

Lesson Plan

Help Nemo Find His Home!



Photo: Claire Fackler, NOAA

Grade Level

4-8

Timeframe

30-45 minutes

Materials

- Game boards
- Game data sheets
- Game markers
- Stopwatches/Timers
- Paper and markers for data graphs



Photo: Claire Fackler, NOAA

Activity Summary

This lesson focuses on understanding the impacts of ocean acidification on the olfactory senses of clownfish.

Learning Objectives

Students will be able to define ocean acidification and understand how specific species such as the clownfish may be affected by the increasing acidity of the ocean.

Background Information

In their ocean habitat, clownfish use an exceptional sense of smell as a mechanism to help determine which direction to swim, called “olfactory homing”. When given a choice between two water currents, one with the scent of an anemone and the other with the scent of the open ocean, clownfish will choose the anemone scent nearly every time! They can also tell the difference between the scent of a predator and the scent of a friendly non-predator...like Dory...choosing the non-predator nearly every time! However, recent research in Australia has shown that the olfactory homing ability of clownfish is severely disrupted by ocean acidification (through interference with neuron function).



Photo: Claire Fackler, NOAA



Larger fish such as lionfish will prey on clownfish.
Photo: Claire Fackler, NOAA

Ocean acidification occurs when excess carbon dioxide gas, produced when humans burn fossil fuels such as coal and gas. This rampant carbon dioxide mixes with seawater, forms a weak acid and lowers the ocean pH. This process has been accelerating on Earth ever since the Industrial Revolution, when we started using fossil fuels (coal, oil and natural gas), and it has increased the acidity of the ocean by 30% in just 200 years. It is predicted that the amount of carbon dioxide expected to be in the atmosphere and ocean by the end of the century will cause the pH to decrease to levels the global ocean has not experienced in millions of years. This drop in seawater pH can impact the neuron function of some types of fish, including clownfish, which means that clownfish such as “Nemo” in the popular movie “Finding Nemo” may have a very hard time finding their way home or avoiding predators in the future

Preparation

Prepare game boards and fish markers for each group. Provide data sheets and timers/stopwatches for each group.

Procedure

Start with sharing the background information with students.

Clownfish Game:

Read this script to students:

In this activity, you will help Nemo (a clownfish) and his friends find their home anemone on the reef, while avoiding predators and trying not to get lost in the open ocean!

Your challenge, should you choose to accept it, is to place as many clownfish as you can onto the anemone at the center of the game board...within 5 seconds. You'll do this twice. The first time will simulate the clownfish swimming in an ocean with present day water chemistry (pH = 8.1). The second time will simulate the future ocean, with ocean acidification (pH = 7.7). The catch is that you'll have to spin around three times first to become disoriented, kind of like a clownfish might feel under conditions of ocean acidification.

Vocabulary

Ocean acidification - decrease in pH of the ocean caused by the uptake of atmospheric carbon dioxide

pH - a logarithmic scale of hydrogen ion concentration

Olfactory homing – using sense of smell to navigation to a location (i.e. home)

Fossil fuels – any combustible organic material derived from the remains of former life (i.e. oil, coal, or natural gas)

Carbon dioxide - a colorless, odorless gas present in the atmosphere

Predator – a carnivorous animal

You receive one point per fish that gets home safely. Which scenario do you think will win? Try it and challenge your friends!

Rules

- 1) Begin with the fish spread around the perimeter of the game board.
- 2) Time limit is five (5) seconds per attempt.
- 3) During the second attempt, you must spin around **three** times before the timer starts.
- 4) One point per “safe” fish.
- 5) A “safe” fish is one that does **NOT** overlap the red lines that outline the anemone picture, **or** fall anywhere within the predator or open ocean pictures. They must be **completely** inside the red borders of the anemone picture to the “safe”.
- 6) Highest score wins.

Clownfish Game Board



Clownfish Game Data Sheet

Record the number of fish that made it home in under 5 seconds

	pH 8.1	pH 7.7 Must spin three (3) times each turn
Round 1		
Round 2		
Round 3		
Round 4		
Round 5		