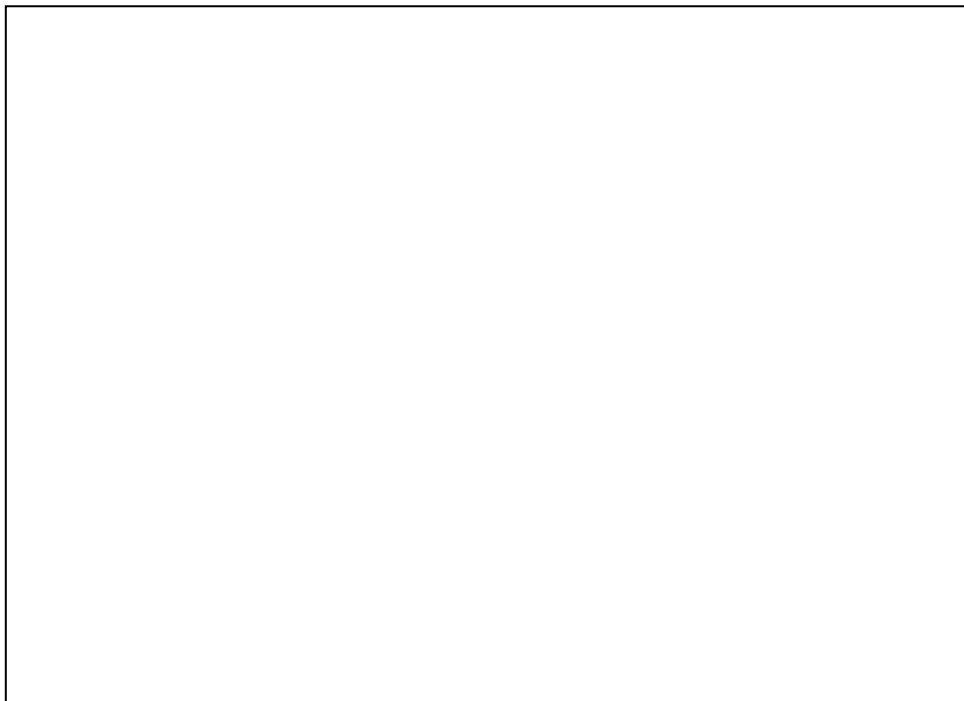


# Extra Credit - Cabrillo Marine Aquarium

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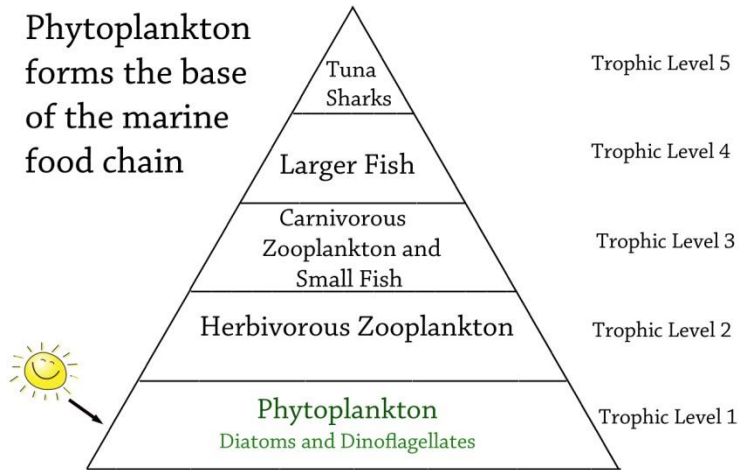
**You will need a camera for this assignment**



