

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

Vananda Creek Stickleback Pairs: Limnetic Stickleback (*Gasterosteus sp. 16*) & Benthic Stickleback (*Gasterosteus sp. 17*)

Global: G1, Provincial: S1, COSEWIC: E, BC list: Red/ Identified Wildlife



Notes on *Gasterosteus sp. 16* and *17*: A member of the family Gasterosteidae (“sticklebacks”), Benthic and Limnetic Stickleback Pairs are a rare divergent group of Threespine Stickleback (*Gasterosteus aculeatus*), in BC which have undergone rapid species separation within the same waterbody. They are descended from a marine form ancestor that began colonizing freshwater environments after the last glaciation period.

Top left: Limnetic male
Top right: Limnetic female
Bottom left: Benthic Male
Bottom right: Benthic female

Description

Average length 3.5 - 5.5 cm. Stickleback Pairs are generally similar in size to their more common threespine relative. However distinct size and morphology differences exist within Stickleback Pairs themselves. Typical colouring for most forms is silvery or brassy with greenish or black mottling and iridescent blue in the eye (more noticeable in males). During spawning season males develop bright red throats and bellies. Both sexes have armoured plates along their sides, and spines in front of the dorsal fin and pectoral fins. These spines can be extended in response to a threat or for males when challenging rivals during spawning season. Males guard eggs and aggressively defend nests.

Diet

Limnetic Stickleback are primarily planktivorous, feeding near the water's surface. Their long slender body, narrow upturned mouth and numerous, long gill rakers (bony or cartilaginous, finger-like projections off the gill arch), help to filter zooplankton and reflect adaptations to surface feeding. They are also more heavily armoured than benthic species (as they are more vulnerable to predation near the surface). Conversely Benthic Stickleback, which populate deeper waters, exploit benthic invertebrates and other similar food organisms in bottom vegetation. Their wider bodies, broader mouths and significantly fewer gill rakers are adaptations to bottom feeding.

Look's Like?

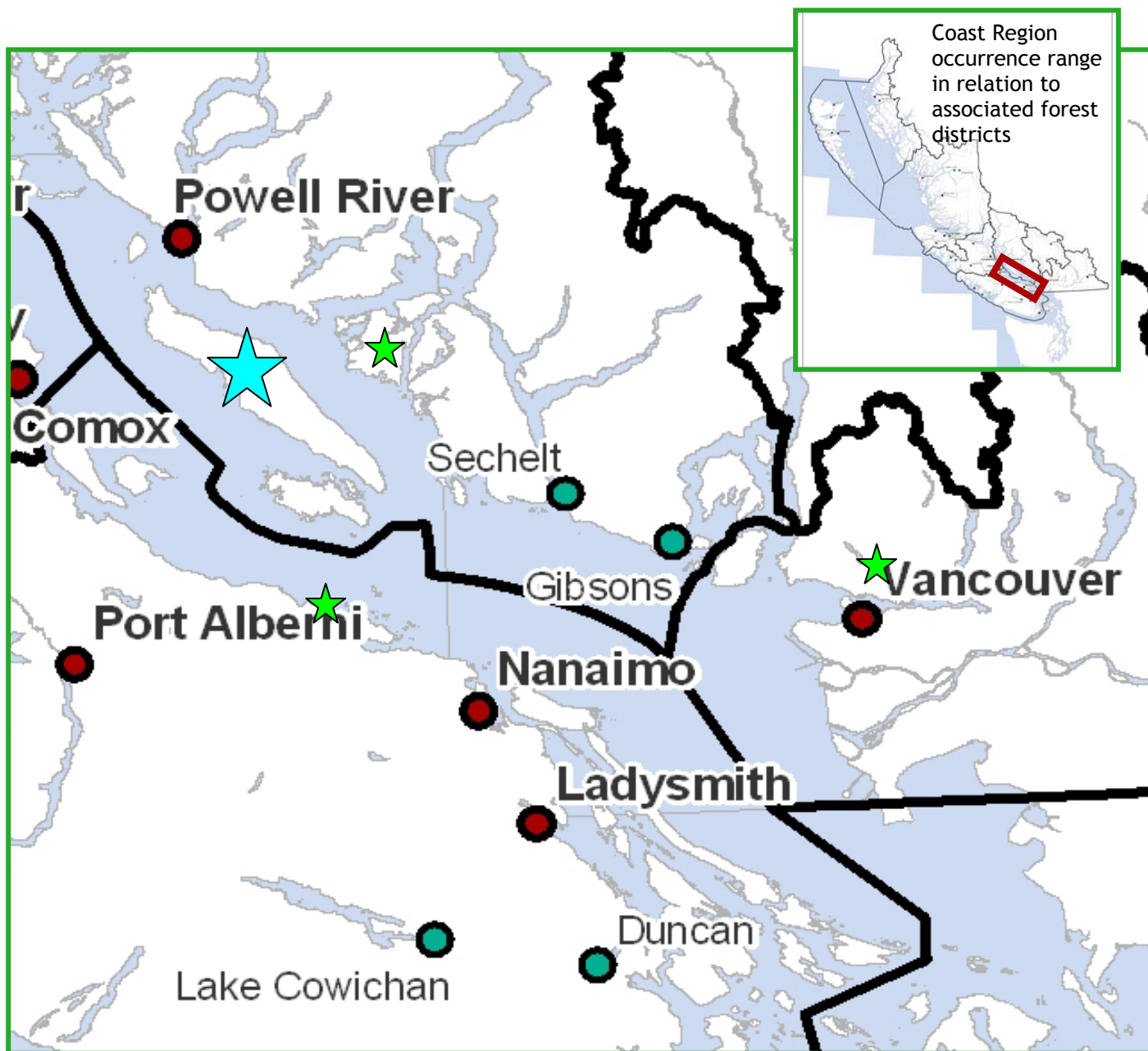
Each Stickleback Pair, though separate species from pairs in other waterbodies have similar physiologies so that all Limnetic Pairs are similar to each other as are Benthic Pairs. However unless a waterbody is known for supporting Stickleback Pairs they may be easily confused with, or identified as, the more widely distributed Threespine Stickleback.



