

SHORE STEWARDS NEWS

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Between the River and the Sea

There is a narrow strip of our world that forms a transition between the salty sea and the flowing freshwater. Soon, millions of tiny fish will once again swim the Salish Sea's nearshore. During the spring and early summer, look for them and cheer them on as they grow and navigate many hazards during their march to the Pacific.

(Note: the Salish Sea is a term that refers to the coastal waterways that reach from Desolation Sound at the north end of the Strait of Georgia in British Columbia to Budd Inlet at the south end of Puget Sound. The Salish Sea includes Puget Sound, the Strait of Juan de Fuca, and the Strait of Georgia.)

Salmon in the Salish Sea's Nearshore

When most of us are taught the salmon life cycle, we learn the simplified version – salmon eggs hatch in river gravel, then juveniles travel to the ocean to grow large before returning to their natal streams as adults and giving their lives for the next generation. However, salmon in the Salish Sea spend a critical period of their life in the nearshore environment, after they leave freshwater and before they reach their ocean feeding grounds. Most salmon species spend from weeks to months in nearshore habitats - as juveniles, feeding, hiding and adapting to saltwater, and as adults preparing to enter freshwater to spawn.



At the same time, the narrow nearshore occupies land with access to the water and scenic vistas that make it an essential component of coastal economies and a highly desirable place to occupy and make our own. If we don't understand the role and value of nearshore habitats in the life history of Salish Sea salmon, we may not be giving the necessary attention and resources to a critical link in the life of one of our most significant regional icons.

What exactly is the nearshore? It is the interface of the land and sea, from the tops of coastal bluffs to the greatest depth at which most plants have enough light to photosynthesize (usually less than 100 feet in the Puget Sound). The portions of streams and rivers that are influenced by tides are also part of the nearshore. Nearshore vegetation stabilizes and builds

soils. Together the plants and soil act as a sponge to control runoff and sediment and to treat pollution. In addition, a healthy nearshore helps maintain healthy salmon populations by supporting the fish in four major areas.



- Feeding and growth – Juvenile salmon need to grow big quickly to avoid being eaten and compete for food. A healthy nearshore creates microclimates that provide refuge and habitat for a diverse community of terrestrial and aquatic insects and invertebrates, as well as spawning grounds for small forage fish. All these animals are important food resource during the salmon life cycle.

- Predator avoidance - The shallow beach slope gives small fish a chance to escape from larger predators that are kept out of the shallows by higher wave energy, murkier waters and greater exposure to their own predators.

- Physiological transition – It's no small feat for a freshwater animal to live in saltwater. This is standard practice for salmon and a few other fish, but they still need the lower-salinity water of the nearshore for the necessary changes in their physiology, behavior, and appearance to take place, since it doesn't happen instantaneously.



- Migration corridor – The integrity of the nearshore as a whole is critical for getting juvenile fish safely to the ocean and adult fish back to their spawning grounds. Gaps, whether natural or manmade, leave juvenile fish exposed to greater hazards. The more we add to those gaps by modifying the shoreline, the more fragmented and dangerous the corridor will be for migrating fish.

More and more evidence suggests restoration and protection of the nearshore is critical to rebuilding salmon populations. Examples of restoration that take these factors into account include restoration of the Skokomish and Nisqually deltas. Simply returning some of the delta to salt marsh with tidal channels increases the time that juvenile salmon spend feeding on the quality prey produced in these habitats and gives them more shallow water habitat to avoid predators.

Salish Sea Salmon Species and the Nearshore

All juvenile Pacific Salmon spend some portion of their lifecycle in the nearshore, but some more than others.

Species most dependent on the nearshore

Chinook salmon (*Oncorhynchus tshawytscha*) may spend half a year, or more in the Salish Sea's nearshore, reflecting how critical this habitat is to these fall or ocean-type Chinook. Once in the Salish Sea, Chinook disperse widely with peak populations in early summer, though they can be found in the nearshore nearly year-round. While in the nearshore, they adapt to living in saltwater, eat and grow rapidly and avoid being someone else's meal. Chinook salmon use all types of shorelines before leaving for their feeding grounds in the North Pacific



Ocean. However, the integrity of the nearshore on these shorelines heavily influences whether or not they survive that leg of their journey.

Chum salmon (*Oncorhynchus keta*) emerge from their stream's gravel in the spring then head for the nearshore where they spend a month or more feeding on small crustaceans and schooling in eelgrass beds. Small fry tend to migrate along shoreline, using the shallow water as refuge from predators. Their numbers are highest in the



nearshore in the late spring, but like Chinook, small numbers can be found there most of the year.