**Take a picture of yourself in front of the aquarium. Print the picture and paste it in this box.**

**Name and Roll Number** \_\_\_\_\_

## Wall just inside front entrance



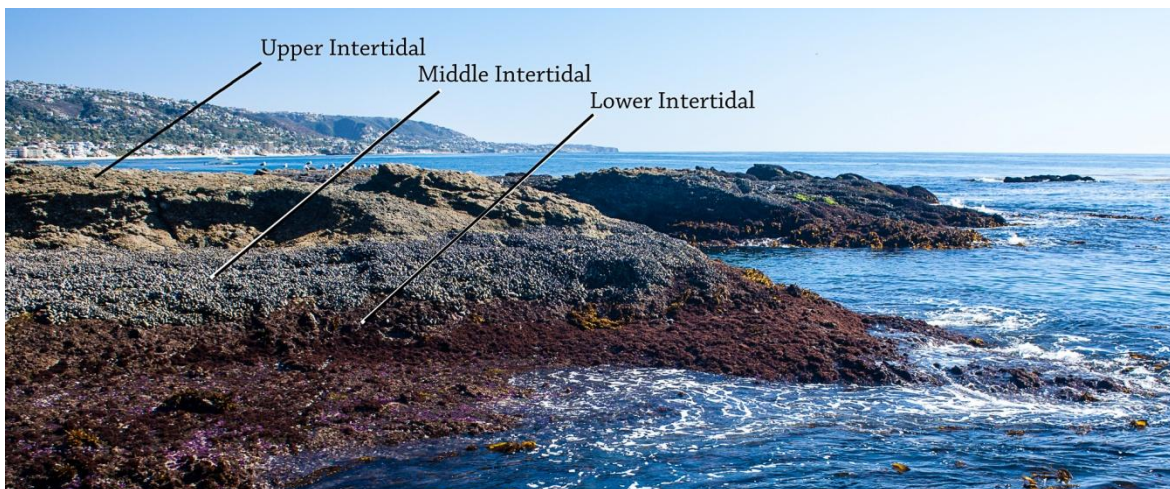
### Plankton

You will come across the term plankton a number of times in this worksheet. Note that you find plankton in the first and second trophic levels of this pyramid of biomass. Plankton are organisms that are not strong enough to swim against the currents. Most planktonic organisms are microscopic. Phytoplankton are photosynthetic organisms at the bottom of the marine food chain. Just like plants, phytoplankton require nutrients (fertilizer) to grow. **Upwelling** brings nutrients from the sea floor to surface waters. This results in a bloom of phytoplankton that ultimately supports the fish population off the coast of California.

1. When does upwelling tend to occur in California?
- 

## Wall by the tank called *The Living Surf*

The intertidal zone is the zone between the lowest low tide and the highest high tide. If you visit rocky areas off the California coast at low tide you will see a variety of interesting organisms. These organisms are found at different elevations above sea level. The higher up that they are found, the more they are exposed to air and sunlight. Thus the highest organisms occupy the most stressful environments. These organisms use gills to breathe and lose significant amounts of water on hot sunny days.



This is a photograph of Shaw's Cove in Laguna Beach at low tide.

1. Name four animals of the high tide zone (splash zone and upper intertidal) and an adaptation of each animal for existence in that zone.

Animal	Adaptation

2. Name four animals found in the middle intertidal and an adaptation of each animal.

Animal	Adaptation

3. How do aggregate anemones reduce water loss when the tide is out?

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## House Builders - Tank 2

There are a great number of marine worms that fill many different ecological niches. Most marine worms are in Class Polychaeta and are referred to as polychaete worms. Many of the polychaete worms that live in the intertidal zone construct tubes that can be used to hide from predators. Most of these worms are filter feeders that use their tentacles to grab small animals from the water column.

State the common name and phylum of three tube building animals in this tank and what their tubes are made of.

Common Name	Tube

## Borders on Rocky Shores (wall next to house builders)

The rocky intertidal differs from sandy beaches in that rock is hard to burrow into. Thus most organisms live on the surface of the rocks and are easily seen at low tide. These organisms are called epifauna. However, there are a few organisms that are capable of scraping depressions in the rock or even burrowing into it.

1. Describe how sea urchins find refuge from surf, from drying out, and from predators.

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2. Describe how chitons find refuge from surf, from drying out, and from predators.

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3. Name a clam that scrapes out a burrow in the rock.

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## Grazers and Browsers - Tank 3

Grazers and browsers are herbivores that primarily feed on sea weeds (marine algae). They are eaten by carnivores such as sea stars and shore birds. A number of them were an important food source for native Americans that lived along the California coast.

1. Name three grazers or browsers that can be found in tide pools in California.

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## Sea Weeds

1. What are the three seaweed groups?

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2. What is the largest brown algae? \_\_\_\_\_

3. State two problems that seaweeds found in the high intertidal zone have to deal with. What are two adaptations found in these seaweeds for existence in the high intertidal zone?

