

Student Name: \_\_\_\_\_

Class: \_\_\_\_\_

Grade: \_\_\_\_\_

## Birch Aquarium at Scripps Institution Oceanography

**Introduction:** The purpose of this mandatory oceanography field trip is to observe and study live marine life, their habitats, and the major environmental concerns that they face. This worksheet is divided into three parts: **Part I** covers the three major exhibits: Global Warming, Research Vessels, Sharks, and Seahorses (Exhibit Hall is to your left – south end ; sharks outside). **Part II** address the Hall of Fish aquarium tank exhibits (to your right – north end ). Both the Exhibit Hall and the Hall of Fish question sets are ordered according to a counterclockwise circuit of the hallway loop. **Part III** covers the outdoor tide pool exhibits (straight ahead, behind the building – west end). This is designed as a self-guided tour - do it solo, or work as a student group. Can't find info? Track down the professor or an aquarium docent.

### Part I - The Exhibit Hall

#### A. Global Warming Exhibit (west side of exhibit hall)

1. Climatologists collect the samples of **polar ice** to learn about paleo-climates (climates of the past).

Polar ice samples contain tiny, trapped bubbles of ancient, which record ancient levels of atmospheric \_\_\_\_\_, a powerful greenhouse gas..

2. Over the last 650,000 years - up to the start of industrial revolution (200 years ago) - atmospheric CO<sub>2</sub> concentration had never risen over what level? \_\_\_\_\_ppm

3. What's the current level of CO<sub>2</sub> concentration in our atmosphere? \_\_\_\_\_ ppm

4. How much has atmospheric CO<sub>2</sub> gas risen over the last 200 years? \_\_\_\_\_ppm, a \_\_\_\_\_% increase

5. What are the predicted levels of CO<sub>2</sub> in our atmosphere 50 years from now if we continue to burn fossil fuels at present rates? \_\_\_\_\_ppm

#### Evidence for Global Warming and Climate Change

6. List four visible changes occurring today that are considered solid physical evidence for global warming?

#1) \_\_\_\_\_ #2) \_\_\_\_\_ #3) \_\_\_\_\_ #4) \_\_\_\_\_

#### Ocean Acidification

7. Ocean acidity has increased by how much in the last 250 years? Increased by \_\_\_\_\_ %

8. What is being added to the ocean that is causing seawater to become increasingly acidic? \_\_\_\_\_

9. How much CO<sub>2</sub> that we pump into the atmosphere gets absorbed into the ocean every year? \_\_\_\_\_%

10. How will increases of CO<sub>2</sub> in our ocean affect carbonate shell and coral reef production?

11. List three ways that you can reduce your carbon footprint:

#1) \_\_\_\_\_ #2) \_\_\_\_\_ #3) \_\_\_\_\_

#### B. Sally Ride Research Ship Exhibit (back end of exhibit hall)

1. Briefly describe the new Sally Ride research vessel (size, length, capabilities, owned and operated, etc.)

2. List (at least 4) various types of oceanographic sample/data collecting activities carried out on this vessel?

#1) \_\_\_\_\_ #2) \_\_\_\_\_ #3) \_\_\_\_\_ #4) \_\_\_\_\_

3. Which of the above listed oceanographic research activities do you find most interesting and why?
4. Pretend that you are the leading research scientist on board. What would you propose as the research theme for a new oceanographic research study at sea? Why?

**C. Outdoor Shark Exhibit** (outside: via the south door exit of exhibit hall)

1. Name two different types of sharks in the tank. #1. \_\_\_\_\_ #2. \_\_\_\_\_
2. Name two different types of rays in the tank. #1. \_\_\_\_\_ #2. \_\_\_\_\_
3. How do sharks differ from their cousins, the rays, in terms of appearance (anatomy) and lifestyle?
4. What do you think is a shark's role in a marine community? Do they have an important job to fulfill?
5. Do you like sharks?                      Are you afraid of sharks?                      Are sharks in trouble worldwide? Should we take more steps to protect sharks, and what might those steps be?

**D. Seahorse Exhibit** (east side of exhibit hall)

1. What are seahorses exactly? Fish? Some sort of invertebrate?
2. What are the three major types of marine habitats where seahorses call home?  
#1. \_\_\_\_\_ #2. \_\_\_\_\_ #3. \_\_\_\_\_
3. What makes seahorses so unique in the animal world, in terms of their reproduction practices? 4. What are the seahorse's natural enemies, and how do they protect themselves from them?
5. How many seahorses are harvested every year? \_\_\_\_\_ What are they harvested (used) for?
6. Why are seahorse species in danger of collapse? What some solutions to improve seahorse numbers?

