



Education and Research: Testing Hypotheses

Lesson Plan—Survival in the Open Ocean

Summary

This activity serves as an introduction to the open-ocean ecosystem, the animals that live there, why they are important and how they are studied by researchers. Students will use brainstorming, discussion and small-group research to investigate pelagic predators and their environments.

Key Concepts

- There are certain basic needs that must be met for animals to survive in the open oceans
- Science and technology are closely linked when organisms under investigation are not easily accessible to scientists
- A variety of physical and biological factors are involved in determining the behavior, migratory patterns and activities of pelagic predators

Objectives

Students will be able to:

- **Identify** a variety of pelagic predators
- **Describe** different methods used by scientists to carry out pelagic research
- **List** different physical and biological factors required for survival
- **Explain** how these factors influence organism behavior

Materials

- Computers with Internet access
- Reference books about pelagic predators
- Presentation materials (art supplies, paper, markers, scissors, etc.)

Procedure

1. Discuss the definition of **pelagic** and have students consider what kinds of marine animals live in this open-ocean habitat. Generate a class list based on student suggestions.
2. Discuss the definition of **predator** and have students determine which animals on their list could be considered **pelagic predators**.
3. Separate class into small groups of 3–4 students and have each group consider the question of what it takes for an animal or species to survive in the open ocean. Have groups list biological and physical needs for a particular example and share results with the class.

4. Discuss the similarities and differences between groups' lists. Each list might include a variety of survival needs, which depend on some of the following factors:
 - **Biological factors**
 - Food sources
 - Reproductive needs
 - Predator/prey relationships
 - Instinctive behaviors
 - Communication
 - **Physical factors**
 - Currents
 - Temperature
 - Weather
 - Seasons
 - Depth
5. Have each student choose an animal from the class list and research the life history of the organism, including information on its physical and biological needs.
6. Have students hold a mini-symposium in which they present their findings, along with photographs or other information about their animals. Information should be presented in such a way that other groups can utilize it for reference in the satellite tracking activity.
7. Discuss why it is important/interesting to know what these animals are doing and where they are going. How can we learn more about our environment by studying pelagic predators? How do scientists study open-ocean animals? What can we do with information we learn from pelagic research?
8. Have students visit the **TOPP** Web site (Tagging of Pacific Pelagics—<http://www.toppcensus.org/>) to investigate how and why the scientists involved in this project are studying open-ocean animals.
 - The **TOPP home page** features field reports about ongoing tagging projects and video clips of scientists in action
 - The **Overview/Animals** section includes information about the animals that the scientists are studying
 - The **Overview/Technology** section provides descriptions of the different types of satellite tags scientists use to track animals

Assessment

- **Performance**—Did student participate in discussion and brainstorming sessions and demonstrate an understanding of both physical and biological factors influencing survival in the open ocean?
- **Product**—Did student's presentation accurately identify his/her pelagic predator, describe the life history, list different physical and biological factors required by that organism for survival and explain how these factors influence his/her organism's behaviour? Did student present their information in an organized and understandable format?