Problems with living in the high intertidal zone	Adaptations to deal with the problems

4. State two problems that seaweeds found in the low intertidal zone have to deal with. What are two adaptations found in these seaweeds for existence in the lower intertidal zone?

Problems with living in the lower intertidal zone	Adaptations to deal with the problems

### Plant-Like Animals - Tank 4

If you visit the rocky intertidal zone at low tide and look in the tide pools you can see a number of animals that look like plants. You can see other plant-like animals if you snorkel or dive in waters just off the coast. Most of these plant-like animals are related to corals and jellyfish. They use stinging tentacles to capture small planktonic animals. Sponges are another example of the plant-like animal. Sponges are filter feeders that use flagellated cells to draw water into their bodies in order to feed on small organisms suspended in the water column.

State the common name and phylum of three plant-like animals that you observed in this tank.

Common name

### Nonpredatory Echinoderms - Tank 6

The term *Echinoderm* means spiny skin. Echinoderms are only found in marine environments. This group includes sea stars, sea cucumbers, sea urchins, and sand dollars. Many species of echinoderms can be observed in the rocky intertidal at low tide.

Complete the following table:

Feeding Mode	Common Name
Scavenger	
Suspension Feeder (Filter Feeder)	
Deposit Feeder	
Herbivore	

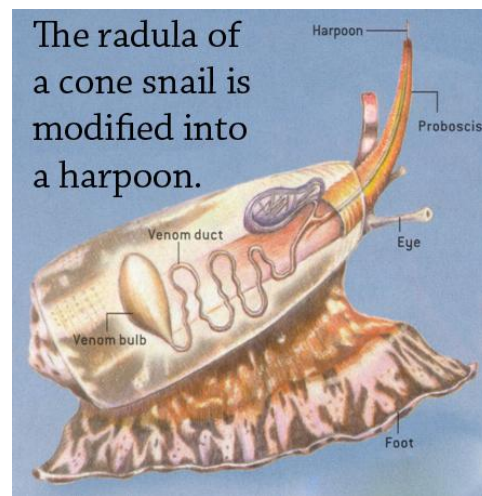
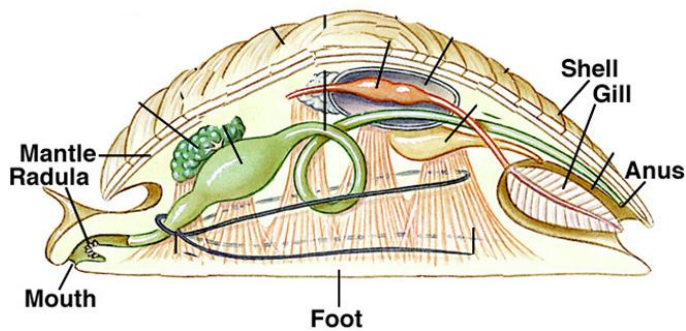
## Predatory Sea Stars - Tank 7

1. What does the ochre sea star eat? \_\_\_\_\_
2. What do brittle stars feed on? \_\_\_\_\_
3. What is the preferred food of the sunflower star? \_\_\_\_\_

## Predatory Snails - Tank 8

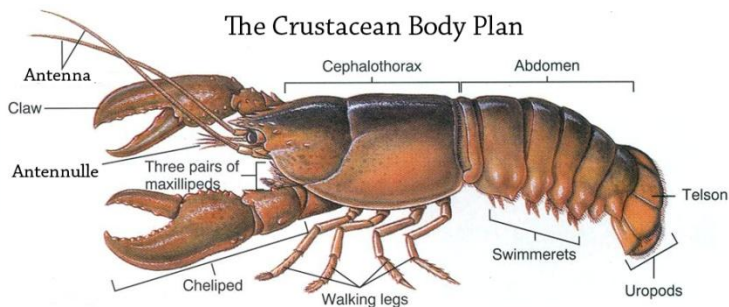
Snails are in Kingdom Animalia, Phylum Mollusca, Class Gastropoda. They are closely related to limpets and abalone. Most marine snails are herbivores that graze on sea weeds and other forms of marine algae. However, some marine snails are carnivores such as the poisonous cone snail found on the Great Barrier Reef of Australia. This tank has a species of carnivorous snail found off the coast of California.

