

Plankton

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topics: Phytoplankton, Zooplankton, Richness, Density, Abundance Consumers, Producers

Summary: Students will collect and examine two water samples for plankton. Observations using dissecting microscopes will include identifying common zooplankton. Students will also compare the biodiversity of the two samples and the population density of target organisms

After completing the field lab, students will be able to:

- Objective(s):**
1. Identify zooplankton types
 2. Determine abundant zooplankton and calculate average sample density
 3. Observe plankton samples under a microscope and categorize groups according to shape and complexity and distinguish phytoplankton from zooplankton in your sample.
 4. Describe factors that influence range (vertical and horizontal) and role of these primary producers of the ocean

Ecosystem(s): Marine, Gulf Coastal Waters, Bays

Equipment:

- Plankton Samples from 2 locations (collected in advance)
- Water samples from the same 2 locations (collected in advance)
- 2 Plankton nets
- 12 Zooplankton Reference Charts
- Phytoplankton Reference Chart (optional)
- Prepared Phytoplankton Slides (optional)
- 12 Microscopes
- Refractometer
- 12 Petri dishes with 1cm grid pattern
- 12 Sample organisms (shells, dried specimens)
- 2 Small aquariums with air and light source

Background:

- **Reference Material:** Plankton and the Marine Food Chain, Ocean Life Video (Bill Nye)
- **Vocabulary:** Zooplankton, phytoplankton, species richness, density abundance, diversity
- **Equipment Training:** In-class demos of refractometer and microscope as needed.

Setup

1. Collect two one-liter plankton samples (one near-shore sample and one mid-bay sample)
 - a. The mid-bay sample should be collected by towing the plankton net behind the boat
 - b. The near-shore sample should be collected by dipping a five-gallon bucket into the water from the dock and then pouring the water through the plankton net. Fifty gallons of water should be poured through the net in this fashion.
2. Collect a mid-bay water sample to be tested for salinity. The sample should be collected from the same area of the bay where the plankton sample was collected.
3. Place the one-liter plankton samples in aerated aquariums and add additional water. Thirty minutes prior to starting the activity, aeration should be turned off and the light turned on. Light source should be a small light at one end of the aquarium.

4. Set up Lab
 - a. Label two tables (one “Mid-Bay Sample” & one “Near-Shore Sample”)
 - b. Place a bowl with sample organisms at each table
 - c. Set up 6 workstations at each table. Each workstation should have
 - i) 1 dissecting microscope
 - ii) 1 Zooplankton reference chart
 - d. Place Petri dishes and eyedroppers near the aquariums containing the plankton samples

Procedure (Engage; Explore; Explain)

1. Students gather for short introduction in breezeway. Which sample (near shore or mid-bay) will have the larger plankton diversity average? Why?
2. Group proceeds to dock where students measure salinity of two water samples taken from two different locations (near-shore & mid-bay).
3. While at dock, staff demonstrates use of small plankton net. Note: Actual plankton samples used for observation in lab are the samples collected in advance (the ones placed in the aerated aquariums).
4. Students move to lab where they are broken into two groups. One group goes to the table labeled “Mid-Bay Sample” and the other to the table labeled “Near-Shore Sample.”
5. Staff leads students through a “warm-up” activity using the sample organisms to allow students to learn microscope’s parts and functions and allowing them to practice focusing.
6. Next, staff describes and demonstrates the procedure for collecting a plankton sample, using the eyedropper, and placing just enough of the sample on a Petri dish to cover one square of the grid.
7. After students collect their plankton sample and return with it to their microscope, they focus the scope on the entire drop (without using the zoom).
8. Students note the number of different kinds of zooplankton organisms observed within their drop. Using the Zooplankton Reference Charts, they identify each kind of organism and record its name in the “In Your Drop” section of their data sheet.
9. Students must then confer to list all the different kinds of organisms found at their tables. (Staff can expedite this procedure by writing what was found at each table on the board.)
10. Students calculate the average diversity by dividing the total # of different kinds of organisms at their table by the number of plankton samples at their table.
11. Students record if all or most of the organisms seen were moving.
12. Students must confer to decide which type of zooplankton was the most abundant at their table. This organism’s name is recorded as the target organism
13. Students count and record the number of target organisms in their drop. They then confer to get the total number of target organisms observed at their table.
14. Students calculate the average density by dividing the total number of target organism at their table by the number of plankton samples at their table.
15. Students complete assessment questions.
16. If time permits, students can observe prepared slides of phytoplankton.

Sunshine State Standards:

Science: SC.F.1.3.1; SC.G.1.3.2, 3, 4; SC.H.1.3.4

Language Arts: LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1

Mathematics: MA.A.1.3.1; MA.B.3.3.1;

Social Studies:

Plankton**Student Data Sheet****General Information**

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

Hypothesis The larger plankton diversity average will be from the (Choose one: near shore or mid-bay) sample because... _____

Field Observations/Measurements/Data

	Near Shore Sample	Mid-Bay Sample
Salinity (ppt)		
Richness: List the different kinds of plankton seen. (Use Plankton Key)	In your drop:	In your drop:
	At your table:	At your table:
Calculate Average Richness: # different organisms at table # of plankton samples at table Show fraction. Use calculator to get decimal.		
Where all or most of your organisms moving? Yes or No		
Target Organism: Type of zooplankton that is most abundant at your table		
Population Density: Count the number of target organisms present.	# in your drop:	# in your drop:
	# at your table:	# at your table:
Calculate Average Density: # of target organisms at table # of plankton samples at table Show fraction. Use calculator to get decimal.		

Plankton

Assessment

1. Phytoplankton are producers. What does this mean? Would you expect to find phytoplankton near the surface of the water, near the bottom or somewhere in between? Why?

2. Zooplankton are consumers. What does this mean?

3. Zooplankton can move on their own. List two ways this adaptation helps them to survive.

4. What does it mean when it is said that plankton are the base of the food chain? How does this relate to their abundance?

5. Which sample collected had the highest richness of organisms? _____
Which had the highest number of target organisms? _____

Is there anything that might account for the differences in population density and richness between the two samples?

Portfolio Journal Prompt

Imagine that you are a marine biologist working at the Florida State University Marine Laboratory. You discover a new species of fish, plankton or barnacles. Now you have to write a paper describing the organism that you discovered. On the lines below write a paper describing your discovery as if you were submitting a paper to a scientific journal. Name the organism and tell where you discovered it. Be exact. Give the location in the bay or Gulf. What was the depth of the water? Was your organism found on the bottom, on the surface or somewhere in between? If it was found on the bottom, what was the bottom like (sandy, an oyster bed, a coral reef, etc.)? Is your organism free swimming or does it attach to something? What does it attach to? Next describe your organism. What does it look like? What colors does it have? Does it have appendages? How many? Where are they located? Does it have spines, a shell, scales, teeth, spots, etc.? Now describe any adaptations that you have observed. What physical or behavioral characteristics does it have that help it to survive? How does it defend itself? Does it use camouflage? Is it venomous? How does it feed, and on what does it feed? Is it a parasite? How does it get around? How does it breathe underwater? Use both sides of this sheet if necessary.