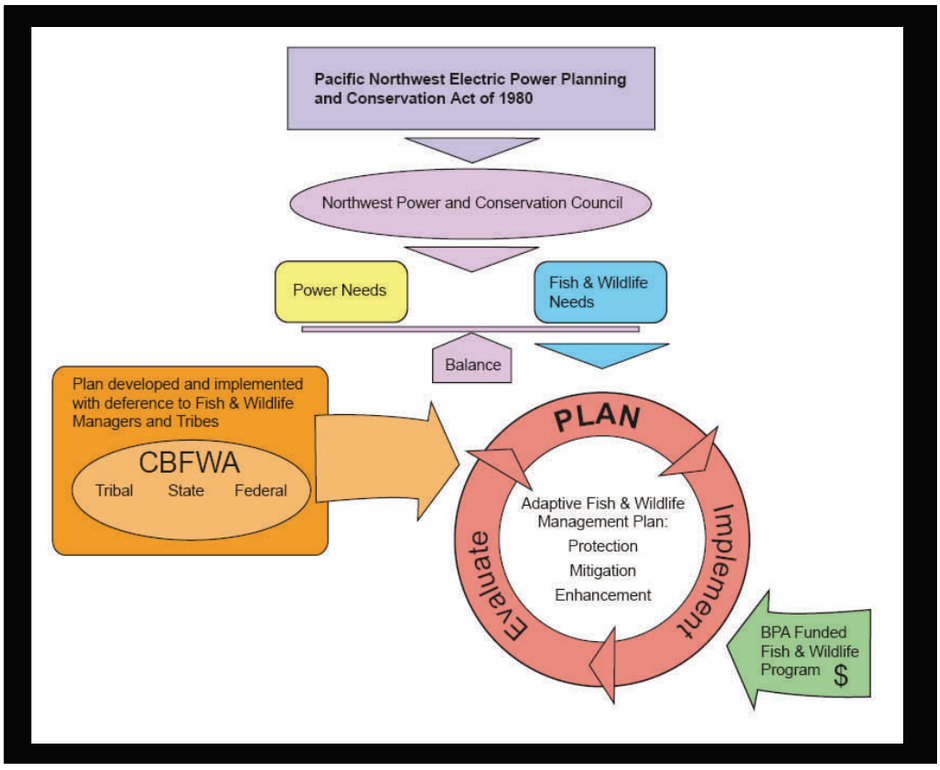


Figure 1. Depiction of the fish and wildlife managers role in the adaptive management framework for implementation of the Northwest Power Act.

BONNEVILLE POWER ADMINISTRATION FISH AND WILDLIFE FUNDING


Dworshak Dam

The Power Act directs the Council to adopt a fish and wildlife program to guide BPA fish and wildlife mitigation funding. The BPA divides their fish and wildlife costs into four categories:

1) Capital Investments;
2) Reimbursed Expenses of Other Agencies;
3) Integrated (Direct) Program Expenses; and,
4) River Operations.

Although the Council includes provisions for these categories in their Program, the Council most closely manages and monitors the Integrated Program. The Integrated Program funds individual projects and programs (e.g., scientific research, habitat protection, construction projects to improve habitat and fish passage, hatchery development and operation, and coordination and Program support projects) consistent with BPA's obligations. Through many of these projects, biologists collect data for fish and wildlife resources throughout the Columbia River Basin.

COMPILING AND COORDINATING DATA FOR THE COLUMBIA RIVER BASIN

In 2000, the Independent Scientific Review Panel (ISRP) suggested that no systematic data inventory had been performed in the Columbia River Basin and that "no organization has taken responsibility for a coordinated basin-wide design, and no organization has taken responsibility for uniform consistent implementation of such a design." The ISRP questioned "whether any existing organization has broad enough authority to take command of basin-wide implementation."

The Council's 2000 Program recommended that data be collected in a standard format and that "the Council will initiate a process for establishing an Internet-based system for the efficient dissemination of data for the Columbia Basin." In 2003, the Council recommended, to the BPA, to fund the Columbia Basin Fish and Wildlife Authority's (CBFWA) Annual Work Plan proposal, including an effort to compile an annual report on the status and trends of fish and wildlife populations in the Columbia River Basin.

Following the completion of subbasin plans, the ISRP suggested there "is the need for readily accessible data on numbers of adults returning to the subbasin (i.e., escapement estimates)." Subsequently, the ISRP recommended "that Council and BPA ensure that data generated by public funds is readily available through publicly accessible websites." The Independent Scientific Advisory Board suggested that "a process to compile and coordinate data for the Columbia Basin is an obvious need."

Following the completion of the subbasin plans, the CBFWA began to coordinate and implement the Status of the Resources Project utilizing a uniform basinwide design to track the status of fish and wildlife populations throughout the Columbia River Basin. To be successful, the CBFWA initiated a two-step process: 1) coordinate with data generators, and 2) coordinate with data user groups.

During 2005, the fish and wildlife managers of the CBFWA (17 state, tribal, and federal entities) designed a procedure for a continuous data inventory/reporting exercise that would make data on numbers of fish and wildlife readily available through the publicly accessible CBFWA website and an annual report. This first year was regarded as a pilot-effort, thus the project was initiated on a limited scale using a specialized data set (i.e., escapement data) that would be useful to technical experts, policy makers, agencies, and the general public in the Columbia River Basin.

From December 2005-May 2006, the CBFWA met with the Council, BPA, StreamNet, and other organizations collecting data in the Columbia River Basin to ensure that the CBFWA effort was not duplicative but instead complimentary, that the right data was included in the inventory, and that the reporting mechanisms would be useful to interested entities. The entities decided that the CBFWA's Status of the Resources Project would not be responsible for collecting or compiling/analyzing data but would provide the following services:

- Conduct data inventories, identify data gaps, and report them to the region
- Ensure data quality
- Establish and maintain a publicly accessible website for policy makers, technical experts and the general public
- Prepare an annual report designed for policy makers and the general public

The 2008 Annual Report represents a collaborative effort of the CBFWA's fish and wildlife managers (data generators), Federal Caucus, BPA, Council, and other entities (data user groups). A significant amount of time was invested by the data generators and user groups to ensure the identification of the appropriate suite of metrics. To view the Province and Subbasin sections of the Status of the Resources Report, please visit www.cbfwa.org/sotr.

It is anticipated that biological objectives at the subbasin, province, and regional scale will continue to be developed and finalized during the upcoming years. The biological objectives will describe the conditions that are needed to reach the Program's vision and provide a measure of accomplishment for the implementation of the Program and will be expressed in measurable terms, likely with discrete time frames. As those objectives are adopted into the Program, the Status of the Resource Report will be modified in a way to report changes consistent with those objectives. In this way, the Status of the Resources Project can become the framework to support adaptive management for the Program.

Chapter 2: Basin-wide Indicators

BACKGROUND

The interest in basin-wide indicators has increased significantly in recent years. Policy and decision-makers in the Columbia River Basin have expressed a desire to better understand the changes in fish and wildlife populations as well as associated habitat and environmental conditions.

The basin-wide indicators included in this chapter were identified by state, tribal, and government fish and wildlife managers as well as the Federal Caucus. It was the goal of these groups to illustrate the status and trends of fish and wildlife populations and habitat/environmental conditions at a basin-wide scale. This reports builds on previous Status of the Fish and Wildlife Resources in the Columbia River Basin reports in which population abundance and trend information was presented, at a subbasin-scale, for fish and wildlife focal species throughout the Columbia River Basin.

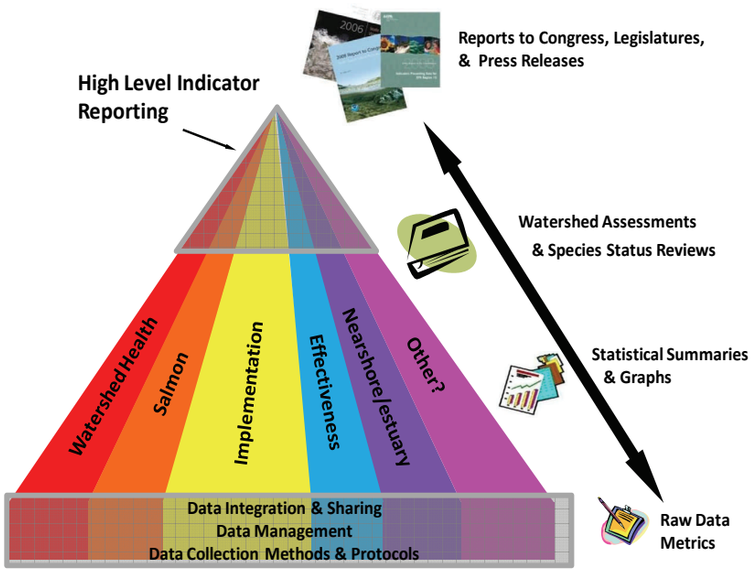
HIERARCHICAL FRAMEWORK

Data are summarized at the three scales identified in the Council's 2009 Fish and Wildlife Program: Subbasin, Province and Basinwide. The data summaries represent high-level indicators (HLIs), or summarized information at broad scales to inform decision-makers and the general public. The most recent description of HLIs, from a Pacific Northwest regional perspective, is provided by the Pacific Northwest Aquatic Monitoring Partnership[1]:"Information associated with HLIs can best be viewed in a hierarchical context. Typically, HLIs are reported at broad geographic scales, drawing upon data that are compatible across multiple scales. For instance, HLIs may use data that are rolled-up from local to larger (e.g., watershed) scales, or perhaps even further rolled-up to regional or broader scales."

We applied the following three inter-related levels of organization and terminology:

1. high level indicators – categories of data that are measured and compiled,
2. reporting measures – the way indicators are reported, and
3. metrics – what is actually measured.

Metrics associated with raw data, collected in the field, are summarized and compiled from the local to broader scales, and are rolled-up and illustrated in reporting measures in management and HLI reports.



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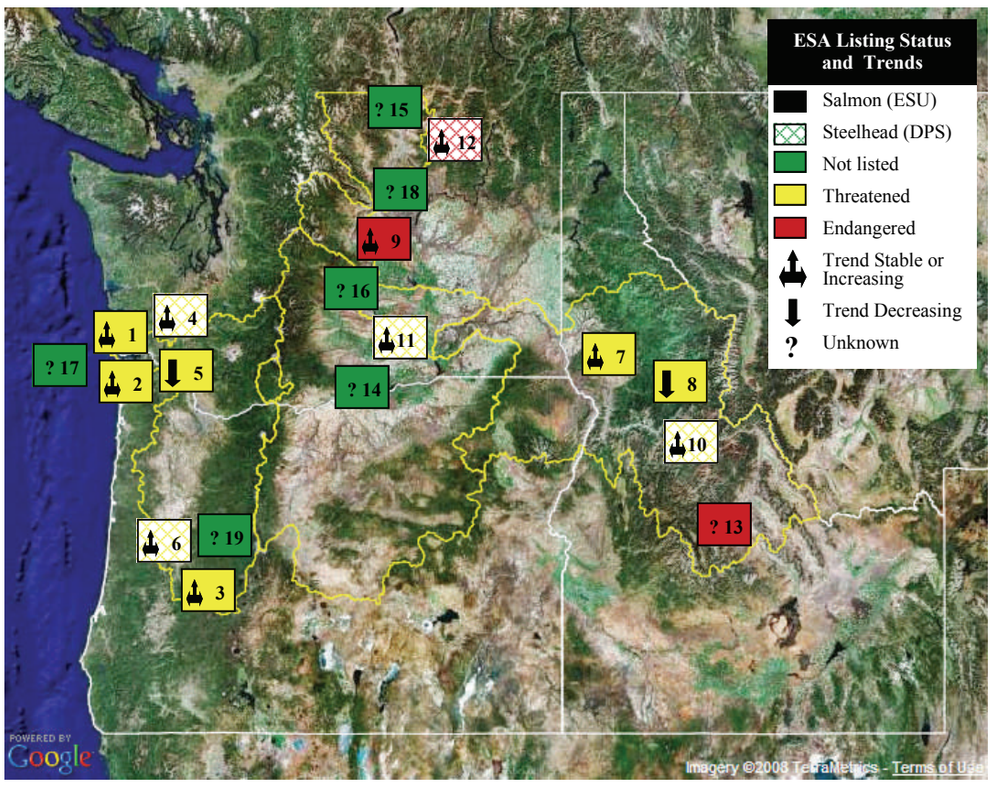
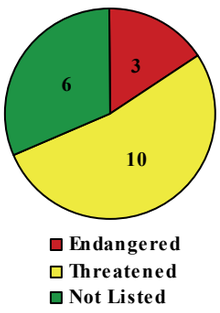
Status and Trends of Salmon and Steelhead in the Columbia River Basin[2]

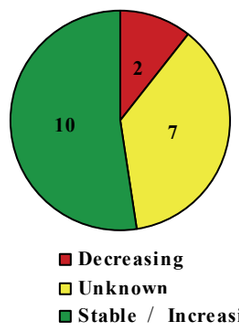


Numbers correspond to the parenthetical numbers in the ESU/DPS column of the table.

Endangered Species Act Salmon and Steelhead ESU/DPS Listing Status



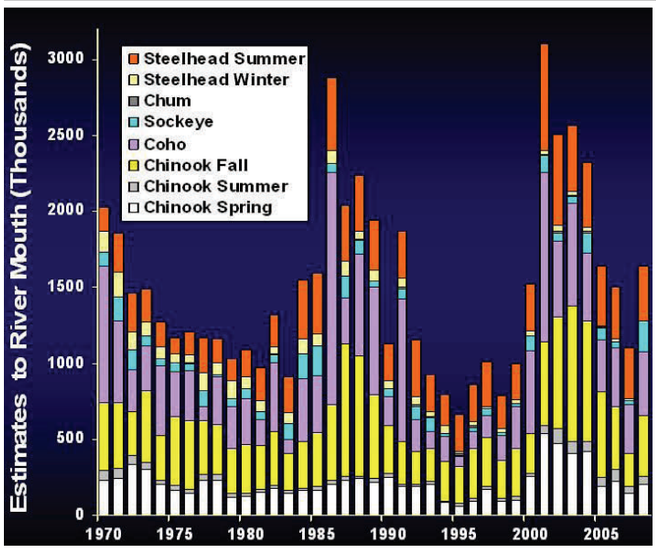
Recent Trends of Salmon Steelhead ESU/DPS[2]

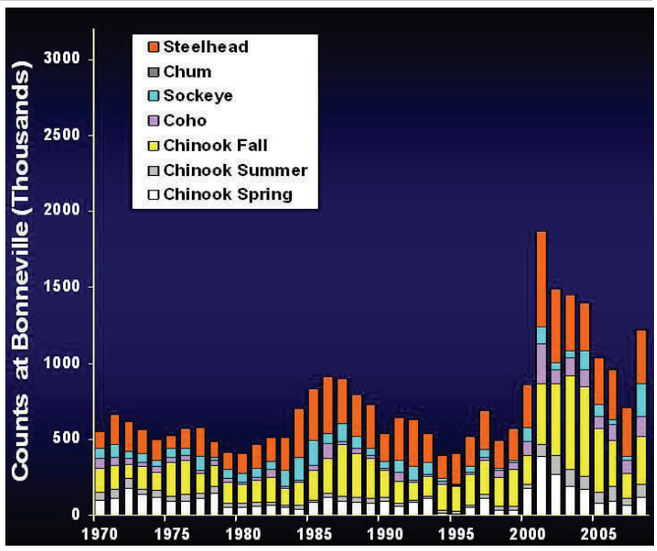


Recovery Domain	Species	ESU/DPS Name (location on map)	Number of Extant Populations	Current ESA Listing Status (Year Listed)
Willamette/Lower Columbia	Chum Salmon	Columbia River Chum (1)	16	Threatened (1999)
	Chinook Salmon	Lower Columbia River Chinook (2)	32	Threatened (1999)
	Chinook Salmon	Upper Willamette River Chinook (3)	7	Threatened (1999)
	Steelhead	Lower Columbia River Steelhead (4)	23	Threatened (1999)
	Coho Salmon	Lower Columbia River Coho (5)	24	Threatened (2005)
	Steelhead	Upper Willamette River Steelhead (6)	5	Threatened (1999)
Interior Columbia	Chinook Salmon	Snake River Fall Chinook (7)	1	Threatened (1992)
(Excludes Clearwater)	Chinook Salmon	Snake River Spring/Summer Chinook (8)	31	Threatened (1992)
	Chinook Salmon	Upper Columbia River Spring Chinook (9)	3	Endangered (1999)
	Steelhead	Snake River Basin Steelhead (10)	24	Threatened (1997)
	Steelhead	Middle Columbia River Steelhead (11)	18	Threatened (1999)
	Steelhead	Upper Columbia River Steelhead (12)	5	Endangered (1997)
	Sockeye Salmon	Snake River Sockeye (13)	1	Endangered (1991)
No Recovery Domain	Chinook Salmon	Middle Columbia Spring Chinook (14)	4	Not Warranted
	Sockeye Salmon	Okanogan River Sockeye (15)	1	Not Warranted
	Sockeye Salmon	Lake Wenatchee Sockeye (16)	1	Not Warranted
	Steelhead	Southwest Washington Steelhead (17)	7	Not Warranted
	Chinook Salmon	Upper Columbia River Summer/Fall Chinook (18)	3	Not Warranted
	Chinook Salmon	Deschutes River Summer/Fall Chinook (19)	1	Not Warranted

