The Fishes of the Northwest Straits

Michael Kaill

I. Overview

Where we, and the fishes, live

We live in a place that could be considered a giant mixing bowl. Great flows of nutrient-rich fresh water from rivers on the mainland move through San Juan County. Meanwhile, the tidal cycles bring in sea water from the west and moves it to and fro. All this water moves over and through a complex of reefs and sand bars, wonderful places to grow marine plants and algae. The near-constant movement of waters keeps nutrient-rich sea water available to marine plants, which in turn, support small animals, which in turn, feed larger animals. Add to this the high number of sunny days in the San Juans and the result is a very productive marine habitat.

Underwater, there are a variety of local habitats. There are sheer rock walls, underwater cliffs, reefs made of boulders the size of pickup trucks, sand and mud plains, and quiet, protected mud-bottom bays where eelgrass meadows grow. Eelgrass is very important as spawning habitat for some fish like herring, and it is rearing habitat for many fish and invertebrates.

There is not a lot of freshwater habitat on the islands and most of what is here is artificial, as in farm ponds. These are usually stocked with trout, bass, and other introduced species. Kokanee, which are a land-locked, freshwater form of sockeye salmon, have been introduced to both Cascade Lake and the higher, cooler Mountain Lake in Moran State Park. In Cascade Lake, there are also regular plantings of cutthroat trout and rainbow trout for recreational fishing. In Mountain Lake, with cooler, spring-fed waters, the kokanee can reproduce naturally and have done so to the extent that the lake is over populated and the fish are stunted. They are 8 to 9 inches long compared to an average size of 14 to 16 inches in Cascade Lake. The Mountain Lake population represents one of those rare situations in our contemporary resource environment: A fish population that could benefit from more fishing pressure,

Introduction to local nearshore marine fishes

There are three useful ways to visualize fishes.

1. The first is to consider natural relationships; that is, a fish's standing, from primitive to advanced, on an evolutionary scale. Rather than think of individual species, it is helpful to mentally organize them into families. This greatly reduces the number of things to remember and if you forget a name, you can get back on track quickly by referring to the family.

All illustrations in this section from: Lamb, Andy and Phil Edgell. Coastal Fishes of the Pacific Northwest. Madeira Park, B.C.: Harbour Publishing, 1986. Reprinted by permission of the publisher.

2. The second is form and function. Background information on habits, and how appearance relates to these habits, makes it easier to understand how a particular fish makes its living.

3. The third is what they do for a living, or natural history. Different species in a fish community can be divided up into functional types, similar to land animals. For example, there are grazers - swiftly swimming schools of silver fish that feed on small plants and animals suspended in the water. There are swiftly sprinting predators that run down and over-power prey. There are ambushers that wait in hiding and pounce on unwary prey.

Organization

There are three major groups of fish:
1. Lamprey and hagfish - These are jawless, boneless, eel-like fish. Many are parasitic.
2. Sharks, rays, and ratfish - These fish are also boneless, their bodies supported by cartilage.
3. Bony fishes - There are two categories of bony fishes:
    - Soft rayed fishes such as salmon.
    - Spiny rayed fishes such as rockfish.

In general, more spines and complexity in bone structure indicate that the fish is evolutionarily advanced rather than primitive. For more details on family relations within the bony fishes, check Hart or Lamb in the references.

Form and function

The medium

Water is dense, and resists movement through it. Animals that move easily through water must be streamlined, much more so than animals that move over land.

Adaptations

The most efficient shape to move through water is a teardrop. Some ocean tunas that swim all their lives approximate this shape. (Some tunas "drown" if they stop swimming.) But moving easily through the water is not everything. Fish need to steer and control their speed.

Fish do not swim entirely with their tail fins. They cast their body into a series of "S" curves and push against the water with the sides of their body, similar to the way in which a sidewinder snake moves across the sand. The longer the body, the more there is to "grip" the water. A nervous bird, ready to fly, will squat with wings partly spread ready to leap into the air. Similarly, a fast swimming fish faced with danger will kink its body into an "S" shape, ready to make a dash to safety.

