ATLANTIC OCEAN ROCKY SHORE ZONES GUIDE

The rocky shore ecosystem is naturally divided into zones by the tidal movement of the ocean. Although specific types of algae and animals are often found in the particular zones outlined below, living organisms can be found in different zones.

Zone	Features	Algae	Animals
Splash Zone	This zone is closest to the land and is always exposed to air except for rain or waves from major storms. It has few algae or animals because there is little shelter or food sources, as well as predatory birds.	Lichen, Cyanobacteria	Seashore Springtail, Rough Periwinkle, Herring Gull, Great Black-backed Gull, Spotted Sandpiper
Upper Intertidal Zone	This zone is mainly exposed to air except for at extreme high tides. Tide pools start to appear in the upper intertidal zone (pools of saltwater left behind when the tide goes out; many living organisms can be found in tide pools).	Cyanobacteria	Scud, Common Periwinkle, Rock Barnacle, New England Dog Whelk, Northern Hermit Crab
Middle Intertidal Zone	This zone is exposed to air and water approximately equal amounts of time.	Rockweed, Knotted Wrack	Blue Mussel, Green Crab, Green Sea Urchin, Tortoiseshell Limpet, Asian Shore Crab
Lower Intertidal Zone	This zone is almost always exposed to water except for at extreme low tides.	Sea Lettuce, Maiden Hair Algae, Coralline Algae	Smooth Periwinkle, Atlantic Rock Crab, Common Slipper Shell, Northern Sea Star, Blood Star, Frilled Sea Anemone, Bread Crumb Sponge, Clam Worm, Speckled Flatworm, Left-coiled Tubeworm, Red Chiton
Subtidal Zone	This zone is always exposed to water.	Irish Moss, Horsetail Kelp, Sugar Kelp, Shotgun Kelp, Bubblegum Algae	Mummichog, Rock Gunnel, Lumpfish, Cunner, Lobster, Jonah Crab, Orange Sheath, Golden Star

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Splash Zone

Organism	Facts
Cyanobacteria	A group of aquatic bacteria that obtain their energy via photosynthesis. They are often referred to as blue-green algae, but they are not algae. This description was used to indicate their appearance. They can be found living on rocks of the rocky shore.
Lichen	A combination of a fungus and an alga (like cyanobacteria). The alga produces food while the fungus gathers water. This symbiosis enables lichen to survive harsh weather that would potentially kill a fungus or alga if they were growing alone. They can form black, yellow, or orange horizontal bands on rocks which represent different species of lichen.
Seashore Springtail	These small arthropods are wingless hexapods. They have cylindrical bodies and they are blackish-blue in color. The small hairs on their bodies act as waterproof layers. They feed primarily on dead marine animals such as mollusks. They are able to survive underwater for two days.
Herring Gull	The herring gull is an omnivore and eats almost anything including mussels, crabs, sea urchins, eggs, carrion, and garbage. They obtain their food in many ways such as diving into the water, taking it from the surface of the water, or scavenging on land.
Great Black-Backed Gull	This is the largest gull in the world. They can steal food from other birds and they can hunt other birds such as puffins. Their name indicates their broad black wings. Great black-backed gulls also hunt mussels, crabs, sea urchins, other marine invertebrates, and fish.
Spotted Sandpiper	The spotted sandpiper is a carnivore and eats insects, crustaceans, worms, mollusks, etc. They obtain their food by foraging along the edge of the ocean. While hunting for food, spotted sandpipers bob their tail up and down, earning them the nickname of "teeter-tail."

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Upper Intertidal Zone

Organism	Facts
Cyanobacteria	A group of aquatic bacteria that obtain their energy via photosynthesis. They are often referred to as blue-green algae, but they are not algae. This description was used to indicate their appearance. They can be found living on rocks of the rocky shore.
Common Periwinkle	This snail is abundant in number at the rocky shore. Many types of shorebirds and other animals feed on this snail. They have a radula (a ribbon of tiny teeth) which they use to scrape algae off of rocks. They have gills, operculum, and they use their own mucous to attach to rocks. Other types of periwinkles include the rough periwinkle (splash zone) and the smooth periwinkle (lower intertidal zone).
Scud	Scuds, or amphipods, are tiny crustaceans that resemble shrimp in appearance. They are a translucent olive-gray color. Scuds are omnivores, feeding on both plant and animal material (often decaying plant material and dead animal matter).
Rock Barnacle	These crustaceans permanently attach their heads to a substrate by cement they produce. They create an outer shell that resembles a volcano. They filter-feed on phytoplankton by extending their feather-like legs through their operculum. They close their shells when the tide goes out.
New England Dog Whelk	These snails are identifiable by their pointed, spiral shells which have raised beads along the ridges. They are scavengers and predators. They are able to drill holes in the shells of other organisms using a radula. Their color is determined by their diet and geographical location.
Northern Hermit Crab	These crabs have soft, spirally curved abdomens. They protect their abdomens by finding and carrying empty shells, mainly from sea snails. They spend most of their life underwater, and they live in varying depths. They breathe through gills and can survive briefly out of water.

