FOOD WEB ACTIVITY CARDS

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Teachers,

Print the organism cards of your choice, fold in half, glue or tape, then punch holes in the top for yarn or string so your students can wear the card around their necks while building their Salish Sea food web. See Food Web Activity instructions.

Sustainability tip: print on card stock instead of laminating to cut down on plastic waste.

ENERGY FROM

Sunlight! Diatoms are single-celled organisms that use the sun's energy along with the water they live in to make their own food (photosynthesis).

EATEN BY

They are eaten by many grazers and filter feeders, including barnacles, mussels, and periwinkle snails.

OTHER INFO

They can appear as brown slime covering seaweed, eelgrass, and rocks in the intertidal.

ROCK WEED *Fucus distichus*
or *F. spiralis*

Snip of photo by Marc Chamberlain

ENERGY FROM

Sunlight! Rockweed uses the sun's energy, along with the water it lives in, to make its own food (photosynthesis)

EATEN BY

Grazed on by isopods, periwinkles and sea urchins.

OTHER INFO

Edible by humans-yum! Dry it and sprinkle on popcorn, or season your salmon. Use their gel for a facial. And watch out for rockweed-where it can be seen it is too shal-low for your boat-even your kayak!

Acorn Barnacle ***Balanus glandula***

ENERGY

Grabs plankton from the water with its cirripeds (feather-like feet).

EATEN BY

Nucella snails, periwinkles, ribbed limpet, ochre stars, sunflower stars, a nemertean worm, and the barnacle nudibranch.

ZONE

Upper intertidal zone.

OTHER INFO

Can obtain oxygen from the air and water. Eggs hatch in water column and the larvae swim/float as plankton until they become too heavy and sink to the bottom. They can detect chemicals given off by old barnacle shells and will settle where they were attached.

Periwinkle Snail ***Littorina sitkana***

ENERGY

Eats diatoms, young barnacles, black lichen, rockweed, sea lettuce, and other algae.

EATEN BY

Nucellid snails, sea stars, red rock crabs, nemertean worms, northern clingfish, penpoint gunnels, shore birds, gulls, raccoons, and more.

ZONE

Splash zone.

OTHER INFO

Will suffocate if underwater for long. Their constant scraping radulas remove rock at a rate of 1cm in 16 years.

Snip of photo by NOAA photo library, fish1912

Periwinkle *Littorina sitkana*

Blue Mussel ***Mytilus trossulus***

ENERGY

Filters plankton (mainly diatoms), detritus, and dislodged kelp bits from the water through its siphon.

EATEN BY

Ochre stars, black oystercatchers, people (yum!), dog whelk (snails), gulls.

ZONE

Upper and mid intertidal zones.

OTHER INFO

Play a vital role in estuaries by removing bacteria and toxins as they filter the water. Their bissel threads are so strong, they have been studied as a source of material for bullet-proof vests.

OCHRE STAR *Pisaster ochraceous*

Photo by Ken Archer

Art by Thayne Yazzie

Ochre Star ***Pisaster ochraceus***

ENERGY

Eats blue mussels, California mussels, and other mollusks.

EATEN BY

Gulls, sea otters

ZONE

Lower and mid-intertidal zones.

OTHER INFO

Can be purple, red, or orange. Pull prey apart with tube feet, egest stomach into mussel, digest the food on the outside of their bodies, then slurp it all back in.

Few in number recently due to sea star wasting disease.

Glaucous-winged gull ***Larus glaucescens***

ENERGY

Eats cockles, clams, mussels, shore crabs, sea stars, fish, French fries, and anything else it can get its beak around.

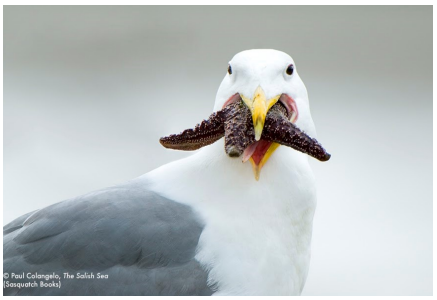


Photo by Paul Colangelo

EATEN BY

Eagles, crows, ravens, hawks, mink, weasels, sharks.

ZONE

All intertidal zones.