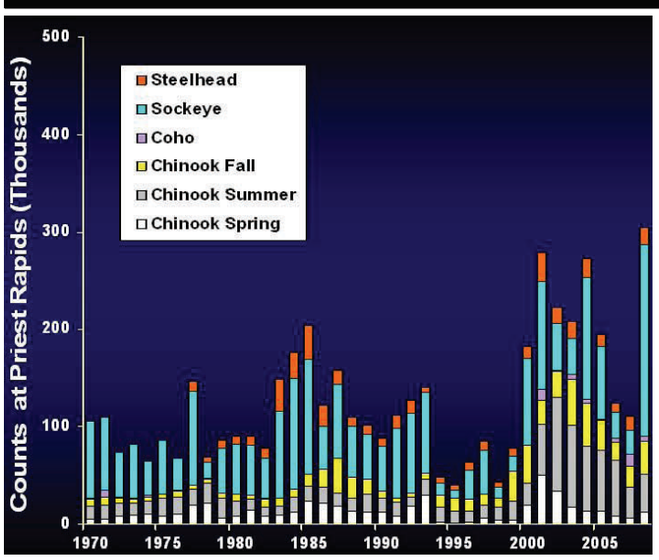
Anadromous Fish

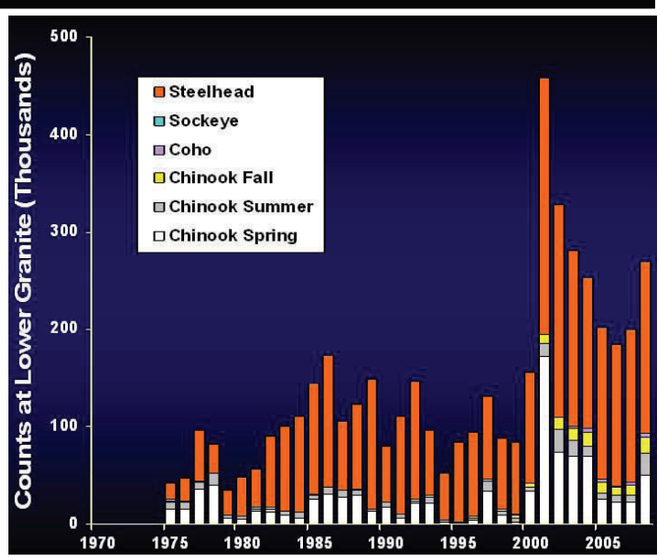
Estimates of Adult Salmon and Steelhead Entering the Columbia River Mouth and Counts at Bonneville Dam (1970-2008)[3,4,5]





Counts of Adult Salmon and Steelhead at Priest Rapids (1970-2008) and Lower Granite (1975-2008) Dams[5]





All counts include adult natural and hatchery-origin fish.

Adult Salmon and Steelhead Counts

Numbers of adult salmonids entering the Columbia River reached a relative high in 2001 then generally declined until an upturn in 2008. The upturn was partially a result of the sockeye salmon return being the highest in over 40 years. The return of coho salmon also increased for the first time in five years, but was still below numbers seen from 2000-2003.

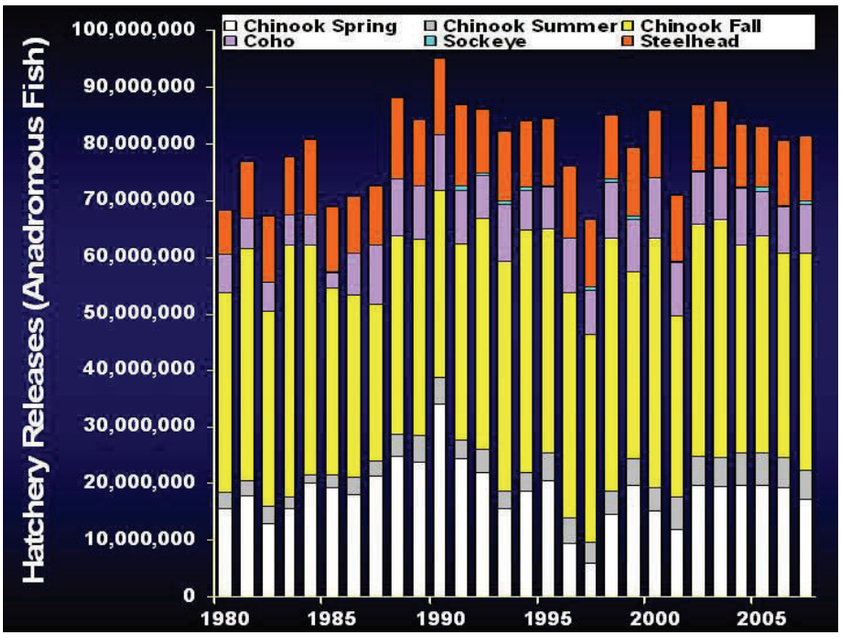
Because it is the lowermost dam on the Columbia River, counts of salmon and steelhead at Bonneville Dam provide information important to the management of upriver stocks. Similar to estimates of fish entering the Columbia River, counts at Bonneville Dam declined from 2001-2007, then increased in 2008.

All Upper Columbia River fish must pass Priest Rapids Dam, including endangered Upper Columbia River spring Chinook salmon and steelhead. Endangered Snake River sockeye salmon must pass Lower Granite Dam, as must threatened Snake River spring/summer Chinook salmon and steelhead, except for fish from the Tucannon River. General trends at both dams were similar to those at the river mouth and at Bonneville Dam.

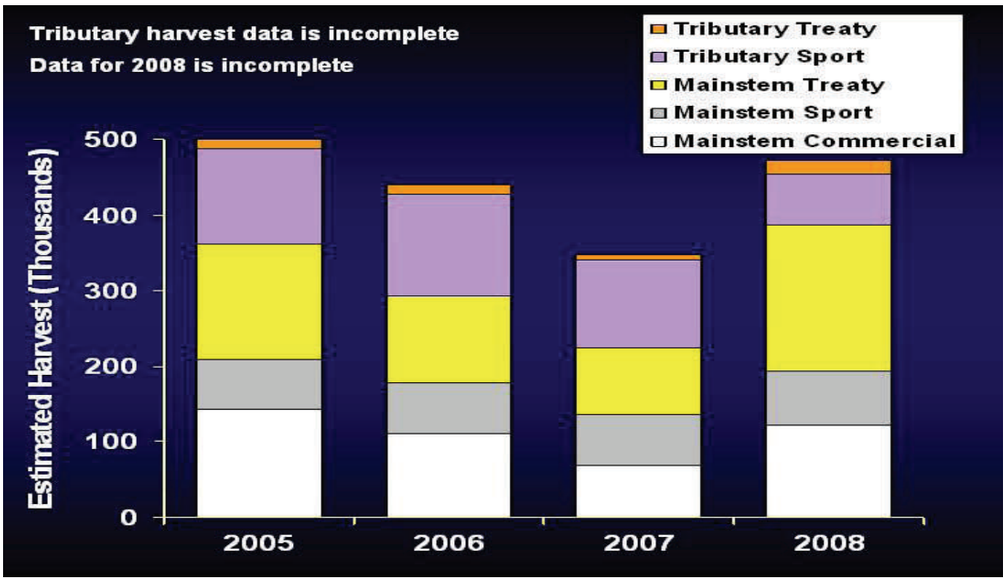
Hatchery Production

In 2007, more than 80 million salmon and steelhead were released in the Columbia River Basin. Hatchery programs are categorized, based on their genetic broodstock management strategy, as either integrated (i.e., composite population of natural and hatchery origin fish) or segregated (i.e., distinct population reproductively isolated from natural populations). The purpose of these programs are either to provide harvest opportunities, serve as a conservation measure, or both.

Hatchery Production of Salmon and Steelhead in the Columbia River Basin[5]



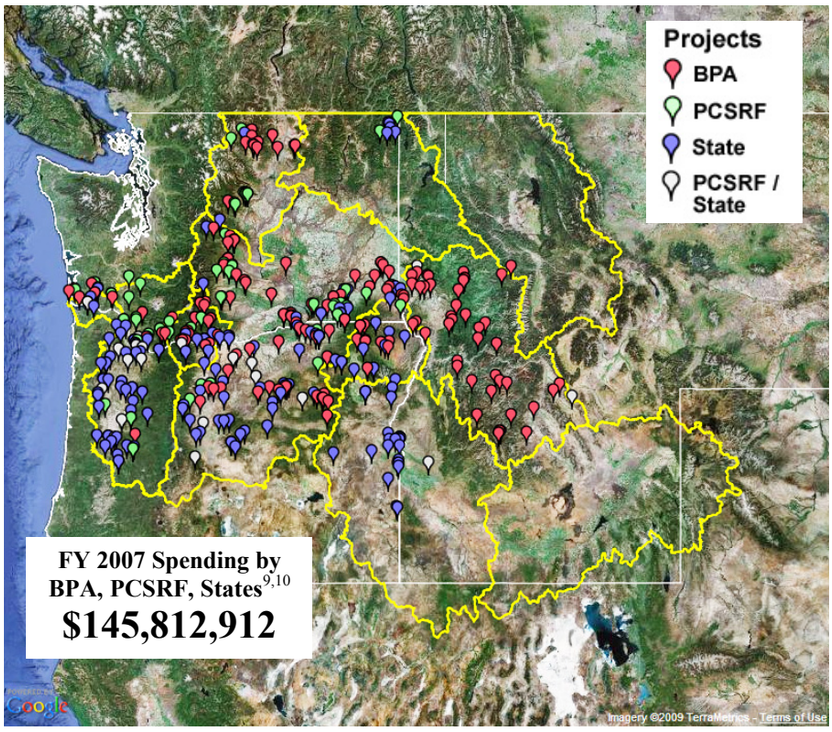
Columbia River Basin Salmon and Steelhead Harvest[6,7,8]



Species/Race	Mainstem Harvest—2007			Tributary Harvest— 2007	
	Commercial	Sport	Treaty	Sport	Treaty
Spring Chinook	10,298	7,129	6,144	15,509	5,700
Summer Chinook	1,122	2,429	5,375	0	0
Fall Chinook	16,750	13,330	45,356	3,680	510
Coho	40,709	9,237	8,035	5,634	Unknown
Sockeye	0	0	1,414	0	Unknown
Chum	38	0	0	0	0
Winter Steelhead	0	1,876	558	6,207	0
Summer Steelhead	0	33,151	20,819	86,339	Unknown

Anadromous Fish

Location of Anadromous Fish Habitat Projects (FY 2007)



Anadromous Fish Habitat Projects

During FY 2008, BPA funded 104 projects in the Columbia River Basin to improve wetland, instream, riparian, and riparian-upland habitat zones that are important for the conservation and restoration of anadromous fish. General descriptions of the project-types and the habitat zones that are addressed through the implementation of the associated actions are listed below. A more thorough description of the actions is included in the Appendix**.**

The accomplishments of a given habitat project can be measured several different ways. For example, a project for which the focus is to increase instream habitat complexity may have the following objectives: 1) install a specific number of structures and 2) treat a specified number of stream miles. Similarly, the installation of wells, pipelines, sprinklers, etc. can provide multiple benefits (e.g., primary stream miles improved, total stream miles improved, cfs of water conserved, and acre-feet of water conserved).

BPA—Funded Anadromous Fish Habitat Project Accomplishments (FY 2008)[9]

Habitat Zone	Project-type	Planned Value*	FY 2008 Accomplishment (Actual Value)*
Wetland	Realign, connect, and/or create channel	46.3 acres	46.3 acres improved
Instream	Increase instream complexity and stabilization, remove vegetation	47.17 miles	65.12 miles stream complexity improved
	Increase instream habitat complexity and stabilization	1098 structures	918 structures installed
	Removal/install diversion, remove/breach dam, install fish passage structure	293.2 miles	308.6 habitat miles accessed
	Install well, install pipeline, install sprinkler, acquire water instream	721.9 miles	884.7 miles primary stream reach improved
	Install well, install pipeline, install sprinkler, acquire water instream	1698.3 miles	2004.3miles total stream reach improvement
	Install well, install pipeline, install sprinkler, acquire water instream	41.3 cfs	45.3 cfs conserved
	Install well, install pipeline, install sprinkler, acquire water instream	19287.3 acre-feet	22,179.3 acre-feet conserved
	Realign connect and/or create channel	2.3 miles	1.1 stream miles added
	Remove/install diversion	4 screens	4 screens addressed
	Install fish screen	145.5 cfs	246.2 cfs diversion flow
	Install fish screen	2,373.3 acre-feet	2,454.6 acre-feet screened
	Acquire water instream	76,554.7 acre-feet	53,862.1 acre-feet water protected
	Acquire water instream	410.6 acre-feet	399.2 cfs water protected
Riparian	Plant/remove vegetation	113.95 miles	113.09 miles vegetation planted
	Purchase land, lease land	187.56 miles	195.47 miles protected
Riparian-Upland	Land purchase, land lease	111,638.3 acres	112,683.2 acres protected
	Conduct controlled burn, plant vegetation, practice no-till and conservation tillage, remove vegetation, upland erosion and sedimentation control, enhance floodplain, create, restore, and enhance wetland	20,125.8 acres	19,196 acres improved
	Install fence	1,070.57 miles	64.68 miles fence installed
	Decommission roads, relocate roads, improve roads	239.3 miles	211.06 miles road treated

* Data current as of 24 June 2009

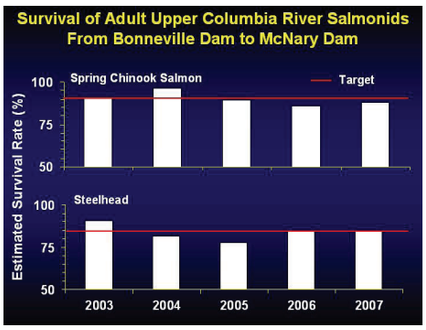
Hydrology and Salmon Survival

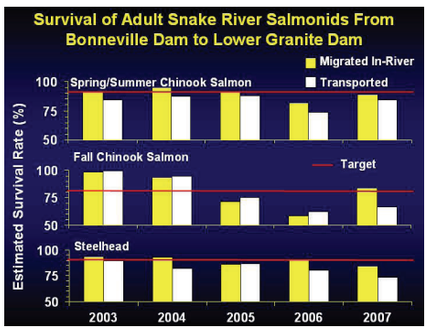
Salmon and steelhead survival depends in part on the hydrology of the Columbia River Basin in conjunction with operation of the hydrosystem. Juveniles, in particular, rely on flow to aid downstream migration, but annual discharge rate can fluctuate greatly. Flow is further regulated by the hydropower system. Dams have altered the seasonal flow of the basin to meet electricity, irrigation, flood control, navigation, recreation, and water supply demands. What was once a free-flowing river with a broad complex of habitats has been converted to a series of reservoirs.

Survival of juvenile salmonids may be directly affected by passage at dams, by the increased time and energy needed for migration to the ocean, or by other factors related to the changed river such as predation, disease, or thermal stress. Adult migration may be delayed or blocked by dams, and may also be affected by predation.

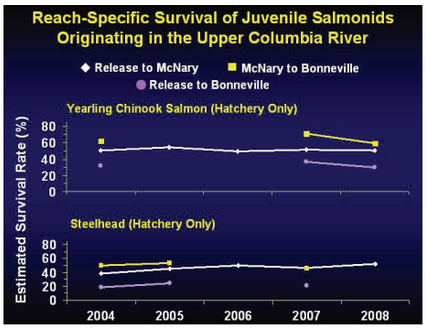
Actions intended to increase the survival of migrating juvenile salmonids include flow enhancement at critical times, increased spill at dams, placement of structures to increase passage efficiency, transportation past dams and reservoirs, and predation control measures. Actions to increase survival of migrating adults have been largely completed, and focused on increasing passage efficiency at dams. Predation control is an additional measure.

