

Pacific Herring -- *Clupea pallasii*



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Herring are a common fish in the Gulf of Alaska. They are visual predators that eat copepods, krill, and amphipods. Their eyes are especially adapted for hunting in low light conditions.

Herring, which are full of nutritious fats, are eaten by all sorts of animals – sea lions, humpback whales, seabirds like common murre and black-legged kittiwakes, salmon, and cod. Herring are harvested for local food and commercial sales by fishermen.

Herring lay their eggs in shallow areas on eelgrass and seaweed. A single female can lay up to 20,000 eggs at a time! Their eggs are an important traditional food for many coastal Alaska Native cultures.

Diatom -- *Chaetoceros debilis*



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This drifter is a type of phytoplankton, called a diatom. Diatoms use carbon dioxide, water, and energy from the sun to photosynthesize. They also need nutrients like nitrogen, phosphorous, and iron. Diatoms have a silica case around each cell which helps to protect them. They need a lot of silicic acid in the water to construct these cases.

Chaetoceros debilis has many spines projecting from their cells, which may help them float, take up nutrients, and ward off predators. Diatoms are major food for lots of consumers, including dinoflagellates and copepods. They form long chains, which makes it a good food source for some bigger animals too, like krill.

Arrow Worm – *Parasagitta* sp.



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Arrow worms are also called chaetognaths. They are ambush predators that eat other zooplankton, like copepods. They use small compound eyes and sensory bristles along the sides of their body to sense their prey. When prey is close, they dart out and grab their prey with the strong, hooked spines on the side of their head. Then they pull the prey whole down into their mouth with a series of small teeth, like a conveyor belt!

Chaetognaths are thought to be an abundant and important part of the food web in the Northern Gulf of Alaska where they are eaten by jellyfish, finfish, squids and even some seabirds.

Krill – *Thysanoessa* sp.



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This is a type of euphausiid, or krill. Krill use specialized legs to filter food their food out of the water. They feed on phytoplankton, detritus (bits of dead stuff in the water), and small zooplankton. Most of their prey can be found near the surface of the ocean, so that is a good place for them to find food.

But being in this light-filled environment makes them easy food for fish, seabirds, and even whales. To solve this problem, krill will migrate hundreds of meters up and down each day. They feed near the surface at night and hide in deeper darker waters during the day.

Pink Salmon -- *Oncorhynchus gorbuscha*



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There are 5 species of salmon in the Gulf of Alaska: chinook (king), coho (silver), sockeye (red), humpback (pink), and chum (dog). Pink salmon are especially common in the region. They begin their life cycle in coastal streams and rivers; juveniles head to the ocean after hatching. They spend about one year growing to adulthood in the ocean, before returning to the stream they were born in to spawn (reproduce).

Juvenile pink salmon feed mostly on larvaceans, pteropods, and krill. Adult pink salmon also eat juvenile herring and other small fish. Pink salmon are important food for seals, sea lions, orca whales, cod, and people, as well as land animals.

Copepod - *Neocalanus flemingeri*



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Like their crustacean relatives crabs and shrimp, copepods have an exoskeleton (exterior shell) that helps to protect them.

They eat diatoms, dinoflagellates and other small plankton such as ciliates. They can't see well, so rely on chemical sensors to smell their prey and find mates. As they eat, they load fats into an internal oil sac, to be used as fuel for the many months they spend in diapause – a type of hibernation.

Their long, sensitive antennae help them sense pressure waves to detect any predators or prey that might be headed their way. To escape, they can jump away with a burst of speed that moves them 600 times their body length per second!

Copepod - *Pseudocalanus minutus*



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This is a smaller type of copepod. Because they are smaller, they generally aren't preyed upon by things like seabirds or whales. Instead, they mostly have to evade jellies, fish, krill, and amphipods. They eat diatoms, dinoflagellates and other small plankton such as ciliates.

These *Pseudocalanus* copepods live year-round in the upper waters of the Gulf of Alaska. They don't diapause like *Neocalanus*. But when food gets scarce in the winter, many of them die. Luckily, females can spawn repeatedly and for many weeks into a protective egg sac. So even if only a few survive the winter, the population can recover quickly.

