

# **Underwater Secrets of a Marine Protected Area**

## **A Lesson Plan for Grades 4 to 8**

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**PLNHA, Summer Adventures**

**NOAA, Davidson Seamount**

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1. A General Summary

2. A Script – This is meant to help the presenter if necessary. The script should also appear below the slides in the presentation. It includes supplementary information the presenter may want to include depending on the age level and level of knowledge of the children. It is meant only as a guide, if needed.

3. The Power Point sides of the presentation

4. Photo Credits and Bibliography

5. Net (Web) Of Life, A follow-up game from 1997 California Seafood Council and UC Davis education.

6. Some web pages for additional information.

7. CD – Underwater Secrets of a Marine Protected Area

## Underwater Secrets of a Marine Protected Area Summary

This lesson plan is based on the concept that a food web needs to be protected in order to assure a healthy ocean for the future. Three main elements are included. They are:

\*MPA's provide a healthy ecosystem by keeping the ocean in balance. Urchin barrens are compared with a kelp forest.

\*MPA's produce enough food to sustain biodiversity allowing many different species of animals and plants to thrive.

\*MPA's help sustain ocean life. Most marine fishes and invertebrates use more than one habitat or geologic feature during their lives. Many fish and other marine animals grow larger in MPA's. Larger females produce more offspring.

Vocabulary that may need to be reviewed with the class:

food web

sustain

predator

biodiversity

invertebrate

geologic

specie

## Underwater Secrets of a Marine Protected Area

### SLIDE 1 TITLE SLIDE

#### SLIDE 2 OTTER IN KELP

- A. Assess knowledge: Where do you feel safest? Why do you feel safe there? What is a preserve or protected area? It's a safe place for animal and plants to grow and reproduce.  
(Otters eat clams, squid, sea cucumbers, sea urchins, mussels, chiton, octopi, scallops, marine worms, prawns, limpets, and several types of fish.)

#### SLIDE 3 STARFISH AND ALGAE

- B. Program: Why protect areas of the ocean?  
They help keep the ocean in a healthy balance. (Notice the starfish and many types of algae in just this little space. Some starfish eat mussels, clams, oysters, and some dying fish. Others eat decomposed plant or animal material. Crabs eat starfish.)

#### SLIDE 4 OCEAN BARRENS AND SEA URCHIN

(In this slide you see what happens when a major element of the environment is removed. The sea otter were hunted to near extinction. One of their major food sources, the sea urchin, then had no predators and was able to eat the kelp to their hearts' content, until the kelp was diminished or gone. The next step is a sandy bottom.)

#### SLIDE 5 KELP FOREST AND KELP FISH

(In this slide you can see the kelp forest with many kinds of fish present. The ocean is in balance. There is also protection for many kinds of mollusks, invertebrates, and fish that live in the kelp and near the sea bottom. The giant kelp is one of the fastest growing plants on the planet growing up to 2 feet per day. There are about 50 species of algae which form the base of the food chain. Kelp absorbs nutrients from the water and produces food for plant eating species such as sea urchins and abalone.)

#### SLIDE 6 OCEAN BOTTOM—THERE IS A FOOD WEB WITH ENOUGH FOOD TO SUSTAIN BIODIVERSITY

(A healthy ocean is rich in many types of animals and plants. This variety provides a food web where nearly every animal or plant may be food for another, but there is enough so that each species can survive and thrive.)

#### SLIDE 7 BIRDS—PELICANS AND HERON

(In the Monterey Sanctuary, there are about 94 species of ocean birds and 90 species of tidal and wetlands birds. Each group has about 30 residents, with the others visiting

from time to time. Pelicans eat mostly fish, but sometimes crustaceans, amphibians, and small birds. The great blue heron eats fish, frogs, snakes, water beetles, salamanders, small mammals, and some birds.)

#### SLIDE 8 MOLLUSKS—RED ABALONE AND MUSSELS

(In the Monterey Marine Sanctuary there are numerous mollusks and invertebrates. The red abalone eats kelp and other algae. Mussels filter plankton out of sea water.)

#### SLIDE 9 INVERTEBRATES—RED ANEMONE AND POLYORCHIS JELLYFISH

(There are many kinds of invertebrates which include colorful sponges, urchins, anemones, lobsters, crabs, snails, octopi, abalones, and sea stars. Anemones and jellyfish are carnivores, eating small fish. The Polyorchis jellyfish is food for the leatherback sea turtle who occasionally visits the sanctuary. Nudibranchs, snails, sea stars, and fish eat jellyfish.)

#### SLIDE 10 FISH—BLUE ROCKFISH AND PINK ROCKFISH

(There are 345 species of fish in the sanctuary. Young rockfish eat plankton. As they grow, they eat fish eggs, crustaceans and small rock fish.)