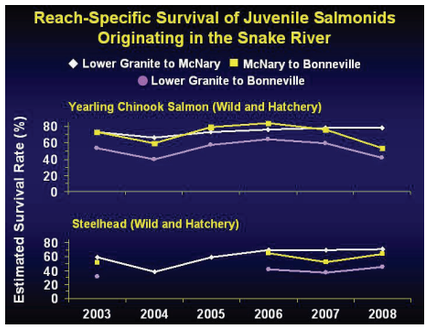
Survival of Adult Salmonids through the Hydropower System[11]



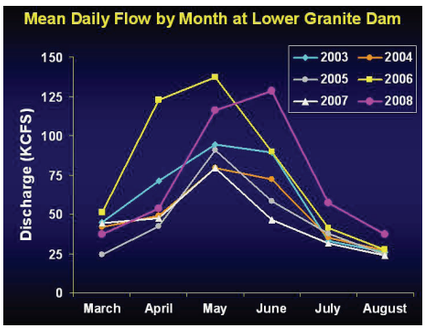


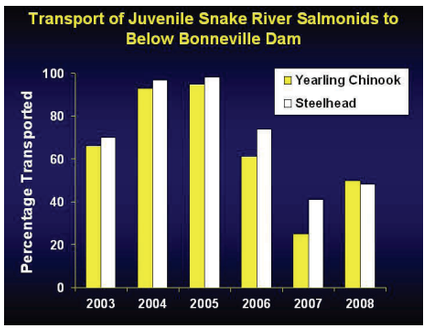
Survival of Juvenile Salmonids through the Hydropower System[12]





Snake River Flows and Transportation of Juvenile Salmonids[5,12]





Survival Estimates for Juvenile Salmonids at Specific Dams in Recent Years[13,14]

Dam, Year*	Yearling Chinook	Subyearling Chinook	Steelhead
Lower Granite (2006)	96.7%	91.8%	98.1%
Little Goose (2007)	100%	90.6%	98.7%
Lower Monumental (2008)	96.9%	94.1%	100%
Ice Harbor (2008)	97.3%	93.3%	97.1%
McNary (2008)	95.9%	95.9%	99.9%
John Day (2008)	95.6%	86.2%	98.4%
The Dalles (2005)	93.0%	90.0%	—
Bonneville (2005)	96.6%	93.8%	96.3%

* Survival from upstream face of dam to reference point in the tailrace

Dam*	Yearling Chinook	Subyearling Chinook	Steelhead
Wells	99.7% (1998)	—	94.6% (2000)
Rocky Reach	91.1% (2005)	—	96.0% (2006)
Rock Island	94.8% (2005)	—	94.0% (2006)

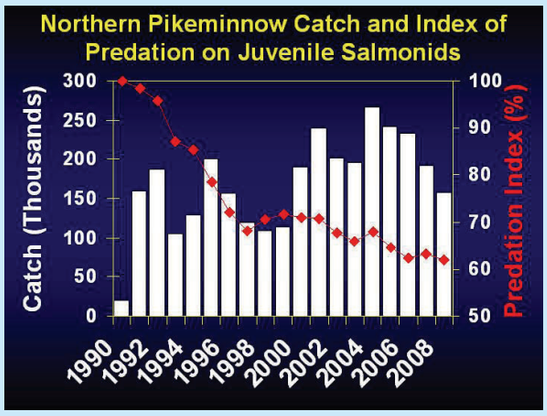
* Survival estimate includes both dam passage and reservoir migration

For dams at which multiple spill treatments were evaluated, and for which no "overall" survival estimate was provided, the estimate shown here is the highest reported.

Predation on Salmonids

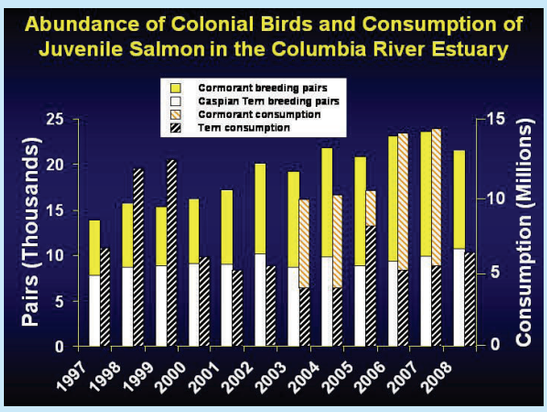
Predation research and management in the Columbia River, to date, has historically focused on losses of juvenile salmonids to predacious fish (primarily northern pikeminnow) and birds (primarily Caspian terns and cormorants). Predation by non-native fish such as smallmouth bass, walleye, and channel catfish has also become a concern. Initial steps have been taken to evaluate and manage predation by these non-natives. In recent years, predation on adult salmonids and white sturgeon by sea lions below Bonneville Dam has become an additional concern. Actions to reduce this predation have recently been implemented.

Northern Pikeminnow Management Program[15]



The goal of the Northern Pikeminnow Management Program (NPMP) is to reduce predation on juvenile salmonids through sustained harvest of northern pikeminnow. The NPMP is based on research conducted from 1983-93 that indicated: 1) loss of juvenile salmonids to resident fish predators was significant, 2) northern pikeminnow were responsible for a majority of the losses, and 3) relatively large reductions in predation could be achieved through relatively low exploitation of northern pikeminnow. Since the NPMP was implemented in 1990, program fisheries have harvested more than 3.2 million northern pikeminnow, with annual harvest rates (fish $\geq$ 250 mm) averaging approximately 13%. Models indicate that annual losses of juvenile salmonids to northern pikeminnow have decreased approximately 38% from pre-program levels. Empirical evidence supports these results. There is no evidence of compensation in predation, growth, or reproduction by surviving northern pikeminnow, or by other resident fish predators.

Avian Predation on Juvenile Salmonids in the Lower Columbia River[16]



A 1997 study found that Caspian terns nesting on Rice Island, a dredged material disposal island, were a significant predator of juvenile salmonids. Rice Island supported the largest Caspian tern breeding colony in the world (16,000 birds), and these birds consumed more juvenile salmonids than any other prey. Terns were subsequently relocated closer to the ocean on East Sand Island. By 2000, 94% of all terns in the estuary nested on East Sand Island. Since 2001, all Caspian terns nesting in the Columbia River estuary have used East Sand Island, and this relocation resulted in a sharp drop in consumption of juvenile salmonids. Double-crested cormorants are another common piscivorous water bird in the Columbia River Estuary. East Sand Island now supports 10-15,000 breeding pairs, compared to about 100 pairs in 1990.

Predation on Adult Salmonids by Sea Lions Near Bonneville Dam[17]

Predation on adult salmonids by California and Steller sea lions has been generally increasing, with over 3% of the total run (January through May) consumed per year since 2006. Predation is primarily on Chinook salmon (93.2% of the catch in 2008), with the remainder on steelhead. These values represent predation at Bonneville Dam only as predation rates in the remainder of the lower river are unknown. Most predation on salmonids (>90%) is by California sea lions, with Steller sea lions consuming mostly white sturgeon (1,139 in 2008). Pacific lamprey are also consumed by California sea lions; however, predation rates relative to this species are unknown. Sea lion deterrents that have been utilized include physical barriers to fishways, acoustic devices, and harassment. Trapping and removal was implemented in 2008.

Estimates of Predation on Adult Salmonids by Sea Lions at Bonneville Dam

Year	Salmonid Count (January 1—May 31)	Observed Salmonid Catch		Expanded Salmonid Catch	
		Catch	% of Run	Catch	% of Run
2002	284,733	448	0.2%	—	—
2003	217,185	1,538	0.7%	—	—
2004	186,804	1,324	0.7%	—	—
2005	82,006	2,659	3.1%	—	—
2006	105,063	2,718	2.5%	3,401	3.1%
2007	88,474	3,569	3.9%	4,355	4.7%
2008	147,543	4,243	2.8%	4,927	3.2%

Pacific Lamprey Background

Like salmon, Pacific lamprey are anadromous; however, their life-cycle is more complex than that of salmon. Juvenile lamprey remain burrowed in the substrate of streams for 4 to 6 years before emerging and migrating to the ocean in late-winter or early-spring. After 2 to 3 years in the ocean, adults return to streams from July to October and spawn the following spring.

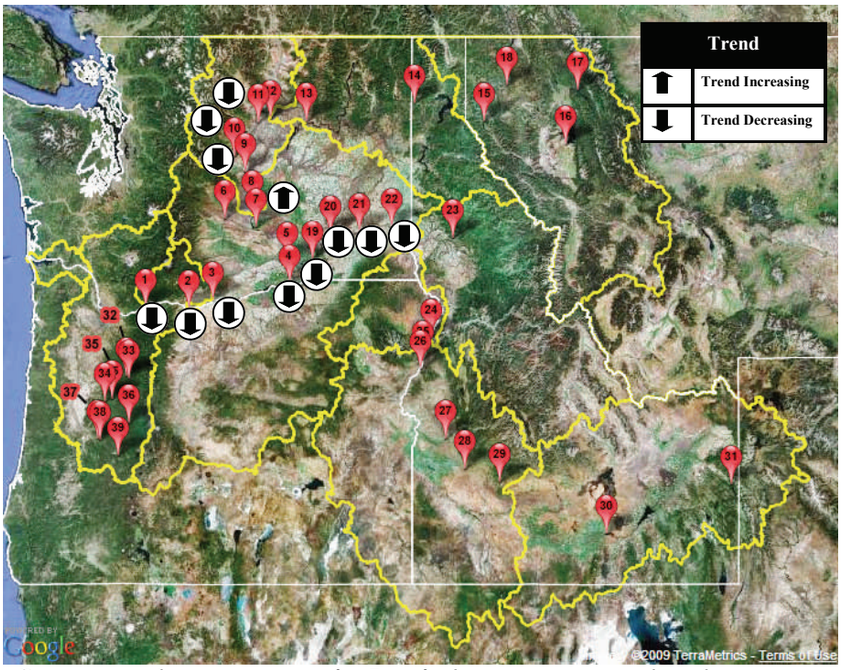
Indigenous peoples from the Pacific Northwest have harvested adult lamprey for subsistence, religious, and medicinal purposes for many generations.[18] Although historical population sizes of lamprey are unknown, adult Pacific lampreys were an important tribal subsistence food.

Pacific lamprey were likely widely distributed throughout the Columbia River Basin, but counts at dams on the Columbia and Snake rivers indicate a severe decline in Pacific lamprey abundance. Annual counts at Bonneville Dam prior to 1970 often exceeded 250,000 fish. Counts at most dams have decreased dramatically in recent years.

Declining trends in abundance suggest that productivity may be limited for all populations. Passage obstructions, degraded habitat, and impaired water quality are all factors that are decreasing the rate of population growth. Predation by exotic predators (e.g., smallmouth bass) may also decrease lamprey productivity.[19]

Recent efforts have begun to address some of these limiting factors and threats, especially passage of adults at mainstem dams. Structures designed to improve the collection and passage of lamprey have been installed at Bonneville Dam, with installations at other dams planned for future years. Gratings and screens will be replaced to enhance passage. Sharp corners in and around fish ladders are being rounded to further improve adult passage. Velocity-reducing structures are being evaluated. Adult and juvenile lamprey passage needs will be evaluated at each dam.

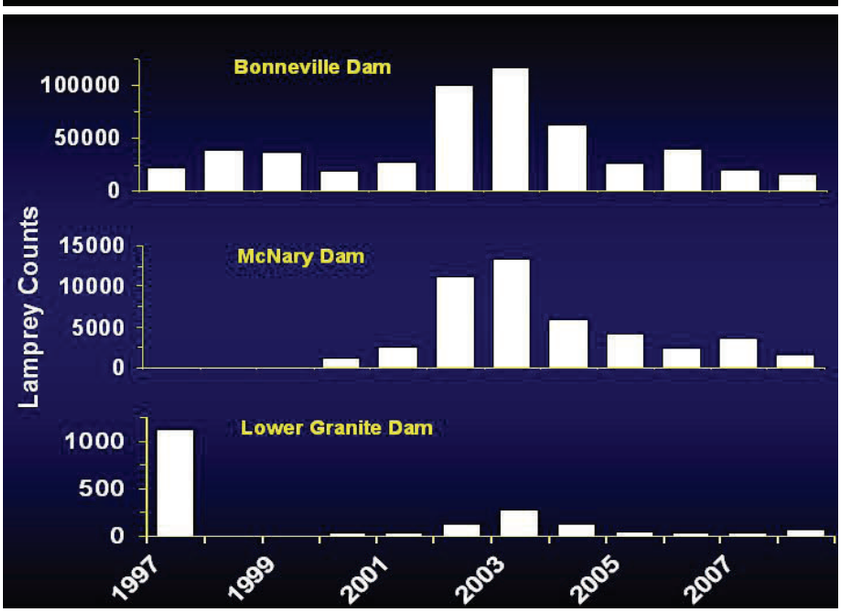
Trends of Adult Pacific Lamprey at Columbia River Hydroelectric Facilities (2007)



Genetic population structure for Pacific lamprey is currently unknown in the Columbia River Basin, thus, specific populations or management groups cannot be displayed at this time. In addition, little is known about adult returns to specific waters.

Please see the inside of the back cover for a complete list of names that correspond with the hydroelectric facility numbers.

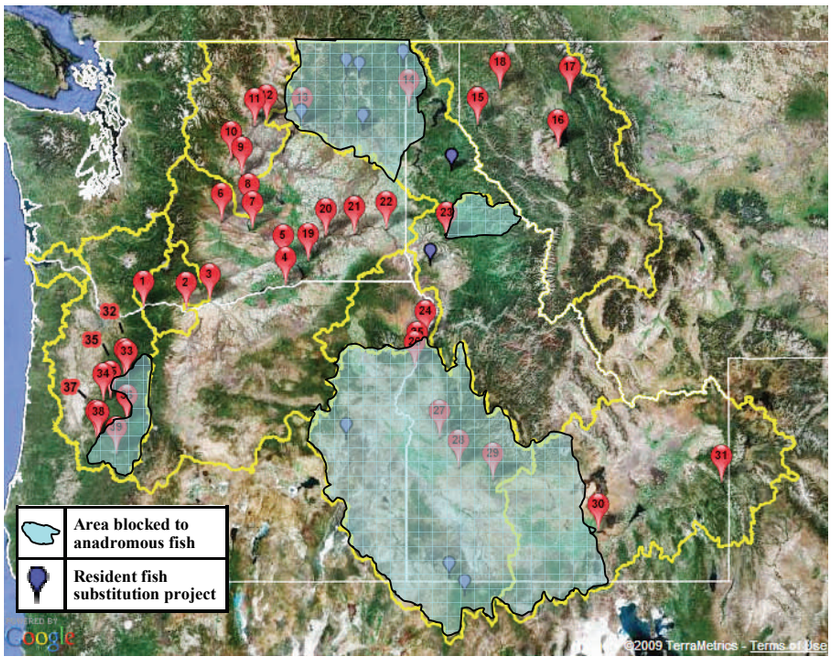
Counts of Adult Pacific Lamprey at Bonneville, McNary, and Lower Granite Dams[5]



Dam counts are used to index the relative abundance of Pacific lamprey, but they are of limited use in estimating actual abundance. Many adult lamprey pass at night when counting is not conducted. In addition, numerous routes are available for lamprey to pass dams without being detected. Research to develop more accurate counting methods is underway.

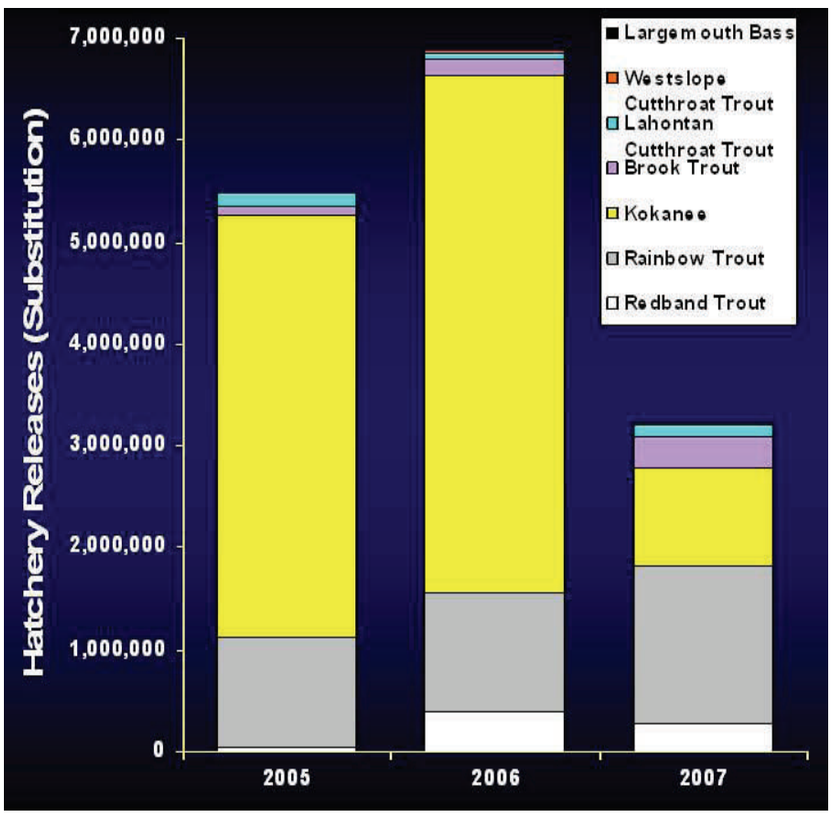
Anadromous Fish

Resident Fish Substitution for Lost Anadromous Fish Opportunities



Please see the inside of the back cover for a complete list of names that correspond with the hydroelectric facility numbers.

Columbia River Basin Resident Fish Substitution Releases[20-37]



Northwest Power and Conservation Council's Resident Fish Substitution Policy[38]

Resident fish populations throughout the Columbia River Basin have been affected by the construction and operation of the hydropower system. Dams altered natural river flows, inundated spawning and rearing areas, and blocked natural migration patterns. Historically, more than two million salmon and steelhead annually spawned in the upper Columbia River and Snake River basins.