Ciliate - *Laboea strobila*



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This microscopic organism is called a ciliate. They use tiny hairs called cilia to propel themselves through the water.

Laboea strobila is pretty special because it is a mixotroph. This means they have more than one way to harness energy! They can chase down bacteria and phytoplankton prey. Once they consume phytoplankton, they can digest all but the chloroplasts, keeping those inside their own cell for a while. They steal the ability to photosynthesize from the prey they eat! This helps the ciliate survive when food is scarce.

Large ciliates are a favorite food for copepods; they are also eaten by krill and pteropods (small, planktonic snails).

Alaska “Walleye” Pollock – *Gadus chalcogrammus*

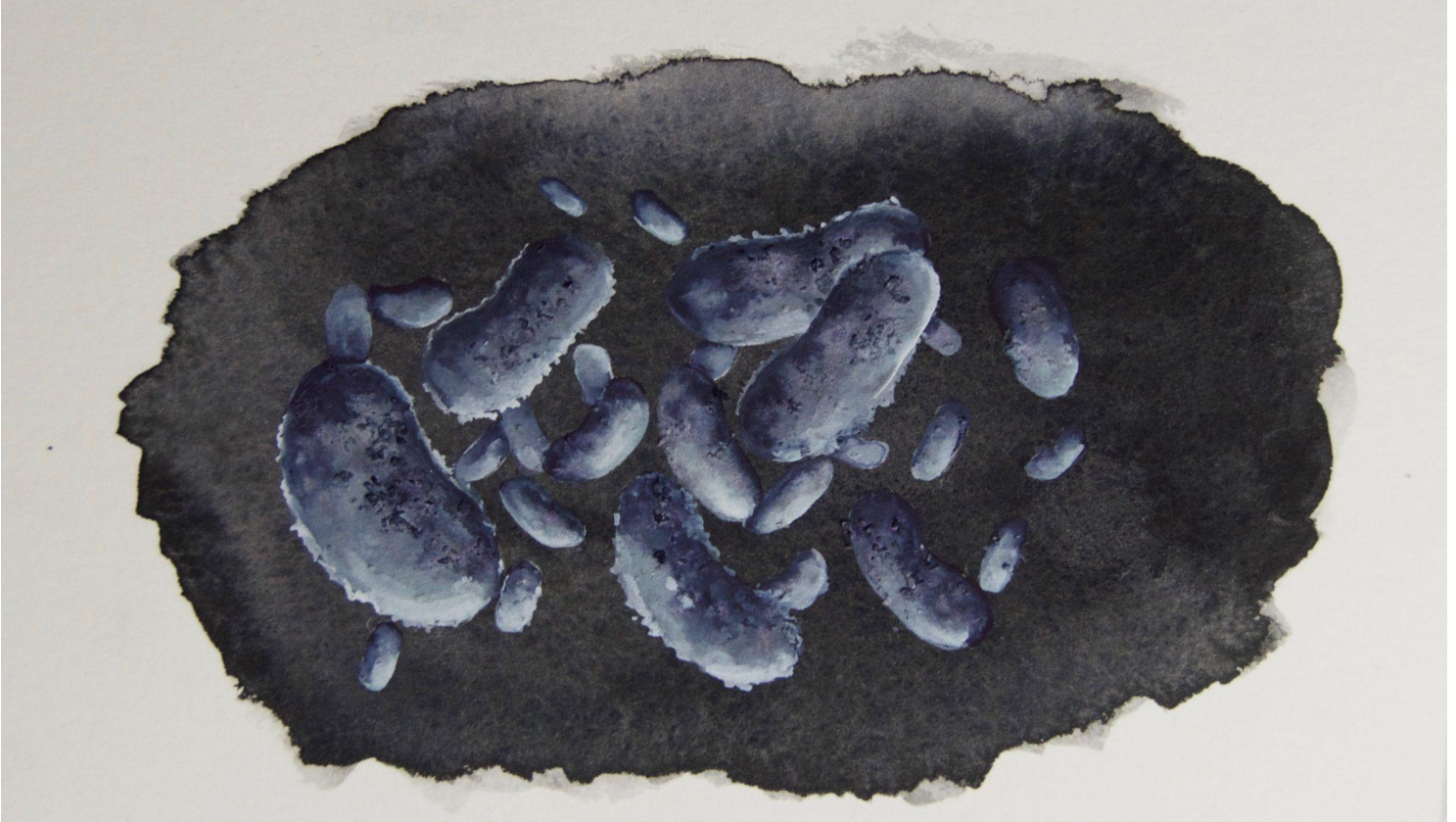


Alaska “Walleye” Pollock – *Gadus chalcogrammus*

Juvenile pollock feed on zooplankton, such as krill and copepods, as well as small fish. Older pollock feed primarily on fish, including juvenile pollock.

Many animals feed on pollock and rely on them for survival, including the Steller sea lion, other marine mammals, fish and seabirds. Pollock are also harvested for local food and commercial sales by fishermen.

Bacteria



Bacteria

Bacteria are found in almost every part of the ocean, including hydrothermal vents, the deep sea and even in oil spills! They are single-celled organisms, so small you cannot see them with just your eyes. Even though they are small, they are very abundant organisms in the ocean. In just one milliliter (less than half of one teaspoon) of seawater, there can be millions of bacteria. Some species of bacteria photosynthesize and get their energy from the sun. Others break down dead material, which makes them important decomposers in the ocean. And some bacteria even eat other bacteria.

They are eaten by other plankton such as protozoans, zooplankton, ciliates, flagellates and viruses.

Black-legged Kittiwake – *Rissa tridactyla*



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Kittiwakes feed on marine invertebrates and small fish, such as herring, pollock, capelin, salmon and sand lance, depending on which species are locally-abundant. These small gulls forage in flight, grabbing prey at or below the surface, and while swimming.

Kittiwakes face few natural predators, due to them building nests on narrow ledges of seaside cliffs. However, they are often preyed upon by bald eagles. Larger gulls will also often target them and steal their food in flight, a form of kleptoparasitism.

Capelin – *Mallotus villosus*



