

BC's Coast Region: Species & Ecosystems of Conservation Concern

Cowichan Lake Lamprey (*Lampetra macrostoma*)

Global: G1, Provincial: S1S2, COSEWIC: T, BC List: Red



Notes on *Lampetra macrostoma*: This parasitic member of the family Petromyzontidae (“lampreys”) is a cartilaginous, jawless fish also referred to as “Vancouver” or “Lake” Lamprey. Three other species of lamprey have been identified in BC: Western Brook Lamprey (a non-anadromous, generally non-parasitic species commonly found in streams), Pacific Lamprey (anadromous and parasitic, commonly found in coastal streams and marine coastal areas), and River Lamprey (also anadromous and parasitic and quite common in the Fraser River and Strait of Georgia during its parasitic phase). Cowichan Lake Lampreys are parasitic, non-anadromous and most closely related to Pacific Lamprey. Aside from the unique mouth parts, Lamprey species have a distinct physiology including numerous external gill slits and an elongated eel like body lacking pectoral or pelvic fins

Description

Length 18.-27 cm (average 11.2 cm). This small, freshwater lamprey is almost cylindrical in form, blue-black to dark brown dorsally with a light coloured ventral area. The sucker-like mouth disc, a distinguishing trait of lamprey, surrounds a funnel like mouth with many sharp teeth. The eyes are small and located high on the head above an array of 7 external gill slits. Females are slightly smaller than males. The ammocoetes (larvae) have sightless eyes and lack the teeth and mouth disc of adults. Instead the mouth is covered with an oral hood (tissue membrane that acts as a filter for feeding). The majority of growth occurs when ammocoetes metamorphose into spawning adults.

Diet

Ammocoetes are filter feeders using their oral hood to filter detritus and microscopic plant and animal matter. This species becomes parasitic in its adult phase - feeding off live fish (e.g. Coho Salmon and Coastal Cutthroat Trout juveniles and adults). The fully developed mouth disc is used to suction onto fish, allowing the rasping teeth and mouth parts to penetrate the flesh and consume blood and tissue.

Look's Like?

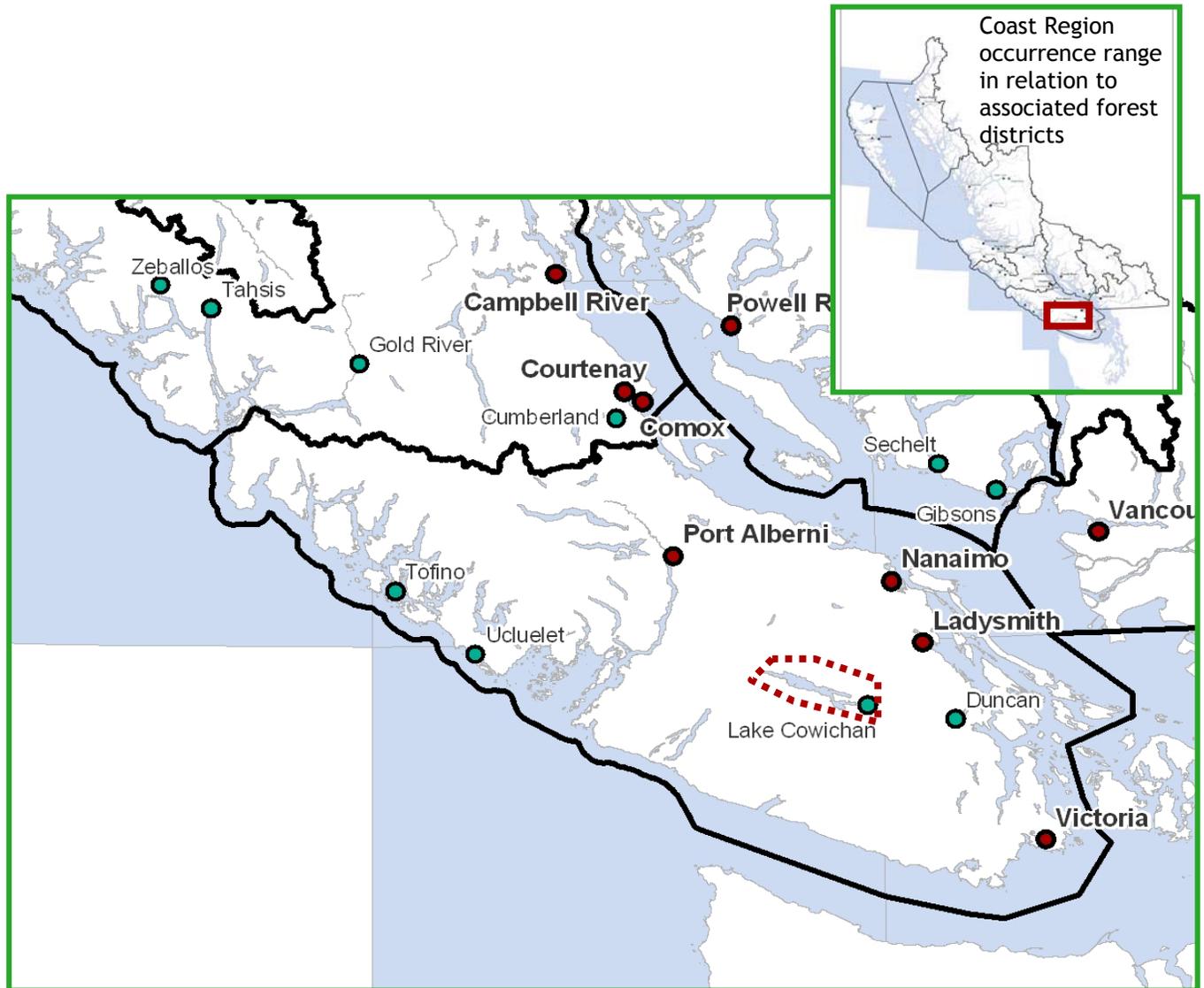
The larger Pacific Lamprey only occurs downstream of the lake outlet and does not overlap into Cowichan Lake. The size of the mouth disc and dentition pattern, a key characteristic used to differentiate lamprey species is significantly larger in the Cowichan species, being approximately two-thirds larger in surface area than that of a similar sized Pacific Lamprey. As well there are some differences in teeth patterns. Another key distinction is the adaptation to a complete freshwater life history (although this species can survive in salt water). Conversely Pacific Lamprey possesses characteristics which make them better adapted to life in marine environments. Other differentiating characteristics of Cowichan Lake Lamprey are a smaller overall size, larger eyes and longer distance from mouth to gill slits than Pacific Lamprey.