Mitigation for the annual losses of anadromous fish in these blocked areas is achieved through the release of hatchery-produced fish such as kokanee, rainbow trout, brook trout, Lahontan cutthroat trout, and largemouth bass as well as habitat projects to benefit resident fish populations. These efforts are essential for providing tribal subsistence and public recreation fisheries, opportunities that were lost due the lack of passage for anadromous fish to reach historic spawning areas.

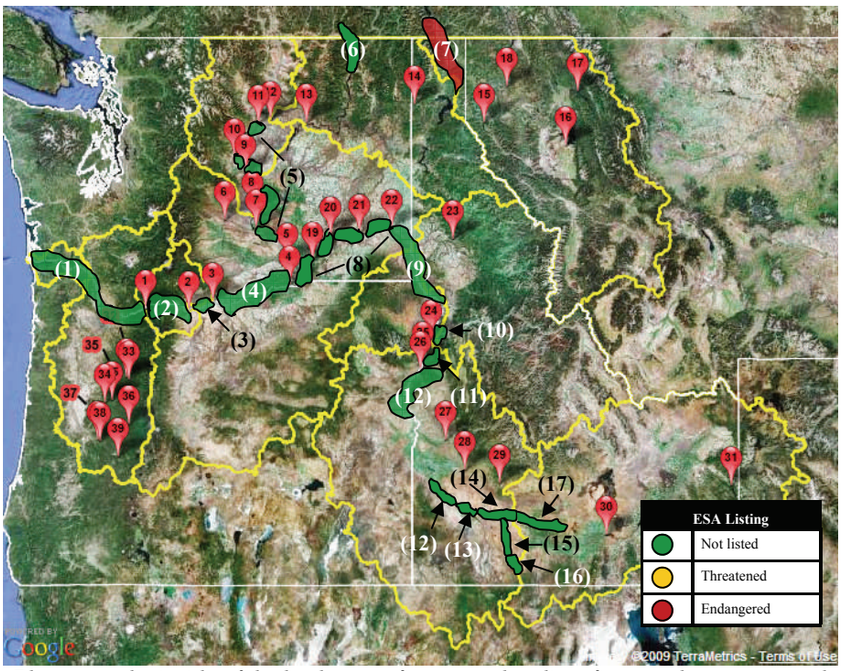
The Northwest Power and Conservation Council "finds that mitigation in areas blocked to salmon and steelhead by the development and operation of the hydropower system is appropriate, and flexibility in the approach utilized for mitigation is necessary. The Northwest Power and Conservation Council's resident fish substitution policy authorizes "restoring native and resident fish species to near historic ranges where habitat can be feasibly restored." The policy also calls for taking actions to reintroduce anadromous fish into areas blocked by dams such as Chief Joseph and Grand Coulee, where feasible, and for administering and increasing opportunities for consumptive and non-consumptive resident fisheries for native, introduced, wild and hatchery-reared stocks that are compatible with the continued persistence of native resident fish species. This includes intensive fisheries within closed or isolated systems and recreational fisheries such as those in northeastern Washington and northwestern Montana.

Columbia River Basin White Sturgeon Background

Since 1983, 13 Bonneville Power Administration–funded projects have been implemented throughout the Columbia River Basin to address the white sturgeon research needs. Some conclusions from these efforts included: 1) dams limit movements of white sturgeon and have functionally isolated populations, 2) the status and dynamics of each population are unique, 3) productivity in reservoirs is less than in the unimpounded area downstream from Bonneville Dam, 4) recruitment and subsequent population size are limited by the effects of river discharge on spawning habitat, which is restricted to high-velocity areas immediately downstream from dams, and 5) reservoirs provide large areas of suitable habitat for juvenile and adult white sturgeon, but compensatory population responses may reduce productivity if carrying capacity is reached.

Current white sturgeon population trends and sizes throughout the Columbia River Basin can be characterized as stable at a relatively high population size in the lower Columbia River, stable or variable at low to moderate population sizes in middle reaches, and declining at extremely low to negligible population sizes in upper reaches of the basin. The Kootenai River white sturgeon population was federally listed as endangered in 1994**.** Although recent research has provided insight into Columbia River Basin white sturgeon ecology and population status, many uncertainties remain that limit the effectiveness of recovery and management efforts.

Status of White Sturgeon in the Columbia River Basin

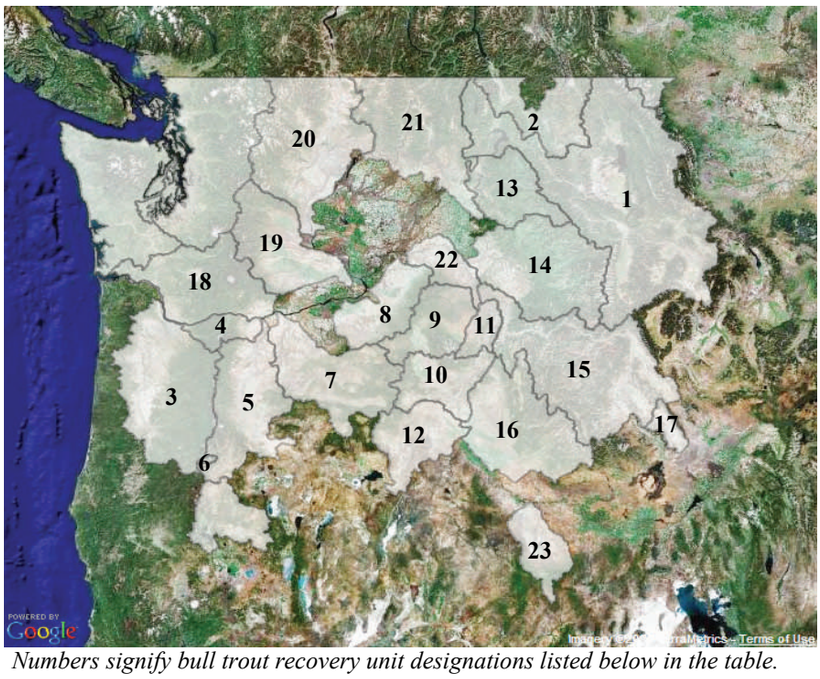


Please see the inside of the back cover for a complete list of names that correspond with the hydroelectric facility numbers.

Population/Management Unit*	ESA Listing Status	Abundance[39-44]
Lower Columbia (below Bonneville Dam) (1)	None	Unknown
Bonneville (2)	None	243 (adult-fish>72 inches, 2006)
The Dalles (3)	None	831(adult-fish>72 inches, 2008)
John Day (4)	None	841(adult-fish>72 inches, 2007)
Mid-Columbia (includes Priest Rapids, Wanapum, and Rocky Reach reservoirs) (5)	None	Data last collected in 2002
Upper Columbia (Transboundary) (6)	None	2,037 (fish > 27.5 inches in U.S. reach, 2005) 1,151 (fish > 13 inches in B.C. reach, 2004)
Kootenai (7)	Endangered	As few as 500
Lower Snake (includes McNary/Hanford Reach, Ice Harbor, Lower Monumental, and Little Goose reservoirs) (8)	None	Data last collected in 1997
Mid-Snake (9)	None	Unknown
Hells Canyon (10)	None	Data last collected in 2002
Oxbow (11)	None	Data last collected in 1998
Brownlee (12)	None	Data last collected in 1998
Swan Falls (13)	None	Data last collected in 1997
C.J. Strike (14)	None	566 (2007)
Bliss (15)	None	3,100 (2005)
Lower Salmon Falls (16)	None	Data last collected in 1993
Upper Salmon Falls (17)	None	Data last collected in 1981
Shoshone Falls	None	Data last collected in 2001

*Parenthetical numbers correspond to the numbers in the above map

Bull Trout Recovery Units in the Columbia River Basin

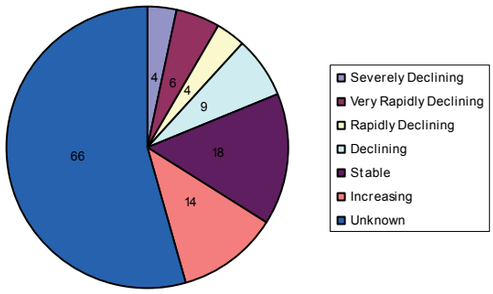


Numbers signify bull trout recovery unit designations listed below in the table.

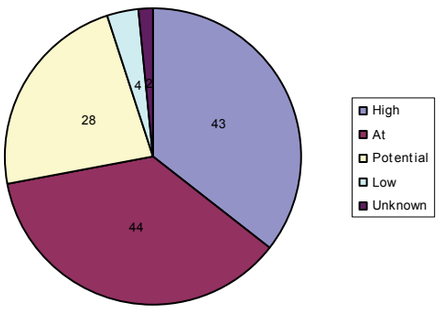
Recovery Unit (Location on Map)*	Population Abundance[45]
Clark Fork River (1)	11,251-41,600
Kootenai River (2)	10,501-102,050
Willamette River (3)	50-250
Hood River (4)	25-125
Lower Deschutes River (5)	1,000-2,500
Odell Lake (6)	1-50
John Day River (7)	Unknown (Middle and North Fork), 1-50 (Upper) Mainstem
Umatilla-Walla Walla River (8)	1,100-3,000
Grande Ronde River (9)	300-1,250
Imnaha-Snake River (10)	Unknown (Granite and Sheep), 250-1,000 (Imnaha)
Hells Canyon Complex (11)	500-2,000
Malheur River (12)	50-250
Coeur d'Alene Lake Basin (13)	50-250
Clearwater River (14)	Unknown (Middle-Lower Clearwater and Selway), 1,302-3,850 (Fish Lake, Lochsa, North Fork Clearwater, South Fork Clearwater
Salmon River (15)	Unknown (Middle Fork Salmon, Middle Salmon/Chamberlain, Middle Salmon/Panther, Opal, Pashimeroi, South Fork Salmon, Upper Salmon), 350-1,500 (Lake Creek, Lemhi, Little Lower Salmon)
Southwest Idaho (16)	Unknown (Arrowrock, Middle Fork Payette, Upper South Fork Payette, Weiser), 752-3,100 (Anderson Ranch, Deadwood, Squaw Creek)
Little Lost River (17)	Unknown
Lower Columbia River (18)	Unknown (Klickitat), 1,000-2,500 (Lewis)
Middle Columbia River (19)	250-1,000
Upper Columbia River (20)	350-1,500
Northeast Washington (21)	1-50
Snake River Washington (22)	1,050-2,750
Jarbidge River (23)	50-250

* Parenthetical numbers correspond to the numbers in the above map

Bull Trout Core Area Trends[45]



Bull Trout Core Area Risks[45]



Bull Trout Population Terminology[46]

Despite being widespread throughout their historical range, bull trout have declined in overall distribution and abundance. Population declines can be attributed to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, and the introduction of non-native fish species. In 1998, the USFWS listed Columbia River populations of bull trout as threatened. The USFWS identified 141 subpopulations (i.e., isolated groups thought to lack two-way exchange of individuals) in the Columbia Basin distinct population segment (DPS) and 1 subpopulation in the Jarbidge River DPS. The following are terms for population units that will be used throughout this document in relation to bull trout:

Local Populations — Populations that are isolated reproductively.

Core Areas — Groups (local populations that are partially isolated, but have some degree of gene flow among them) that function as metapopulations. Within this metapopulation, local populations are expected to function as one demographic unit.

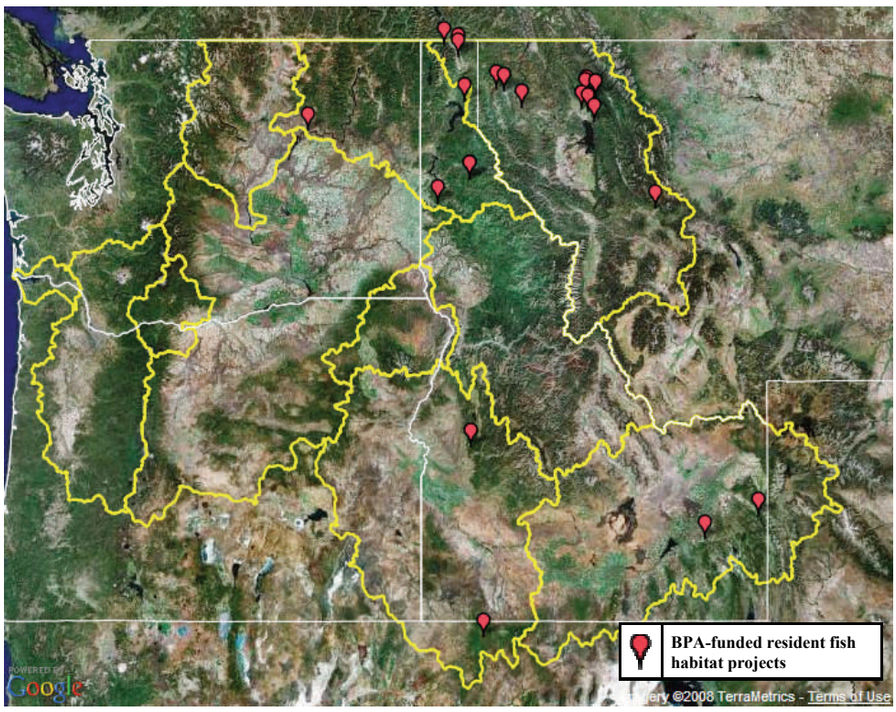
Recovery Unit — Groups that share genetic characteristics and management jurisdictions (can be one local population or multiple core areas). Most recovery units are consist of multiple core areas.

Resident Fish Habitat Project Background

During FY 2008, the BPA funded projects to improve wetland, in-stream, riparian, and riparian-upland habitats zones that are important for the conservation and restoration of resident fish. General descriptions of the project-types and the habitat zones addressed through the implementation of the associated actions are listed below. A description of the actions are included in the Appendix.

Accomplishments can be measured several ways. A project for which the focus is to increase instream habitat complexity may have the following objectives: 1) install a specific number of structures and 2) treat a specified number of stream miles. Similarly, installation of wells, pipelines, sprinkler, etc. can provide multiple benefits (e.g., primary stream miles improved, total stream miles improved, cfs of water conserved, and acre-feet of water conserved).

FY 2008 BPA –Funded Resident Fish Habitat Projects

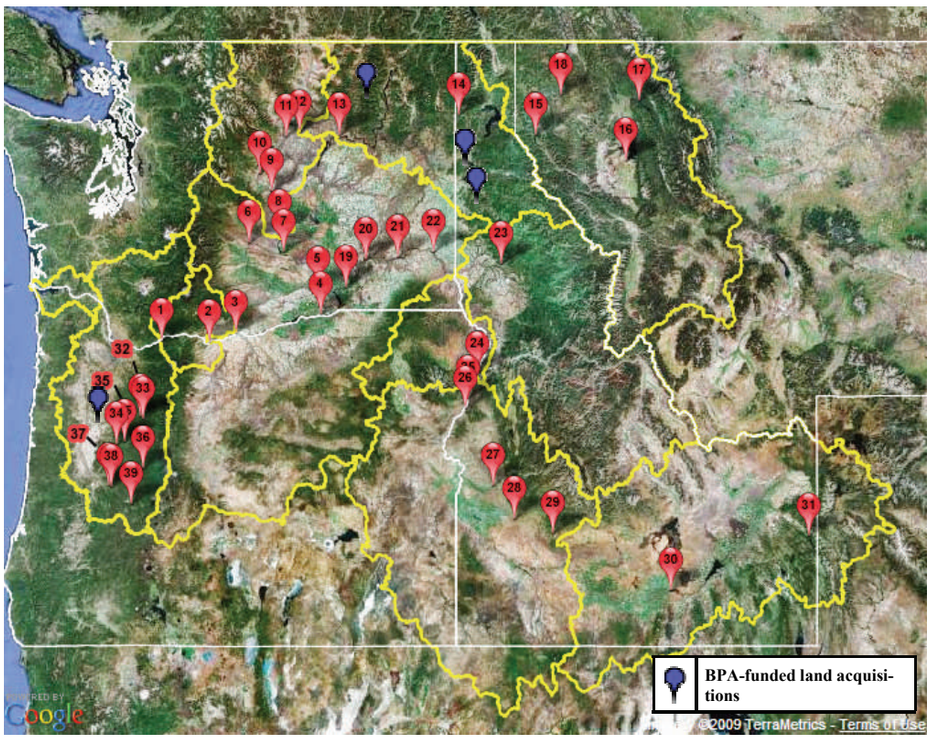


BPA FY 2008 Resident Fish Habitat Project Accomplishments[9]

Habitat Zone	Project-type	Planned Value*	FY 2008 Accomplishment (Actual Value)*
Wetland	Realign, connect, and/or create channel	15.5 acres	13.5 acres created/treated
Instream	Increase instream habitat complexity and stabilization	264 structures	326 structures installed
	Removal/install diversion, remove/breach dam, install fish passage structure	8.4 miles	8.4 habitat miles accessed
	Install well, install pipeline, install sprinkler, acquire water instream	4.5 miles	4.5 miles of primary stream reach improved
	Install well, install pipeline, install sprinkler, acquire water instream	7.4 miles	7.4 miles of total stream reach improvement
	Realign connect and/or create channel	0.2 miles	0.2 stream miles after treatment
	Install pipeline	2 cfs	2 cfs flow conserved
	Install pipeline	40 acre-feet	40 acre-feet water conserved
	Acquire water instream	2.3 cfs	2.3 cfs of flow protected
	Acquire water instream	430.5 acre-feet	430.5 acre-feet water protected
Riparian	Plant vegetation	177.77 miles	177.79 miles planted
	Purchase land, lease land	3.14 miles	3.14 miles protected
Riparian-Upland	Land purchase, land lease	843 acres	843 acres protected
	Conduct controlled burn, plant vegetation, practice no-till and conservation tillage, remove vegetation, upland erosion and sedimentation control, enhance floodplain, create, restore, and enhance wetland	8,899.4 acres	8,707.8 acres treated
	Install fence	28.77 miles	26.57 miles of fence installed
	Decommission roads, relocate roads, improve roads	86.75 miles	48.21 road miles treated

* Data current as of 24 June 2009

BPA FY 2008 Funded Land Acquisitions



Please see the inside of the back cover for a complete list of names that correspond with the hydroelectric facility numbers.