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Capelin are known to feed on planktonic crustaceans, krill, copepods, amphipods, worms and small fish.

A high-energy food source, capelin are preyed on by large fish (cod, herring, halibut), marine mammals (Steller sea lion, humpback whale), and birds (common murre, black-legged kittiwake). Predation rates are especially high during capelin spawning events when the fish move inshore. Some Alaskans also harvest them for roe (eggs), or to use as dog food, bait and fertilizer.

Harbor Seal – *Phoca vitulina*



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Harbor seals are opportunistic feeders, taking advantage of seasonally-available prey resources, such as pollock, cod, capelin, herring, sand lance, salmon, octopus, and squid. Although they move awkwardly on land, they are efficient swimmers and enter the water when threatened.

Predators of harbor seals include orcas, sharks, sea lions, land predators such as wolves, bears and coyotes, and bald eagles. Hunting is restricted to Alaska Natives, as seals play a crucial role in their diet and culture.

Humpback Whale – *Megaptera novaeangliae*



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Humpback whales feed on euphausiids (krill) and small fish like sand lance, herring, and capelin. Using long, fringed plates that hang from their upper jaw called baleen, humpback whales filter massive amounts of water to catch their tiny prey. Another way they feed is through “bubble nets” that they create by releasing air bubbles while swimming in circles under their prey.

Humpbacks then open their mouths and rapidly swim upwards into the concentrated school of fish or krill.

Predators include orcas, false killer whales, and large sharks. Humpbacks have also been hunted by humans throughout history for their oil, meat, and baleen. Subsistence hunting continues in some areas, but commercial whaling is now banned.

Nanoflagellates (example: *Heterosigma akashiwo*)



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Nanoflagellates are small planktonic organisms. They have at least one flagella -- a whip-like projection they use for propelling themselves through the water. They are usually 2-20 micrometers in size. That's about the width of a human hair.

Some nanoflagellates photosynthesize to harness energy from the sun. Others feed on picophytoplankton and bacteria. And some, called mixotrophs, do both! *Heterosigma akashiwo* is an example of a mixotroph.

Nanoflagellates are eaten by larvaceans, *Limacina* pteropods ("sea butterflies"), and small copepods like *Pseudocalanus minutus*.

