



Texada Island Stickleback Species Pairs

Gasterosteus aculeatus

About

The stickleback species pairs found on Texada Island are closely related freshwater stickleback species living side-by-side, descended from the marine Three-spined stickleback (*Gasterosteus aculeatus*). Each species pair comprises a limnetic species (living in the water column of the lake) and a benthic species (living around the lake shallows). It is believed they evolved when marine sticklebacks entered freshwater lakes and remained there after glaciers receded at the end of the last ice age.

Why are they important

These species pairs are found exclusively in a few small lakes in BC, making them vulnerable to population collapse and extinction should environmental conditions change. At less than 13,000 years old, they are also some of the youngest species on Earth! Due to the unique and rapid way in which they've evolved as two separate species, they are very important to scientists to better understand the biological and physical processes that lead to the evolution of new species.

Distribution

The stickleback species pairs are found in southwest BC's Texada Island in the Paxton Lake watershed and the Vananda Creek watershed (in three lakes: Emily Lake, Priest Lake, and Spectacle Lake). There is also a species pair in Little Quarry Lake on Nelson Island. Species pairs were previously found in Enos Lake on Vancouver Island and Hadley Lake on Lasqueti Island; however, these populations are now both extinct.

Legal Status

The Paxton Lake and Vananda Creek watershed species pairs are all designated as Endangered under the Species at Risk Act (SARA). This means they are highly susceptible to extinction. The Little Quarry Lake species pair is listed as Threatened under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), meaning if threats such as invasive species

are not prevented, they could become extinct. The Hadley Lake species pair is Extinct under COSEWIC and SARA. The Enos Lake pair are now designated as Extinct under COSEWIC because the populations collapsed into a hybrid swarm where benthic and limnetic sticklebacks interbred, forming a single hybrid population instead of two distinct populations.



Limnetic male (top left), limnetic female (top right), benthic male (bottom left), benthic female (bottom right).

Identification

Three-spined sticklebacks are small fish, no longer than 70mm at maturity. They can be identified from the spines projecting out from their backs, two pelvic spines projecting out from their bellies, and small plates of armour along their sides. During mating season in the spring and early summer, male sticklebacks of both species develop bright red throats and blue eyes and bodies to attract females.

Limnetic: Limnetic sticklebacks are adapted for feeding on zooplankton in the water column. They have a slender and streamlined body, narrow mouth, and many long gill rakers. They have light-coloured bellies and silver sides, which help them to camouflage in open water. While they are smaller than benthic sticklebacks, they have longer and sturdier spines, and more armoured plates along their sides. Reproductive males are larger than females to better protect their nests and defend their territories.

Benthic: Benthic sticklebacks are adapted for feeding on invertebrates along the lake bottom. Their bodies are stockier, with a wide mouth and few, short gill rakers. Their jaw is shorter and points more downwards, better for catching their prey.

They have shorter dorsal and anal fins, one or two spines, and reduced armour on their bodies compared to limnetic species. They have dark, mottled colouring to blend in with vegetation.

Ecological Characteristics

Habitat: Stickleback species pairs are found in simple lake ecosystems, with Coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) being the only other fish species present. To prevent hybridization, they require clear water to be able to recognize their own species for mating. They also require beds of aquatic plants growing in the water, mainly *Chara* spp. These macrophyte beds harbour invertebrates that benthic sticklebacks feed on and provide shelter from predators. Benthic sticklebacks utilize the beds for nesting and spawning, and stickleback fry of both species rely on the beds for food and shelter.

Life Cycle: In both species, the males build nests from April to June in shallow areas of the lakes. Brightly coloured males will perform a “zig-zag” dance and if a female shows interest, the male will nip at her belly and lead her to his nest. Female sticklebacks squeeze through and deposit their eggs which the males then fertilize and guard. Males will mate with as many females as they can over 3-4 days. They will continue to guard the eggs until they hatch about a week later, then continue to guard the young for about another week. Juveniles of both species will stay in the shallow areas among the macrophyte beds to feed and shelter from predators. As they grow, benthic and limnetic sticklebacks will move to their respective parts of the lake. They eventually overwinter in deeper water in the fall and winter.

Limnetic: Males will build their nests in less vegetated areas, on submerged logs or in shallow gravel or rocky areas. Females can lay several clutches of eggs per season, with about 30-40 eggs per clutch (group of eggs). Limnetic sticklebacks mature after one year and generally live no longer than 2 years.



Benthic (top) and limnetic (below) females from Paxton Lake, Texada Island.

Benthic: Benthic sticklebacks tend to mature later and have longer lifespans than limnetics, possibly up to 7 years. Females can lay around 150-200 eggs per clutch, however, they only lay

1-2 clutches per season. Males tend to build their nests concealed in dense vegetation.

Threats

Invasive species are one of the greatest threats to the stickleback species pairs. The Hadley Lake species pair went extinct within five years after the introduction of Brown bullhead (*Ameiurus nebulosus*) to the lake. It is likely that they preyed upon or interfered with nesting sticklebacks. Likewise, Signal crayfish (*Pacifastacus leniusculus*) were introduced to Enos Lake on Vancouver Island where they contributed to the collapse and hybrid swarm of the species pair there. There are other invasive threats too- invasive Pumpkinseed (*Lepomis gibbosus*) have been threatening solitary freshwater sticklebacks in Trout Lake on the Sunshine Coast. Largemouth and Smallmouth bass (*Micropterus salmoides* and *M. dolomieu*), Yellow perch (*Perca flavescens*), American bullfrog (*Lithobates catesbeiana*), Eurasian watermilfoil (*Myriophyllum spicatum*), and Purple loosestrife (*Lythrum salicaria*) are all found within the region and have the potential to threaten stickleback species pairs through predation, competition for resources, disease, or alterations to water quality.

How You Can Help

Remember to **CLEAN DRAIN DRY!**

CLEAN off all plants, animals, sand, and mud from your gear.

DRAIN all water from your boat and gear onto land.

DRY all parts of your gear completely.



DON'T LET IT LOOSE! Many invasive species were once pets that were let loose. Never release plants or animals into the wild or use live bait while fishing.



DON'T LET IT LOOSE

REPORTING

Report any invasive species using the Report Invasives BC app or iNaturalist for iPhone, iPad, and Android platforms, available for download at <https://bcinvasives.ca/take-action/report/>. Join the [ISpy and Identify Project](#) on iNaturalist to record your sightings and protect biodiversity. You can also report invasive species through bcinvasives.ca, emailing info@bcinvasives.ca, or by calling 1-888-933-3722.



I Spy and Identify Invasives

References

References available upon request.

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