OTHER INFO

Largest gull of the Salish Sea. Wingtips colored medium gray, unlike other gulls. Large, red dot on beak thought to act as a target for young to peck and stimulate regurgitation of partly digested food.

Purple Shore Crab ***Hemigrapsus nudus***

ENERGY

Eats just about anything in the intertidal it can get its claws into. Scavenges dead organic matter, will eat soft body tissues off of living sea stars, anemones, and mollusks. Loves dead meat.

EATEN BY

Gulls, herons, raccoons, sculpins and many other fish, crows, coyotes, bears, and more.

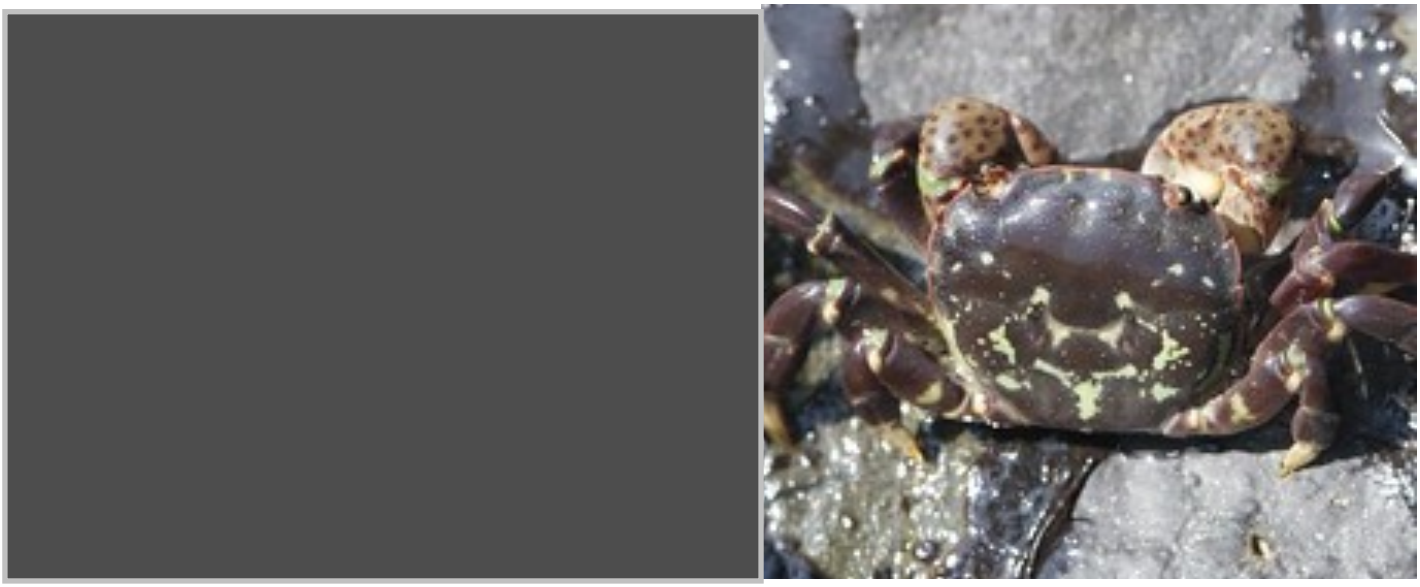
ZONE

Upper to lower intertidal zones.

OTHER INFO

Lives under rocks in the intertidal. Can be distinguished from the hairy shore crab by the lack of “hairs” on its hind legs and by its polka dotted “elbows” on its claws.

Photo by Jerry Kirkhart



PURPLE SHORE CRAB *Hemigrapsus nudus*

Black Oyster Catcher ***Haematopus bachmani***

ENERGY

Eats blue mussels, limpets, and other mollusks.

EATEN BY

Eagles, gulls, minks, otters, crows, ravens, weasels, wolverines, and bears.

ZONE

All intertidal zones.

OTHER INFO

Often seen probing under rocks on shoreline. Shrill, whistling call.