Orca Whale – *Orcinus orca*



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Orcas, also known as killer whales, are apex predators with diverse diets that include fish like herring, halibut, cod, and salmon; marine mammals such as harbor seals, harbor porpoises, Steller sea lions, sea otters, and whales; birds, and squid.

They are social, intelligent animals that hunt together in pods to take down their prey. Orcas will sometimes even beach themselves to reach sea lions and seals that are resting on shore.

Because they are apex predators, orcas do not have other natural predators besides humans.

Pacific Cod – *Gadus macrocephalus*

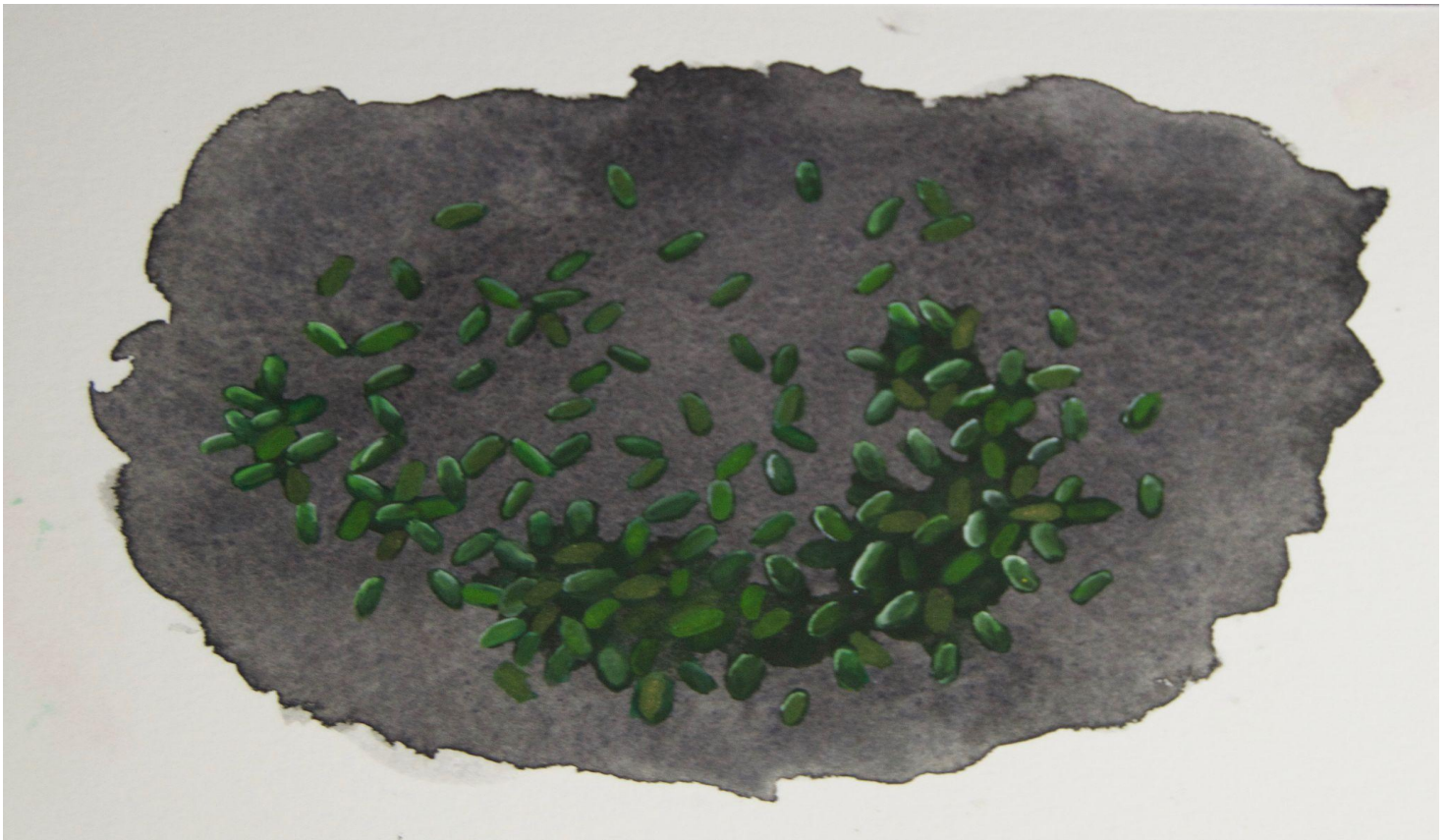


Pacific Cod – *Gadus macrocephalus*

Pacific Cod feed on clams, worms, crabs, shrimps and small fish, such as herrings and their own species. They use the barbel (a fleshy “whisker”) on their lower jaw to search for bottom-dwelling prey.

Pacific Cod are harvested for local food and commercial sales by fishermen. Their meat and oils are rich in omega fatty acids, and their livers contain vitamins E, A, and D. Other than humans, adult cod lack don't have many natural predators. The adults function as apex predators in the ecosystem; however, juveniles can become prey to cannibalistic adult cod.

Picophytoplankton (example: *Synechococcus* spp.)



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Synechococcus are a type of cyanobacteria and are considered to be picophytoplankton. They are between 0.2 and 2 micrometers in size. That's about 1/10th the width of a human hair!

Phytoplankton are known as primary producers. They photosynthesize, which means they use water, carbon dioxide, and energy from the sun to create their own sugars. These sugars are then used for growth, cell repair, and reproduction.

Synechococcus species are particularly important in temperate and tropical oceans, where they are most abundant. They need trace metals like iron and phosphorous to grow. They also require nutrients like nitrogen, but can thrive in areas with fairly low nutrient availability. Their main predators are ciliates, flagellates, and other protozoans.

Pacific Sand Lance – *Ammodytes hexapterus*



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Sand Lance spend their time hiding in sand and gravel and feeding close to their burrowing habitat. Larvae feed on phytoplankton and early zooplankton, while adults feed together in large schools on copepods, as well as herring eggs and larvae.

