

Station #1: Marine Protected Areas

Location: Walk behind the Institute toward the sign at the top of the stairs to the refuge beach.

To See:

As you approach the entrance to the Refuge do you notice the sign? Are other people reading the sign before they enter? Why do you think this sign is here?

To Do:

Read the sign. "This beach is a marine protected area." What does that mean? What can you do? What can't you do? Read the Good Tidepooler rules. What are the reasons for these rules?

To Know:

Marine Protected Areas are ocean habitats that have special rules to help protect them. Human impact on the intertidal areas has grown over the years with more people visiting and more pollution. The populations of intertidal plants and animals have been declining rapidly. The Dana Point Marine Life Refuge is a special resource to be protected and enjoyed. The Orange County Marine Life Refuge Committee, which includes the Ocean Institute, has made a commitment to improve research, education, and enforcement of the intertidal habitats along its coastline.

This commitment includes monitoring human use activities and surveys of intertidal areas to monitor important species. These studies will measure the magnitude and type of human use to determine its effect on the intertidal environment.

This committee has written these rules for limiting the effects of humans on this environment. If you are planning on going to any intertidal area at any time please follow these Good Tidepooler rules.



Please note: We are not going into the refuge on this tour.

Station #2A: Sense the Ocean

Location: Remain in the jetty area but move to the left of the stairs and benches. Please be respectful and do not stand in front of other visitors.

To See:

Face the ocean. Look, listen, smell, and feel the ocean environment around you.

To Do:

Describe the ocean with as many senses as you can. How does it make you feel?

Station #2B: Tidepools

Location: Remain in the same location. We are not going into the Refuge on this tour.

To See:

What do you see along the shoreline? If you were an intertidal animal is this a good day for you? Are you still underwater? Are there people walking on you?

To Do:

What is high and low tide? Look out along the shore line. Do you think it is high tide or low tide? Now look at the Tidepool ID Sheet. Were you correct in your answer?

Are the tidepool animals more at risk from people during high or low tide? Count the number of people you see in the refuge. What is the human impact today: light, medium, or heavy?

To Know:

The Dana Point Marine Life Refuge encompasses an intertidal zone, commonly called the tidepools. The intertidal area is the area that is covered and uncovered by the changing tide levels each day. These tides are mainly caused by the gravitational pull of the moon. Tidepools occur when there are rocks at the shoreline. Rocks provide a place for animals to attach and shelter from the waves. To see the tidepool animals you must come at a low tide when the rocks are uncovered.

The intertidal habitat is a harsh environment. While the plants and animals are adapted to the natural challenges, they are not adapted to the human impact they are now exposed to now. Researchers have come up with a system to rate the human impact in the intertidal area. Below is the human impact scale.

Number of people

0 – 20
20 – 40
Over 50

Impact scale

light
medium
heavy



Station #3: Ocean Surface Conditions

Location: Along the jetty to the left of the entrance stairs (Please be respectful and do not stand in front of other visitors)

To See:

Look out over the ocean. Do you feel any wind? How hard is it blowing?

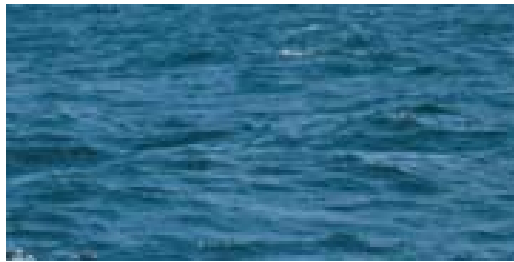
To Do:

Point in the direction the wind is blowing from. Describe how the surface of the ocean looks? What causes the waves and water to move? Can you identify the type of waves?

Count the number of waves that break on the beach in one minute.

To Know:

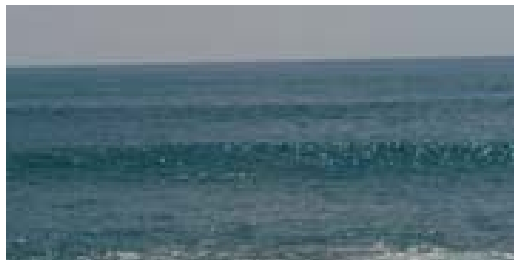
The normal waves that we see at the beach are caused by wind blowing across the water surface. Different size waves form depending on where the wind is blowing and for how long and how strong. The wind that you can feel can cause ripples and wind chop, but the wind that formed the swell and breaking waves can be caused by winds blowing 1,000's of miles away.