Northern Clingfish ***Gobiesox maeandricus***

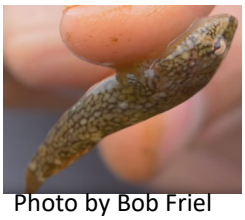


Photo by Bob Friel

ENERGY

Eats worms, snails, limpets, small crabs, and other crustaceans

EATEN BY

Great blue herons, glaucous-winged and other gulls, gopher snakes, raccoons

ZONE

Lower intertidal zone, under rocks

OTHER INFO

Females lay eggs under rocks in the intertidal, where males guard the eggs until they hatch. Their pelvic fins are modified into suction disks to cling to rocks and hold in

BALD EAGLE *Haliaeetus leucocephalus*

Bald Eagle ***Haliaeetus leucocephalus***

ENERGY

Carrion and fresh fish, small animals, and birds, such as gulls and great blue herons. Will take fish from other birds, such as ospreys in flight.

EATEN BY

No predators.

ZONE

Upper intertidal, splash, and spray zones (but do occasionally swim to shore with too big a catch!)

OTHER INFO

Mate for life and continue to build same nest of sticks each year. Nests can reach 20 feet across. Females larger than males. Mottled color until 4th year.

SEAWEED ISOPOD *Idotea wosnesenskii*

Photo by SERC Photos (Smithsonian)

Idotea Isopod **Idotea and *Pentidotea sp.***

ENERGY

Eats Rockweed, sea lettuce, corraline algae, and other algae. May eat eggs of nucella snails.

EATEN BY

Penpoint gunnels, Spotted kelpfish, dwarf perch, shore birds, many others.

ZONE

Splash zone to lower intertidal

OTHER INFO

Avoid predators by swimming, clinging, camouflage, hiding in crevices, and nocturnalism. Type of algae they eat determines their color.

Great Blue Heron ***Ardea herodias***

ENERGY

Eats gunnels, herring, smelt, flounders, other fish, amphibians, reptiles, small mammals, and invertebrates in shallow water, perched on kelp beds, or on dry land.

EATEN BY

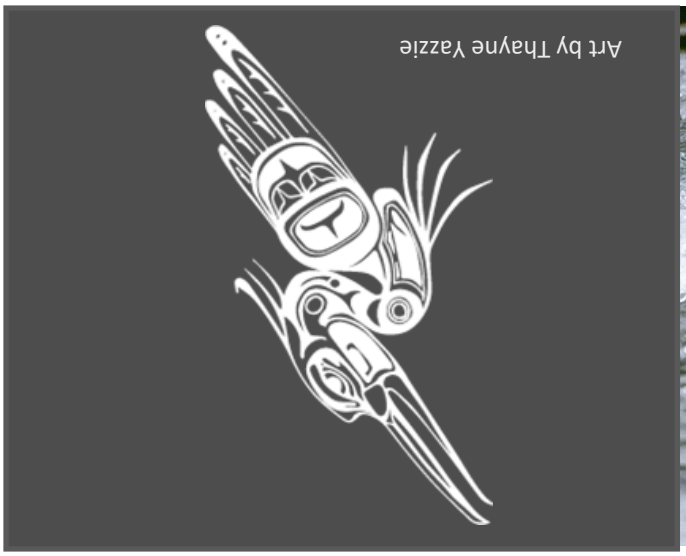
Bald eagles, coyotes, bobcats. Eggs and young eaten by crows, ravens, gulls, raccoons.

ZONE

All intertidal zones, river sides, wetlands, beaver marshes, lake edges.

OTHER INFO

Necks fold into an s shape, helping with aerodynamic flight and quickly striking at prey. Chest feathers fray into powder down that they use to remove fish slime from their feathers as they preen.



GREAT BLUE HERON *Ardea herodias*

Aggregating Anemone ***Anthropleura elegantissima***

ENERGY

Eat small crabs, shrimp, and other crustaceans, mollusksand fish. They also gain sugars from their symbiotic algae.

EATEN BY

Leather star, shaggy mouse nudibranch, and the wentletrap snail.

ZONE

Mid to lower-intertidal zone

OTHER INFO

Two types of microscopic algae live in the anemone's tissues and give them their green color. The algae make sugars for the anemone and gain a protective home. Nemato-cysts (stinging cells) on their tentacles paralyze prey. When the tide goes out sand and shells stick to their sticky bodies and keep them from drying out.

Crumb of Bread Sponge ***Halichondria panicea***

ENERGY FROM

Filter plankton from the water with their feeding cells, choanocytes.