Land Acquisition Background

During FY 2008, the BPA funded five acquisitions (includes fee title purchases and conservation easements) throughout the Columbia River Basin. These acquisitions led to the protection of 113,548 acres. In addition, an estimated 2,438 habitat units, for wildlife crediting purposes, were identified as a result of purchases.

For a complete list of parcels purchased in previous fiscal years as well as a map showing their location in the Columbia River Basin, please visit www.cbfwa.org.

Wildlife Habitat Losses by Hydroelectric Facilities in the Columbia River Basin[9]

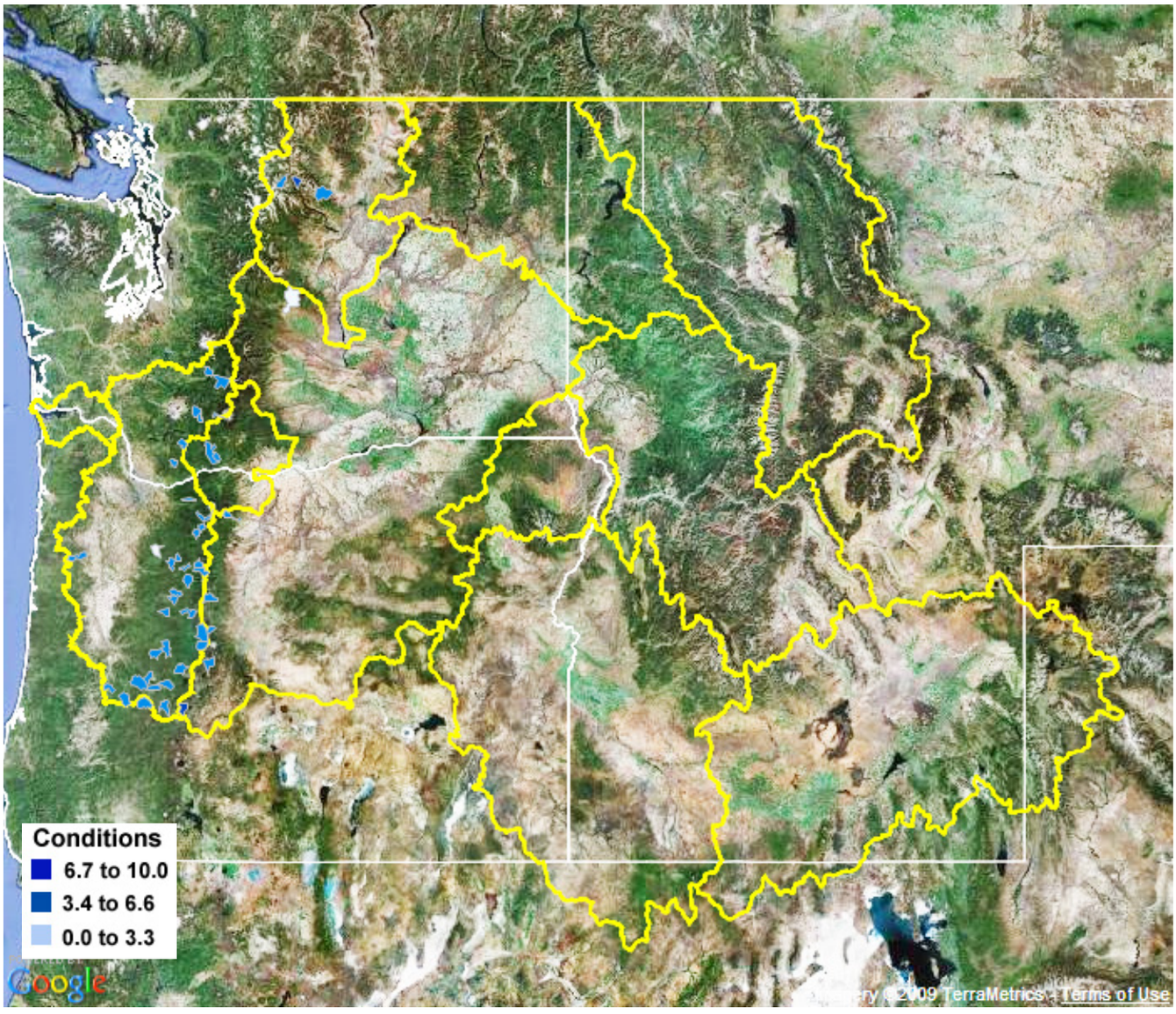
Dam	Habitat Units Lost Due to Construction	Gained Habitat Units	Total Habitat Units Credited
Bonneville (OR) (1)	6,159	1,335	590
Bonneville (WA) (1)	6,159	1,335	871
The Dalles (OR) (2)	1,165	289	0
The Dalles (WA) (2)	1,165	289	329
John Day (OR) (3)	18,280	7,199	14,057
John Day (WA) (3)	18,280	7,199	11,019
McNary (OR) (4)	4,710	2,749	8,406
McNary (WA) (4)	18,834	10,995	32,810
Chief Joseph (12)	8,833	1,440	567
Grand Coulee (13)	111,785	0	107,842
Albeni Falls (14)	28,658	171	9,872
Black Canyon (27)	2,170	076	57
Anderson Ranch (29)	9,619	0	1,063
Minidoka (30)	10,503	0	1,744
Palisades (31)	37,070	0	16,093
Big Cliff (32)	413	40	32
Detroit (33)	11,298	0	0
Foster (34)	3,544	926	96
Greenpeter (35)	16,432	4,742	0
Cougar (36)	11,124	1,637	511
Dexter (37)	6,648	1,214	196
Lookout Point (38)	25,454	2.634	1,296
Hills Creek (39)	19,489	853	1,565
Deadwood	Not available	Not available	Not available

The BPA is responsible for mitigating the impacts to wildlife caused by the development of the dams of the Federal Columbia River Power System. These impacts have been quantified by the Northwest Power and Conservation Council through the completion of "impact assessments" for each dam. Through the Habitat Evaluation Procedure (HEP), impact assessments, which are also referred to as loss assessments, identify the "habitat units" (HU) that were lost due to construction and inundation behind the dams.

Wildlife mitigation activities include land acquisition and management, habitat restoration and improvement, weed control, fencing, and other wildlife conservation efforts. The HUs associated with the mitigation activity are measured or estimated and then counted against the impact assessment for the dam being mitigated. For each wildlife property acquisition, a baseline HEP survey is completed after the acquisition to determine the number of HUs associated with the acquisition.

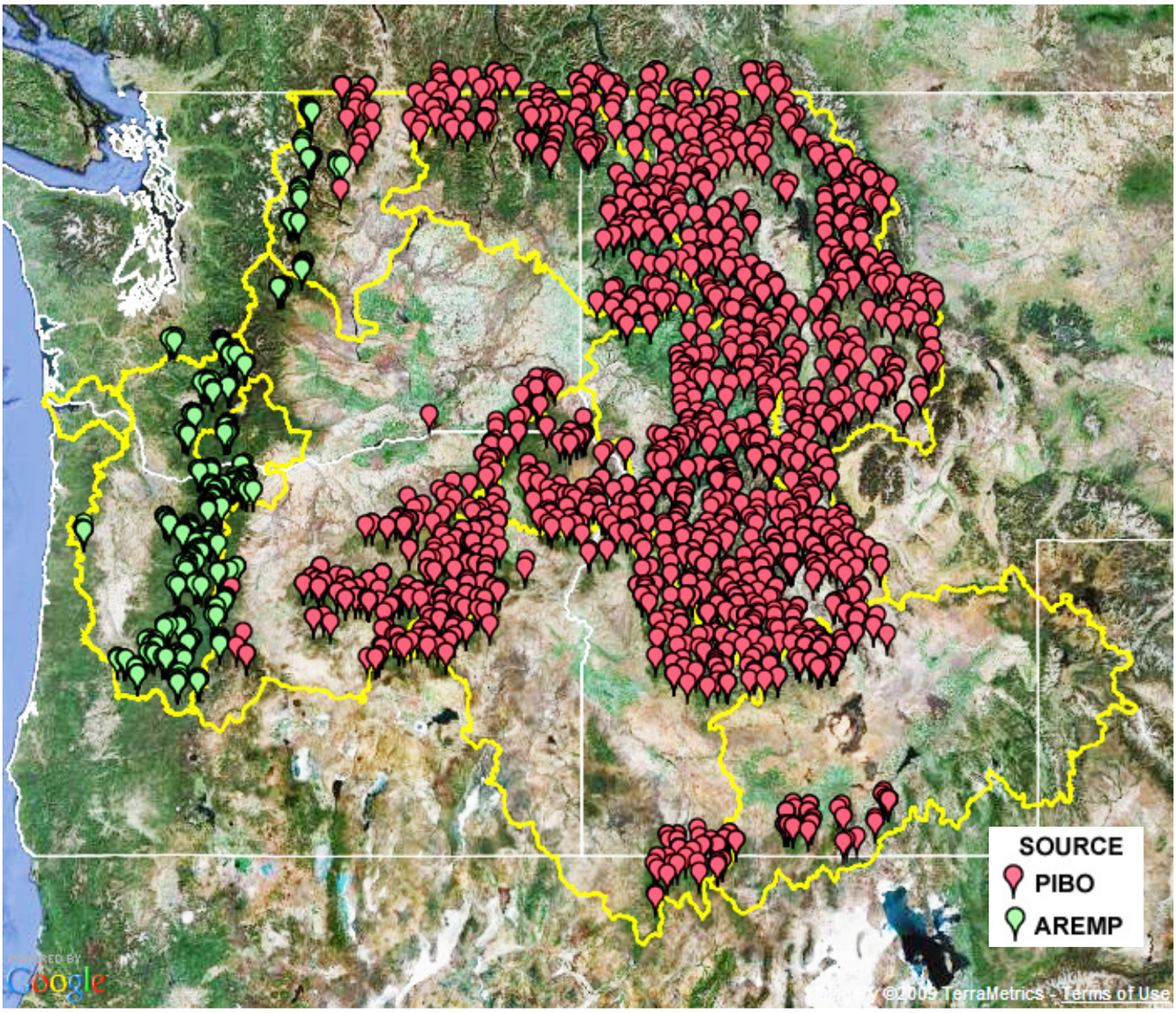
Dams where BPA's wildlife mitigation obligations have been settled, such as Libby, Hungry Horse, and Dworshak, are not listed in the table.

Watershed Conditions for National Forest and Bureau of Land Management Lands in the Columbia River Basin[47]



Watershed condition is based upon work completed by the USDA Forest Service (FS) and USDI Bureau of Land Management (BLM) Aquatic and Riparian Effectiveness Monitoring Program (AREMP). AREMP personnel evaluate the status and trend of watershed condition on FS, BLM, and National Park Service administered lands within the range of the Northern Spotted Owl. Watershed condition scores are determined for all watersheds that contain a minimum of 25 percent federal ownership. AREMP applies a decision support model to evaluate the premise that watersheds are in good condition. Watersheds are judged to be in good condition where the physical processes, such as wood and sediment delivery, and habitat attributes are adequate to maintain or improve the diversity and abundance of native or desired non-native aquatic species.[47] A score of 10 indicates full support for the premise that a watershed is in good condition and a score of 0 indicates no support for the premise. A 15-year assessment of watersheds is being done in 2009, with an expected publication date of early 2010.

Stream Inventory Sites on National Forest and Bureau of Land Management Lands in the Columbia River Basin[47-48]

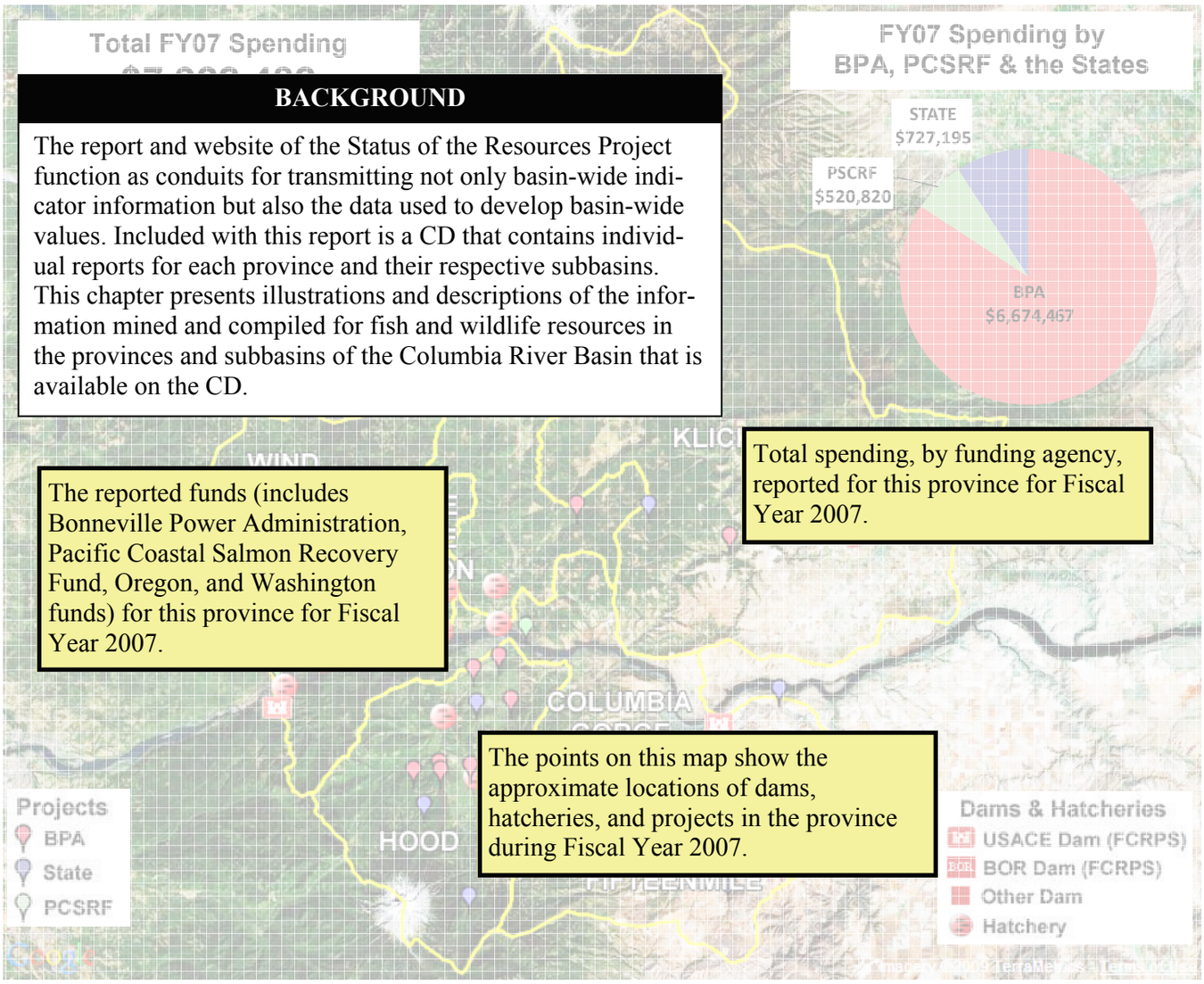


Green Symbol—Indicates locations where stream information is collected by the USDA Forest Service and USDI Bureau and Land Management through the Aquatic and Riparian Effectiveness Monitoring Program (AREMP).

Red Symbol—Bureau and Land Management through the PacFish/InFish Biological Opinion Monitoring Program (PIBO). The locations and information reported are for the sentinel and integrator sites used to track habitat status and trend within the PIBO area over time.[48]

Data for locations depicted on this map are available at www.cbfwa.org/sotr.

Chapter 3: Province/Subbasin



BACKGROUND

The report and website of the Status of the Resources Project function as conduits for transmitting not only basin-wide indicator information but also the data used to develop basin-wide values. Included with this report is a CD that contains individual reports for each province and their respective subbasins. This chapter presents illustrations and descriptions of the information mined and compiled for fish and wildlife resources in the provinces and subbasins of the Columbia River Basin that is available on the CD.

The reported funds (includes Bonneville Power Administration, Pacific Coastal Salmon Recovery Fund, Oregon, and Washington funds) for this province for Fiscal Year 2007.