A high-energy food source, sand lance are consumed by salmon and other fish, seabirds, and marine mammals, such as the Steller sea lion and humpback whale. Due to their importance in marine ecosystems, commercial fishing of many forage fishes, such as sand lance, is generally banned in the Gulf of Alaska.

Sea Butterfly – *Limacina helicina*



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Sea butterflies are a type of pteropod -- a planktonic sea snail. They spend their lives swimming and feeding amongst the zooplankton community. They capture their food by casting a web of mucus that traps plankton. The webs they eat are full of copepods, juveniles of their own species, diatoms, and dinoflagellates.

Nicknamed the “potato chip of the sea,” sea butterflies are an important food source for zooplankton (especially other pteropods called sea angels), sea birds, fish, such as herring and salmon, and seals.

Steller Sea Lion – *Eumetopias jubatus*



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Scientists have discovered what the Steller sea lions eat by scraping their scat off rocks and looking for “hard parts,” such as bones and beaks. Sea lions eat a variety of fish and cephalopods, depending on the season and region, including pollock, herring, salmon, cod and capelin. They also eat the occasional bird or true seal.

The primary predators of sea lions are orca whales, sharks and humans. Historically, sea lions were harvested for a food source, clothing, boat coverings, craftwork, and even meat for fox farms. Currently, hunting is restricted to Alaska Natives who use their meat, hide and oils for food, clothing, tools, and crafts..

Amphipod - *Themisto* sp.



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Amphipods are tiny marine crustaceans. They are free-swimming predators that mostly feed on copepods and other planktonic species, but will also sometimes scavenge for their food. During the summer months, *Themisto* amphipods eat a lot of lipids that can be stored to help them survive the winter and reproduce in the spring.

Thanks to their high lipid content, these amphipods are a nutritious food source for predators like herring, pollock, capelin, and storm petrels.