Photo by Fitzgerald Marine Reserve docent

EATEN BY

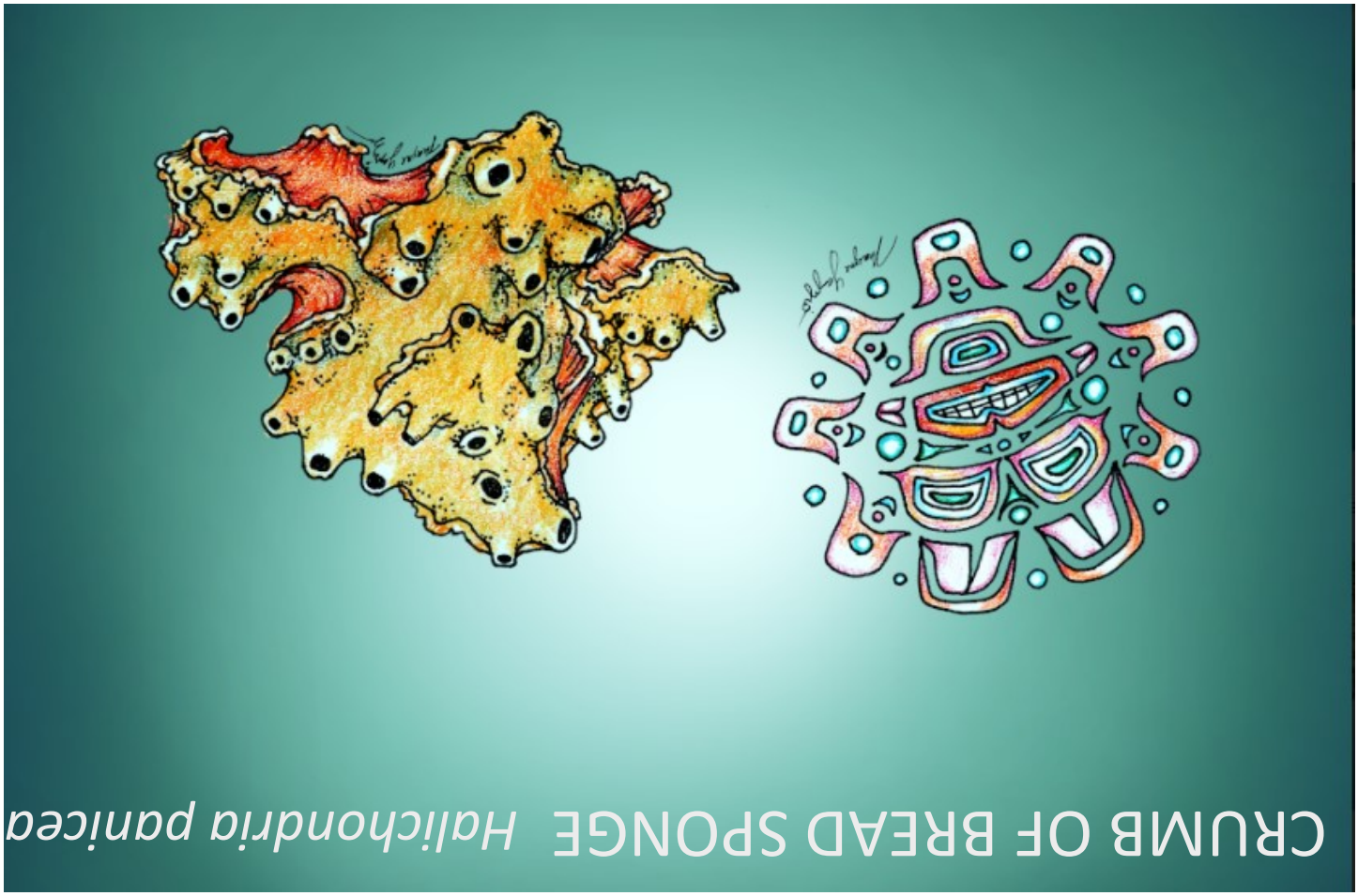
Sea lemon nudibranchs, slime stars

ZONE

Lower intertidal to over 500m.