Pacific Lamprey

Distribution

Elevation 165 m. This species is considered an extreme endemic, being restricted to two lakes in a single watershed (Cowichan Lake and Mesachie Lake), and their lower tributaries in the Cowichan Valley on Vancouver Island. The two lakes are connected via the Robertson River, Bear Lake and an unnamed watercourse, sometimes referred to as Mesachie Creek. The lakes are part of a watershed which drains to marine waters on the east coast of Vancouver Island. Cowichan Lamprey migrate to the lake tributaries for a portion of their life history (mainly juvenile rearing). While there are no physical barriers preventing them from migrating downstream they are not anadromous. Interestingly Pacific Lamprey from which they are believed to be derived, are common downstream of the Cowichan Lake outlet, but neither species overlap into each others areas of distribution in the system.



Cowichan Lamprey (*Lampetra macrostoma*), known occurrence range for the Coast Region

Habitat Preferences This species is restricted to two oligotrophic (nutrient poor), freshwater lakes and their lower tributaries. The larger waterbody, Cowichan Lake is deep and fjord like (34 km long and up to 150 m deep).

Critical Features Access to clean gravels, influenced by groundwater or subsurface upwelling may be key to selection of spawning sites and successful incubation. Adults aggregate on shallow deltas of gravel deposits near the confluence of tributary creeks in water depths of 20 cm -2 m to create redds (scooped out depressions in the gravel) and spawn. Ammocoetes have been found in the substrate of downstream portions of some lake tributaries, indicating some spawning also occurs in more fluvial habitats.



Cowichan Lake, a nutrient poor system on Southern Vancouver Island is part of the only known watershed that supports this unique lamprey species.

Seasonal Life Cycle

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				Spawning May – August, eggs hatch a short time after spawning							
					Adult metamorphosis occurs July-October after ~6 years as ammocoetes						

After hatching ammocoetes bury into soft substrate until metamorphosis. Post metamorphosis, young adults may remain in substrate up to two years until spawning. As with other lamprey species, Cowichan Lake Lamprey spawn only once then die.

Threats

- ◆ Restricted distribution makes this species highly vulnerable to changes in the water quality and hydrological regime of the waterbodies it occurs in. Water diversion and extraction may be an issue if it increases in the future.
- ◆ Overall lack of knowledge on this species general biology, habitat needs and specific threats.
- ◆ Coho Salmon are the most common host fish species for the adult parasitic phase of Cowichan Lake Lamprey. Declines in Coho returns (nearly 46% over the last 24 years) to the Cowichan system is thought to directly impact abundance.
- ◆ Direct mortality from recreational fisheries (as incidental catch and potentially targeted catch efforts by misinformed anglers attempting to protect salmon stocks).
- ◆ Though considered still minor, runoff and sedimentation impacts from adjacent land use activities such as forestry and residential/commercial development may impact spawning habitat.

Conservation & Management Objectives

- ◆ Apply conservation and management objectives as set out in the “Recovery Strategy for the Vancouver Lamprey (*Lampetra macrostoma*) in Canada.”
- ◆ Inventory and monitor using methodology setout in the RISC “Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures.”

Specific activities should include:

- ◆ Further monitoring is needed to assess this species general biology including life history, dispersal patterns, population trends and genetic variability in relation to Pacific Lamprey and other unique resident freshwater lamprey populations in the Coast Region (i.e. Quadra Island, Nelson Island and Sechelt Peninsula).
- ◆ Further study is needed to identify population dynamics in relationship to changes in host fish abundance (i.e. Coho Salmon).
- ◆ Protection of surface and sub-surface hydrological interactions (e.g. protection of the hyporheic or groundwater - streambed interface zone and groundwater sources in spawning areas).
- ◆ Clear-span crossings are preferred. Culvert crossings should be a minimum 2 m diameter with open bottoms with natural substrate, no longer than 30 m and should not have large drops that would impede small mammal (or fish) movement. On long culverts that are dark in the middle, consider the use of grates that will allow light and rain to enter.
- ◆ Reduce sediment entry and minimize loading of contaminants into ground and surface waters and infilling of spawning areas. Protection of spawning zones may be warranted.
- ◆ Encourage improved stewardship amongst private landowners, the general public and decision makers in regards to land use and recreational activities that may impact the watershed.
- ◆ Increase awareness about the sensitivity and value of this species and its role in the health of the Cowichan watershed ecosystem including efforts to reduce potential targeted mortality by anglers.

This species is listed under the Federal Species at Risk Act (SARA) and is subject to protections and prohibitions under the BC Wildlife Act. Habitat for this species is also governed under other provincial and federal regulations including the Fish Protection Act and Federal Fisheries Act and potentially Regional and local municipal bylaws.

Content for this Factsheet has been derived from the following sources

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