Moving from the sleek tuna as an example of high efficiency, we can see compromises in this efficient body form in the dogfish shark, a fish common in the Northwest Straits. In the dogfish, fins used for steering stick out from the body. Drag resistance is created, but the fish is able to turn sharply. The body shape is also elongate, which creates drag. However, with a long body, the shark can grip the water and sprint towards prey. An extreme of this "drag-racer" body form is the barracuda, which could be considered the ocelot of the sea - from zero to very fast in no time at all.

Other fish body shapes include:
- Fishes with deep, laterally flattened bodies are experts at fine maneuvering such as surf perches.
- Fishes with long eel-like bodies can work into nooks and crannies such as the wolf eels and pricklebacks.
- Fishes with flattened bodies can lie on the bottom, often partially covered with sand or mud, waiting for a meal to come by. This group includes the flounders, soles, skates and rays.
- Fishes with a lumpy, rock-looking body and big mouth. They sit passively on the bottom until prey comes close, then lunge, opening their large mouth to create a strong inward current to suck in their prey.

The development of these body shapes are responses to natural conditions and have evolved in many unrelated groups. For example, the body shapes of a mako shark and a bluefin tuna are similar, as are a skate and the unrelated flounder. The idea of unrelated animals all assuming the best adaptation for a set of conditions is called convergence and has been used by engineers to apply the lessons learned by nature to benefit human technology - a discipline called bionics.

II. Important Local Families of Fishes

The following list includes important fish families (family names end in *idae*) found in the waters surrounding the San Juan Islands.

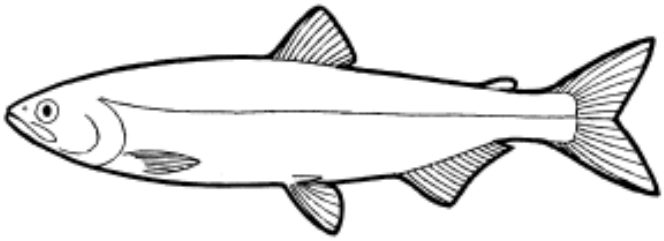
Pacific herring

surf smelt

Herring *(Clupeidae),* **Smelt** *(Osmeridae),* and **Sand Lance** *(Ammodytidae)*
- These small silvery fish are usually found in large, fast moving schools, feeding on plankton in the upper waters.
- They are tremendously important as a food source for other fishes. Some, such as the smelt, lay eggs on a beach. Only recently has it been found how widespread smelt spawning beaches are in Puget Sound. Herring use traditional spawning grounds, often in eelgrass.

sand lance

- Sand lances are very common in our area and are very important as a food fish. They burrow into the sand for shelter and can get stranded at low tide, producing the "miraculous" situation in which these fish swim up out of dry sand. They can be seen in boat harbors and are distinguished from herring by their long, twisting body (although herring and sand lance school together).



Salmon *(Salmonidae)*

- Salmon spawn in fresh water, live in the ocean for one to five or more years, and then return to their natal stream. Five species of salmon are found in Puget Sound and the Northwest Straits. However, there is little production from the islands. Almost the entire salmon fishery here is intercept, taking fish headed for the mainland, which creates political issues when the natal streams are in Canada.
- Trout occur in local ponds, stocked by land-owners.