OTHER INFO

Colonies of individual cells that each have a specialized job of feeding, defense, or re-production. Can encrust on rocks, docks, or even on the shells of scallops, giving them helpful chamoflage and the sponges a higher chance of avoiding sea lemons.



Penpoint Gunnel ***Apodichthys flavidus***

ENERGY

Eats isopods, shore crabs, other crustaceans, and small mollusks, such as

EATEN BY

Great blue herons and other shore birds, larger fish.

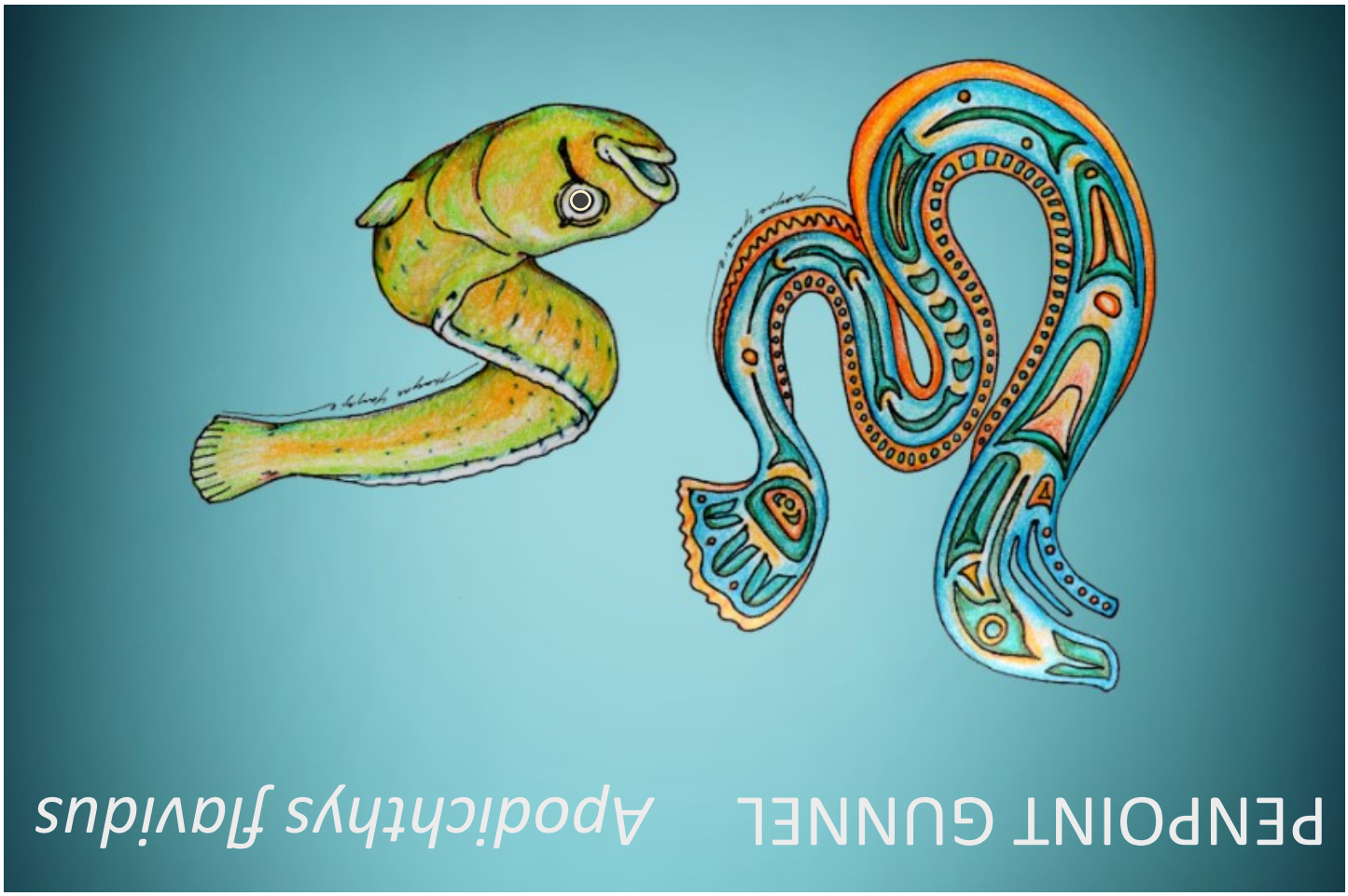
Photo by Bruce Kerwin

ZONE

Lower intertidal zone to 2m.