Note the radula on this diagram of a generalized mollusc



1. What phylum and class do these predatory snails belong to? \_\_\_\_\_
2. How do these animals locate food? \_\_\_\_\_
3. Describe how these animals feed? \_\_\_\_\_

## Crustaceans - Tanks 13 and 14



1. List the names of three large crustaceans.

\_\_\_\_\_

## Octopus - Tank 17

1. List three facts about the octopus.

\_\_\_\_\_

## Moray Eel

1. What does the red rock shrimp do for the moray eel? \_\_\_\_\_

2. What is the favorite prey of the moray eel? \_\_\_\_\_

## Color Change - Tank 20

1. What are the cells called that allow the fish to change colors? \_\_\_\_\_

2. Why do fish change colors? \_\_\_\_\_

## Kelp Forests - Tank 21

1. State the name of the bright orange fish. (This is our official state marine fish!). \_\_\_\_\_

2. Observe the sheephead fish. This fish changes sex as it gets older. Locate a male and a female. Describe the difference in coloration of the male and female.

Male: \_\_\_\_\_

Female: \_\_\_\_\_

## Moon Jelly - Tank 28

1. What color are the moon jellies in the tank?

\_\_\_\_\_

2. What phase (medusa or polyp) is the dominant phase of the moon jelly life cycle? \_\_\_\_\_

# Bioluminescence: A Living Signature

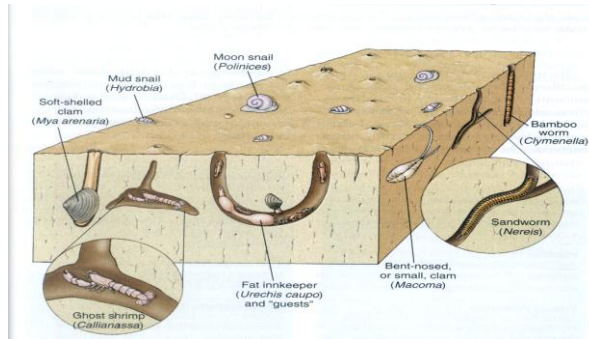
1. What are four reasons fish use bioluminescence?

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## Mudflats



1. What are the 5 major feeding strategies of wetland birds? Give an example of a bird that uses each strategy.

Feeding Strategy	Example

2. What are three endangered birds found in wetlands in California?

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## Sharks and Rays - Tank 35

1. List three things you found interesting about the shark exhibit?

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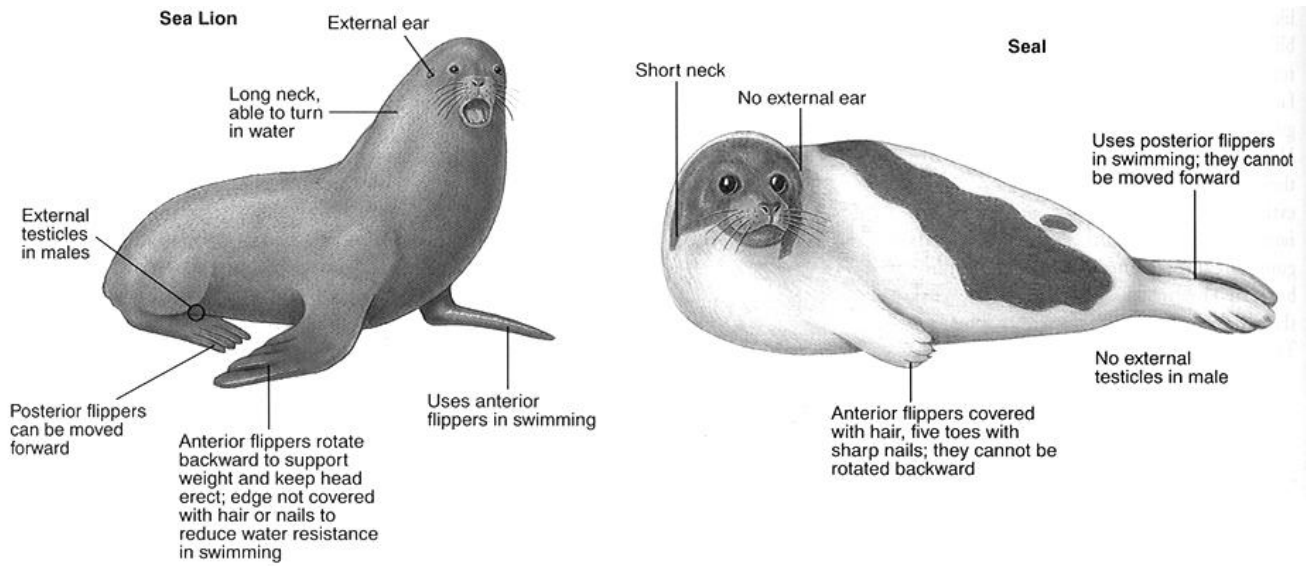
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## Seals and Sea Lions