Larvacean – *Oikopleura dioica*



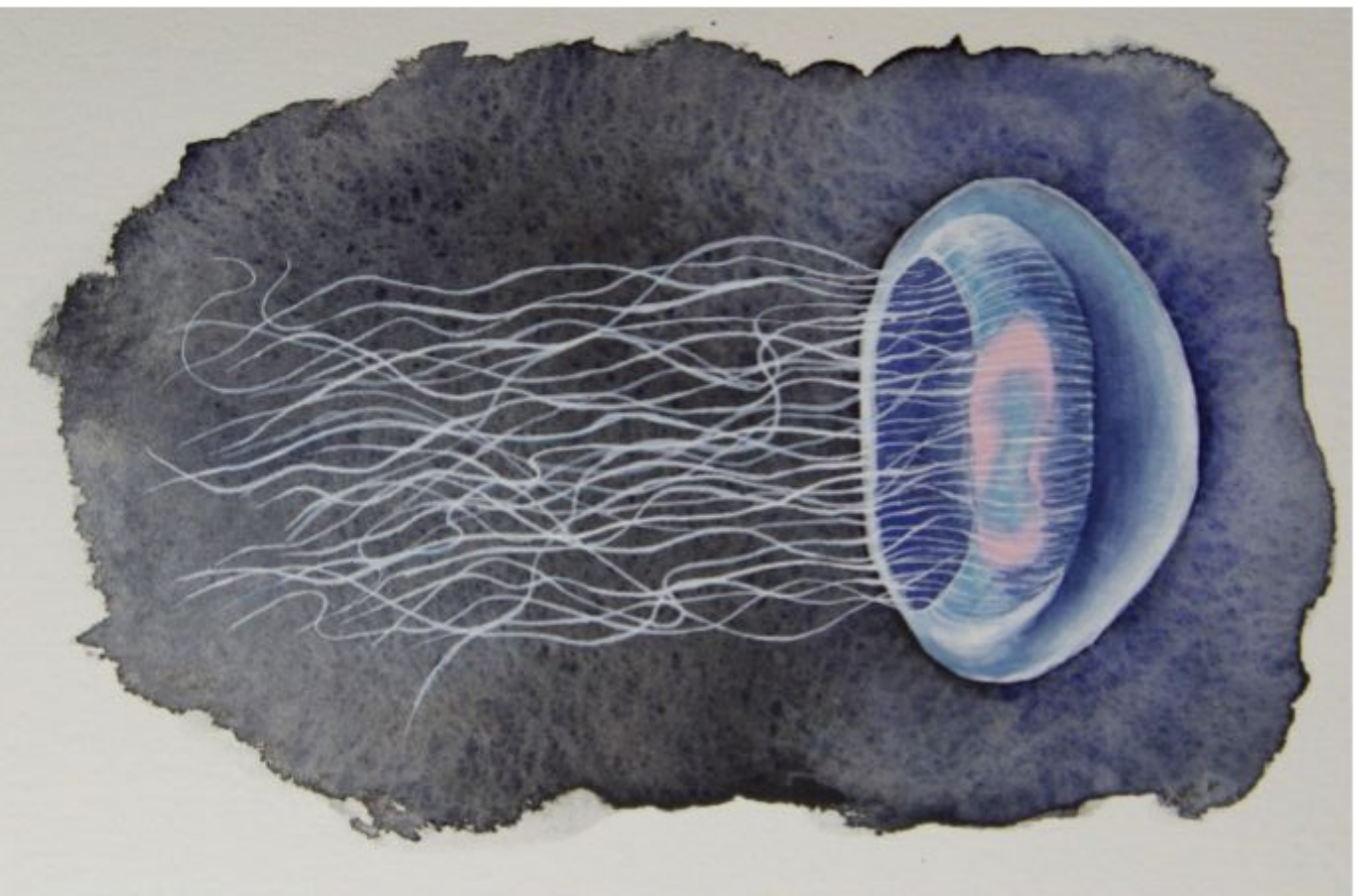
Larvacean – *Oikopleura dioica*

The main body of the larvacean looks kind of like a tadpole, but larvaceans create a mucus “house” around themselves. They pass water through mucous nets in this house, trapping bacteria and other particles that the larvacean then eat.

This mucus house can be as big as a chicken egg, even though the larvacean itself is usually about 1 inch long. Eventually the mucus net gets clogged with debris from the water, so the larvacean swims free and creates a new one. *Oikopleura* replace their mucus net as frequently as every 4-6 hours!

Larvaceans are eaten by jellies, arrow worms and by fish like salmon and herring.