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Middle Intertidal Zone

Organism	Facts
Rockweed	This brown alga has a small holdfast. Its flat blades have a noticeable midrib, air bladders, and Y-shaped tips. It is a dominant algae species in the intertidal zone. It serves as an important shelter to many animals and plants.
Knotted Wrack	This brown alga has long blades with large, egg-shaped bladders found along the blades at regular intervals. The blades are long, flexible and slimy. They are a dominant algae species in the intertidal zone, and serve as shelter to animals and plants.
Green Sea Urchin	Green sea urchins are echinoderms. They have a globe-like shape that is covered with a large number of long spines. Their bodies have radial symmetry. They have five rows of paired tube feet used for movement and adhesion to rocks. They are omnivores, and their predators include crabs and shorebirds.
Green Crab	These crabs are a widespread invasive species. Their carapaces grow to a width of three and one-half inches. They feed on a variety of mollusks, worms and small crustaceans. The color of the green crab can vary from green, brown, red, or gray.
Blue Mussel	These common bivalves have a slender foot that allows them to move and hold onto substrates temporarily. They create byssal threads using a gland in their shell. These strong, threadlike anchors are used to attach securely to almost any substrate. They are filter feeders.
Tortoiseshell Limpet	These common limpets have hard, cone-shaped shells with rounded, off-center points. They have soft bodies with a large foot. The shape and foot of the limpet provides this animal with powerful suction. Their name refers to their shells' brown and white coloration.
Asian Shore Crab	These crabs from East Asia are an invasive species in North America and Europe. Their square-like carapaces can be up to two inches in width, with three teeth along the sides. They are marked with alternating light and dark bands. They are omnivores that prefer to eat other animals, especially mollusks.

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Lower Intertidal Zone

Organism	Facts
Sea Lettuce	This rubbery, sheet-like green alga is two cell layers thick and attaches to rocks with an unnoticeable perennial holdfast. It is an annual species that can tolerate considerable temperature fluctuations. See lettuce is edible. It can grow up to sixty centimeters long.
Maiden Hair Algae	This green alga has long and thin unbranched blades. The blades are hollow, which can be seen when air bubbles are trapped in the blades. Maiden Hair algae can survive in the rocky shore's harsh environment by tolerating wide changes in temperature and salinity.
Coralline Algae	This red algae can be red, pink, or purple in color and can be found growing on rocks and shells. It is flexible when alive and white and brittle when dead. Corallines can have the appearance and rough texture of coral. Due to its rough texture, most herbivores prefer not to eat it, but some do such as limpets and sea urchins.
Atlantic Rock Crab	These crabs have nine small teeth on the front of their carapaces. They have purplish-brown spots. They can grow new legs using regeneration. They molt as they grow, shedding their exoskeletons in the process. They move by scuttling sideways. They are edible.
Common Slipper Shell	The shape of these gastropod mollusks is influenced by the object to which they are attached. The inside of their shell resembles a slipper. They can often be found stacked on top of each other. They are filter feeders. They are sessile—remaining in the same place their entire lives.
Brittle Star	Brittle stars are echinoderms, but they are not sea stars. They are similar in appearance to sea stars, with radial symmetry and very slender arms around a central disk. Brittle stars are mainly scavengers. They got their name because they are more fragile than sea stars, losing their arms more easily. They move using their muscles, not their tube feet.
Blood Star	These echinoderms have five long and slender arms around a central disk. They range in color from tan and yellow to red or purplish. They have two rows of tube feet on each arm. Sensory cells in the skin can sense light. Their only sense organs are a red eyespot at the tip of each arm that can sense differences of light and dark. They are smaller than northern sea stars.