Pink salmon (*Oncorhynchus gorbuscha*) are similar to chum in that they leave freshwater almost immediately. They move quickly to the ocean but grow rapidly during their few weeks in the nearshore.

Species not as reliant on the nearshore

Coho salmon (*Oncorhynchus kisutch*) spend up to two years in fresh water. They may be present in the nearshore, but most pass fairly quickly through the nearshore on their way to the ocean and offshore waters of the Salish Sea.

Steelhead (*Oncorhynchus mykiss*) are large rainbow trout that migrate to the ocean. Like coho and some Chinook, they are relatively large when they enter the nearshore. They pass through quickly to find water at their preferred temperature and head for the open ocean.

Cutthroat trout (*Oncorhynchus clarki clarki*) are year-round residents of nearshore habitats and may spend most of their lives there, feeding on an array of invertebrates and even preying upon juvenile salmon.

Sockeye salmon (*Oncorhynchus nerka*) typically spend one or two years growing in lakes then migrate quickly through the nearshore to the ocean.

Our Actions to Sustain Salmon

- Protect water quality in nearshore waters. On every property and in every home, we can take actions that treat and infiltrate our rainwater, using rain gardens, naturally planted shorelines or other low impact development techniques. We can reduce or eliminate our use of pesticides and herbicides. We can also maintain our septic system and our vehicles.
- Protect existing healthy nearshore habitat. Once established, a healthy shoreline vegetation community supports diverse organisms



and other factors that are important to the success of juvenile salmon – shallow intertidal, terrestrial insect and marine crustacean food sources, shade and microclimates, cool fresh water, and pollution and sediment control.

Enhance and rehabilitate shorelines that have some functions present. Minor changes may enhance the shorelines ability to provide valuable functions for juvenile salmon.

Restore shorelines that have been completely modified and lost their functions. When the time comes to modify or replace structures on the shoreline, considering alternatives can result in a more productive habitat and a safer slope.

Share your knowledge and continue to learn – one of the best ways to experience the relationship of salmon to the nearshore first hand is to participate in a beach seines or in stream monitoring. You'll be surprised to see the fish inhabiting the space just 100' from the shoreline or spawning in the streams.



References and Resources

The Washington Department of Ecology has a great website covering salmon species, lifecycles and relationship to the nearshore (www.ecy.wa.gov/programs/sea/pugetsound/species/salmon.html).

You can find several related papers among the Puget Sound Nearshore Partnership's informative and highly readable Valued Ecosystem Component Report Series. Visit www.pugetsoundnearshore.org and click on Publications.

Brennan, J.S. 2007. Marine Riparian Vegetation Communities of Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-02. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

Fresh, K.L. 2006. Juvenile Pacific Salmon in Puget Sound. Puget Sound Nearshore Partnership Report No. 2006-06. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

Penttila, D. 2007. Marine Forage Fishes in Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-03. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

You can explore the Washington Department of Fish and Wildlife 21st Century Salmon and Steelhead Initiative <http://wdfw.wa.gov/conservation/salmon/> and the Shared Strategy Salmon Recovery Plan <http://www.sharedsalmonstrategy.org/plan/>

Visit the Habitat Works Schedule to see what salmon related projects have taken place or are under way in your area: . <http://hws.ekosystem.us/>

Upcoming Events

Spring 2011: WSU Beach Watchers training on Camano Island and Whidbey Island.

Would you like to know much more about the natural world around you, and join a fun and exciting group of volunteers on the beach and around the islands? Become a Beach Watcher! Training will be held on Camano in April and September on Tuesdays and Thursdays from 9 am to 4 pm. On Whidbey, training will be in April and October on Mondays and Wednesdays from 8:30 am to 4 pm. The focus of the training includes watersheds and groundwater, marine biology and oceanography, salmon and nearshore habitats, climate change, noxious weeds, agriculture, forestry, waste reduction, recycling, sustainable living, native plants and wildlife, intertidal monitoring, coastal geology and more. There are several field trips during the training. There is a nominal fee to offset the cost of reproducing the training manual and other printing costs. For additional information, you can contact Barbara Bennett at barbara.bennett@wsu.edu Or phone 360-679-7391 (Toll free on Camano: 629-4522, ext. 7391).

To download the application for your island, or for more information about Beach Watchers, go to <http://www.beachwatchers.wsu.edu/island/about/training/>



This product is funded by the Island County Marine Resources Committee and the Northwest Straits Commission. You can view the Marine Resources Committee website at www.islandcountymrc.org

The website for the Northwest Straits Commission can be seen at <http://www.nwstraits.org/>

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