

Name: _____

Virtual Oceanography Boat Trip

This exercise is meant to show you what oceanographers might do on a typical day at sea off the Southern California coast. If you are completing this exercise as an alternative assignment to another lab activity, put a hard copy of your completed exercise in your lab notebook.

Go to <http://www.miracosta.edu/home/kmeldahl/VOBT> to begin. Navigate through the links you find there to complete the exercise.

Part 1: Introduction to Local Sea Life (see the “INTRODUCTION” link on the website above)

1. What are the four main ways that local seabirds feed, with an example of each? What adaptation of deep diving birds enables them to dive deeply?

2. Describe two ways to tell the difference between seals and sea lions.

3. To what group of cetaceans (whales) do dolphins belong. What are some other members of this group? Describe the major adaptation that this group of cetaceans uses for feeding.

4. The _____ Dolphin (*fill-in the blank*) is the name of the dolphin that is very common in the area and frequently surfs the bow waves of moving boats.

Part 2: Observations at Shipboard Stations (see the “STATIONS” link)

1. Describe the conditions that would give you the following Secchi disk readings.
 - a. green water color, moderate clarity: _____
 - b. blue/clear water color, high clarity: _____
 - c. brown water color, low clarity: _____
2. What are phytoplankton, and why are they important? What are the two most common forms of phytoplankton in our area?

3. Give two examples of temporary zooplankton.

4. What is the name of the most abundant form of permanent zooplankton that we find in our local waters? What does this creature eat?

5. What causes phytoplankton and zooplankton like copepods to commonly have a “boom-and-bust” cycle of abundance?

6. Differentiate between a weak thermocline and a strong thermocline. Which one is best for primary productivity, and why?

7. How do living things affect the amount of dissolved oxygen in seawater? Consider factors that increase oxygen and factors that decrease oxygen.

8. What is typical ocean water salinity? What natural processes can cause salinity to decrease? To increase?

9. Summarize the features of a healthy seabed versus an unhealthy seabed. Why is a healthy seabed important for phytoplankton living at the ocean surface?

10. What does it mean to say that a fish is an “**exotic**” species? Under what conditions might you to see such a fish, and why?

Part 3: Data Interpretation (see the “DATA INTERPRETATION” link)

For the following scenarios, write an interpretation that explains the conditions that might have created each data set. Use the information and concepts given on the “Data Interpretation” part of the website to support your interpretation. An example is given for you for #1. Write your answers to #2, #3, and #4 in a similar way.

Data set #1: Water properties station shows weak thermocline, normal oxygen levels, normal salinity, and normal pH; benthic sample shows a healthy seabed with many decomposers; plankton net contains abundant dinoflagellates with little to no other plankton present; Secchi disk shows brown water color with low clarity; fish trawl brings up fish typical of the area (i.e. fish are in their normal range).

Example answer: This is probably a “red tide,” also known as a harmful algal bloom (HAB). Dinoflagellates are the main type of phytoplankton that causes red tides. In addition, the Secchi disk data show brown color and low water clarity, consistent with abundant dinoflagellates in the water. The healthy seabed indicates nutrients are being released by decomposition, and the weak thermocline means that waves and currents can easily stir those nutrients up to the surface where they can help dinoflagellates grow and reproduce. How “harmful” the bloom may be is unclear; the normal fish sample and healthy seabed suggest no harmful effects at this time.

Data set #2: Winter. Water properties station shows a strong thermocline, slightly below-average levels of oxygen, normal salinity, and normal pH; benthic sample shows a healthy seabed with many decomposers; plankton net has low amounts of phytoplankton and zooplankton; Secchi disk shows blue color and high water clarity; fish trawl brings up several exotic species, including fish normally found far to the south.

Data set #3: Water properties station shows a weak thermocline, high dissolved oxygen levels, normal salinity and normal pH; benthic sample shows a healthy seabed with many decomposers; plankton net contains large amounts of diatoms; Secchi disk shows green color and low water clarity; fish trawl brings up fish typical of the area.

Data set #4: Summer. Water properties station shows a strong thermocline, below-average oxygen levels, normal salinity, and normal pH; benthic sample shows a healthy seabed with many decomposers; plankton net contains low amounts of phytoplankton and zooplankton; Secchi disk shows blue color and high water clarity; fish trawl brings up fish typical of the area.