

WESTERN BROOK LAMPREY

TAXONOMY

Scientific name: *Lampetra richardsoni*

Vladykov and Follett, 1965

Common name: western brook lamprey

Family: Petromyzontidae

Taxonomic comments:

Derived from genetically similar parasitic river lamprey, *Lampetra ayresii* (Vladykov and Follett 1965). Referred to as *L. planeri* in earlier publications (Lee et al. 1980). The 1991 and 2004 AFS checklists (Robins et al. 1991, Nelson et al. 2004) and Kan (1975)



regarded the Pacific brook lamprey (*L. pacifica*) as a junior synonym of *L. richardsoni*. Page and Burr (1991) retained them as separate species. An intermediate freshwater parasitic form, *L. richardsoni* var. *marifuga*, is found on Vancouver Island (Morrison Creek), British Columbia (Beamish 1987, Mecklenburg et al. 2002).

DESCRIPTION

Basic description: A nonparasitic freshwater lamprey.

General description:

A small lamprey, typically 10 to 17 cm (Vladykov and Follett 1965, Morrow 1980, Mecklenburg et al. 2002). Body elongate and eel-like with two dorsal fins arising far back on the body, and caudal fin with a conspicuous dark blotch connected to both anal fin and rear dorsal fin-like fold (anal fin well-developed in female, weakly developed in male). Brown, olive or black above, gray or olive beneath and generally darker than *L. ayresii*; seven gill openings on each side, mouth is jawless; a rounded oral sucker with blunt teeth present on and around tongue (or not present on tongue). Body size and color are the most important distinguishing characteristics at the species level, but arrangement of teeth is most useful at the generic level: supraoral tooth bar with 2 blunt cusps, 3 lateral tooth plates with 2 or 3 cusps on central pair, and anterior and posterior teeth entirely absent. Parasitic individuals of the Morrison Creek, B.C. population distinguished by their silver upper body, white lower body, and prominent sharp teeth in the same tooth formation (Fisheries and Oceans Canada 2004). Ammocoetes (larvae) are gray above and lighter below with dark pigmentation on the tail/caudal fin (Vladykov and Follett 1965).

Length (cm): range 10-17, max. 17.3

Reproduction:

Spawns day or night, late April-July. Females 4.4 to 7.7 inches long produce 1,100 to 3,700 eggs (Wydoski and Whitney 1979). Eggs hatch in about 10 days at temperatures of 50-60° F.

Ammocoete stage lasts up to 7 years. Metamorphosis occurs in August-November. The preceding

information pertains to northern populations; little is known about California populations formerly known as *L. pacifica*.

Ecology:

A nonparasitic lamprey confined to freshwater because it cannot osmoregulate in salt water, and believed to be a derivative of parasitic, anadromous *L. ayresii*. Spawning success and survival are apparently high; ammocoetes of this species are considered one of the most abundant life forms in the lower courses of streams in the northwestern United States (Scott and Crossman 1973). In Morrison Creek, a tributary to the Puntledge River on Vancouver Island, B.C., a population of *L. richardsoni* contains a parasitic variety of the species (*L. richardsoni* var. *marifuga*); this parasitic population co-occurs with nonparasitic *L. richardsoni* and Pacific lamprey, *L. tridentata* (Beamish 1987). Parasitic individuals live up to several months longer than nonparasitic individuals, which metamorphose, then immediately spawn and die (Fisheries and Oceans Canada 2004).

Migration:

Non-migrant.

Food:

Ammocoetes (larval lampreys) filter feed on microscopic plant and animal matter, including desmids, diatoms, algae and detritus (Scott and Crossman 1973). Adults do not feed; however, parasitic adults of the Morrison Creek population have been observed feeding on herring (*Clupea* spp.) in the laboratory. Adult feeding has not yet been observed naturally in streams for *L. richardsoni* var. *marifuga* (McDermott 2003).

Habitat:

Clear freshwater streams. Ammocoetes found in eddies of streams where rich deposits of silt, mixed with some sand, settle. Adults usually collected over gravel riffles while spawning (Lee et al. 1980). In California, occurs in low elevation portions of streams and rivers; probably restricted to the less disturbed areas (Moyle 1976). Spawning occurs in riffles on rock, sand, or gravel stream bottoms in shallow depressions 5 cm deep and 10 -12 cm in diameter, at the head of a riffle (Wydoski and Whitney 1979). The Morrison Creek population occurs in high gradient stream channels 1-2 m wide and low gradient lower reach channels 3-4 m wide, with relatively constant temperature (Beamish et al. 2001, Environment Canada 2004).

STATUS

Global rank: G4G5 (27Jan2005)

Global rank reasons:

Widespread in streams from Alaska to California; population status and trends are not well known.

State rank: S1S2 (20Jun2005)

State rank reasons:

Distribution restricted to southeastern Alaska; only three known occurrences. Population status and trends unknown, but suspected rare. Few threats due to remote distribution.

