Student Name: _____ **Class:** _____ **Grade:** ____

Extra Credit Birch Aquarium at Scripps Institution Oceanography

Introduction: The purpose of this extra credit weekend 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. You can earn up to 15 extra points for this fieldtrip.

Part I - The Exhibit Gallery

A. Marine Life Oddities – Scripps Institute of Oceanography's Organism Collection

1. The Scripps Institute of Oceanography has collected and cataloged millions of marine organisms over the last 100 years. What are the 4 major groups of marine organisms that Scripps has collected?

#1. _____ #2 _____ 3# _____ #4 _____

2. Marine life have a variety of physical attributes that help them to survive and flourish in the ocean. Some of these attributes can be termed "***super powers***". List some these so-called "super-powers" that a marine organism may possess in order to get the edge over its enemies and/or prey.

#1. _____ #2 _____ 3# _____

#4. _____ #5 _____ 6# _____

3. Name an example of an organism that posses **"super" vision**. Name: _____

Also, describe some of the extraordinary characteristics of its super-vision: _____

_____

4. Name an example of an organism that emits **electrical current** Name: _____

Also, describe some of the extraordinary characteristics of emitting electrical jolts: _____

_____

5. Name an example of an organism that has "**super-armor**" Name: _____

Also, describe some of the extraordinary characteristics of its super-armor: _____

_____

6. Name an example of an organism that has "**invisibility**" Name: _____

Also, describe some of the extraordinary characteristics of its invisibility: _____

_____

B. Coral Bleaching Exhibit

1. What are visible differences between a healthy coral reef and a bleached coral reef?

2. What is the primary cause for the worldwide increase in coral reef bleaching? _____

C. Ocean Acidification

1. Ocean acidity has increased by how much in the last 250 years? Increased by _____ %

2. What is being added to the ocean that is causing seawater to become increasingly acidic? _____

3. How much CO_2 that we pump into the atmosphere gets absorbed into the ocean every year? _____ %

4. How will increases of CO_2 in our ocean affect carbonate shell and coral reef production?

5. List three ways that you can reduce your carbon footprint.

#1) _____ #2) _____ #3) _____

D. <u>Sally Ride Research Vessel Exhibit</u> (back end of exhibit hall)

1. An important device on the Sally Ride is the rosette sampler. What does it sample?

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. What is the Scripp's Institute's Official Quest Statement? (find it next to Beufort Wind Scale)

E. <u>Seahorse Exhibit</u>

1. Seahorses are classified as what sort of marine animal? _____

2. What are the three major types of marine habitats where seahorses call home?

#1. _____ #2. _____ #3. _____

3. What do seahorses eat? How do they feed?

4. What makes seahorses so unique in the animal world, in terms of their reproduction practices?

5. What are the seahorse's natural enemies, and how do they protect themselves from them?

6. How many seahorses are harvested every year?_____ What are they harvested (used) for?

7. Why are seahorse species in danger of collapse?

8. What are some of the solutions to stabilize and increase seahorse number?

F. <u>Outdoor Shark Exhibit</u> (outside: via the south door exit of exhibit hall)

1. How many different types of sharks do you recognize in the tank? _____ List at least two.

#1 _____ #2 _____

2. How many different types of rays do you recognize in the tank? _____ List at least two.

#1 _____ #2 _____

3. How do sharks anatomically differ from their cousins, the rays?

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? Should we take more steps to protect sharks?

G. <u>The Plastic Vortex</u> – (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 does the vortex plastic pose a threat to sea life? List some the negative effects.

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

A. <u>The Sardine Tank</u> – 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 purposes.)

#1. _____ #2. _____

2. The California sardine fishery collapsed back in the 1950's. Most likely reason why it happened?

B. <u>The California Current and West Coast Marine Ecosystems</u>

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

#1_____ #2 _____ #3_____ #4 _____

2. 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_____

3. What is the most important physical factor that determines the distribution and variety of marine life in west coast coastal waters?

_____

4. What are some other important factors that influence offshore habitat conditions? List fhree.

#1_____ #2 _____ #3_____

5. 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?*

6. 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)

7. How does upwelling influence water temperature and nutrient levels in the surface waters?

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. _____

11. How do Northwest Coast marine communities differ from those on the Southern California coast, in terms variety and size of organisms?

Giant Kelp Forest Tank (Tank #19)

12. 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?

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

14. 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?

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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?

PART III - OUTDOOR TIDEPOOL EXHIBITS

1. How many plant and animal phyla do you recognize in the tide pools? _____List at least four.

#1. _____ #2. _____ #3. _____#4. _____

2. Do the tide pools have a dominant plant phylum? _____If so, which one?_____

3. Do the tide pools have a dominant animal phylum?_____If so, which one? _____

4. 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.

5. 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.

PART IV - POST FIELD LAB REFLECTION

Write a two-point reflection of your field trip experience at the Birch Aquarium (about 150 words).

1. What did you learn on this trip? How does that relate with what you are learning in this course?

2. What did you find most interesting or important? What did you find difficult or challenging?