

Surf Smelt

Adapted from [Penttila, 2007](#) by Mira Castle



Photo by Matt Castle, Samish Tribe DNR

A surf smelt, caught in Fidalgo Bay, WA, waits in a container to be measured and photographed by scientists.

What are surf smelt?

Surf smelt are a type of *forage fish*, meaning many animals forage for (eat) them, such as salmon, sea birds, seals, porpoises, and people. You might think of them like the Snickers bars of the sea. They are bright, schooling fish that look like herring, but with golden, instead of silver backs.

Little is known about the life history of surf smelt away from their spawning grounds, leaving many mysteries to solve for future marine biologists. They haven't found many over 4 years old in their surveys, even the king of smelt research, Dan Penttila, so they don't think they live much longer than that.

Habitat

Nearshore-dwelling surf smelt in the Strait of Juan de Fuca feed primarily on calanoid copepods, with a small part of their diet consisting of small crustaceans (crabs and shrimp) (Simenstad et al. 1977, Simenstad et al. 1979).

There is no evidence of surf smelt in the Salish Sea migrating out to the open ocean or forming large schools. In fact, they seem to remain near their spawning beaches for much of their lives.

Surf smelt spawn in a mix of sand and gravel during high tide. Their eggs are sticky and adhere to the sand and pebbles.

The life history of the surf smelt is intimately linked to geological processes on and uphill from the beach:

1. The critical part of surf smelt spawning habitat is the availability of a suitable amount of the right mixture of sand and gravel. This sediment gets washed away by waves, so needs replenishing.

New sediments erode from glacial deposits above the beach. If new sediment is prevented from getting to the beach, spawning habitat may be lost.

Most of the sand and gravel in a spawning site needs to be between 1-7 mm in diameter (Figure 2)(Schaefer 1936; Penttila 1978).

2. This sediment needs to be available at a tide level between +7 feet and the extreme high-water mark. This is the upper 1/3 of the whole intertidal range (the area of the beach that gets uncovered during low tides).

3. Eggs on the surface are easily killed by sun or wind exposure during the summer. Overhanging shade trees above the upper beach greatly reduce this loss (Figure 3) (Penttila 2002; Rice 2006).

Spawning

Surf smelt take turns spawning throughout over a month or so. Spawning takes place in just a few inches of water just below the waterline during high tides.



Figure 1: Surf smelt spawning site being surveyed for eggs, tidal height, and sediment grainsize. Photo by Penttila. WDFW

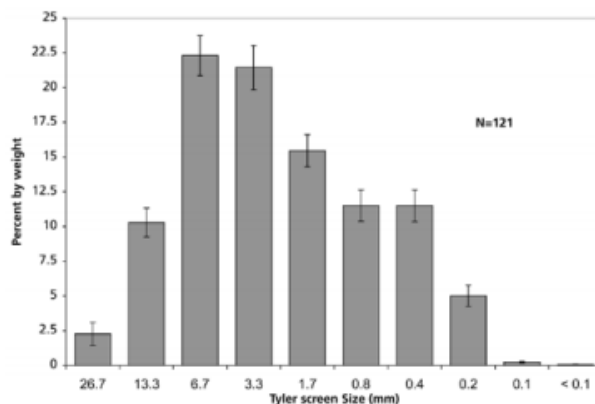


Figure 2: Puget Sound surf smelt spawning substrate grainsize spectrum.



Figure 3: Summer shaded surf smelt spawning habitat Camano Island, WA Photo by Penttila, WDFW

During the summer, eggs incubate for about two weeks, while during cold winter weather, it may be four to eight weeks (Figure 4). The shade that increases summer egg survival is unnecessary during the fall-winter season, when cool air temperatures result in much lower mortality (death) rates.

Like the Pacific herring, surf smelt have managed to colonize the entire length and breadth of the Puget Sound Basin in the short time since the glaciers receded.



Figure 4: Surf smelt eggs sticking to gravel in Fidalgo Bay, WA. Photo by Matt Castle, Samish Tribe DNR

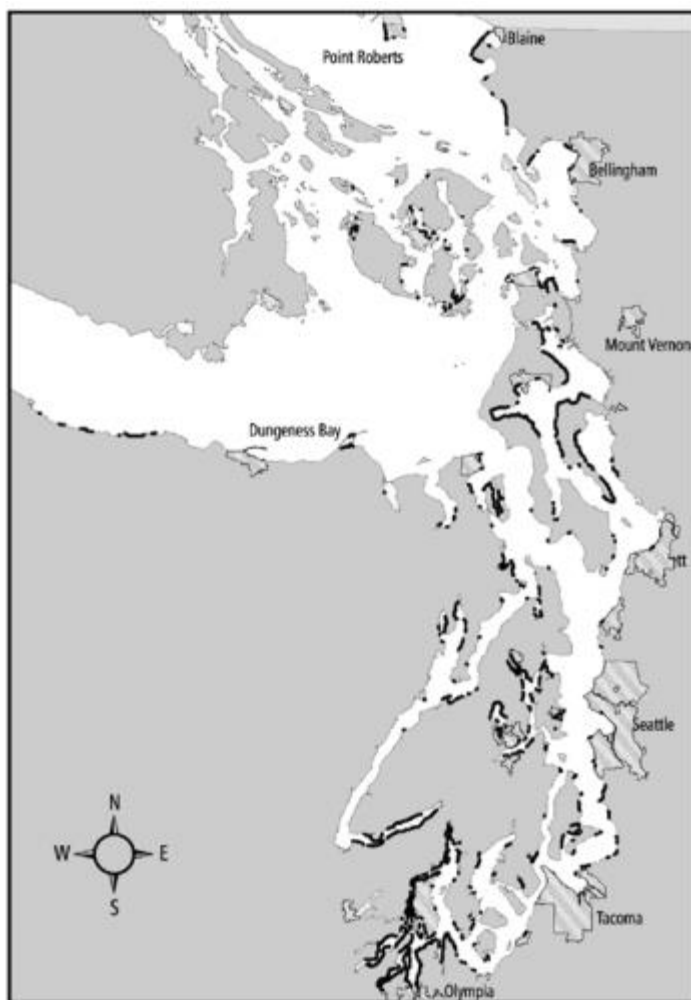


Figure 5: Documented Puget Sound surf smelt spawning beaches as of October 2005.

Approximately 10 percent of the shoreline of the Puget Sound Basin is used by surf smelt for spawning habitat (Figure 5).

Also like herring, the times of surf smelt spawning at each spawning beach seem to be predictable. All spawning beaches first mapped by the Washington Department of Fisheries (WDF) in the 1930s are still being used at present, if the smelt stocks there have survived detrimental human impacts since then (Schaefer 1936).

With the spawning times lasting for more than a month, these spawning beaches may produce larvae continuously for several months. Young-of-the-year surf smelt are virtually ubiquitous along Puget Sound shorelines.

Adapted from:

[Penttila, Dan 2007](#). Technical report 2007-03 Marine Forage Fishes in Puget Sound. prepared for Puget Sound Nearshore Partnership (now Puget Sound Nearshore Restoration Project).