#### SLIDE 11 MAMMALS—HARBOR SEAL AND CALIFORNIA SEA LION

(There are 33 species of marine mammals of which 12 are whales that visit regularly and 6 more that visit from time to time (including killer and sperm whales). Other mammals include Steller sea lions, harbor seals, Northern elephant seals, elephant seals, California sea lions. Visitors include the Northern fur seal and Guadalupe fur seals. Sea lions and seals enjoy nice meals of fish and squid.)

#### SLIDE 12 PLANTS—BULL KELP AND SEA PALM

(There are 400 types of sea plants in the sanctuary. Three main types of kelp predominate in the Marine Monterey Sanctuary: the giant kelp, the bull kelp, and the sea palms.)

#### SLIDE 13 OCTOPUS—MARINE PROTECTED AREAS HELP SUSTAIN OCEAN LIFE.

(Most marine fishes and invertebrates use more than one habitat or geologic feature during their lives. Each habitat is home to a special group of animals and plants. When the goal of a marine reserve is to protect many species, all habitats used by these species throughout their life must be included.)

#### SLIDE 14 LIFE CYCLE OF THE BOCACCIO

(As larva, the bocaccio drift through open water far off shore. The young drift under floating kelp near the surface. Then, at about 4 months, they favor shallower water



near shore with rocks covered with algae, sand, eel grass and kelp. As they get older they move to waters over 900 feet deep above boulders fields and rocks. The oldest fish look for caves and crevices. They eat smaller rockfish, anchovies, and squid.)

**SLIDE 15 LARGER FEMALES PRODUCE MORE YOUNG THAN SMALLER ONE**

(Marine Protected Areas allow fish to hide and not be caught or eaten as easily as they would be if they lived in the open ocean, thus allowing them to grow larger. Large female fish produce more and healthier offspring than smaller, younger fish. Most female fish continue to produce young throughout their lives. Rockfish are not adults until they are 10 to 15 years old and often live to be 40. Some are known to live for 100 years or more, and one is suspected to have been 114.)

**SLIDE 16 SCALLOPS**

(Inhabitants grow larger in a healthy, protected ocean space.)

**SLIDE 17 MPA MAP**

Monterey Bay is a Marine Protected Area.

**SLIDE 18 THE END**

Some suggested follow-up questions:

1. What is a marine protected area?
2. Name three reasons to protect a part of the ocean?
3. What are the predators in a marine protected area? What is the prey?
4. What happens when an important predator is removed from the ecosystem?
5. What kind of sea animals would you expect to find on a diving trip in a marine protected area? Plants?
6. Pick your favorite sea animal. What would you eat? Where would you live? Why? How would you protect yourself from predators?

## Photo Credits

Photo		Credit
Cover	Sea Star and algae	Jerry Loomis, California State Park Ranger
1	Big Wave	Jerry Loomis, California State Park Ranger
2	Otter Floating	Josh Pederson, MPA SIMoN
3	Sea Star and Algae	Chad King, MPA SIMoN
4	Urchin Barrens	Jerry Loomis, California State Park Ranger
	Urchin	Steve Lonhart, MPA SIMoN
5	Kelp Forest	Steve Lonhart, MPA SIMoN
	Kelp Fish	Josh Pederson, MPA SIMoN
6	Red Anemone	Josh Pederson, MPA SIMoN
7	Pelicans	Josh Pederson, MPA SIMoN
	Heron	Stan Dryden, Point Lobos Docent
8	Red Abalone	Ian Sayers, MPA SIMoN
	Mussels	Becky Stamsky, MPA SIMoN
9	Anemone	Jerry Loomis, California State Park Ranger
	Polyorchis Jellyfish	Jerry Loomis, California State Park Ranger
10	Blue Rockfish	Josh Pederson, MPA SIMoN
	Pink Rockfish	Chad King, MPA SIMoN
11	Harbor Seal	Jerry Loomis, California State Park Ranger
	California Sea Lion	PLNHA Summer Adventures
12	Bull Kelp	Josh Pederson, MPA SIMoN
	Sea Palms	Steve Lonhart, MPA SIMoN
13	Octopus	Jerry Loomis, California State Park Ranger
14	Life Cycle of the Bocaccio	PISCO: Partnership for Interdisciplinary Studies



Coastal Oceans, 2007, The Science of Marine  
Preserves, 2<sup>nd</sup> Edition United States Version)  
p.13, [www.piscoweb.org](http://www.piscoweb.org).

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|----|----------------------------------|--------------------------|
| 15 | Large Females Produce More Young | Ibid, p. 5               |
| 16 | Scallops                         | Ibid, p. 11              |
| 17 | Map of Marine Protected Areas    | Ibid, p. 15              |
| 18 | Sun star eating a nudibranch     | NOAA, Davidson Sea Mount |

#### Bibliography

Monterey Bay National Marine Sanctuary      URL:<http://montereybay.noaa.gov/introlwelcome.html>

PISCO: Partnership for Interdisciplinary Studies of Coastal Oceans, 2007, The Science of Marine  
Reserves, 2<sup>nd</sup> Edition (United States Version) [www.piscoweb.org](http://www.piscoweb.org). 22 pages