



Pacific Lamprey

Lampetra tridentata

The Pacific lamprey has inhabited the rivers, streams and coastal waters of the west for 350 million years. The lamprey is so primitive that it is among the earliest species in fossil records, but recent data shows that populations have diminished dramatically in the last few decades. Since 1994, BPA has provided nearly \$6 million for research and habitat restoration, and has partnered with other agencies and tribes on projects to protect this native fish.

The Pacific lamprey is eel-like in shape (but is not related to the eel) and has dark bluish-gray or dark brown scaleless skin. It has no true bones or jaws, and can reach up to 30 inches long and weigh over a pound. Lamprey mouths are down-turned for sucking and lined with sharp, rasping teeth.

Life cycle

Like salmon, Pacific lamprey are anadromous. After spending two to three years in the ocean where they live as parasites preying on larger mammals and fish, they return to fresh water to spawn. Lamprey do not cause permanent damage to their host fish. Lamprey ascend rivers by swimming upstream briefly, then attaching to rocks and resting.

Unlike salmon, Pacific lamprey spend well over half of their total life cycle in freshwater. The adult female Pacific lamprey lays tens of thousands of extremely small eggs in a nest built in a gravel or sandy streambed then dies within a few days after spawning. The young lamprey hatch after two to three weeks, burrow into mud where they live in the larval stage for four to six years and eventually emerge as juveniles averaging about four-and-a-half inches in length. They migrate to the ocean during late winter or early spring.

Some researchers suggest that large populations of adult lamprey may have been a buffer for migrating

adult salmon from predation by marine mammals. Seals would have found lamprey a more appealing food source than salmon because, traveling in schools, the lamprey would have presented an attractive concentration of food. They are easier to catch than salmon and, pound-for-pound, they offer a higher source of calories. In addition, lamprey in the larval stage are a known food source for salmon and trout.



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Importance to the tribes

Historically, Pacific lamprey were important for food and medicinal purposes to Native American tribes in the mid-Columbia River Plateau, and they remain important for traditional tribal cultural practices.

Tribal peoples generally harvested lamprey at falls or fast water areas where the fish tend to congregate. They caught them by hand, dip net or jigging with a



long pole and hook. Lamprey were prepared for eating by drying or roasting. The medicinal oil collected from drying lamprey was applied to skin or ailing part of the body during a purifying sweat bath. This oil was also used to condition hair and cure earaches.

In addition to their tribal uses, lamprey have also long been harvested for commercial purposes. Early fur trappers used lamprey as bait for coyotes and, at the turn of the century, fish culturists used ground raw lamprey to feed young salmon. In 1913, some 27 tons were harvested for fish food. From 1943 to 1949, some 816 tons of lamprey were harvested, primarily for vitamin oil, protein food for livestock and poultry, and fishmeal.

Today, Pacific lamprey are used in scientific research, as a source for medicinal anticoagulants, for teaching specimens (North Carolina Biological Supply House regularly collected at Willamette Falls) and for food (in 1994, approximately 3,960 pounds were exported to Europe).

Declining numbers

Counts of Pacific lamprey in Northwest streams have decreased dramatically since the mid-1960s. According to unpublished data collected by the U.S. Army Corps of Engineers, nearly 48,000 lamprey were counted at Winchester Dam on Oregon's Umpqua River in 1966. By 2001 the count was only 34. At Ice Harbor Dam on the lower Snake River, almost 50,000 were tallied in 1963. In 2001 the count dropped to 203. Some of the factors that researchers believe have contributed to the decline of lamprey include impeded passage at dams, over harvesting, degraded habitat and chemicals used to control non-native fish.

In December 2004, the U.S. Fish and Wildlife Service determined that there is not substantial scientific or commercial information that would warrant listing the species under the Endangered Species Act.

Research and habitat restoration

The Lamprey Technical Workgroup is a subcommittee of the Anadromous Fish Committee of the Columbia Basin Fish and Wildlife Authority. This workgroup, made up of scientists with lamprey

expertise, project managers and others, provides technical review, guidance and recommendations for activities related to lamprey conservation and restoration. The group meets quarterly and is currently working on finalizing a report on critical uncertainties for lamprey in the Columbia River Basin.

BPA has supported and funded lamprey research since 1994. As of fiscal year 2005, BPA funding for lamprey research totaled just over \$6 million, including \$896,439 in fiscal year 2005.

Ongoing projects

Umatilla River, Oregon

With funding to date of more than \$3.7 million, the Umatilla project aims to restore natural production of Pacific lamprey in the Umatilla River to self-sustaining and harvestable levels.

One of the objectives in this project is to evaluate the role of pheromones, or bile salts, which are released by larval lampreys as a migratory cue to upstream migrating lampreys. Researchers are measuring the fish's response to bile salts during the adult spawning migration in freshwater.

Since 2002, the project has out planted adult lamprey in the Umatilla River, monitoring life stages to determine if the technique will help restore the fish. Initial results show adults spawning and producing larval lamprey, which have been found from the headwaters to the lower reaches of the river.

Warm Springs, Oregon

Since 2002, the Confederated Tribes of the Warm Springs Reservation of Oregon have received \$312,632 in funding from BPA to determine species composition, larval distribution and associated habitat in the lower Deschutes River subbasin; estimate the number of lamprey emigrants from Warm Springs River and Shitike Creek; evaluate the feasibility of estimating the escapement of adult lamprey in the Deschutes River upstream of Sherar's Falls and estimate lamprey harvest at Sherar's Falls.

Cedar Creek, Washington

This study, conducted by the U.S. Fish and Wildlife Service, has received \$908,787 in funding from BPA since it was initiated in 2000. The aim of

this study is to estimate abundance, examine biological characteristics, and determine migration timing of adult Pacific lamprey; determine larval lamprey distribution and habitat use; determine emigration timing and estimate the abundance of recently metamorphosed lampreys; and evaluate spawning habitat requirements of adult lampreys.

Clearwater and Salmon river drainages, Idaho

Since Idaho Fish and Game started this study in 2000, it has received \$346,524 in funding from BPA. The study aims to determine life history characteristics, habitat requirements and distribution of adult and juvenile and larval lamprey develop and implement strategies to protect adult and juvenile and larval habitat; and assess population structural characteristics of juvenile and larval lamprey.

Completed projects

The U.S. Geological Survey received \$373,144 in funding from BPA to spawn three species in captivity and determine diagnostic characteristics of each. The study began in 2000 and involved collecting ammocoetes (larval lamprey) and holding them through metamorphosis to verify identification techniques and evaluating temperature effects on the survival and early development of three species.

The U.S. Geological Survey conducted another study in 2003 that involved trapping adults and using radio telemetry to determine lamprey movement to spawning areas. This study, with \$199,494 in funding, described over-wintering and spawning habitat of radio-tagged fish.