Crystal Jelly – *Aequorea sp.*



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The crystal jelly has special stinging tentacles to capture prey and protect itself from predators. They use these tentacles to grab and paralyze their favorite prey, like copepods and larvaceans. The doomed prey are then moved to the mouth of the jelly and ingested.

When there isn't a lot of food around, crystal jellies can actually shrink in size. This allows them to be super survivors during times when there is less food to catch.

Crystal jellies are bioluminescent. This means that they can create their own light with a chemical reaction – they basically glow in the dark when they are disturbed!

Fork-tailed Storm-Petrel ***Oceanodroma furcata***



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The Fork-tailed Storm-Petrel feeds on marine invertebrates, small fish, floating animal oils, and carrion or dead animals. They feed by hovering over the water and picking at the surface, and while swimming. Sometimes adults have to fly very long distances to find prey; fortunately, their chicks have special adaptations to survive for days without food.

The birds nest on hilly islands with grass and shrub cover, laying a single egg in a burrow or rock crevice. They have few natural predators; however, nonnative foxes and rats have decimated populations when introduced to islands.

Common Murre – *Uria aalge*



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Murres feed on marine invertebrates and fish, such as capelin, pollock and sand lance. They also can be important predators of juvenile cod. They use their small wings to propel themselves during underwater dives for food. These birds can reach depths of 600 feet! They also have the ability to swallow their prey underwater.

They nest on cliff ledges and slopes, where they have few natural predators. Gulls and introduced mammals, such as foxes, have been known to prey on eggs. Additionally, Alaska Native subsistence hunters harvest both adult murres and their eggs for food.

Sea Angel – *Clio* *limacina*



Sea Angel – *Clio* *limacina*

Sea angels spend their entire lives swimming amongst the zooplankton community, feeding almost exclusively on smaller pteropods called sea butterflies (*Limacina helicina*). When a sea butterfly floats by, this planktonic sea slug exposes six hunting arms from its head to quickly grab a meal. While holding onto the animal's shell, they pull their prey's body out of the shell to feast.

In order to discourage predators, sea angels have evolved to produce a chemical compound that is distasteful to fish; however, they are still preyed upon by baleen whales, such as humpbacks.

Dinoflagellate *Triplos muelleri*



Dinoflagellate - *Triplos muelleri*

This dinoflagellate is a mixotroph. This means that *Triplos muelleri* can both photosynthesize (making their own food from sunlight) and prey on other microbes. They always photosynthesize, but employ feeding when they need a nutrient or energy boost.

They use two thread-like flagella to move themselves through the water and can even capture highly mobile ciliates. They probably sneak up on the ciliates and 'harpoon' them with a toxin-containing filament.

In turn, animals like copepods and krill prey upon *Triplos*. However, *Triplos* are usually bioluminescent, and the flashes of light they emit can scare away these predators.

Lion's Mane Jelly ***Cyanea capillata***



Lion's Mane Jelly – Cyanea capillata

Like other jelly species, lion's mane jellies use tentacles with special stinging cells called nematocysts to catch and stun their prey. The trapped prey is then moved to their mouth, which is on the underside of their bell. Lion's manes eat zooplankton like krill and *Neocalanus* copepods, small fish, crustaceans, and other jellies like the crystal jelly.

During their one-year lifespan, the tentacles of a lion's mane can grow up to 120-feet long, which makes it hard for other animals to eat them. Predators of juvenile lion's manes include seabirds, larger fish, sea turtles, and other species of jelly. Sea anemones are one of the only animals that will eat both juvenile and adult lion's mane jellies.

Human – *Homo Sapiens*



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Human beings are mammals that do not live in the ocean, but they are able to eat many different animals from the ocean. Throughout history, humans have hunted whales, seals, sea lions, porpoise, crab, shrimp, seabirds and many species of fish such as salmon, halibut, pollock, and cod.

They have the ability to fish for different animals with specific gear and technology. Common gear includes fishing nets, crab and shrimp traps, fishing boats, kayaks, long lines, and fishing rods. The technology that humans use makes them very efficient predators.

There are no known natural predators to humans in the Gulf of Alaska.