DISTRIBUTION AND ABUNDANCE

Range:

Global range:

Streams of Pacific coast from McDonald Lake, southeastern Alaska, to California, including Vancouver Island. Major inland distributions in the Columbia and Sacramento-San Joaquin drainages (Vladykov and Follett 1965, Page and Burr 1991, Moyle 2002, Wydoski and Whitney 2003). In Washington, found in coastal and Puget Sound streams and as far inland as the upper reaches of the Yakima River; recorded in streams on the west and south sides of the Olympic Peninsula but not on the north or east sides (Wydoski and Whitney 2003). Relatively common in forested coastal basins, such as the Alsea River, Oregon, but has largely disappeared from Columbia River basins above Bonneville Dam. In California, western brook lampreys have been recorded mainly from the Sacramento River drainage, including areas as remote as Kelsey Creek above Clear Lake (Lake County), but they are also present above Pillbury Reservoir in the Eel River and in Mark West Creek, a tributary of the Russian River; spawning adults were collected in the Navarro River (Mendocino County) in 1999 (Moyle 2002). Ammocoetes from an extirpated population in the Los Angeles River basin may represent this species (Moyle 2002). Easily overlooked and difficult to collect, it is likely that this species occurs in many streams in coastal California (Moyle 2002).

State range:

Southern Southeast Alaska north to approximately 20 miles north of Juneau; occurrence documented in the Taku River, McDonald Lake north of Yes Bay, and Bear Creek on Mitkof Island (Mecklenburg et al. 2002).

Abundance:

Global abundance:

Very abundant in Canada and throughout range, especially during ammocoete stage (Beamish pers. comm.). Up to 170 ammocoetes/m² have been reported in the lower courses of streams in the Pacific Northwest (Scott and Crossman 1973, Mecklenburg et al. 2002). No reliable population estimates for the Morrison Creek population are available (Environment Canada 2004).

State abundance:

Not common in Alaska; a small number of total observations (about 6) suggests species is probably rare in the state. Ammocoetes occur as densely as 170/m² elsewhere in lower courses of streams in the Pacific Northwest (Scott and Crossman 1973, Mecklenburg et al. 2002).

Trends:

Global trend:

Likely has declined in polluted and altered rivers. The Morrison Creek population was relatively stable between 1978 and 1984, but may have declined in recent years (Environment Canada 2004).

State trend:

Unknown.

PROTECTION

Global protection:

L. richardsoni var. *marifuga* designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1999. Protection of spawning and ammocoete rearing habitat is needed. Individual streams may support genetically unique stocks.

State protection:

Species afforded no formal protection in Alaska. Subsistence and commercial lamprey harvest is regulated by the Alaska Department of Fish and Game (ADFG).

CHALLENGES

Global challenges:

No major threats are apparent at this time, but the species is likely unable to withstand severe pollution or habitat changes (Moyle 2002). Potential threats include stream pollution, habitat modification which changes stream flow rates and siltation patterns, and use of poisons in fish management practices. The Morrison Creek population is threatened by rapid residential development along stretches of important spawning and rearing habitat; this lamprey's extremely limited distribution places it at higher risk to all threats, especially habitat modification (Fisheries and Oceans Canada 2004).

State challenges:

Potential threats include stream pollution and habitat modification which changes stream flow rates and siltation patterns; however, most known habitat in Alaska is likely pristine and the degree of threat is minimal.

RESEARCH AND INVENTORY NEEDS

Global research needs:

Baseline information needed on population age structure, diet, migration, and species identification. Habitat requirements/associations and relationship with river lamprey need study. Assessment of threats and the development of a population monitoring program are also needed. Taxonomy needs clarification; for example, unique lamprey populations from British Columbia were formerly included in Pacific lamprey *L. tridentata* but were determined to be different enough from the *tridentata* form to be given the distinct species name *macrostoma* (Beamish 1982)—this is an example of new species discoveries likely still to occur in the genus, possibly in Alaska (Beamish pers. comm.).

State research needs:

Baseline information needed on population age structure, diet, migration, and species identification. Habitat requirements/associations and relationship with the river lamprey need study. Assessment of threats and the development of a population monitoring program are also needed. Taxonomy needs clarification.

Global inventory needs:

Determine the number of populations and abundance rangewide. Monitor selected populations throughout the range to determine trends. More precise information is needed on which streams this species occurs in and what portions of these streams it uses preferentially during its entire life cycle.

State inventory needs:

Surveys needed to better determine specific distribution, population size and trends. Identification of ammocoetes is easily learned and very useful both for determining lamprey population status as well as identifying salmon freshwater habitat; field identification training for fisheries workers would be worthwhile and add to our knowledge of both groups of fish (Beamish pers. comm.).

CONSERVATION AND MANAGEMENT NEEDS

Global conservation and management needs:

Protect those regions of the streams that support this species. Individual streams may support genetically unique stocks. Continue current study on the impact of land-management practices on the Morrison Creek population and its habitat; use results to formulate a conservation plan for this species in B.C.

State conservation and management needs:

Identified and predicted spawning and rearing habitat should be mapped and this information provided to land/resource managers. Prevent degradation of stream channels in the few areas where this species is known to occur. Due to the paucity of information on this species' distribution and abundance, conservation status is difficult to assess. Develop unified protocols for fisheries researchers statewide to share data, coordinate sampling efforts, and collect specimens for genetic analysis.

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Acknowledgements

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NatureServe Conservation Status Factors Author: West, E. W., and G. Hammerson

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