Total spending, by funding agency, reported for this province for Fiscal Year 2007.

The points on this map show the approximate locations of dams, hatcheries, and projects in the province during Fiscal Year 2007.

This section provides general background on the location, federally-listed species, and geologic, cultural, economic, and biologic characteristics of the province.

The Columbia Gorge Province is bounded by Bonneville Lock and Da
at river mile 191 on the Columbia River, and encompasses an area of 3
Columbia Gorge Province include the Big White Salmon, Columbia G
Reservoir), Hood, Fifteenmile, Klickitat, Little White Salmon, and Wi
steelhead (summer and winter), and bull trout populations throughout the province are listed under the federal
Endangered Species Act. This province is characterized by a complex geologic structure and vegetation pattern.
Fed by glaciers in the Oregon and Washington Cascades, the rivers in the province flow from high elevation
coniferous forests and transition through fruit orchards and other irrigated agriculture in the lowlands before
entering the Columbia River. Forestry, ranching, agriculture, orchards, and tourism are significant factors in the
economy of communities in the province.

Key to Province Layouts

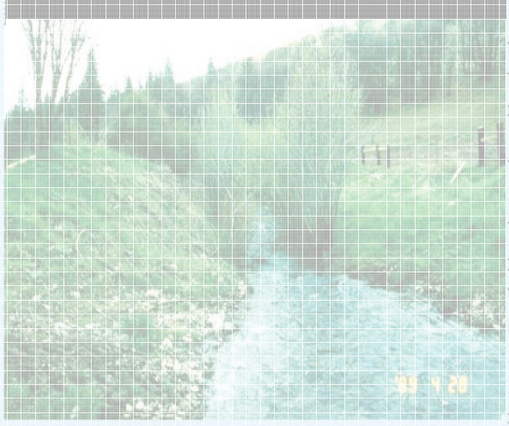
BPA FY 2008 Habitat Project Accomplishments in the Columbia Gorge Province[8]

Habitat Zone	Project-type	Planned Value	FY 2008 Performance Indicator (Actual Value)
Instream	Increase instream habitat complexity	1 stream miles	0 stream miles treated
	Increase instream habitat complexity	64 structures	54 structures installed
	Install well, install pipeline, install sprinkler, acquire water instream	2.3 cfs water	2.3 cfs of water saved
	Install well, install pipeline, install sprinkler, acquire water instream	3.8 cfs water	3.8 cfs of water protected
	Install well, in… water instream	…1,810 acre-feet	1,810 acre-feet water conserved
	Install well, in… water instream	…906.1 acre-feet	906.1 acre-feet water protected
	Install well, in… water instream	…3 miles of primary stream reach improved
	Install well, install pipeline, install sprinkler, acquire water instream	67.6 miles	67.6 miles of total stream reach improvement
	Install fish passage structure	2.2. structures	2.2 structures installed
Riparian	Plant vegetation	2.25 miles	.5 miles planted
	Purchase land, lease land	1 miles	1.35 miles protected
Riparian-Upland	Land purchase, land lease	20 acres	14 acres protected
	Plant/remove vegetation	92.6 acres	65.3 acres treated
	Install fence	1.55 mile	2.15 miles of fence installed

This section provides habitat project accomplishments for Bonneville Power Administration-funded projects during Fiscal Year 2008.

Habitat Improvement Project — Fifteenmile Subbasin[41]

Before



Fifteenmile Creek supports the easternmost run of wild winter steelhead in the Columbia River Basin, a population that was federally-listed as threatened under the Endangered Species Act in 1999. The population, which is part of the Mid-Columbia Ecologically Significant Unit, has ne… …lhead.

This section provides an overview of accomplishments for a Bonneville Power Administration-funded project in this province.

W… …Wildlife, Co… …on, and the U… …following six factors as affecting the quantity/quality of summer rearing habitat for winter steelhead in the Fifteenmile Creek Basin: 1) passage barriers, 2) lethal summer temperatures, 3) low summer flows, 4) lack of habitat diversity, 5) lack of channel stability, and 6) sediment loading. To address these limiting factors, biologists recommended that 80-90 mile of stream should be treated using: 1) structural improvements for adult and juvenile passage, 2) riparian fencing, 3) structural channel stabilization, and 4) structural rearing habitat improvements.

After

From 1986 to present, implementation of the Fifteenmile Creek Habitat Restoration Project has led to completion of 5 fishways, 203 leased and co-op miles of riparian corridor fence resulting in the protection of over 109 miles of stream, 30 off-site water developments, installation of 924 structures producing 20.6 miles with structure, and the addition of 90 irrigation screens.

These photos illustrate results of riparian corridor fencing implemented through the Fifteenmile Creek Habitat Restoration Projected.

Focal Species[a]

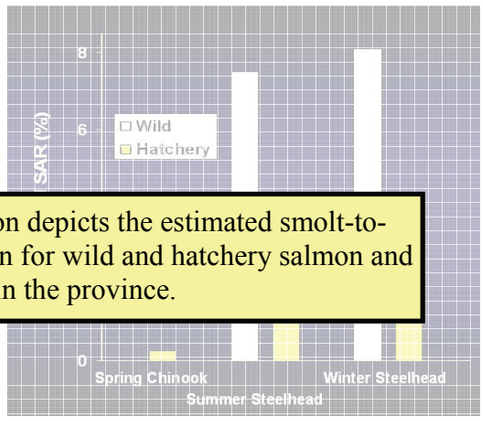
Focal Species	Big White Salmon	Columbia Gorge	Fifteen-mile	Hood	Klickitat	Little White Salmon	Wind
Coastal Cutthroat Trout							
Coho							
Pacific Lamprey							
Rainbow Trout							
Steelhead – Winter							
Steelhead – Summer							
White Sturgeon							

Not a focal species | Not listed | Species of Concern[b] | Threatened[c]

Focal species for each subbasin in the province, as determined by the subbasin planners, and their respective federal designations.

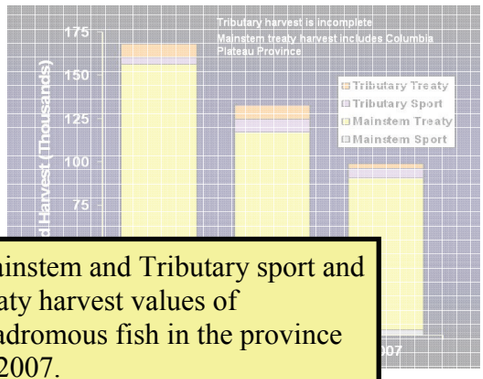
[a]Focal species were identified by subbasin planners during the Northwest Power and Conservation Council's subbasin planning process. Since the completion of subbasin planning, the list of focal species has been amended through the Fish and Wildlife Program Amendment process. This list represents the most current suite of focal species.
[b] USFWS Status
[c] ESA Status

Smolt to Adult Return (SAR) for Salmon and Steelhead Originating from the Columbia Gorge Province (Hood River)[49]



This section depicts the estimated smolt-to-adult return for wild and hatchery salmon and steelhead in the province.

Columbia Gorge Province Salmon and Steelhead Harvest[5,6]



Mainstem and Tributary sport and treaty harvest values of anadromous fish in the province in 2007.

Species/ Race	Mainstem Harvest 2007		Tributary Harvest 2007	
	Sport	Treaty	Sport	Treaty
Spring Chinook	92	6,144	3,670	2,745
Summer Chinook	0	5,375	0	0
Fall Chinook	659	45,356	390	50
Coho	1,141	8,035	104	Unknown
Winter Steelhead	6	558	499	0
Summer Steelhead	871	1,362	935	Unknown

2007 Hatchery Releases and Returns to Hatcheries in the Columbia Gorge Province[42–48]

Species	Release Goal/ Released	Return Goal/Return to Collection Facility
Spring Chinook	3,975,000/	/
Fall Chinook (Upriver River Bright)	8,500,000/	/
Fall Chinook (Tule)	15,100,000/	/
Summer Steelhead		
Winter Steelhead		
TOTAL		

Hatchery releases and adult returns to hatcheries in 2007. Returning adults were released in previous years.

The release goals include values for national fish hatcheries that ensure the U.S. Fish and Wildlife Service meets mandated treaty and trust responsibilities. These release goals reflect values identified in the Columbia River Fish Management Plan developed as a result of the *U.S. v Oregon* agreement.

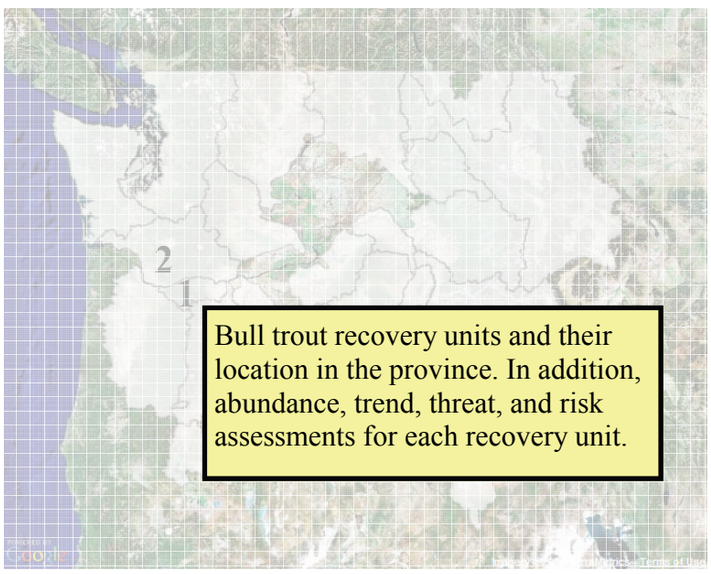
Key to Province Layouts

Status and Recovery Standards for ESA-Listed Salmon and Steelhead in the Columbia Gorge Province[50,51]

ESU or DPS	Major Population Group (MPG)	Populations and Viability			Number of Natural Spawners	
		No. of Populations	No. Meeting Viability Standards	Minimum No. Needed to Meet Standards	Minimum if MPG Viability Standards Met	Minimum if all Populations Meet Standards
Lower Columbia Chinook	Spring Run Gorge				1,729	Unknown
	Fall Run Gorge				2,387	>4,172
Lower Columbia Coho	Gorge	3	0	Unknown	Unknown	9,505
Columbia River Chum	Gorge	2	1	1	>2,000	Unknown
Lower Columbia Steelhead	Gorge Winter	3	0	2	3,059	3,644
	Gorge Summer	2	1	2	2,988	2,988
Mid Columbia Steelhead	Cascade Eastern Slope	6	2	4	4,000-4,500	5,000

This section describes the status and recovery standards for ESA-listed salmon and steelhead in the province.

Bull Trout Status in the Columbia Gorge Province[39]



Bull trout recovery units and their location in the province. In addition, abundance, trend, threat, and risk assessments for each recovery unit.

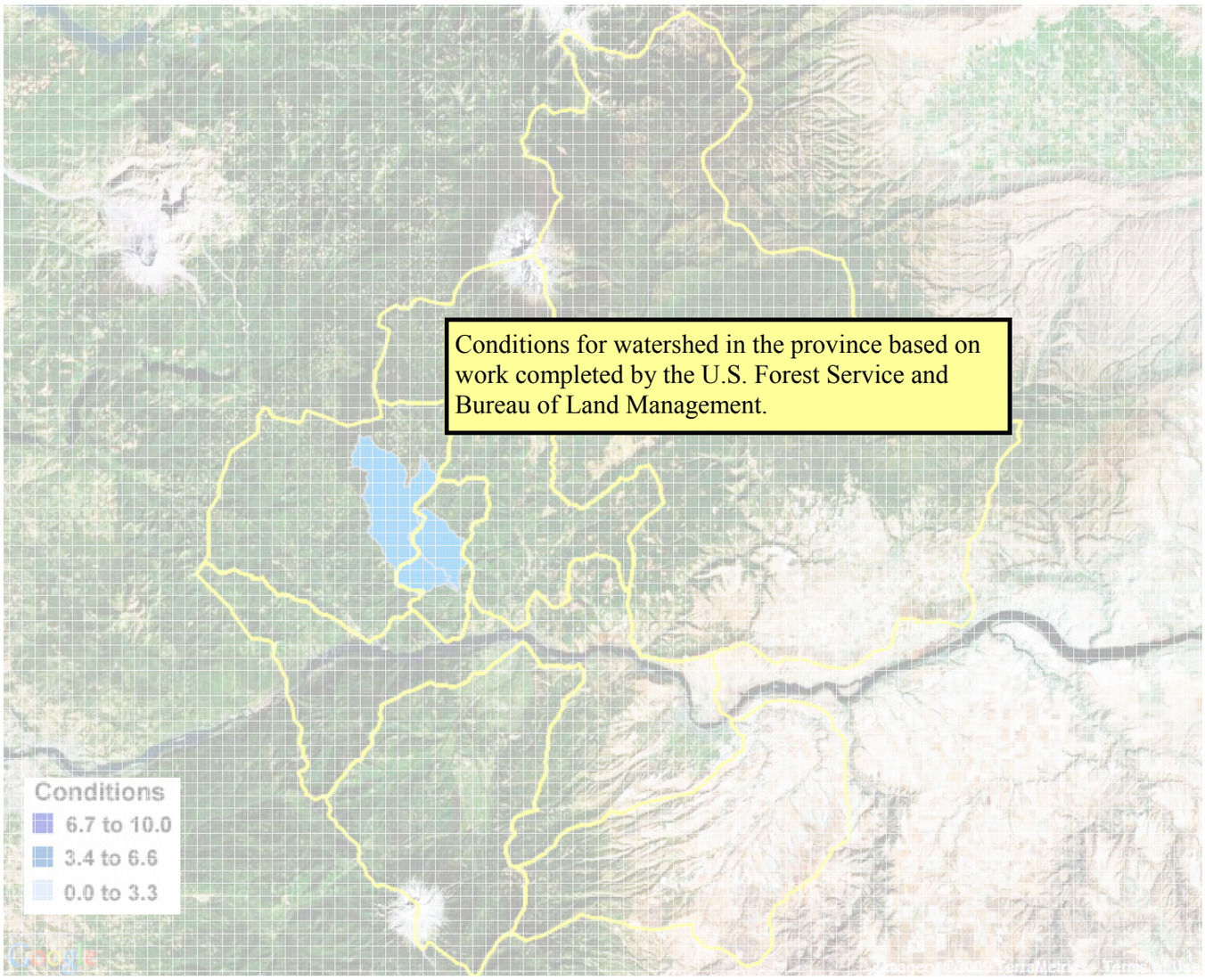
Recovery Unit	Number of cores	Abundance	Trend	Threat	Risk
Hood River (1)	1	50-250	Unknown	Moderate (imminent)	High
Lower Columbia River (2) Klickitat River = Gorge Core	2 (one in Gorge)	Unknown for Gorge core	Unknown for Gorge core	Moderate (imminent) for Gorge Core	At

Wildlife Habitat Losses by Hydroelectric Facility in the Columbia Gorge Province[8]

Dam	HU Lost	HU Credited in 2008	HU Credited (Gained)
Bonneville (OR)	6,159		1,335
Bonneville (WA)			
The Dalles (OR)			
The Dalles (WA)			

This table shows the habitat units lost due to the construction and operation of hydroelectric facilities in the province and the total habitat units that have been mitigated by the Bonneville Power Administration as well as those credited in 2008.

