

RESOURCE LIBRARY
ACTIVITY : 45 MINS

Coral Reef Fish Survey Simulation

Students watch a video and discuss coral reef fish surveying methods. Then they conduct a simulated Belt Transect (BLT) survey. Students calculate their data and make estimates of fish populations for a designated area of the classroom.

GRADES

3 - 5

SUBJECTS

Earth Science, Oceanography, Geography, Physical Geography, Mathematics

CONTENTS

1 PDF, 1 Video

OVERVIEW

Students watch a video and discuss coral reef fish surveying methods. Then they conduct a simulated Belt Transect (BLT) survey. Students calculate their data and make estimates of fish populations for a designated area of the classroom.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/coral-reef-fish-survey-simulation/>

DIRECTIONS

1. Introduce the concept of coral reef fish surveys.

Ask: Why do you think scientists would want to count the number of fish on a coral reef?

What might they learn from it? Prompt students to think about number of fish, types of fish, and the health of the reef. Explain to students that knowing the number of fish that live in a small section of the reef can help scientists estimate the size of the fish population for the

entire reef. It is important for scientists to pay attention to the different types of fish, too. Species richness, or the number of species in a given area, is information that scientists use to figure out if a coral reef is healthy or not.

2. Watch the National Geographic video "A Survey of Flint Island's Coral Reefs."

Introduce the video by telling students that Enric Sala and his team of scientists survey and document Flint Island's coral reefs, diving up to 50 times a day to get a complete picture of this marine ecosystem. Show students the video clip. Then check their comprehension. Ask:

- *What goals do the scientists have?* (to survey and document all life on the reef)
- *What organisms are they surveying?* (all organisms, from smallest to largest, and including both fish and coral species)
- *What tools are they using in their survey?* (photography, a transect line, data recording sheets)

3. Introduce and explain different types of fish surveying methods, focusing on the Belt Transect (BLT) method.

Explain to students that there are a number of methods to sample fish; for example:

- Rapid Ecological Assessments (REA)—used to quickly document what species are present at a specific location
- Belt Transects (BLT)—used mainly to count high numbers of small and abundant fishes
- Stationary Point Counts (SPC)—used to count larger (>25 cm total length) and more active fish species
- Towed-Diver Video Surveys (TDVS)—used to count large (>50 cm total length), wide-ranging fishes over a large area

Ask: Which method did Enric Sala and his team use in the video? How do you know? (Belt Transect method; they were traveling along a transect line/measuring tape)

4. Introduce the simulation.

Explain to students that they will simulate the Belt Transect (BLT) method in the classroom. Draw on the board as you describe the BLT method, to give students a visual to refer to. Explain that, in a BLT survey, two lanes are created using three ropes. Two divers swim in their own lanes like runners on a track. The divers swim in the same direction and make observations about the fish they see in their lane. The first time they swim, their lanes are four meters wide and they look for fish that are bigger than 20 centimeters. The second time they swim, the lanes are two meters wide and they look for fish that are less than 20 centimeters. The divers record what they see each time. The divers also make sure they check in reef ledges and holes for any fish that may be hiding. Allow students to ask any questions they may have about this method of fish surveying.

5. Conduct classroom fish sampling.

Designate a 10' x 10', or 100 square foot area, of the classroom. Scatter a predetermined amount of fish cut-outs in that space. Split students into ten small groups and ask each group to designate one student as their data recorder. Give each group a 1' x 10' section of the 100 square foot area. Use string and tape to place a 10 foot transect line in each section. Have students in each group count fish six inches to the left and right of their transect line. Make sure the designated student in each group records the data for their group. Allow students sufficient time to complete the fish survey.

6. Have students analyze the data they collected.

After all groups have finished counting fish, have each group estimate the number of fish they think are in the 100 square foot area based on the number of fish they counted in their 1' x 10' section. Ask them to write their estimate below their recorded data. Invite a few volunteers to share their estimates with the class. After students have made their guesses, ask: *How many fish did each group count?* Write the numbers on the board. Then have students calculate the actual number of fish in the 100 square foot area. Ask:

- *How did your estimate compare to the actual number of fish in the 100 square foot area?*
- *Was your estimate accurate or not?*
- *What does this tell you about the importance of sampling in fish surveys?*

Wrap up by discussing the similarities and differences between the classroom BLT method and a real BLT survey completed by marine scientists. For example, students should understand that a real fish survey is more challenging, as both divers and fish are continually moving and fish are able to hide from them.

Informal Assessment

Assess student comprehension by the accuracy of their estimates and calculations and by their conclusions based on their calculations.

Extending the Learning

Conduct additional fish sampling surveys using one or more of the other techniques students learned about:

- Rapid Ecological Assessments (REA)
- Stationary Point Counts (SPC)
- Towed-Diver Video Surveys (TDVS)

OBJECTIVES

Subjects & Disciplines

Earth Science

- Oceanography

Geography

- Physical Geography
- Mathematics

Learning Objectives

Students will:

- describe the Belt Transect Method (BLT) of fish surveying
- conduct a classroom fish survey
- compare and contrast classroom techniques with those of marine scientists

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Hands-on learning

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Learning and Innovation Skills
 - Communication and Collaboration
- Critical Thinking Skills
 - Analyzing
 - Understanding

National Standards, Principles, and Practices

NATIONAL GEOGRAPHY STANDARDS

- Standard 8:

The characteristics and spatial distribution of ecosystems and biomes on Earth's surface;

OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- Principle 7b:

Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes.

ISTE STANDARDS FOR STUDENTS (ISTE STANDARDS*S)

- Standard 2:

Communication and Collaboration

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Construction paper
- Lined or ruled paper
- Pencils
- Masking tape
- Rulers
- Scissors
- String

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector, Speakers

PHYSICAL SPACE

- Classroom

SETUP

You will need a 10' x 10' area of open space with ten 1' x 10' sections marked off with masking tape. Within each of the ten sections, use string and tape to place a transect line down its center.

GROUPING

- Large-group instruction

OTHER NOTES

Before starting the activity, cut out enough fish for each small group to have a good-sized sampling.

BACKGROUND & VOCABULARY

Background Information

The Belt Transect (BLT) method is one method of reef fish sampling. Sampling a reef gives scientists a way to estimate species richness, or the number of species in a given area. Species richness is one measure of the health of a coral reef.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
coral reef	<i>noun</i>	rocky ocean feature made up of millions of coral skeletons.
estimate	<i>verb</i>	to guess based on knowledge of the situation or object.
ocean	<i>noun</i>	large body of salt water that covers most of the Earth.
population	<i>noun</i>	total number of people or organisms in a particular area.
sampling	<i>noun</i>	a small part of a group observed and tested to represent the whole group.
scientist	<i>noun</i>	person who studies a specific type of knowledge using the scientific method.
simulation	<i>noun</i>	a teaching method/strategy in which students sometimes use role play in a staged replication of an event or concept through the teacher's manipulation of the classroom setting in order to enhance students' understanding of the nature of the concept or event.
species	<i>noun</i>	group of similar organisms that can reproduce with each other.
survey	<i>noun</i>	a study or analysis of characteristics of an area or a population.
transect	<i>noun</i>	area used as a sample of a larger region.

For Further Exploration

Websites

- [NOAA: Pacific Islands Fisheries Science Center—Ecological Assessment of Fish](#)
- [Ocean Fest: Families Exploring Science Together](#)



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