OTHER INFO

Can breathe air when out of water. Often found under seaweeds and rocks, guarding egg masses. Avoids predators by camouflage, taking on the color of the vegetation it lives in.



Sea Lettuce ***Ulva lactuca***

ENERGY FROM

Sunlight! Sea lettuce is photosynthetic, making sugar from the water and carbon dioxide, using energy from the sun.

EATEN BY

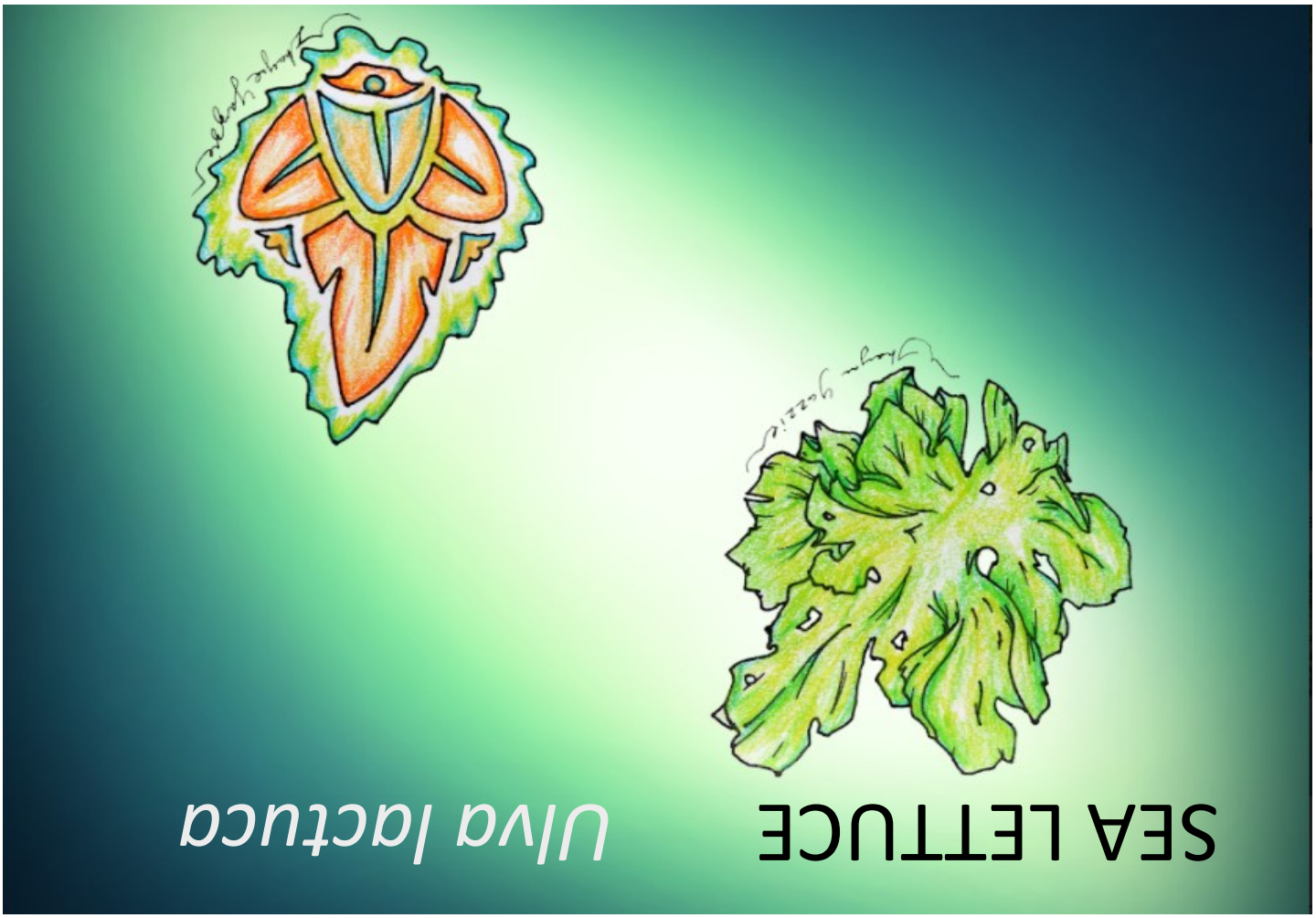
Brant geese, periwinkle snails, people!

