

Design an Aquarium Exhibit



Developed by: Cathy Yehas, Aly Busse, Katie Gardner

Topic: Introduce the different species that depend on different physical & biological properties (temperature, salinity, sunlight, food, habitat) in the ocean and how they move to find their ideal habitat.

Audience: Grades 5 – 8

Length: 45 to 60 minutes

NJ State Standard: 5.3.8.C – Interdependence

Objectives:

- Compare and contrast the environments different marine species inhabit
- Interpret and apply layers of water quality data
- Consider food web dynamics, temperature ranges, and salinity ranges in designing an aquarium.

Introduction:

Students will create an aquarium exhibit using information that they have learned about the ocean and its organisms. The students only have one tank that can be maintained within a certain temperature and salinity range - they must determine what temperature and salinity will support the species they choose. The students will be given a 10,000 gallon aquarium to populate, and can choose up to 5 large fish (over 3 feet) and up to 12 smaller fish (less than 3 feet) to use in the aquarium. Using A list of species with habitat requirements for each species, the students will be creating a plan to find, collect, and transport the species they choose to have in their exhibit. Students must also make sure the species they choose do not eat each other leaving an empty tank with a few fat fish. If time allows, students can present their exhibit to the rest of the group.

Background:

Knowing and maintaining the water properties fish need to survive is vital for any aquarist. Aquariums attempt to replicate the conditions a species would naturally live in. Also, it is important to know what



everyone eats and place compatible species together; tank mates eating each other leaves an empty tank and wastes all the hard work done collecting specimens. When capturing species, using ocean data is important to help you locate the animals you desire.

Materials:

- [Marine Species Book](#) (contains a list of local species and their habitat requirements)
- [Aquarium Planning Worksheets](#)
- [Maps of collection area and sea surface temperature \(SST\)](#)
- [Aquarium pictures \(optional\)](#)
- Colored markers/pencils/crayons
- Scissors
- Paste/glue
- Pencils

Procedure:

I. Preparation

A. Print out one the following for each group of 2-4 students:

- The Aquarium Planning Worksheets
- Maps of the collection area and SST
- Marine Species Information booklet

B. If you would like to use the pictures provided when the students construct their exhibits, print out the Aquarium pictures document

II. Activity

A. Explain that the students will be acting as a museum curator and will need to stock a new exhibit with fish that they will collect.

B. Review the characteristics that fish require for their habitat (i.e. temperature, salinity, and food). Some fish can survive in many areas while others are confined to their particular environment. (*Note: Take a moment to talk about each of these points, especially if the students are not familiar with salinity*)



C. Like any real curator, the students will need to plan within constraints of: exhibit space and water properties (temperature and salinity), fish feeding behavior, where to collect the fish, and unpredictable ocean conditions when collecting.

D. Distribute the Marine Species Information booklet and Aquarium Planning Worksheets. Have the students look through the booklet and start to think about which fish they would like in their exhibit. They should start to notice the temperature and salinity requirements for each fish, as well as the size.

E. Students should make a tentative list of the fish and the quantity of each they would like to collect for their exhibit (students are limited to a maximum of 5 large fish (over 3 feet) and up to 12 smaller fish (less than 3 feet) but may also substitute 2 smaller fish for each large). When making their lists, students must consider the following:

Temperature – The species must live within a five degree temperature range.

Salinity – If two of their chosen species cannot live in the same salinity range, they must choose only one of those.

Size – Size must be considered to limit the amount of biomass for the exhibit. Discuss some of the problems that could occur with keeping too many fish in one tank. Problems include: Water quality control (more fish, more fish waste), disease (more fish allow diseases to spread more rapidly through a tank population), and care taking (more fish to feed, and monitor health on for museum staff).

Habitat – Fish may be found at different depths and in different places throughout the water column. Fish may be benthic (bottom dwelling), demersal (living near the bottom), and pelagic (adapted to open ocean). Fish may also live in very shallow water and may need a place to hide (these fish stay out of view most of the time but it is worthwhile for visitors to try and find them). It is a good idea to get a mix of fish with different environmental preferences because if the tank has only benthic fish, all of the fish will spend their time on the bottom.

I. Once students have a plan of which fish species they want, it is time for the first day of collecting.

J. Distribute the collection area map and explain that they might need to adjust their exhibit plan a little during the collection process. Students will have 3 collection days to get their fish.



The days will be four months apart to potentially give students the opportunity to catch species in many temperature ranges. (Flexibility is required for real aquarists too – this happens in real life also!)

K. Give each group the “Day 1” temperature data. Students will use this information to locate where they will collect each fish, (assume that if the student is collecting in the temperature range of the fish they want, they will get it). Students may collect no more than 7 fish per day since space limitation on collection boat. Have students record the coordinates that they captured each fish at by letter and number (for example, E-10). Students may need help using the SST maps (information can be found at http://new.coolclassroom.org/files/adventures/1/popup_sst_tutorial.htm).

L. Go through the other two days of collecting: pass out the data maps one at a time, just before the collecting will begin. Students again must record fish coordinates, and can collect no more than 7 fish per day.

M. Once complete allow the students to sketch and color their completed tank exhibits (distribute the aquarium pictures handout if desired). If time allows, have student group present it to the class.

Evaluation:

1. Students are asked to explain why they chose the species that they did.
2. Students are asked to explain why their species will survive in the aquarium.
3. Talk about what difficulties they encountered (what was hardest, easiest?)
4. What educational value will their aquarium add to our museum? Convince me why I should make your aquarium vs. someone else’s in the class.