**The Plastic Vortex** – (Central Hall near west exit to outdoor tidepools)

1. What is the "Plastic Vortex"? Where is it?
2. Where does the plastic come from and how/why does it get into the vortex?
3. Why do the vortex plastics pose a threat to sea life? List some of the negative effects.

**PART II - THE HALL of FISHES - North side of Building**

**A. The Sardine Tank – Front entrance (Tank #1)**

1. Sardines often swim in schools with their mouths wide open. What are two reasons for this?  
(Hint: They use their gills for two important life-supporting purposes.)

#1 \_\_\_\_\_ #2 \_\_\_\_\_

2. What do you think are some advantages for fish to swim in schools?

**B. The California Current and Adjacent West Coast Marine Ecosystems**

1. What is the most important physical factor that determines the distribution and variety of marine life in west coast coastal waters? Hint: It's a physical condition of water.
2. What are some other important physical factors that influence offshore habitat conditions? List three.

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_

3. Classify/Describe the California Current within the North Pacific Gyre. Circle the one correct choice in each of the pairs of choices below (circle a total of three answers).

*Boundary or Transverse?*

*Eastern or Western?*

*Cold or Warm?*

4. The California Current and adjacent coastal waters are a particularly rich marine ecosystem. Why?  
(Hint: think about the limiting factors and water movement that promote primary productivity)
5. How does upwelling influence water temperature and nutrient levels in the surface waters?

6. List the four featured marine geographic provinces found along our west coast from Canada to Mexico.

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ #4 \_\_\_\_\_

7. List the major types of marine habitats displayed in the various tanks. Note: there are 7 listed on wall.

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ #4 \_\_\_\_\_

#5 \_\_\_\_\_ #6 \_\_\_\_\_ #7 \_\_\_\_\_

**Northwest Coast Marine Habitats – (Tanks 2 through 7)**

8. List **three** of the most common types of marine life that you observed in the Northwest Coast tanks?

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_

9. Take a close look at Tank #5. What is so special about tank #5? Describe what you see (hopefully, it's not hiding). What is the average lifespan of this amazing cephalopod?

**Southern California Marine Habitats** – (Tanks 10 through 19)

10. List **three** of the most common types of marine life that you observe in the So Cal tanks

#1. \_\_\_\_\_ #2. \_\_\_\_\_ #3. \_\_\_\_\_

**Giant Kelp Forest Tank** (Tank #19)

11. Spend some time studying the abundant marine life in the very large kelp forest tank. Identify and count as many species of sea life as possible. How many species did you count?

12. Name and describe (in some detail) one species in the kelp tank that you find most interesting

13. List two ways that you think that a kelp forest promotes and sustains abundant and diverse sea life.

#1 \_\_\_\_\_ #2 \_\_\_\_\_

**C. Troubled Tropical Coral Reefs Ecosystems** – (Tanks 20 through 33). Find the Tropical Seas coral reef tanks/exhibits. Read and study the information listed on the wall.

1. List **three** of the most common types of marine life that you observe in the tropical marine habitats.

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_

2. How do warm-water marine communities differ from the previously-observed cold-water communities, in terms of variety and anatomy?
3. What are signs of an unhealthy coral reef system?
4. What are some threats or causes for the collapse of the coral reef systems worldwide?
5. What are some of the ways that humans are providing relief to troubled coral reef systems?
6. Why are coral reef ecosystems worldwide important and worth saving?

**OUTDOOR TIDEPOOL EXHIBITS**

1. How many animal phyla do you recognize in these simulated tide pools? List at least four.

#1 \_\_\_\_\_ #2 \_\_\_\_\_ #3 \_\_\_\_\_ #4 \_\_\_\_\_

2. Do you see any marine algae in these tide pools? \_\_\_\_\_ If so, name one: \_\_\_\_\_

3. What types of challenging physical conditions must tide pool organisms deal with that are not commonly found in most other marine ecosystems? Think about things like tides and waves.

4. What principle characteristics do these organisms possess that makes them so well suited to the tide pool habitat? Think about the above challenging physical conditions of a tide pool that you listed.

**POST TRIP REFLECTION:**

1) What did you discover/ learn on this trip? \_\_\_\_\_

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2) What did you find most interesting, enjoyable and/or important?

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3) What did you find most difficult or challenging? \_\_\_\_\_

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