



linking people to nature on Lasqueti and surrounding islands

Issue #9, Summer 2016

Membership \$5.00 annually

Donations to support our work are tax deductible

LINC, 11 Main Road, Lasqueti Island, BC V0R 2J0

250-333-8754 linc@lasqueti.ca

Charity BN #84848 5595

Forage Fish Matters by Connie Haist

Small is Beautiful and Essential for Life

Sunlight streaming into ocean waters is soaked up by phytoplankton, the living solar collectors of the sea. They use this solar energy to convert carbon dioxide and water, through photosynthesis, into food that zooplankton graze upon. Phytoplankton, or marine algae, and zooplankton, the smallest of marine animals, are the tiny organisms that drift in huge numbers in the middle to upper levels of the ocean. Together, both kinds of plankton become a nutritious energy-rich superfood that fuels the whole web of marine life.

Yet, this food-energy is unavailable to most marine mammals, seabirds and large fish.

An important group of small fish called **forage fish** have evolved to thrive on a diet of plankton. Forage fish form massive schools which we measure in metric tonnes. In turn, these dense schools of small fish are concentrated sources of fuel for larger marine predators.

Through their immense numbers, forage fish make the captured solar energy stored in plankton available to their predators. Uniquely, these forage fish are the

energetic link between that vast nutritious biomass of plankton and fish eating seabirds, marine mammals and the larger fish that we humans rely on for food.

Collectively, forage fish are also known as cornerstone species because they are the critical link between energy rich plankton and the very survival of the hundreds of larger marine predators which forage on them.

Importantly, Lasqueti Island hosts two kinds of beach spawning forage fish: Surf smelt (*Hypomesus pretiosus*) and Pacific sand lance (*Ammodytes hexapterus*). With magnetic attraction, they are drawn back year after year

to spawn on our coarse sand and gravel beaches. Thanks to marine biologist, Ramona de Graaf and hundreds of volunteers, many spawning beaches are now being documented around the Salish Sea; however, the life history and biology of Surf smelt and Pacific sand lance is still largely unknown.

At maturity, both species of fish are about 20 cm. (8") long. Surf smelt have olive green backs and silvery bellies while Pacific sand lance have reflective blue top sides and silver bottoms, the perfect camouflage from

predators, both from above and below. Surf smelt have a typical fish shape while Pacific sand lance, also known as needelfish, have thin, elongated bodies. Our beach



Rhinoceros auklet with a bill full of PSL: Pacific sand lance are thought to be the most important fish in the N.E. Pacific because of their unique status of being forage for the most number of predators such as: marbled murrelets, scoters, murre, guillemots, cormorants, red-throated loons, seals, sea lions, whales, rockfish, halibut, salmon and rhinoceros auklets. Photo Andrew A Reding



*left: male and female Surf smelt, photo: K George
top: Pacific sand lance rising, photo Jon Gross*

spawners have relatively short lives – up to 5 years for Surf smelt and 7 years for Pacific sand lance. Those that survive the hazards of life as a small fish will return every year to spawn.

Pacific sand lance are somewhat unique in their behaviour pattern, schooling and feeding in open water during the day. Then, at night, they burrow into well-oxygenated, sub-tidal, sandy bottoms to avoid predation. During the winter, these little fish will lie dormant, hibernating in their burrows for long periods of time. Burrowing habitats are usually close to their feeding ground, and perhaps also their spawning grounds.

Scientists believe that Surf smelt in the open Pacific and those in Puget Sound are two separate stocks which evolved from the same ancestors living along the outer Pacific coast of North America. Around 13,000 years ago, as the thick ice of the Fraser Glaciation began to melt, ocean waters flooded into the Puget Sound area, bringing with it the sea life of the Pacific, including Surf smelt. Then, glacial events created conditions that restricted further influx of Surf smelt from the Pacific, cutting off the Puget Sound smelt. These two populations evolved so differently that now they do not mix. We do not know how our local Surf smelt are related to these two distinct populations in Washington State.

Surf smelt come onto Salish Sea beaches to spawn both during the summer months and in the winter. So far, we have only been able to find evidence of winter spawning on Lasqueti. Several beaches do have good potential habitat for summer Surf smelt. Unfortunately we don't really know much about the relationship between the year-round, summer and winter Surf smelt spawning stocks in the Strait of Georgia, although they have been extensively studied in Washington State for over 60 years.