1. List three things you found interesting in the seal and sea lion exhibit.

\_\_\_\_\_

2. State two ways these animals keep cool on land.

\_\_\_\_\_

3. What is the largest of all the seals?

\_\_\_\_\_

## Whales

1. List three things you found interesting in the whale and dolphin exhibit.

\_\_\_\_\_

2. What is the largest of all whales and how does it feed?

\_\_\_\_\_

3. What is the deepest diving whale and how does it feel?

\_\_\_\_\_

## Aquatic Nursery

1. Go across the courtyard to the aquatic nursery. There are a number of displays, volunteer projects, and aquaculture projects in this building. List 5 things that you learned or found interesting in the aquatic nursery.

A. \_\_\_\_\_

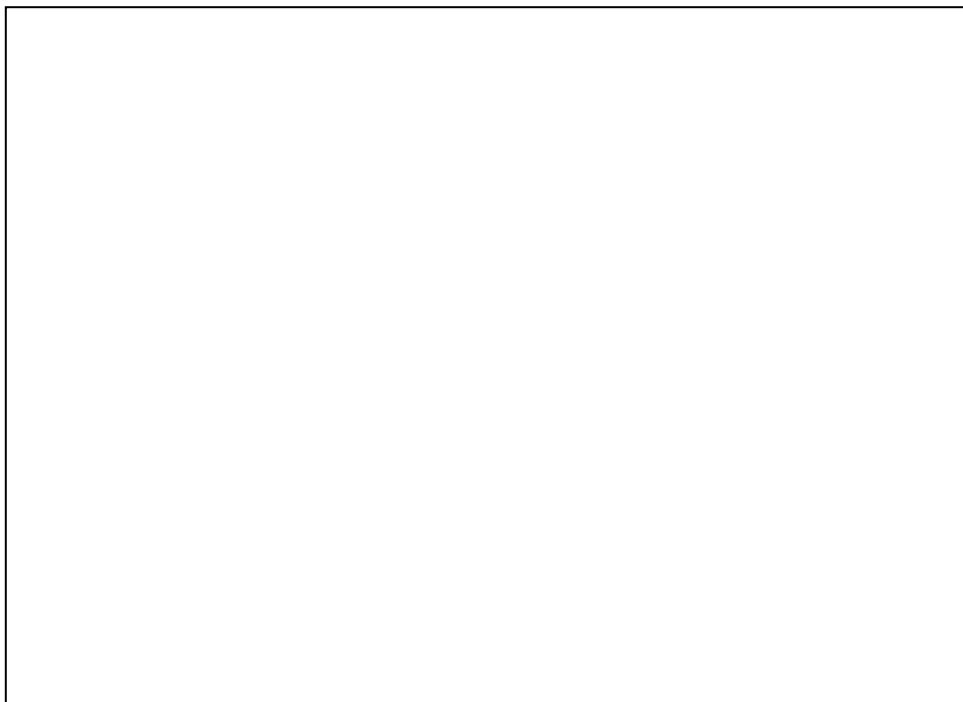
B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

E. \_\_\_\_\_

## Final Touches



**Walk out to the beach area and take a picture of an animal that you see. It can be a bird or an organism attached to the rocks along the cliffs. Print your photograph and paste it in the box.**

1. What are the three most interesting things that you learned at the Cabrillo Marine Aquarium?

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_