Ocean Surface Conditions

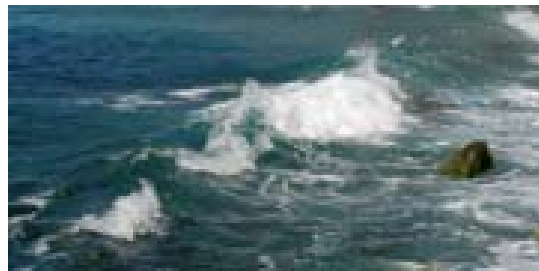
Wind chop - 'messy' looking water with no pattern caused by local wind.



Whitecaps – waves that break in the open water not the shore.



Swell - the regular wave motion formed by the natural separation of different waves as they travel from their source.



Breaking wave – a wave whose base can no longer support its top, causing it to collapse. This happens as the bottom of the waves 'feels' the bottom and slows.

Station #4: Jetty

Location: Walk down to the corner of the harbor at the picnic tables.

To See:

Look around at the harbor. What do you see? What do you think this long pile of rocks is? What does it do? Does the water surface inside the harbor look like the ocean you just saw? Why or why not?

**To Do:**

Use the Harbor Surface Conditions guide to identify the surface conditions.

To Know:

The West Jetty is a long pile of rocks also called a breakwater. Breakwaters are structures constructed on coasts as a coastal defense or to protect an anchorage from the effects of waves, weather, and longshore drift. It is what protects the moored boats and makes it a protected harbor. A harbor will have calmer water conditions than the open ocean.

Harbor Surface Conditions

Glassy – no wind or waves disturbs the surface so it looks like glass.



Ripples - Ripples appear on smooth water when the wind blows, but will die if the wind stops.



Boat wake – Boats displace the water leaving a V shaped wave behind them that travels out away from the

Station #5: Harbor Intertidal Animals

Location: Walk along the harbor rail away from the jetty and stop anywhere.

To See:

Look over the rail to the rocks below. What do you see? Are there any fish swimming around? Are any animals out of water or underwater on the rocks? What are the animals doing?

To Do:

Using the "Harbor Intertidal Animals ID" card identify the animals you see. While walking along the rail to the next station, count the crabs you see. How many did you count? How many crabs do you think live in the harbor?

To Know:

Many intertidal animals do not live in the intertidal area inside the harbor. The harbor water is warmer than the ocean. Because many animals need the waves crashing on them to bring them food, they cannot live in the harbor.

Here are four animals you should be able to see. The limpet is a type of snail (mollusk) that grazes on the small algae growing on the rocks. The barnacles are glued to the rocks and cannot move. At high tide they will use their feathery feet to sweep food particles into their mouth. Shore crabs are scavengers and will eat available dead organisms or small algae growing on the rocks. They often hide in the crevices between rocks. The opaleye perch lives in shallow water when young and moves off shore when it grows larger. They can grow to 2 feet in length.

Harbor Intertidal Animal ID

← Limpet



Shore Crab →



← Barnacle



Opaleye
Perch →

Station #6: Common Birds

Location: Walk along the rail toward the Pilgrim and stop anywhere you see birds.

To See:

Look out over the harbor. Do you see any birds? Where are they? What are they doing?

To Do:

Use the Harbor Bird ID card to identify the birds you see.

Please do not feed the birds.

To Know:

The Brown Pelican, once an endangered species, is common to see on the jetty or flying overhead. If you see a flock of them flying, notice they are often in a V-formation to save on the energy needed to fly. The Great Blue Heron is a long-legged shore bird that stands in shallow water to catch fish with its long bill. The Western Sea Gull is brown-colored as a juvenile and will try to steal food. The pigeon is not a shore bird but is very common here in the harbor.

Harbor Bird ID**Brown Pelican****Western Sea Gull****Pigeon****Great Blue Heron**

Station #7: Boats

Location: Along harbor rail across from the Ocean Institute's dock.

To See:

Look out over the harbor. Do you see any boats? Where are they? What are they doing?

To Do:

Use the ID sheet to identify the type boats you see. What does the R/V mean before the name of a boat?

To Know:

A harbor is a safe place to anchor and moor boats. Look out over the large open water area of the harbor that is in front of you. Boats that need a safe place to anchor as they travel along the coast can be seen anchored in this area. Look down the channel and you will see the thousands of boats that are docked permanently in this harbor. There are many designs of modern boat types here.

Looking at the Ocean Institute's dock you may see the 70-foot **R/V Sea Explorer** unless it is out on a trip with students. The R/V stands for research vessel. This boat is the Ocean Institute's marine educational vessel, which has a research component dedicated to environmental education.

Boat ID

← **Sail boat**



R/V Sea Explorer →



← **Kayak**



Harbor Patrol boat →

Station #8: Tallships

Location: Walk past OI toward the Pilgrim and stop just before the rail turns.

To See:

Look at the *Pilgrim* to your left and, when it's not out sailing, the *Spirit of Dana Point* to your right.

To Do:

Look at these two ships. Do they look like modern sailboats? Do you know what type of ships they are? When do you think these ships would have sailed along the coast of California?