Threespine Stickleback

Distribution

Vananda Creek and Paxton Lake Limnetic and Benthic Stickleback Pairs support two of the remaining listed species pairs. Both are on Texada Island. The Vananda watershed includes Balkwill, Emily and Priest lakes. In total five species pairs have been listed to date, of which Hadley Lake Stickleback from Lasquiti Island went extinct in the 1990's, and Enos Lake Stickleback have now merged into a hybrid swarm (neither one species or the other). The introduction of non-native aquatic fauna is thought to have been the driver for extinction of both these pairs. Prior to their collapse, a population of Enos Lake limnetics was established in Murdo-Frazer Park in North Vancouver through a transplant of wild fish to a pond. A viable population was confirmed in spring 2002. A recent discovery of a stickleback species pair in 2008 in Little Quarry Lake on Nelson Island is being studied but has yet to be listed.



Vananda Creek Stickleback Pairs (*Gasterosteus* sp. 16&17 blue star) and other known Stickleback Pairs (green stars) known occurrence range for the Coast Region

Habitat Preferences Limnetic Stickleback are usually located near the surface of the lakes they occur in, although they disperse to deeper waters during the winter. Benthic Stickleback spend most of their life cycle near the bottom of lakes. Spawning occurs in spring and summer. Limnetic nests are in areas of shallow water <1m. Benthic nests are built in deeper water of 1-2m. Both species congregate in shallow, somewhat vegetated areas near lake edges to breed.



Critical Features Systems supporting Stickleback Pairs require sufficient zooplankton and benthic communities to support both species within respective populations. The rapid extinction of the Hadley Lake species pair following introduction of Brown Bullhead and subsequent impacts to the Enos Lake species pair from colonization of signal crayfish are strong indicators that persistence is likely dependent on maintaining a simple ecological community with few or no competitors.

Stickleback Pairs generally occur in small isolated shallow lakes with extensive vegetated littoral areas and submerged woody debris.

Seasonal Life Cycle

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
			Nest building & Spawning (Limnetics – several clutches per season, Benthics 1-2). Fry rear in similar habitats as used by adults									
								Overwintering				

Threats

- ◆ Coastal Cutthroat Trout are the only known fish species to co-occur with Vananda Creek Stickleback Pairs with no discernable impact. Introduction of new, invasive and or exotic aquatic species have demonstrated significant negative alteration of the ecological relationships in the lake systems where these species pair occur and have been the cause of extinction for at least one pair.
- ◆ Water allocation and license management. At present only some lake outlets in the Vananda watershed are regulated and while water use is modest at present actual licensed amounts are large relative to lake volume and inflows.
- ◆ Resource use such as logging is still ongoing and is regulated through varying and potentially inconsistent private and crown land forest practices.
- ◆ Other land use activities such as road development, housing and quarrying activities could impact respective populations through increased runoff, sedimentation or loss of foreshore habitat values.

Conservation & Management Objectives

- ◆ Apply management and conservation objectives as set-out in the “Recovery Strategy for Paxton Lake, Enos Lake, and Vananda Creek Stickleback Species Pairs (*Gasterosteus spp.*) in Canada.” Investigate complimentary objectives and assessment applications found in “Identification of Critical habitat for Sympatric Stickleback Species Pairs and the Misty Lake Parapatric Stickleback Species Pair (draft).”
- ◆ Inventory and monitor using methodology setout in “Guidelines for the Collection and In Situ Scientific Study of Stickleback Species Pairs (*Gasterosteus spp.*)” prepared by the Recovery Team for Non-Game Freshwater Fish Species in BC.

Specific activities should include:

- ◆ Recovery planning and implementation should occur at the scale of individual watersheds as individual populations are isolated from one another and face varying threats. Present Vananda Creek Stickleback Pair populations are stable, however maintenance of self sustaining populations are required for long-term viability.
- ◆ Ongoing monitoring and outreach efforts are required to prevent introduction of invasive species or other native predacious sport fish species (e.g. rainbow trout) which will likely have negative impacts on respective populations.
- ◆ Direct developments and hydrological disruptions away from suitable habitat through appropriate land use planning.
- ◆ Reduce sediment entry and minimize loading of contaminants into ground and surface waters. Maintain septic fields and other potential sources of contamination to surface and ground water.
- ◆ Adequate base flow in all habitats with high potential productivity must be established or maintained. Protect vulnerable aquifers that may be sustaining hydrology.
- ◆ 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.
- ◆ Increase awareness about the sensitivity and unique value of Stickleback Pairs and encourage stewardship amongst private landowners, the general public and through land use decision making and associated activities.

Stickleback Species Pairs are listed under the Federal Species at Risk Act (SARA) and are subject to protections and prohibitions under the BC Wildlife Act. Habitat for these 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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- Vamosi, Steven M., 2003. [Internet] The presence of other fish species affects speciation in threespine sticklebacks. *Evolutionary Ecology Research*, 2003, 5: 717-730
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Every effort has been made to ensure content accuracy. Comments or corrections should be directed to the South Coast Conservation Program: info@sccp.ca. Content updated August 2010.

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