ZONE

Mid to lower intertidal and up to 75 feet deep in very clear water.

OTHER INFO

Provides habitat to small invertebrates, such as shore crabs and sand fleas. Tolerant of pollution and big blooms areused as an indicator for pollutants in seawater.



NOBLE SEA LEMON NUDIBRANCH *Archidoris montereyensis*

Photo by Bruce Kerwin

Sea Lemon Nudibranch ***Archidoris montereyensis***

ENERGY

Eats crumb of bread sponge and other sponges.

EATEN BY

Other nudibranchs.

ZONE

Lower intertidal zone to 50 meters.

OTHER INFO

Hermaphrodites-produce both eggs and sperm. Breathe through gills on their backs. Avoid predation with fruity odor and acidic taste.

ENERGY FROM

Copepods make a water current with their legs that brings phytoplankton and tiny zooplankton to the mouth to munch. Diatoms make up a large portion of their diet.

EATEN BY

Filter-feeders, such as clams, barnacles, and even gray whales catch copepods when filtering seawater through their siphons, legs, or baleen. Copepods are a very important food source for juvenile fish, such as Chinook salmon.

ZONE

Copepods live near their prey in surface waters in every zone, but mostly nearshore.

OTHER INFO

Copepods are crustaceans, related to crabs, shrimp, and barnacles. Copepod means ‘paddle foot’. They use their appendages to row themselves through the water. Female calanoid copepods, like this one, carry their eggs until they hatch, keeping them safe from other copepods. Being nearly the base of the ocean food web, though, copepods are never really safe!

CALIFORNIA GRAY WHALE *Esrichtius robustus*

Photo by Linda Tanner

ENERGY FROM

Gray whales scoop up huge mouthfuls of sand and mud in intertidal waters, then use their giant tongues to squish out the mud and water through their baleen, long rows of combs that serve as filters to trap tasty ghost shrimp, worms, and amphipods.

EATEN BY

Bigg's (transient) killer whales are notorious predators of gray whales, especially gray whale calves.

ZONE

intertidal and pelagic zones (open water)

OTHER INFO

Gray whales scoop up a meal on their sides, leaving pits you can climb into at low tide.

Their feeding dislodges invertebrates for other predators, such as surf scoters, who are often found as dining companions when whales are on the feed!

Grays only feed in northern waters, swimming to Mexico to mate and calve without snack!

GHOST SHRIMP *Neotrypaea californiensis*

Photo by Monterey Bay Aquarium

Ghost shrimp ***Neotrypaea californiensis***

ENERGY

Eats plankton, worms, and detritus (dead stuff) by scraping its burrow walls.

EATEN BY

Gray whales, staghorn sculpin, shorebirds, like willets and curlews.

ZONE

Intertidal zone mudflats to 2.8 meters/9 feet.

OTHER INFO

Ghost shrimp are now a nuisance to oyster growers, who've tried all sorts of crazy ways to get rid of them, even hot chili oil! All their burrowing buries and suffocates oysters. This wasn't possible before the native, Olympia oysters were eaten to near-extinction because they formed thick mats of oyster reef which these constantly-mining shrimp could not penetrate.

OLYMPIA OYSTER *Ostrea lurida*

Photo by Dave Cowles, Walla Walla U.