During the winter spawning season, from early November until late March, winter Surf smelt stocks arrive in the upper intertidal area. Individual female Surf smelt separate from the school and are followed by several males into the shallows to spawn, releasing eggs and milt and leaving small patches of fertilized eggs on the beach. It is likely that female Surf smelt will spawn several times in one season, laying thousands of eggs.

Pacific sand lance use a slightly different spawning strategy. Once a year, in the late fall and winter, when their biological alarm clock goes off, the whole school arrives in the shallow water over a spawning beach and together they churn up spawning pits. Here, the females all lay their thousands of eggs and the males release their milt. Otter Be Good Productions has made an interesting video with live footage of this phenomenon from a beach in Powell River. (<https://www.youtube.com/watch?v=uduZJ1X4zjs>)

The fertilized embryos of Pacific sand lance are just 0.5 mm in size, while Surf smelt embryos are a whopping 1.0 mm in diameter! Both are easily overlooked on the beach. Surf smelt eggs come equipped with a suction cup which allows them to tightly adhere to beach pebbles. Pacific sand lance eggs are sticky and sand quickly coats the eggs making them invisible and heavy. Anchored to beach substrates, wave action helps to cover the fertilized embryos with a protective layer of sand and gravel.

While some drift is inevitable, embryos of both species are usually found buried just below the surface in the substrate, between 2 and 4 meters below the high tide line. Here, they stay moist and ride out our winter storms for their 4 weeks or more of incubation. **Embryo survival is improved by the presence of overhanging shade on the beach and the lack of human disturbance.**

Newly hatched larval Surf smelt and Pacific sand lance, pulled by the tides, currents and storms, drift and feed in the rich, plankton-laden surface waters throughout the Salish Sea. As juveniles, young fish rear in protected bays, inlets and estuaries. Pacific sand lance adults form vast schools feeding throughout the water column while adult Surf smelt tend to stay closer to shoreline or benthic habitats, feeding at depths of no more than 30-50 meters.

What we know about the populations of B.C.'s Surf smelt and Pacific sand lance: in 1904, at the peak of the commercial harvest, 230 metric tonnes of Surf smelt were

caught in B.C. The commercial harvest reported for 2002 was a mere 710 kg. No reporting is required for recreational harvesting, although it may exceed the commercial fishery and is perhaps the reason for the local Burrard Inlet stock being driven to perilous low numbers. Because there has been an unlimited and unreported catch for many years, and no recent stock assessments have been done, no one knows how many Surf smelt live in B.C. waters. No stock assessments have ever been done for Pacific sand lance in B.C., and there is no commercial fishery in Canada at this time. However, this species is a common by-catch during commercial trawling. Numerous fish, seabird, and marine mammal populations are in precipitous decline in British Columbia and scientists have started to look at the link between forage fish biomass reduction and these declining populations.

While we know little about the dietary needs of most marine animals, we do know that Pacific sand lance comprise 35% of juvenile salmon diets, a critically important food for these young fish. With all of the human resources we have invested in restoring salmon habitat in the watersheds of the Salish Sea, we also need to be mindful that our coastal beaches are important to salmon survival, because our beach spawning forage fish provide that critical link between energy rich plankton and energy hungry salmon, sea mammals, sea birds and people.

These little, unassuming forage fish are the most important fish in our ocean waters. Their spawning beaches scattered around Lasqueti Island are particularly sensitive, and we should strive to leave them undisturbed and pollution free.

For further information, check out the LIFFT *Forage Fish* Brochure on LINC's website and *Sharing Our Shorelines* on the Islands Trust website.

Citations are available on request. Connie Haist, a member of LINC and the Lasqueti Island Forage Fish Team (LIFFT)

Watching and Conserving Lasqueti Butterflies

by Sue Wheeler

Butterflies! Everyone seems to love catching sight of them. These beauties are important pollinators for plants, and they are food for birds and other animals. Moths and butterflies belong to the insect order *Lepidoptera*, which comprises about a million species. Generally, butterfly antennae are thread-like, with a small club at the end. Moth antennae usually lack clubs and resemble either threads or feathers.