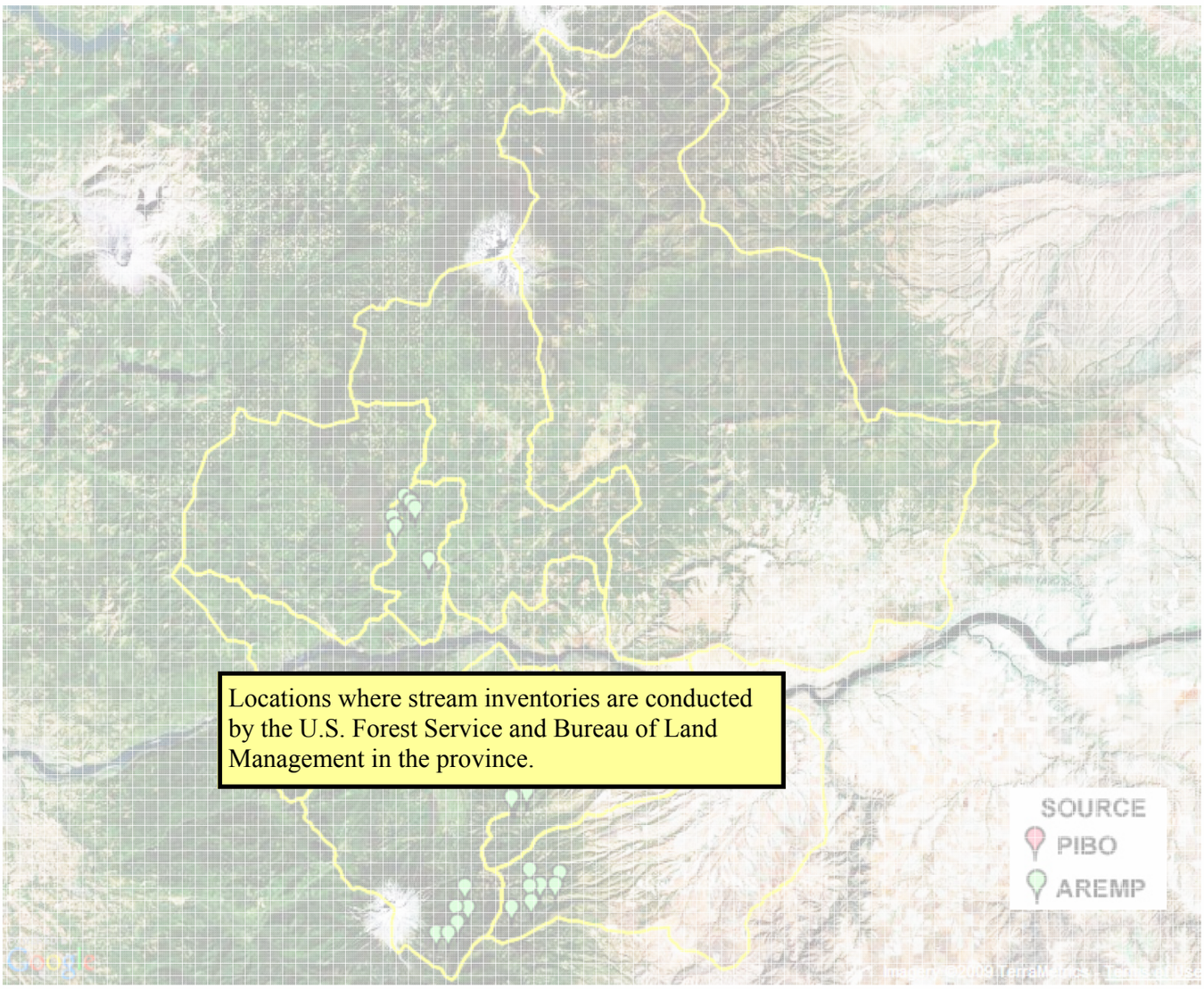
Watershed Conditions for National Forest and Bureau of Land Management Lands in the Columbia Gorge Province[52]



Watershed condition is based upon work completed by the USDA Forest Service (FS) and USDI Bureau of Land Management (BLM) Aquatic and Riparian Effectiveness Monitoring Program (AREMP). AREMP personnel evaluate the status and trend of watershed condition on FS, BLM, and National Park Service administered lands within the range of the Northern Spotted Owl. Watershed condition scores are determined for all watersheds that contain a minimum of 25 percent federal ownership. AREMP applies a decision support model to evaluate the premise that watersheds are in good condition. Watersheds are judged to be in good condition where the physical processes, such as wood and sediment delivery, and habitat attributes are adequate to maintain or improve the diversity and abundance of native or desired non-native aquatic species. (Gallo et al 2005). A score of 10 indicates full support for the premise that a watershed is in good condition and a score of 0 indicates no support for the premise. A fifteen-year assessment of watersheds is being done in 2009, with an expected publication date of early 2010.

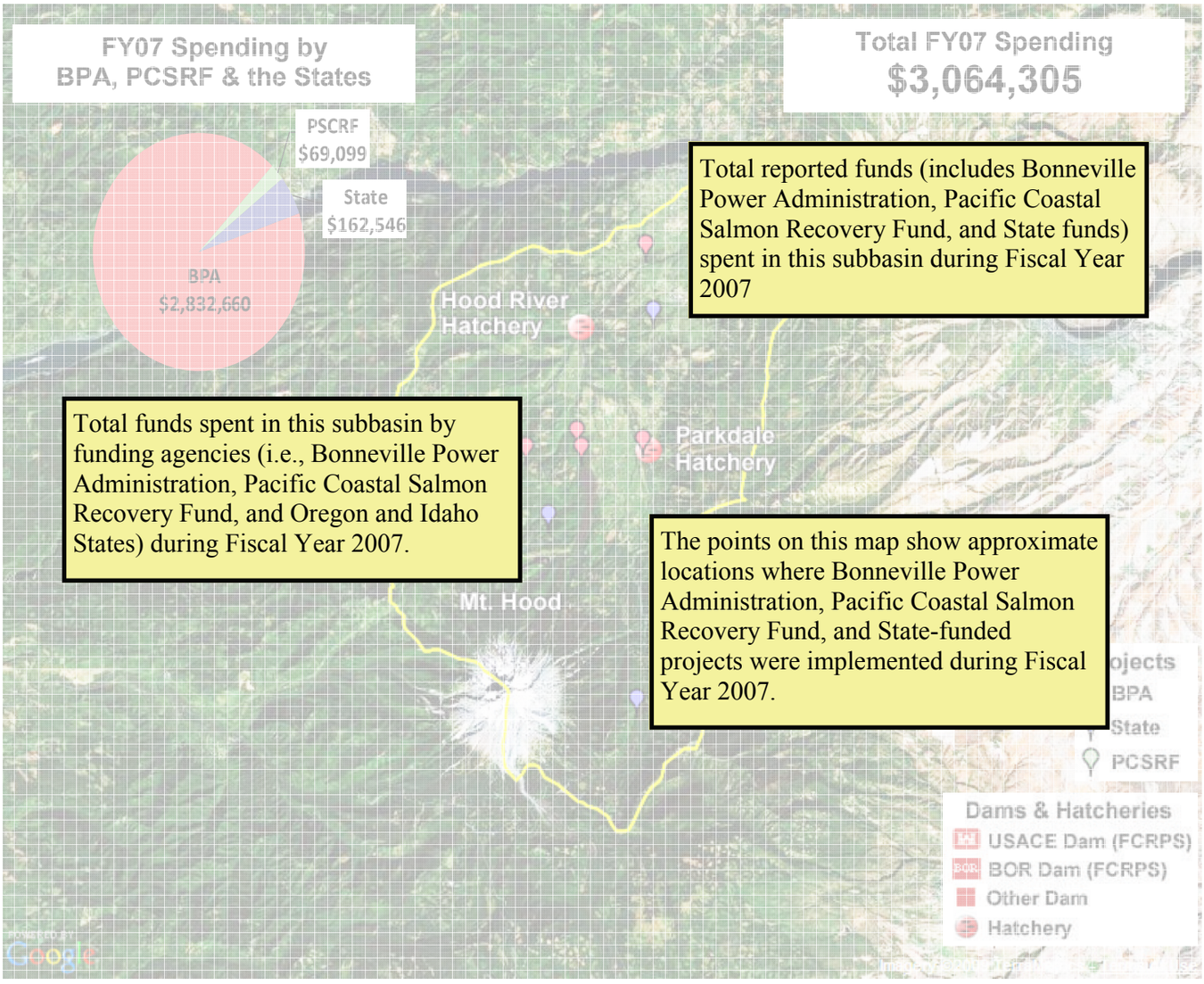
Key to Province Layouts

Stream Inventory Sites on National Forest and Bureau of Land Management Lands in the Columbia Gorge Province[53,54]



Green Symbol—Indicates locations where stream information is collected by the USDA Forest Service and USDI Bureau and Land Management through the Aquatic and Riparian Effectiveness Monitoring Program (AREMP).

Red Symbol—Indicates locations where stream inventory information is collected by the USDA Forest Service and USDI Bureau and Land Management through the PacFish/InFish Biological Opinion Monitoring Program (PIBO). The locations and information reported are for the sentinel and integrator sites used to track habitat status and trend within the PIBO area over time (Archer et al 2008 available at http://www.fs.fed.us/biology/resources/pubs/feu/pibo/2008-pibo_em_annual_report.pdf)



In the Hood River Subbasin, steelhead (both summer and winter runs), Chinook salmon (both spring and fall runs), Pacific lamprey, bull trout, and coastal cutthroat trout (both resident and sea-run forms) have been identified as focal species. Steelhead, Chinook salmon and bull trout are also listed as threatened under the federal Endangered Species Act. Steelhead in the subbasin are part of the Lower Columbia River Distinct Population Segment (DPS), Chinook salmon are part of the Lo), and bull trout are within the Hood River Recovery U SU do not necessarily require that all populations achie plan for Lower Columbia River steelhead and salmon has specified that all Hood River populations must achieve viability. Recovery criteria for bull trout vary among recovery units. Very little is known about the status of Pacific lamprey and cutthroat trout in the subbasin.

This section provides general background on the federally listed fish species and the de-listing criteria.

Key to Subbasin Layouts

Key Factors Limiting Hood River Subbasin Focal Species[30,31,32]

Factors for Decline/Limiting Factors/Threats		Species/Race, and Life-Stage Most Affected							
		Spring Chinook	Fall Chinook	Coho	Summer Steelhead	Winter Steelhead	Pacific Lamprey	Bull Trout	Cutthroat Trout
Habitat	Estuary and Nearshore Marine Habitat Degradation	Smolts	Smolts	Smolts	Smolts	Smolts			
	Floodplain Connectivity and Function		Juveniles	Juveniles	Juveniles	Juveniles			
	Channel Structure and Complex		Fry	Juveniles	Juveniles	Juveniles		Juveniles, adults	Juveniles, adults
	Riparian LWD Re					les		Juveniles, adults	Juveniles, adults
	Stream F					les	Juveniles, adults	Juveniles, adults	Juveniles, adults
	Water Q					ive-s	All	All	All
	Fish Pas	adults	adults	adults	adults	les, adults	Juveniles, adults	Juveniles, adults	Juveniles, adults
Hydro	Mainstem Columbia River Hydropower-related Adverse Effects	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles, adults		
Hatchery	Hatchery Fish Interbreeding With Wild Fish	Adult spawners	Adult spawners	Adult spawners					
Harvest	Mortality from Targeted Fishery		Adults	Adults					

This table provides a general overview of the primary limiting factors for fish in the subbasin. Included in this section is a description of the focal species and respective life stages that are most affected by the limiting factors. Life stages are general (e.g., juveniles), unless a more specific life stage (e.g., summer parr) is primarily affected. Comprehensive lists of limiting factors are provided in subbasin plans and recovery plans.

BPA FY 2008 Habitat Project Accomplishments[8]

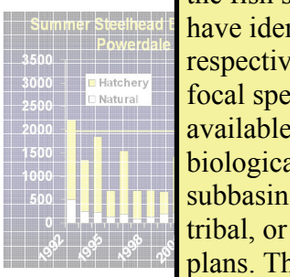
Habitat Zone	Project-type	Planned Value	FY 2008 Accomplishment (Actual Value)
Instream	Install well, install pipeline, install sprinkler, acquire water instream	5.0 miles	5.0 miles of primary stream reach
	Install well, install pipeline, install sprinkler, acquire		ach
	Install well, install pipeline, install sprinkler, acquire		d
	Install well, install pipeline, install sprinkler, acquire		on-
	Increase instream habitat complexity	54 structures	54 structures installed

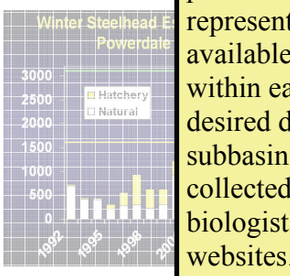
This section provides habitat project accomplishments for Bonneville Power Administration-funded projects during Fiscal Year 2008.

Steelhead

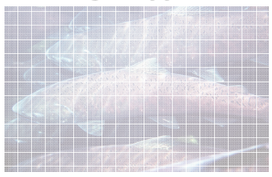
Summer

ESA Listing Status: Threatened
DPS: Lower Columbia
MPG: Gorge Summer



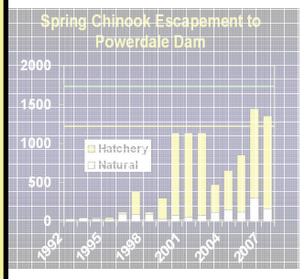


Chinook



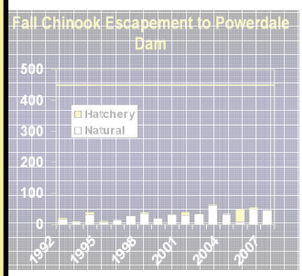
Spring

ESA Listing Status: Threatened
ESU: Lower Columbia
MPG: Gorge Spring
Population: Hood River
Draft Recovery Plan Criteria: 1,229 natural adults[15]
Draft Broad Sense Recovery Objective: 1,784 natural adults[15]
Status: 158 natural and 1,200 hatchery adults and jacks (2007)[36]



Fall

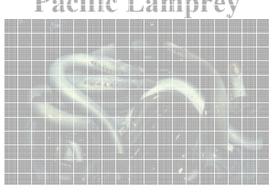
ESA Listing Status: Threatened
ESU: Lower Columbia
MPG: Gorge Fall
Population: Hood River
Draft Recovery Plan Criteria: 454 natural adults[15]
Status: 45 natural and 0 hatchery adults and jacks (2007)[37]



Coho

(OR)
Draft Recovery Plan Criteria: 5,149 natural adults[15]
Status: Unknown

Pacific Lamprey



ESA Listing Status: Species of Concern
Biological Objective: None[32]
Status: Unknown

The information in this section describes the fish species that the subbasin planners have identified as focal species for the respective subbasin. Included for each focal species is recovery criteria (where available and applicable) as well as biological objectives described in the subbasin plan or were included in state, tribal, or federal recovery/management plans. The status and trend information represents the most current data that is available. The yellow horizontal lines within each of the figures represents desired draft recovery, management, or subbasin plan objectives. Data were collected through interviews with biologists and reviews of reports and websites. Data presented in the graphs are available via the www.cbfwa.org/sotr which links directly to the data sources. The data presented in this report have been reviewed and approved by the respective collectors.

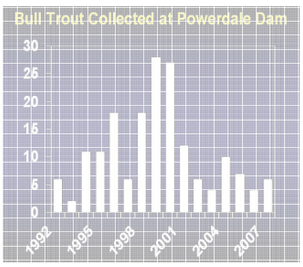
Recovery Status of ESA-Listed Steelhead and Salmon in the Hood River Subbasin[15]

Population	Abundance Threshold	Mean Abundance	Major Spawning Areas Occupied	Growth Rate	Recruits/Spawner	Current Viability
Steelhead						
Hood River Summer	1,988	195 (1993-2005)	Unknown			Low
Hood River Winter	1,633	395 (1992-2004)	Unknown			erate
Chinook Sal						
Hood River Spring	1,229	Unknown	Unknown	Unknown	Unknown	Very Low
Hood River Fall	1,240	36 (2000-2004)	Unknown	Unknown	Unknown	Very Low
Coho Salmon						
Hood River	5,149	12 (1992-2004)	Unknown	Unknown	Unknown	Very Low

This table lists the recovery status of ESA-listed salmon and steelhead populations in the subbasin.

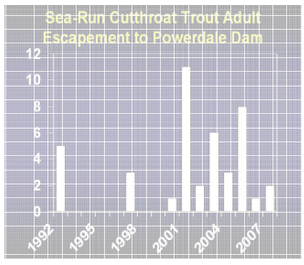
Key to Subbasin Layouts

Bull Trout



ESA Listing Status: Threatened
Core Area: Hood River (Within Hood River Recovery Unit)
Local Populations: Clear Branch, Hood River
Draft Recovery Plan Criteria: ≥500 adults, distributed among three or more local populations[21]
Status: 6 adults passed Powerdale Dam (2007)[38]; 90 adults collected in Clear Branch (2007)[39]
Abundance, Trend, Threat, and Risk Ranks (Hood River Core)[17]**:**
Abundance = 50-250
Short-term Trend = Unknown
Threat = Moderate, imminent
Risk = High

Coastal Cutthroat Trout



Resident

ESA Listing Status: Species of Concern
Biological Objective: None[32]
Status: Unknown

Sea-Run

ESA Listing Status: Species of Concern
Biological Objective: None[32]
Status: 2 adults passed Powerdale Dam (2007)[40]

2007 Hatchery Releases and Returns to Hatcheries in the Hood Subbasin[7]

Hatchery	Species	Release Goal/Released (By life stage)	Return Goal to Powerdale Dam/ Actual Return
		125,000/127,829	1,300/1,200
		30,000/0	/816
		50,000/36,523	/473
Total		205,000/164,352	