Olympia oyster ***Ostrea lurida***

ENERGY

Filters the water through its gills for phytoplankton

EATEN BY

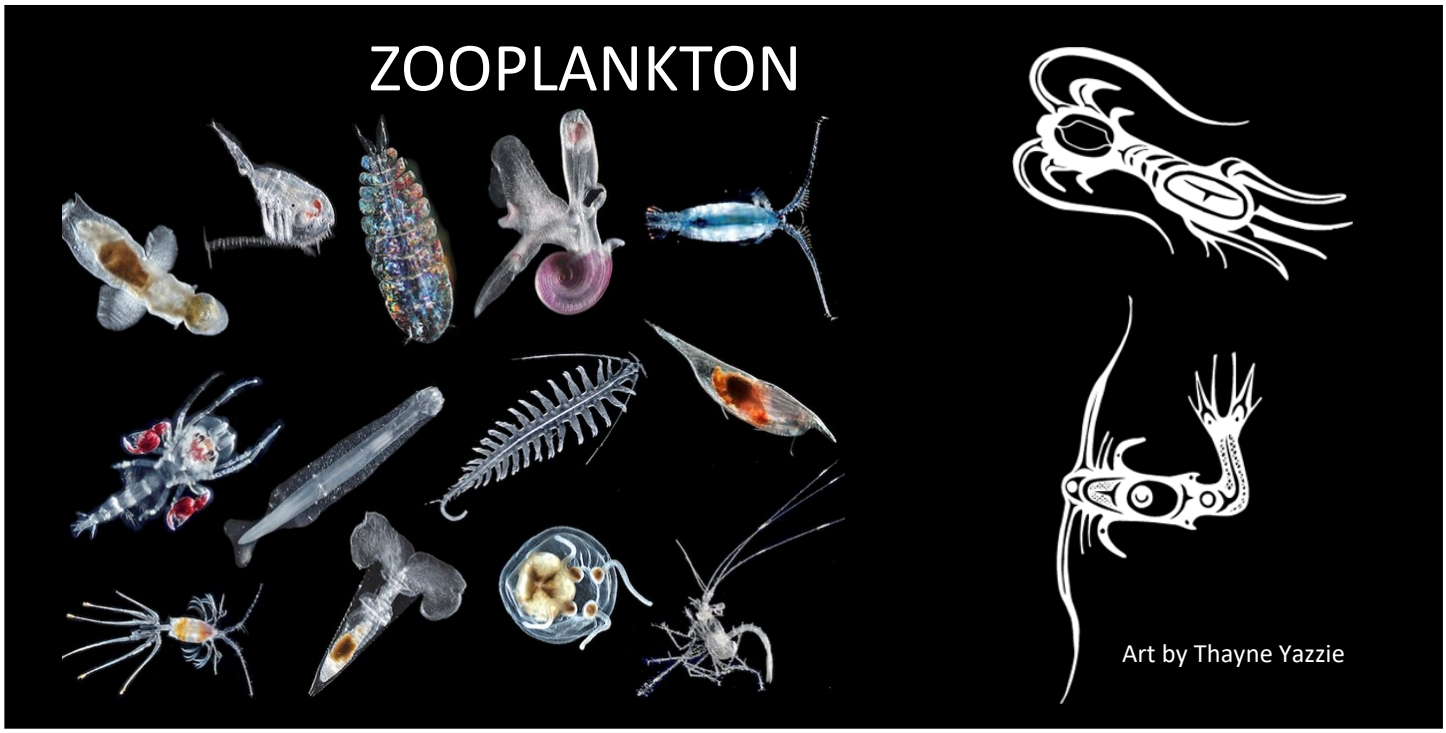
Humans, some shorebirds(oystercatchers), snails (oyster drills), red rock crab

ZONE

Intertidal zone and shallow subtidal zone cemented to rocks or oyster shells

OTHER INFO

Non-indigenous peoples harvested so many Olympia oysters in Puget Sound in the 1800s that they were all but extinct by 1930. This not only removed oysters, but the shells that oyster larvae settle upon to growRecovery efforts by Salish Sea heroes are restoring "Olys" throughout Puget Sound today. They have a long way to go, but with clean water with natural shorelines, they have a chance.



EAT

Phytoplankton. Some eat other zooplankton or both.

EATEN BY

Forage fish, crustaceans, filter feeders (clams, oysters, mussels, tube worms, bryozoans, sponges, basking sharks, whale sharks, blue whales, and many other animals.

OTHER INFO

Zooplankton means animals that swim too weakly to counteract currents. Some are small, like microscopic copepods, but some are as long as football fields, like siphonophores. Some remain plankton their whole lives, such as jellyfish and krill, but others are only plankton while they are larvae, such as crabs, shrimp, many fish, octopus, squid, and many other large animals that drift with the currents after hatching from their eggs.

EAT

EATEN BY

OTHER INFO

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