



## Santa Monica Bay's Rocky Shore Habitat

If you're heading out to the tidepools, follow these guidelines to make sure you're not impacting these incredible animals:

### Watch where you step.

Rocks are slippery, and they can house many small animals. Make sure that you are only stepping on rocks and not on the variety of numerous animals that live on the rocks, like barnacles, worms, or anemones.

### Do not collect anything.

If everyone who visited the tidepools took home a souvenir shell or animal there would be nothing left for others to enjoy and it would disrupt the balance of the entire tidepool community. The only thing that should be taken with you when you leave the rocky shore habitat is trash—yours or someone else's. Even an empty shell is an important home or hiding place for animals. Leave them there.

**Don't pick up or move rocks or shells.** Many animals hide underneath them and could be crushed or injured in the process. Plus, by touching animals, you can inadvertently hurt them.

The rocky shore habitat is the intertidal zone that makes up tidepools and other rocky borders of the ocean. Depending on the day and how high the tide is, the rocky shore may either be completely covered with water or completely exposed to the air. The rocky shore habitat can be broken down into three zones—depending on how much time each area spends underwater.

The highest area of this habitat is known as the **splash/spray zone**. While this area is never completely submerged, it is kept moist by splashing waves. The plants and animals found here are adapted to withstand exposure to air, high temperatures, and direct sunlight. Small tufts of filamentous green algae and small clumps of brown algae create pastures, which are grazed on by periwinkles, limpets, and some shore crabs. The periwinkles (*Littorina* sp.) that live in the splash zone can breathe air like land snails, so they can live out of the water for months at a time. Many terrestrial predators such as raccoons, rats, and shorebirds visit this area.

Next is the **middle intertidal** zone. This habitat is submerged and uncovered by the tides on a regular basis. The highest parts of this zone may only be under water during extremely high tides. You can identify the uppermost border of the middle intertidal zone by looking for a group of acorn barnacles (*Balanus* sp. and *Chthamalus* sp.). These species are more resistant to drying out and can tolerate more sun and air exposure than other middle intertidal species. In the lower range of the middle intertidal, acorn barnacles are preyed upon by whelks (whelks can't tolerate the air and sun as well as acorn barnacles, so they can't travel as high up in the middle intertidal zone to feed). Where the barnacles taper off, mussels begin. Like the barnacles, the lower reaches of their range is dictated by how far up their predators can travel – in this case, the sea stars (*Pisaster* sp.). Factors such as pattern of tides, steepness of the shore, wave exposure, predation, competition for space, and larval settlement all dictate how organisms will distribute themselves throughout this zone.

The **lower intertidal** zone is immersed most of the time, so there isn't as great of a risk of drying out. This makes it easy for the whelks and sea stars to feed, resulting in very few mussels and barnacles. The lower intertidal is dominated by seaweeds. There are thick mats of red, brown and green algae. Green sea anemones (*Anthopleura* sp.), crabs, fish, snails, and sea urchins are also abundant.

The organisms that live in this habitat have developed specific adaptations to withstand some of the harsh realities of life in the rocky shore habitat. Withstanding the tidal changes, and accompanying air and sun exposure, the force of crashing waves, variations in salinity and competition for space means that these animals must be able to adapt. Some animals can drill down into the rock, thus creating holes that protect them from exposure, but most attach themselves to the rocks using various methods. Barnacles secrete a special cement, mussels use byssal threads (strong threads comprised of proteins secreted by the foot), and sea stars will use their suction cup tube feet to adhere to the rock.



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## PROTECTING THE ROCKY SHORE

Unfortunately, while these animals have adapted to withstand the forces of nature, they are not able to protect themselves from human impacts. Tidepools are magical, and many of us have fond memories of watching the animals in them for hours. But too many people accidentally step on small organisms, or collect them for food or as souvenirs. Many rocky shore habitats have been severely impacted by these practices and therefore regulations by Department of Fish and Game make it illegal to collect organisms from this habitat without a valid collection permit. However, even though laws protect the tidepools, there is very little enforcement.

## ROCKY SHORE ANIMALS

### **Bat Star (*Asterina miniata*)**

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**Habitat:** Low intertidal zone and rocky reefs to 300 m from Alaska to Baja California.

**Size:** Can grow to 4 inches.

**Food:** Feeds on plants and animals, especially algae, tunicates and surfgrass.

**Interesting Facts:** The bat star extends its stomach out as it walks "sweeping" food particles into its mouth.

### **Purple Sea Urchin (*Strongylocentrotus purpuratus*)**

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**Habitat:** Low intertidal zone, rocky reefs and kelp forests to 160 m from British Colombia to Baja California.

**Size:** Test size can grow to be 2 inches in diameter.

**Food:** Feeds on red and brown algae, including giant kelp (*Macrocystis*).

**Interesting Facts:** Purple sea urchins feed on the holdfasts of kelp causing the main frond of the kelp to become detached, float away, and die. To control this occurrence, predators keep the urchin populations in check. When predator population decline, entire areas of kelp forest may quickly be destroyed leaving behind an "urchin barren".



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## **California Mussel (*Mytilus californianus*)**

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**Habitat:** Rocky intertidal zone from Alaska to Baja California.

**Size:** Can grow to 10 inches in length.

**Food:** Feeds on phytoplankton and suspended organic material.

**Interesting Facts:** Toxins such as domoic acid can **bioaccumulate**, or multiply, in mussels that feed on phytoplankton during red tides. These neurotoxins affect mammals that eat the infected mussels causing memory loss and brain damage in humans and causing tremors, seizures, and disorientation in marine mammals.

## **Ochre Star (*Pisaster ochraceus*)**

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**Habitat:** Intertidal and rocky reefs to depths of 88 m from Alaska to Baja California.

**Size:** Arm radius to 14 cm.

**Food:** Feeds on mussels, barnacles, snails, chitons and limpets.

**Interesting facts:** This species of sea star is more tolerant to air exposure than other species of *Pisaster*, often being exposed for 8 hours during tidal changes

## **Striped Shore Crab (*Pachygrapsus crassipes*)**

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**Habitat:** Rocky intertidal zone from Oregon to Baja California.

**Size:** Carapace can grow 2 inches wide in males and 1.5 inches wide in females.

**Food:** Feeds on various algae, diatoms, and dead organic matter.

**Interesting Facts:** Able to live half of their time out of the water, but must go into the water to keep gills moist and to feed.