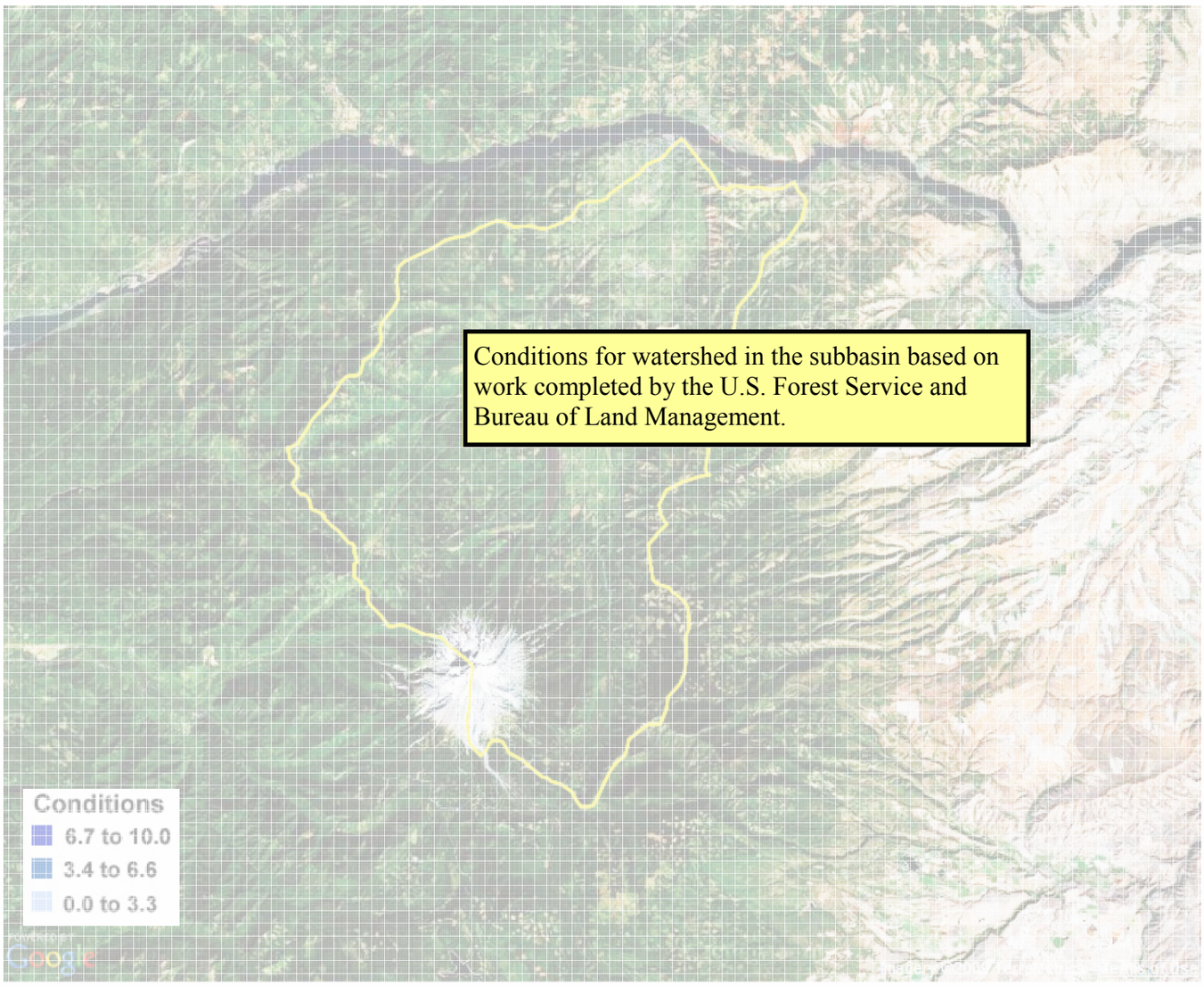
This table provides hatchery releases and returns in the province in 2007. Fish returning in 2007 were released in previous years.

BPA-Funded Wildlife Projects in

There are no wildlife projects

This section provides a list of the Bonneville Power Administration - funded projects in the subbasin and the acres, habitat units, and habitat types associated with each project.

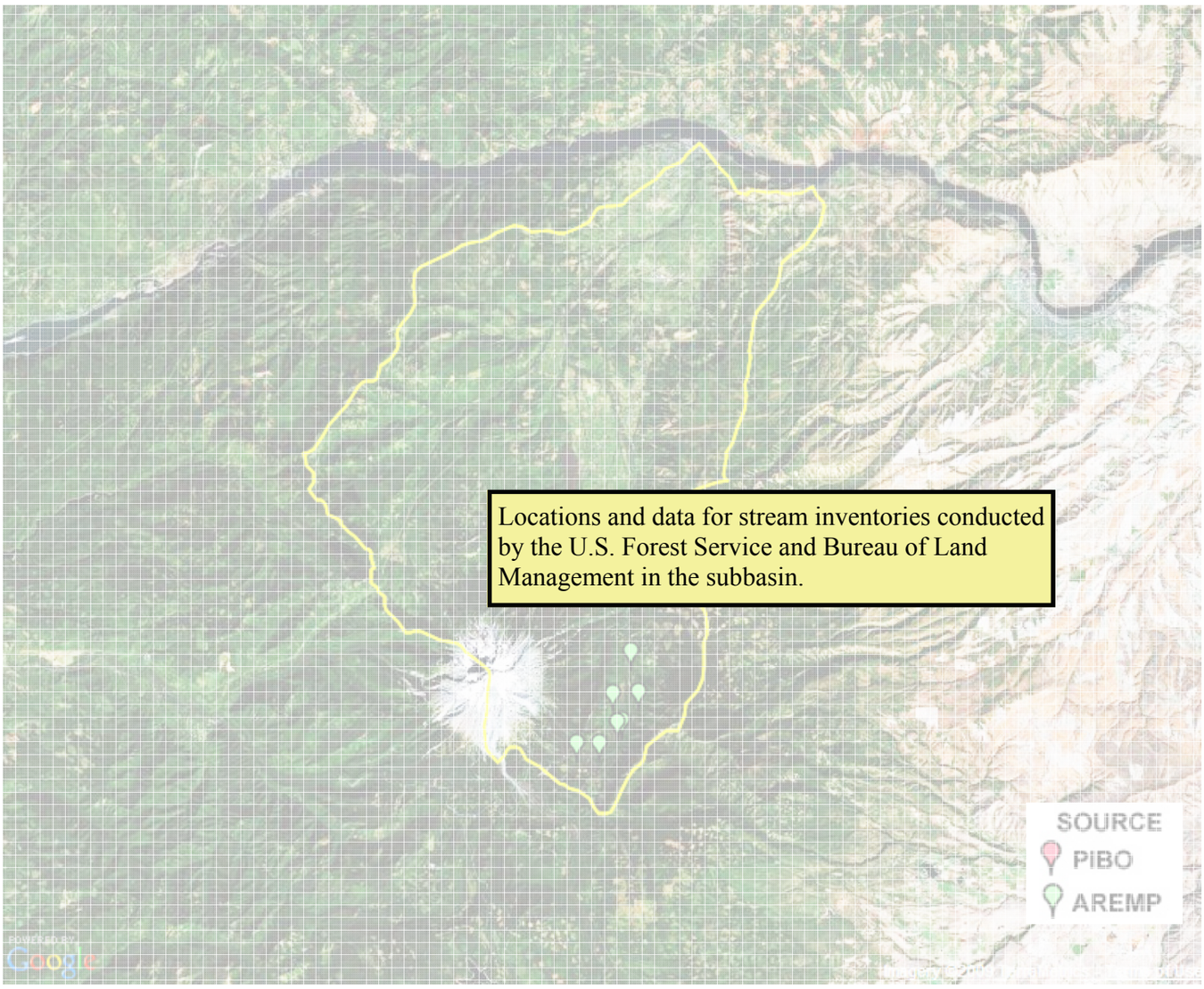
Watershed Conditions for National Forest and Bureau of Land Management Lands in the Hood Subbasin[52]



Watershed condition is based upon work completed by the USDA Forest Service (FS) and USDI Bureau of Land Management (BLM) Aquatic and Riparian Effectiveness Monitoring Program (AREMP). AREMP personnel evaluate the status and trend of watershed condition on FS, BLM, and National Park Service administered lands within the range of the Northern Spotted Owl. Watershed condition scores are determined for all watersheds that contain a minimum of 25 percent federal ownership. AREMP applies a decision support model to evaluate the premise that watersheds are in good condition. Watersheds are judged to be in good condition where the physical processes, such as wood and sediment delivery, and habitat attributes are adequate to maintain or improve the diversity and abundance of native or desired non-native aquatic species. (Gallo et al 2005). A score of 10 indicates full support for the premise that a watershed is in good condition and a score of 0 indicates no support for the premise. A fifteen-year assessment of watersheds is being done in 2009, with an expected publication date of early 2010.

Key to Subbasin Layouts

Stream Inventory Sites on National Forest and Bureau of Land Management Lands in the Hood Subbasin[60]



Stream Data[60]

Source	Year	Location	PoolDp	PoolPCT	PlFn6	LWFreq	LWD>3m	BNKAn-gle	AMT_16p7	Rich-ness	Abun-dance
AREMP	2008	1006	.17	23.50	0.00		92.86				
AREMP	2008	1008	.24	76.66	.53		137.50				
AREMP	2008	1010	.13	45.84	37.30		70.83				
AREMP	2008	1017	.23	90.31	17.78		168.75				
AREMP	2008	1011	.43	35.61	0.00		62.50				
AREMP	2008	1013	.23	38.17	2.56		87.50				

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3. Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife. 2008. 2008 Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and Other Species, and Miscellaneous Regulations.

4. Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife. 2008. 2008 Joint Staff Report: Stock Status and Fisheries for Fall Chinook Salmon, Coho Salmon, Chum Salmon, Summer Steelhead, and White Sturgeon.

5. Fish Passage Center, www.fpc.org.

6. Pacific Fishery Management Council, www.pcouncil.org/salmon/salbluebook/salbluebook.html

7. Oregon Department of Fish and Wildlife, www.dfw.state.or.us/resources/fishing/sportcatch.asp

8. Alan Byrne, Idaho Department of Fish and Game, personal communication.

9. Bonneville Power Administration, www.efw.bpa.gov/IntegratedFWP/reportcenter.aspx

10. Brendan Sykvander. National Oceanic and Atmospheric Administration, personal communication.

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13. U.S. Army Corps of Engineers, Unpublished Data.

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20. Tod Sween, Nez Perce Tribe, personal communication.

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30. Gould, W. 2006. Kalispel Resident Fish Project Kalispel Tribal Hatchery Operations and Maintenance 2005 Annual Report. Project No. 199500100, 17 electronic pages.

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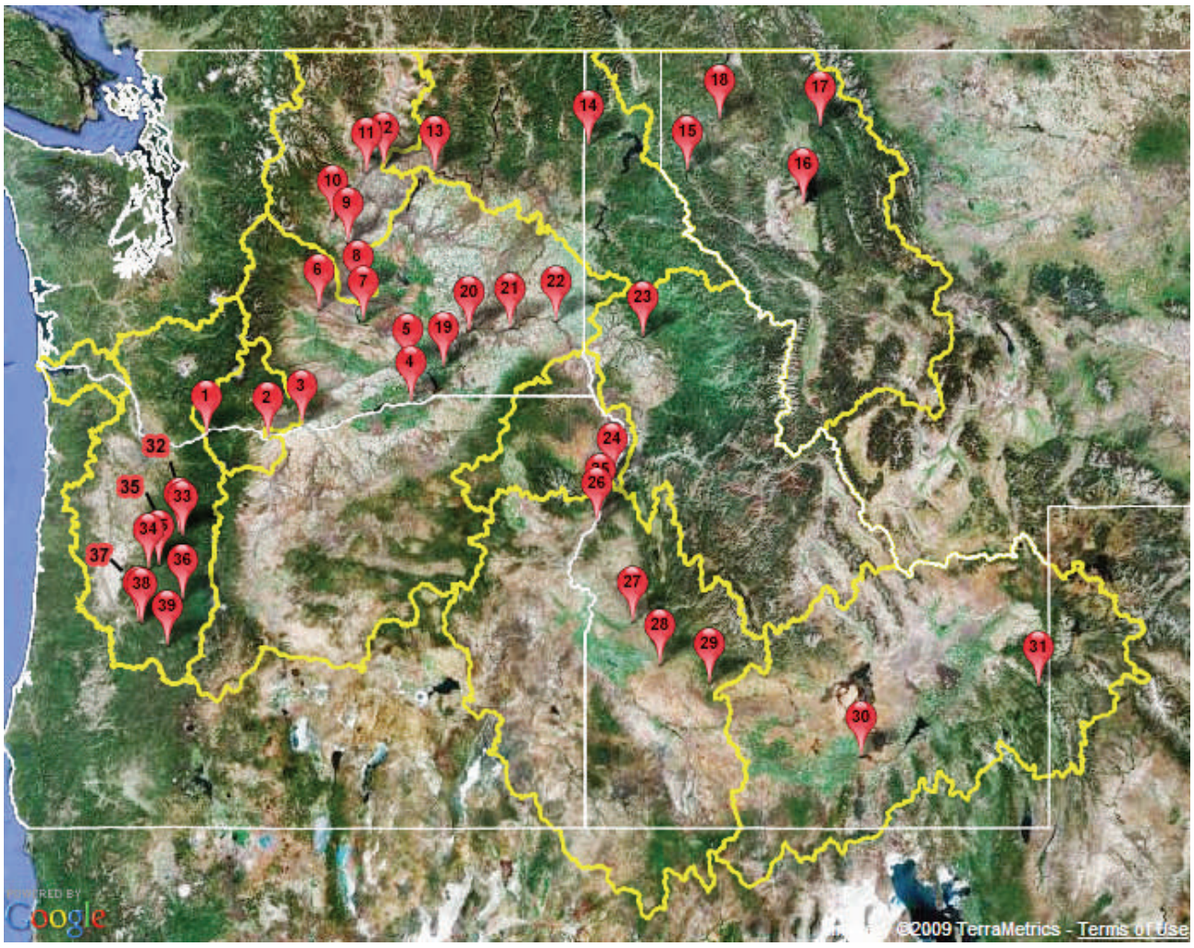
Appendix

Description of Habitat Actions Summarized in this Report

Increase Instream Habitat Complexity — Activities that add natural material instream to create habitat or improve channel morphology. Material include J-hooks, barbs, vortex weirs, large woody debris, and riprap.
Conduct Controlled Burn — Use fire to improve habitat.
Realign, Connect, and /or Create Channel — Projects that add sinuosity, meanders, side channels, off-channel habitats, reconnection of historical channels, excavation of new channels, and/or improving the functionality of existing channels.
Decommission Road/Relocate Road — Activities that make roads or trails unusable including adding berms, pits, boulders or logs, ripping or obliterating the road or trail with heavy equipment that may involve re-contouring the slope, and/or building a or trail in a more appropriate location to replace a decommissioned road or trail.
Improve Road — Projects that eliminate or reduce erosion, sediment and/or toxic run-off from reaching streams, rivers, or wetlands from roads or trails currently in use.
Install Fence — Installation of various types of fence and gates including cattle guards or water gaps for livestock.
Plant Vegetation — Installation of plants or seeds for purposes such as erosion control, roughness recruitment, shading, restoring native habitat, forage enhancement, and road removal.
No-till and Conservation Tillage Systems — Establishment of practices that focus on increased crop residue during subsequent crop seeding, and/or reduction or elimination of traditional tilling practices.
Remove Mine Tailings — Activities that remove or re-contour remnant landscape effects from old mining operations.
Remove Vegetation — Projects that involve either the mechanical, biological, or chemical removal of one or more plant species or a number of individuals of a plant species. The plants are often non-native, naturalized, undesirable native-plants, all of which have been deemed noxious, invasive, or "weeds".
Upland Erosion and Sedimentation Control — Activities include installation of water bars, gully plugs and culvert outlets, grassed waterways, grade stabilization structures, sediment catchment ponds/basins, and removal of drainage pipes and other blockages to specifically prevent sediment slump or landslide.
Enhance Floodplain — Projects that remove or breach a dike to restore floodplain function or the enhancement of a floodplain through the addition of large woody debris as well as potentially involving the installation of a tidegate or water control structure.
Create, Restore, and /or Enhance Wetland — Efforts that include water control structures, tidegates, dike removal or breaching, re-contouring, and excavation to create, restore, or enhance wetlands.
Install Fish Screens — Activities that involve the installation or replacement of screens associated with diversions or pumps.
Remove/Install Diversion — Projects that remove, replace, or avoid creating a fish passage barrier associated with a stream diversion including push-up dams. These efforts may be part of a diversion consolidation efforts that reduce the number of diversion sites that includes installation of alternative ways (e.g. infiltration galleries, instream diversion pumps, and lay-flat stanchions) to divert stream flow without creating passage barriers caused by traditional diversion structures.
Remove/Breach Dam — Work that facilitates fish passage over a natural or human-made dam by breaching or removal.
Install Fish Passage Structure — Activities that include the removal or modification of a full or partial instream barrier to improve fish passage and/or flow through the installation of the fish ladders, bridges, culverts, jump pools, and weirs.
Lease Land — Includes riparian, grazing, and multiple-use leases, typically for multiple years.
Install Well — Project that includes installation of a well to enable groundwater to be used as an alternative to instream flow.

Columbia River Basin Hydro-facilities Referenced in this Report



1. Bonneville
2. The Dalles
3. John Day
4. McNary
5. Chandler
6. Roza
7. Priest Rapids
8. Wanapum
9. Rock Island
10. Rocky Reach
11. Wells
12. Chief Joseph
13. Grand Coulee
14. Albeni Falls
15. Noxon Rapids
16. Kerr
17. Hungry Horse
18. Libby
19. Ice Harbor
20. Lower Monumental
21. Little Goose
22. Lower Granite
23. Dworshak
24. Hells Canyon
25. Oxbow
26. Brownlee
27. Black Canyon
28. Boise River Diversion
29. Anderson Ranch
30. Minidoka
31. Palisades
32. Big Cliff
33. Detroit
34. Foster
35. Green Peter
36. Cougar
37. Dexter
38. Lookout Point
39. Hills Creek

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