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We are continuing to learn about the evolutionary resourcefulness of these remarkable fish. The subgroups and names of the family can be confusing. Here is a glossary:

<u>Pacific salmon (die after spawning)</u>

- Chinook (also known as king, spring, blackmouth)
- Coho (also known as silver)
- Sockeye (also known as red - in freshwater called Kokanee)
- Pink (also known as humpy)
- Chum (also known as dog)

<u>Atlantic salmon and trout (can spawn repeatedly)</u>

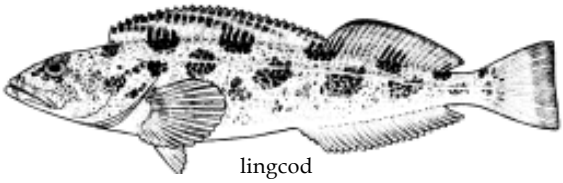
- Atlantic salmon - From the east coast, but reared here in net pens. There have been recent rumors of net pen escapees spawning in Washington streams, which is cause for concern.
- Rainbow trout - The sea-run version of rainbow is called steelhead. The rainbow trout is more closely related to the Pacific salmon species than the Atlantic salmon.
- Cutthroat trout - Introduced locally, there is also a sea-run version which may occur around the islands. Also more closely related to the Pacific salmon species.
- Brown trout - Introduced, though not common here. Brown trout grow to a large size and can be a significant predator.

Pacific tomcod

Cods *(Gadidae)*

- This important family contains the true cods, hake, and pollock.
- Cods are the only fishes with three dorsal fins, and two anal fins.
- This family contains very important food fishes which are locally overfished.

kelp greenling
F. (back) M. (front)

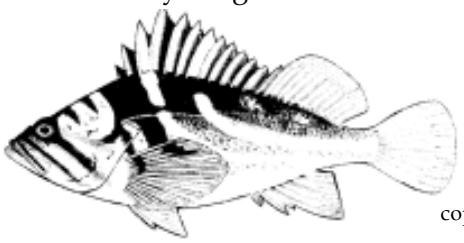


lingcod

Greenlings *(Hexigrammidae)*

Includes lingcod, as well as kelp greenling and others.

- After spawning, the much larger female lingcod swims into deep water leaving the male to guard the eggs. Because he is very territorial and will not easily leave the nest, he is easily caught at this time. With the male gone, the eggs are easy prey, which is a serious problem for lingcod populations.
- The lingcod can grow up to 100 pounds and tend to have a very small home range. A tagged fish was caught in the same location 22 years later.
- Male and female kelp greenling have different color patterns and are one of the most commonly caught fish in the area.



copper rockfish

Rockfish *(Scorpaenidae)*

The Latin family name was chosen to recognize the venom that is contained to a greater or lessor degree in the spines of this family. Punctures from these sharp spines can leave a painful wound.

- There are about 35 species of rock fish in the North Pacific - around 20 are found locally.
- Most species have a "prickly" appearance.
- Some seasonal movement takes place, mostly from on-shore to off-shore.
- Rockfish take four to five years to reach sexual maturity and commonly live over 30 years while some can live over 100 years.
- Rockfish can be very territorial. A yellowtail rockfish came back to its

original location after a 20 mile displacement. Some species (black and yellowtail, Puget Sound) are schooling fish while others (copper and quillback), are more solitary.

- Rockfish live near the sea floor. Some are found in deep water. Bringing them to the surface kills them as their gas bladder expands. Therefore, they are not a good candidate for catch and release.

shiner surf perch

Live Bearing Surfperches *(Embiotocidae)*

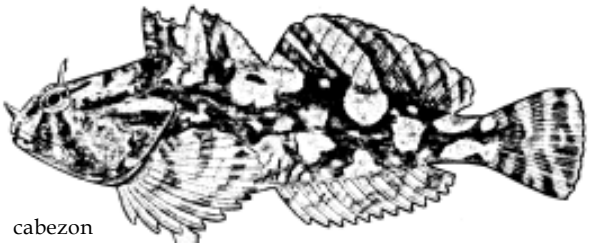
There are several species of surfperches in our waters. They are perch-like in shape and are commonly found around pilings, kelp, and near-shore reefs.

- They range in size from the 2 to 3 inch shiner perch to the 12 inch lined surfperch.

