

WILD TIMES

FOR KIDS

life on the Rocky Shore

The rocky ocean shore is an exciting place to explore. You can easily find many forms of life here. What do they live on? This ecosystem, like all others, runs on sun power. The algae called seaweed and minute plants called phytoplankton use sunlight to grow and provide food for the creatures that live here. Snail-like plant eaters graze over the rocks, predators hunt their prey and countless filter feeders sift their food from the living “soup” of the sea.

So, begin your adventure where the land meets the sea!



Green sea urchins (above) and Atlantic rock crabs (below) are just two of the many fascinating creatures you can find on New Hampshire's rocky shore.



THE RISE
AND
FALL OF

TIDES



The sea dominates the shoreline, carving the ever-changing shape of the shore and subjecting everything that lives there to alternate swings between the dangers of drying out or of drowning. Have you ever wondered what causes the tides? Tides are created because the Earth and the moon are attracted to each other, just like magnets. The moon tries to pull at anything on the Earth to bring it closer. But the Earth is able to hold onto everything except the water. Since the water is always moving, the Earth cannot hold onto it, and

the moon is able to pull at it, thus creating a bulge of water that is the tide. Each day, there are two high tides and two low tides. The ocean is constantly moving from high tide to low tide, and then back to high tide. There is about 12 hours and 25 minutes between high tides.

in the zone

Plants and animals are specially adapted to their harsh environment at the edge of the sea. As a result of constantly changing conditions, the rocky shore can be divided into distinct zones. These zones are changeable, and there is overlap between them because of varying exposure to the sun, action of the tides, currents and the landscape. Understanding the seashore zones can help you know what kinds of life to look for in the intertidal area — the space on the shore between high and low tide.

black zone

This is the area above the high point of the sea's reach onto the land. Its only contact with saltwater is the spray splashed up by storms. A thin black crust on the rocks gives this zone its name, though it is actually a layer of microscopic blue-green algae. Watch out! When wet, these rocks are very slippery.

Periwinkle zone

Submerged twice a month by the highest tides and equipped to withstand drying out, periwinkles dominate this zone. They seek cracks and crevices, where they secrete mucus securing their cone-shaped shells to the rocks and locking out the air to prevent dehydration.

Smooth Periwinkle (*Littorina obtusata*)

Smaller than the common periwinkle, it grazes on algae. A horny plate (operculum) at the end forms a plug so that it will not dry out. Green, yellow or, less commonly, orange, the shiny shell may also be banded.





Barnacle zone

This area is covered by water twice a day. To contend with the tides and waves, barnacles live attached to rocks. They close up when exposed to air and open when the tide rises so they can filter for food. You might also find mussels in this zone.

Common Rock Barnacle (*Balanus balanoides*)

A shrimp-like creature that is cemented upside-down on its head inside a limestone house, or shell. When the tide comes in, the barnacle feeds by opening its trap door, extending its six pairs of legs to kick minute bits of food into its mouth.

Rockweed zone

Knotted wrack and rockweed cover this area — long seaweeds with “float bladders,” or pockets of air. They are secured to rocks by a “holdfast,” a root-like structure that attaches to a surface. When covered with water, they sway back and forth with the tides. When the tide is out, they provide a sheltered environment for many organisms. Carefully lift them up, and you might be surprised by what you find.



Acadian Hermit Crab (*Pagurus acadianus*)

A close relative of the shrimp, lobster and true crab, it has five pairs of legs. Claws are present on the first pair, the second pairs are used for walking and the last two pairs help keep it in its borrowed shell.



Blue Mussel (*Mytilus edulis*)

This edible bivalve (two shells hinged together) attaches itself firmly to rocks with byssal threads (strong silky filaments) early in life. Mussels are filter feeders, opening their shells underwater and straining out microscopic food.

Irish moss zone

Exposed only during very low tides, the Irish moss zone is home to plants and animals which can only stand short exposure to sun and wind. Short red tufts of Irish moss and dulse cover the rocks. Look carefully for sea stars and urchins.

Sea Urchin (*Strongylocentrotus drobachiensis*)

Found anywhere in the intertidal zone, the sea urchin is an echinoderm, meaning it has a hard spiny shell completely surrounding its soft parts. Tube feet extend through openings in the shell plate, and beak-like mouthparts, used to scrape algae off rocks, are underneath in the center of the shell.





Kelp zone

Portions of this zone are only exposed four times a year, during the very lowest tides. The zone extends out into the ocean as far as light can penetrate.

Kelps, growing from the ocean floor, are common here. The kelp zone is the dwelling place of many animals that need to be constantly under water, like sponges (the simplest form of multicellular animals), anemones, certain mollusks (animals with a soft foot), echinoderms (radially symmetrical animals, like sea stars), arthropods (joint-footed animals, like crabs), tunicates (animals with nerve cords down their backs, like sea squirts) and fish.

Frilled Anemone (*Metridium senile*)

When all its tentacles are extended, the frilled anemone looks more like a plant than an animal. Its tentacles, armed with nematocysts (stinging cells), are used to grab food.

Tidepools

Found in all zones, these are basins that trap water from the outgoing tide. Pools remain until the next high tide, when they receive new water. The organisms that live here must be able to survive a wide range of conditions, including significant fluctuations in water temperature.

Common Sea Star (*Asterias vulgaris*)

An echinoderm with many small spines on the upper surface and rows of tube feet below; if when escaping a predator an arm is broken off, it will grow back. Eats by pushing its own stomach into a bivalve shell and digesting the animal.



Rock Crab (*Cancer irroatus*)

The rock crab has an oval, reddish shell with toothed edges. Crabs will usually eat any kind of flesh they can get their claws into. They have four pairs of walking legs and a pincer and crusher claw.



Tortoise-shell Limpet (*Acmaea tetudinalis*)

The cone-shaped shell offers nothing for waves to catch onto, and the foot acts like a suction cup. Uses its radula (a tongue-like organ with rows of horny teeth) to scrap off algae it eats.



Aliens on our Shores

In New England, it is often hard to tell what animals were found originally on our shores and which are marine invaders. Most of the creatures not originally found on our shores have made their way here over the years through the ballast of ships. When people introduce organisms into new areas, either on purpose or by accident, the new species can take a toll on native plants and animals. They often have no natural predators or diseases in their new homes, and native plants and animals often have no defenses against the introduced species or the diseases they carry. Because there is still so much we don't know about the marine environment, it's hard to know the long-term impacts of these invaders. A few non-native species you might see along our shore:

GREEN CRAB (*Carcinus maenas*)

One of the dominant predators on our shore, the European green crab invaded the east coast of the U.S. in the 1850s. Because it has been here so long, it is rarely even considered an invader anymore. It has powerful claws and is able to consume shellfish. Not often seen in daylight, green crabs go everywhere at night, scavenging for decaying matter.



COMMON PERIWINKLE (*Littorina littorea*)

Eaten by people in northern Europe, this animal was introduced for food in Canada; it spread throughout New England in the 1800s. Interestingly, this periwinkle has been found to prevent a non-native algae. On the flip side, it has damaged the ecosystem by bringing with it a disease harmful to important fisheries.



ASIAN OR JAPANESE SHORE CRAB (*Hemigrapsus sanguineus*)

Asian crabs were first seen in the U.S. in New Jersey in 1988. Since that time, they have spread steadily northward. A very aggressive crab that eats other crabs, periwinkle snails, clams, barnacles and dead things, it also eats seaweed. Asian crabs are not shy about shoving other crabs away from protective rock crevices. Biologists still have a lot to learn about the Asian crab.