A pair of close-focus binoculars is a wonderful tool for butterfly-watching. If you are shopping for binoculars, be sure you can focus on something at a distance of two metres or less, then you're OK for butterflies.

To watch butterflies, go to a likely habitat, in season, after the sun has warmed things up, and sit and be patient. You will notice them as you walk on the roads

or woodland edges, or in fields, or as you garden. I have also seen butterflies crossing bays and flying between islands. Since they get both water and minerals from various places, they may be found on beaches and tideflats, on piles of old seaweed, and on mud and animal dung.

A greenhouse with doors open can be a great butterfly attractor, but if your greenhouse is trapping them, be sure to check a couple of times a day and catch

and free them and try netting the doors to keep them out. Gentle handling is fine, and touching the wings doesn't hurt them, just be sure not to squeeze the body.

The more you watch, the more you'll see. Butterflies will chase each other and birds out of their territory. When they court and mate, they will be distracted and tolerate your close watching. If you notice an adult flying around host plants, you may see the female laying eggs, and then you will know where to look later for larvae and pupae.

I have noticed a decline in recent years in the numbers of butterflies I am seeing here. A butterfly expert assures me that populations fluctuate, and only one species recorded on Lasqueti (the Common Woodnymph) is listed at risk in BC. Warmer temperatures are affecting some



Top: Red Admiral, Lower: Painted Lady
Photos by Sue Wheeler

species, leading to expanded ranges and longer breeding seasons, allowing more than one brood per year, but severe drought is reducing populations in other areas. The biggest threat to butterflies, however, has been and remains habitat loss, to urban development, intensive agriculture, logging, and overgrazing by cattle and sheep, all of which can happen both here and in the areas they migrate to and from.

Butterflies need two kinds of plants: flowers with nectar for the adults and plants that offer a suitable food source for hatched-out larvae (caterpillars), which is usually leaves. The nectar sources could be entirely different plants from the leafy, larval food source.

Garden flowers of all sorts will attract adult butterflies to sip nectar, but the main thing we can do to protect and conserve them is to preserve natural areas – their habitats, especially forests, sheltered forest glades, wet places and streams, brushy areas, and patches of nettles, willow, and alder, which are the host plants (places to lay eggs) for many Lasqueti butterfly species.

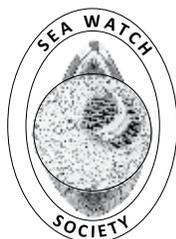
It is important to avoid completely the use of herbicides and insecticides, including and especially Bt, which is widely sold as a mild way to control some pests, but this is deadly to the larvae of all butterflies and moths.

Another threat is raising purchased butterfly larvae, or releasing butterflies at a wedding or other event. This can put non-native butterflies, or non-resident populations, into an area, which is the same as Atlantic salmon escaping from fish farms into Pacific waters.

Editors Note: The Mourning Cloak, dark to purplish in colour, is usually the first butterfly we see in spring with a life span of about 10 months. Seen in early spring, it has actually overwintered in preparation for egg laying in May.

MORE INFORMATION: Butterflies page of the Lasqueti website (<http://lasqueti.ca/eco/butterflies>): photos and more details of all the species seen and identified on Lasqueti in recent years, plus more information and a short list of useful books and other websites.

Funding for this issue was generously provided by



GOT BATS?

Are you interested and concerned about bats?

"Of the sixteen species of bats in B.C., over half are red or blue-listed, meaning that their populations are declining and they could become endangered. Recently the Little Brown Myotis, a species that commonly uses buildings as roost sites, was listed as Federally Endangered due to the devastating impacts of White Nose Syndrome (WNS) in eastern Canada. This introduced fungus has already killed approximately 6 million bats in North America. Since WNS has not arrived in BC, community bat projects are doing all they can to promote bat conservation prior to its arrival." (BC Community Bat Project)



There are two very good web sites to check out: www.bcbats.ca and <http://www.hat.bc.ca/bats>.

If you have bats living in your buildings, would like to join the BC Bat Count, or need information on how to build a bat-house, visit www.bcbcats.ca or call 1-855-9BC-BATS.

LINC will conduct counts this summer at the community hall around July 21. Contact Sheila Ray if you want to get involved!

Join Us on Squitty Bay Day!

brunch, walks, boat rides, music, and much more!

Come celebrate our Parks and Protected Areas!

August 21, 2016