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Lower Intertidal Zone (continued)

Organism	Facts
Northern Sea Star	These five-armed echinoderms are the most common sea star in Atlantic waters. Each arm has four rows of tube feet which are used to move. They eat bivalves, snails and other animals by protruding their stomachs through their mouths into their prey, which then softens their prey for digestion. They are capable of regeneration.
Frilled Sea Anemone	These large, common anemones have smooth, cylindrical bodies with up to one thousand tentacles. They can be orange, yellow, or brown in color. They can move slowly using their pedal discs. They feed on live or dead animals. They catch food with their tentacles' stinging cells.
Bread Crumb Sponge	These primitive, multi-celled sponges with glistening, bumpy surfaces are bright yellow when found in intertidal zones. They are known for the sulfuric odor they release when broken apart. They filter feed by sucking water through the openings of their surface. They get their name from how they crumble when touched.
Clam Worm	These worms have segments that possess pairs of small, paddle-shaped appendages. They have four pairs of tentacles, one pair of antennae, and one pair of fleshy lobes on their heads. When feeding, these worms extend a proboscis, which has hook-like jaws used to grasp prey. They retract the proboscis to draw food into their mouths.
Speckled Flatworm	This very common flatworm in New England is oval in shape. Their dorsal sides often have reddish-brown spots and their ventral sides are grayish-white. Their eyes are arranged in two clusters, with ten to twenty eyes in each cluster. They can grow to one inch in length.
Left-Coiled Tubeworm	These segmented marine worms are sedentary and they secrete a small, off-white tube to reside in. Their tubes form a spiral coil and the worms retreat into their tubes when above water. When below water, the worms can be seen to have green tentacles.
Red Chiton	These mollusks have an eight-piece shell. They cling to rocks with a wide, muscular organ. They are sluggish and eat algae with their radula. They often appear orange-red in color with whitish zig-zag markings.

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Subtidal Zone

Organism	Facts
Kelp	These brown algae have large blades, heavy stalks, and finger-like holdfasts. The horsetail kelp's wide blade is divided into strap-like strands. Sugar kelp has a ruffled blade with no midrib, and is found on more sheltered shores. Shotgun kelp has an obvious midrib and is dotted with holes. It grows in deeper water than other kelps, but is often found washed up on shores. Kelps are found year round and grow up to three meters long during the winter.
Irish Moss	Irish moss is a red alga with flattened blades that fork off from a short stalk to form fingers with round, blunt tips. They are often deep, purplish-red in color. It has a disk-shaped holdfast. It is harvested for its carrageenan, a gelatinous carbohydrate used to emulsify dairy products, baked goods, and cosmetics.
Bubblegum Algae	This red algae is an encrusting algae. It has pink coloration which resembles bubble gum. Bubblegum algae have calcium carbonate in their tissue. When the algae dies, its white skeleton remains attached to rocks or shells.
Mummichog	These brownish-green saltwater minnows can grow to a length of five inches. Their Indian name means "they go in great numbers." They are hardy fish and important food sources for larger fish. They feed on insects, small fish, crustaceans, and plant material.
Rock Gunnel	These small fish have long, thin bodies and long dorsal fins. They are gray to green in color. They are also referred to as rock eels because of their appearance. These egg layers deposit their eggs and leave them alone. The young are not cared for by their mothers.
Lumpfish	These fish have short heads and thick, round bodies that end with a lumpy tail. They do not have scales. Most of their fins are small and roundish. Their ventral fins form a sucking disk that enables them to attach themselves to substrates. They are poor swimmers. They are carnivores, eating mainly small crustaceans, mollusks and worms.
Cunner	These fish, members of the wrasse family, have oblong bodies and pointed heads. Their body colors vary and include brown, red, blue, green, and blue. They are omnivores and they feed on mollusks, crustaceans, and other invertebrates. They can grow up to seventeen inches long. Their predators include other fish and shore birds.

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Subtidal Zone (continued)

Organism	Facts
Lobster	These greenish-black crustaceans are long and have a cylindrical carapace. They are decapods with two different-sized pincers in front. One claw is heavier and blunt with rounded teeth, referred to as the "crusher." The other claw is lighter, sharp and pointed, referred to as the "cutter." They are cannibals, scavengers, and they also prey on fish, small crustaceans, and mollusks. They are nocturnal and territorial.
Jonah Crab	Jonah crabs have a round, rough-edged carapaces with small light spots. Their claws are large with dark brown-black tips. Jonah crabs can grow up to eight inches wide or more. Jonah crabs can live at depths of up to seven hundred fifty meters. They are known to move around to areas in which the temperature is comfortable to them.
Orange Sheath	These tunicates are immobile, tube-like invertebrates that grow together in groups called colonies. Their colonies can be found attached to rocks, boulders, artificial structures, and algae. They are filter feeders that eat plankton and detritus. They can be orange or red in color and they are covered in a firm jelly.
Golden Star	The centers of the individual tunicates, called zooids, form flower-shaped patterns. They are resilient organisms, tolerating a wide range of temperatures and salinities, and they can grow in polluted waters. They can out-compete native filter feeders for food and space.