

Subtidal Ecology at the Monterey Bay Aquarium

The answers to most questions can be found by viewing and reading the displays, by asking the docents, and by discussion with your classmates --- but MOSTLY determined by YOU based on OBSERVATIONS of the creatures in the exhibits and the concepts you've learned as a biology major! Use your notebook to record the information/facts at the aquarium. Take your time, make thorough notes, take breaks as needed, and have fun! The answers to the questions that you turn in for credit MUST BE TYPED. For more information, visit the Monterey Bay Aquarium website: <http://www.montereybayaquarium.org>

I. SEA OTTERS

1. Where/how did the Aquarium get their sea otters? How long have *these* otters in the exhibit been here?
2. What do sea otters eat? How much do they have to eat each day? Why so much?
3. What is a genetic bottleneck and how was one caused in the sea otter population?
Why is such a bottleneck a concern for the future of the otter species?

II. MONTEREY BAY HABITATS

4. Note the display of tanks along the wall across from the Bay tank.
For each tank representing a stop along your "dive", record at least one unique feature of interest.
 - a) Wharf
 - b) Sandy Bottom
 - c) Crevice Dwellers

III. KELP FOREST (You may find many of the answers by attending the Kelp Forest Feeding Show scheduled at 11:30 am or 4:00 pm. Check your Aquarium brochure or the Information Desk to verify the times of the shows.)

5. Monterey Bay Aquarium is the first aquarium to successfully grow giant kelp in an artificial setting. What are **three** essential factors that kelp need to grow, and how did the Aquarium provide them?
How fast and how deep does the kelp grow in the wild? How does that compare to the kelp growth in this exhibit?
6. What is the water temperature in the Kelp Tank. Where does the water come from?
How do the aquarists ensure that all the filter-feeding creatures in the tank get fed?
7. Why don't the fish in the Kelp Forest Tank eat each other?

IV. KELP LAB / "ENCHANTED KELP FOREST" (Upstairs)

8. Observe the kelp forest tank from the second floor windows. How does the presence of kelp *physically* change the ecosystem *abiotic* factors? [At least two abiotic factors.]
9. Observe the kelp holdfast. How is a holdfast different from roots in land plants?
Name three animals that live within the holdfast.
10. The "Seaweed Garden" and "Kelp Forest Canyons" tanks both represent rocky habitats occurring within the kelp forest understory — Thus they may have similar light intensity, substrate type, and depth. So, why are they different?
I.e., why is the former dominated by benthic algae, but the latter is dominated by sessile invertebrates?

V. OUTER BAY / JELLIES exhibits (Across the skywalk bridge.)

11. Why are all the schooling anchovies/sardines/mackerel *in these tanks* swimming in the same direction?
12. Why are so many different oceanic animals gelatinous (bodies made of that Jello-like stuff)?
13. Compare the comb jellies with the true jellies. Contrast how they each move. Contrast how they each catch food.
14. What are copepods? Why are they important to planktonic food webs?

VI. OUTER BAY / OPEN SEA: THE 1 MILLION GALLON TANK (Another perspective of this tank may be viewed from the window downstairs in the VANISHING WILDLIFE exhibit. Some of the videos there also address these questions.)

15. The Monterey Bay Aquarium is the first institution outside of Japan to succeed in displaying live tunas. They were also the first aquarium anywhere to keep a great white shark longer than sixteen days.
Why are such powerful animals so delicate in terms of survival in captivity?
What are at least **two** ways that the Monterey Bay Aquarium is able to keep these great creatures alive?

VII. VANISHING WILDLIFE (Downstairs)

16. Pick up a *Seafood WATCH* card. What do the red, yellow and green categories mean?
Select an example from each color category and explain **why** it is in that group.
17. What are two ways that human activities impact sea turtles? How may these impacts on the turtles be mitigated?

VIII. NEARSHORE ECOSYSTEMS VS. OCEANIC ECOSYSTEMS

18. Using the Kelp Forest/Kelp Lab exhibits as an example of the nearshore environment, and the Outer Bay/Open Sea exhibits as an example of the oceanic environment, contrast their respective sources of primary production.
19. How do these differences in primary production create other differences in their respective food chains?
20. Since so much of the ocean's life is concentrated in the nearshore regions, how *should* that influence our human exploitation of the seas?