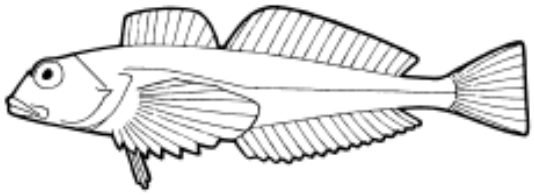
rock prickleback

Pricklebacks, warbonnets, eelblennies *(Stichaeidae)*

- These fish are eel-like inhabitants of rocky intertidal habitat. Local people in some areas fish for them using "poke-poles" - a short line on the end of a long pole that is jammed into rock crevices.
- Pricklebacks can often be found locally by digging in pebble/cobble beaches, where they live between wet rocks often well above the tide line.



cabezon



Sculpins *(Cottidae)*

- These are the fishes with fan-shaped pectorals and big heads seen darting about in tide pools.
- They include the cherished food-fish, cabezon.
- This family contains many species. Several species are quite large (to 24 inches) while many more are small (less than 2 inches) and difficult to identify.

blackeyed goby

Gobies *(Gobiide)*

- The gobies are common, darter-like fish usually found in sand-rock habitats.
- They have a long and colorful narrow body, eyes on top of their head, and are usually seen resting on their pectoral fins and tail in a "tripod" fashion.

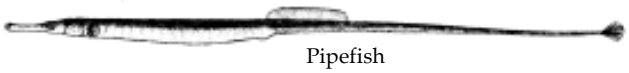
Pacific halibut

Flounders *(Left eye - Bothidae; Right eye - Plueronectidae)*

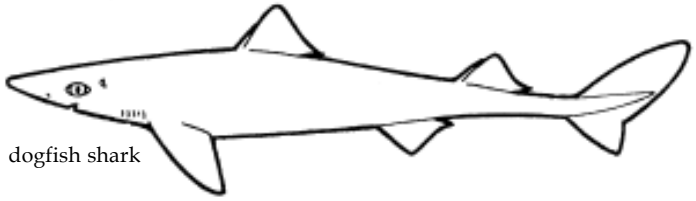
- These fishes begin their lives looking "normal." As they mature, one of the eyes migrates from one side of the head to the other; eventually the fish lies with both eyes on its side.
- This family includes important species like halibut and sole.
- The Pacific halibut can grow to be over 8 feet long and weigh more than 400 pounds.

pacific lamprey

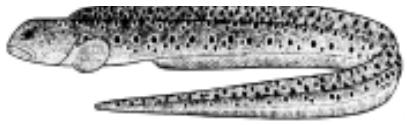
kelp clingfish



Pipefish



dogfish shark



wolf eel

Other miscellaneous but interesting fishes in our area:

- **Pipefish** - A relative of the sea horse, and looks like one that has been straightened out. It can be seen in eelgrass and around docks.
- **Pacific Lamprey** - This fish feeds on salmon and other species by adhering to the host's body with a round jawless mouth. The lamprey is rarely seen, but its round fresh or healed feeding wound can be found on the body surfaces of a variety of fish.
- **Dogfish Shark** - The dogfish is a small species (2 to 3 feet long) as sharks go but an important predator in our waters. There is some discussion about the replacement of prized food and game fish with dogfish-like species as the more valued species are fished out.
- **Wolf Eel** - The wolf eel is ferocious looking, with powerful jaws, but is commonly trained as a "pet" by divers who hand-feed them. They are usually found in waters 50 feet and deeper in rocky reefs.
- **Clingfish** - The clingfish is a curious, lumpy fish that can be found adhering to the bottom of rocks in tide pools attached by a sucker made by its ventral fins.

III. The Problem with Being Popular

We live in a world filled with air. Because of this, it is difficult for many of us to visualize natural communities below the water's surface. They are in a difficult medium and out of sight, so we tend to forget them. There are whole ecosystems underwater, as important and dazzling as a rain forest. We have had county, state, and national parks in mountain, desert, and forested areas for many years. However, underwater parks, especially marine biological preserves, are a "new" idea. And because they are not in plain view, marine parks are hard to create.