To Know:

The Ocean Institute's two tallships are replicas of ships that were once common off of California. A tallship is any sailing vessel whose masts are in more than one piece--a tallship must have at least one topmast (a separate timber attached to the lower mast). Our ships are used to teach Living History programs. The *Pilgrim* does not sail for programs but the *Spirit* does.

The *Pilgrim* is a full size replica of the hide brig immortalized by Richard Henry Dana, Jr. in his American seafaring classic novel *Two Years Before the Mast*. The purpose of its 1834 voyage was to participate in the California cattle hide trade for her Boston owners. The *Pilgrim* set sail from Boston loaded with New England's manufactured goods such as shoes, foodstuffs and ironware. When she arrived along the Alta California coast, the *Pilgrim* would sell or trade her New England wares and then procure hides from the missions and rancheros to be transported back to Boston. The *Pilgrim* anchored several times at San Juan Bay (Dana Point).

The *Spirit of Dana Point* is a traditionally built replica of a 1770s privateer employed during the American Revolution. She is classified as a topsail schooner, with a length of 118 feet and 5,000 square feet of sail. She was originally called the *Pilgrim of Newport*, was built by Dennis Holland in Costa Mesa, California and launched in 1983. Her design, known for speed, enabled these vessels to be used for smuggling, the slave trade, and privateering.



The *Pilgrim*



The *Spirit of Dana Point*

Station #9: *Pilgrim*

Location: Along the rail across from the brig *Pilgrim*.

To See:

Look at the brig *Pilgrim*. Does it have the same parts as the other sailboats in the harbor? Do you know what a mast is? How about a yard? How many sails can she set?

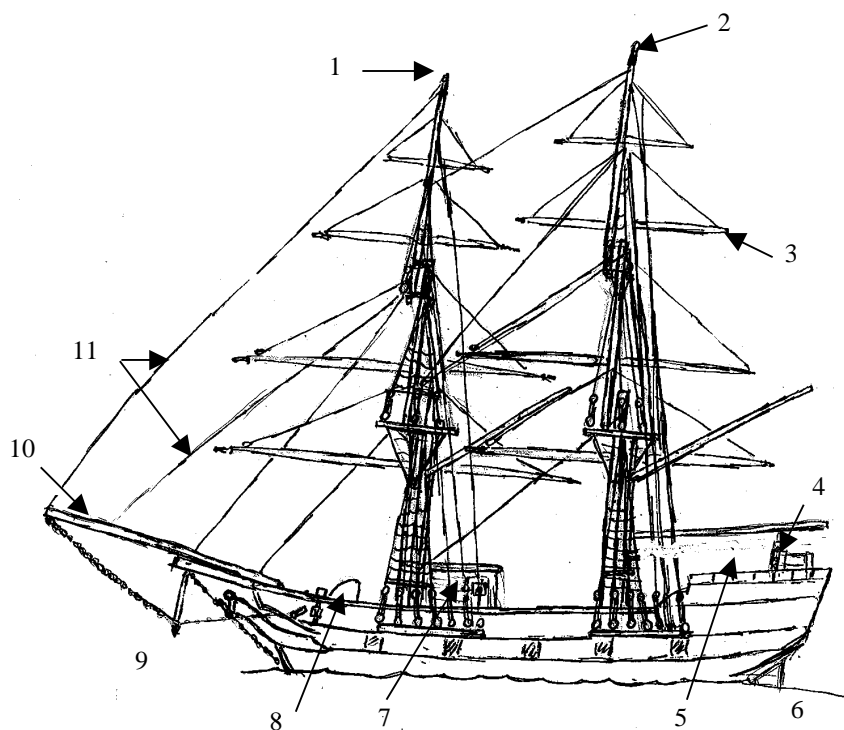
To Do:

Can you imagine how it would be going up the rigging during stormy seas to take in the sails? Using the diagram name the parts of the ship.

To Know:

The *Pilgrim* is a type of ship called a brig. A brig is a two masted sailing vessel that is primarily square rigged on her fore and main masts. The *Pilgrim* is a 130-foot "snow brig" hosting fourteen sails, including eight square sails, giving her that distinctively majestic appearance. The mainmast is 98 feet high.

To set the square sails, the sailors would have to climb aloft on the ratlines (the black rope 'ladder') and use the footropes (the ropes you see under the yards) to move out along the yard to unfurl or furl the sails. Square-rigged vessels are pushed from behind by the wind and have less ability to go into the wind than the more modern design fore-and-aft type sails.



1. Fore Mast
2. Main Mast
3. Yard
4. Helm
5. Captains
Quarterdeck
6. Stern
7. Galley House
8. Foc'sle Hatch
9. Bow
10. Jib-Boom
11. Stays