Yet we feel free to over-use those marine species that meet our needs. As a result, several groups of fish, such as stocks of Pacific salmon in our area, are in trouble. So much so that rescue efforts are necessary through the Endangered Species Act. Our pattern seems to be: Over-harvest the fish until they are almost extinct, then spend lots of money on big emergency plans to save them.

We focus on our favorite species of fishes, relentlessly bearing down on those which posses certain traits. We go after fish that look good, are big in size, and fight fiercely when caught, like salmon. Or fish that taste good, like halibut. Or fish that are active and aggressive in defending their territory, like lingcod. It is sad that people often tend to think only of game fish or food when the word "fish" comes to mind. This selective removal creates distortion in fish communities, as numbers of important species decline. A report in *Science Magazine* describes areas where the top predators have been relentlessly removed from fish communities. In one case, this resulted in the top predator becoming a species of jellyfish.

Other issues that can lead to the decline in the number of fish and the quality of habitat:

Overfishing

As we are learning when fish stocks are fished to collapse, the human tendency towards denial is strong. Fishers will point to other fishers as the fault. Or they may blame the seals. Or they may say that there is really no problem and a real fisher can catch fish any time. There are answers to these objections, and they have been compiled in a "*Letter to a Fisherman*" noted in the "Additional Reading" section. Almost all fishers want to do the right thing and if they understand, they will not resist sound conservation measures.

Habitat protection

A variety of land-use practices can effect the welfare of fish populations. Dock building, land clearing, and even seemingly innocuous structures can effect the currents along the shore, change the near-shore ecology, and disrupt important resources that fish might need.

Non-point pollution

Runoff from land can contain a variety of dissolved or suspended materials that might negatively effect fish populations. For example, fertilizers (from lawns or septic systems) can create an artificial richness that can cause a plankton bloom, which can shadow or over-grow eelgrass meadows and other important habitats.

Protection of forage, or "bait" fish

These are the fish that you see in "bait-balls", attacked by gulls from above and other sea birds and marine mammals from below. In our area, common forage species are herring, smelt, and sand lance. They usually move in schools, and feed on plankton. They are impacted by human activities in two ways. First, they are objects of fisheries; in particular, herring that is taken for bait. Second, their reproductive potential is reduced as their spawning habitat is degraded. Tremendous losses have occurred in herring spawning areas within the last few years. This is not only a direct economic fishery loss, but also a loss of basic food support for a variety of valuable species from salmon to orcas.

References and Additional Reading

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Hart, J.L. Pacific Fishes of Canada, Bulletin #180. Ottawa: Fisheries Research Board of Canada, 1974. (One of the "bibles" of fish information. Detailed accounts of each species, though information is becoming dated.)

Kaill, Michael. Letter to a Fisherman. Available from the San Juan County Planning Department, 1998. (Deals with common objections from fishers like: "Sport fishing isn't really depleting bottomfish stocks." "What is the State doing?" "Seal populations eat all the bottomfish." "Divers (long-liners, draggers, gill-netters) are the ones that are really getting the fish.")

Lamb, Andy, and Phil Edgell. Coastal Fishes of the Pacific Northwest. Madeira Park, B.C.: Harbour Publishing, 1986. (A good overview of fishes, with accounts for each species from the point of interest of fisher, diver, naturalist, and the species as food.)

Pauly, Daniel and others, "Fishing Down Marine Food Webs," SCIENCE Vol. 279 (February 6, 1998), pps. 860-863. ("It is likely that continuation of present trends will lead to widespread fisheries collapses. If things go unchecked, we might end up with a marine junkyard dominated by plankton.")

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Sommerton, David, and Craig Murray. Field Guide to the Fish of Puget Sound and the Northwest Coast. Seattle, WA: University of Washington Press, 1976. (A handy pocket book for identification. Simple line drawings, printed on waterproof paper.)