

Impacts of Climate Change on Fish

Driving Question: How does climate change impact fish?

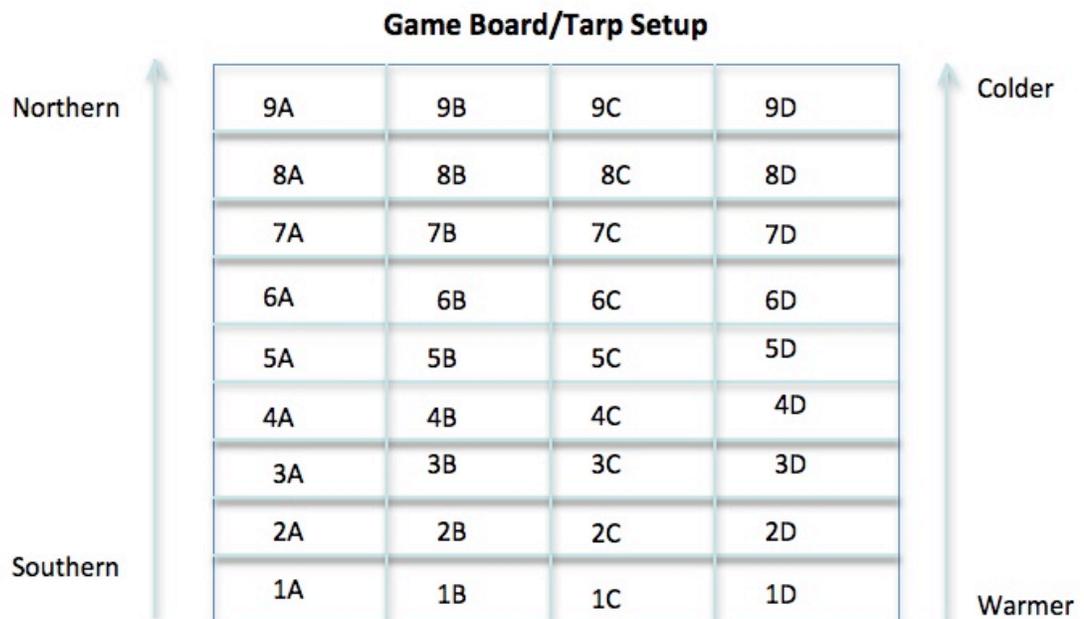
Synopsis: In this activity, students will learn that since they are cold blooded, fish must move their habitat to respond to increasing or decreasing water temperatures.

Rationale: This activity will help the students learn about species migration and how the physiological constraints of fish affect their response to changes in water temperature. Also, it will allow students to connect fisheries to the broader climate change issue.

Procedure:

BEFORE THE ACTIVITY

1. Make tarp (game board) as follows (or ask to borrow ours)



The tarp that is in front of the table will be divided into a 9×4 grid. The nine numbered rows represent different temperature regimes and represent “southern” (lower numbers) and “northern” (higher numbers) waters. The lettered columns will denote the paths that players must move in during their turns. There can be a total of twelve players and a minimum of six players.

2. Make game cards using the slides found at the end of the Session 7b Swimming Fishes powerpoint file

ENGAGE & INFORM

1. Ask the students if they have ever taken their body temperature with a thermometer? Do they remember what it was? Would that change depending on if you are outside or inside (i.e. if there you are in areas with different temperatures)?
2. Explain that today they are going to learn about fish and their body temperatures. Share the following information with the students:

- Humans and other mammals are warm blooded, they try to keep the inside of their bodies at a constant temperature. They do this by generating their own heat when they are in a cooler environment, and by cooling themselves when they are in a hotter environment. To generate heat, warm-blooded animals convert the food that they eat into energy.
(http://coolcosmos.ipac.caltech.edu/image_galleries/ir_zoo/coldwarm.html)
 - Fish are cold blooded and take on the temperature of their surroundings. They are hot when their environment is hot and cold when their environment is cold. In hot environments, cold-blooded animals can have blood that is much warmer than warm-blooded animals, like humans.
(http://coolcosmos.ipac.caltech.edu/image_galleries/ir_zoo/coldwarm.html)
3. Ask the students to describe the different temperatures environments that fish might live in (cold-water, warm-water, tropical) and of they can think of any fish species that may live there. Also, ask what they think would happen if ocean temperatures were too warm. Would the fish move northward or southward, or stay in the same area?
 4. Before the game officially starts, each player must randomly select a card which will assign them to be a certain type of species (warm water, cold water, temperate)- the “type” of species it is will be denoted on the card. On each card there will also be colors representing at least two temperatures that the species needs to live in order to survive, a photograph, the common and scientific name, a “fun-fact” for each species, and the starting position on the board. Each player holds their card throughout the game for reference.
 5. Directions and Rules
 - Use the Session 7b Swimming Fishes powerpoint file to walk through the activity with the students.
 - During each round (representing ten years time), the temperature regime will change- the first decade represented will be 2000 and will continue to 2100 or until all players are eliminated, whichever comes first.
 - The initial “starting” map shown on the flip chart will represent ocean temperatures where all fish species can survive.
 - Each player can only stay in a cell for two consecutive rounds.
 - There can only be one person in a cell at a time.
 - During a change in temperature, if a player is found within a row with a color that is not on their playing card, they are eliminated.
 - Before each new round begins, the facilitator will check to see who has been eliminated and ask them to leave the board.
 - At the end of ten rounds, the players still remaining will win the game.
 6. Explain that with the expected change in average ocean temperatures due to global climate change, many commercially and recreationally important fish populations will move in response. As a result, the distributions of some species’ populations will shift, either expanding into new areas or becoming limited to few areas due to physiological stressors. In this activity a human-sized board game demonstrate how changes in water temperature may affect fish distributions and, ultimately fisheries.

7. Ask the students which direction were the fish moving and why? What would happen to your fish if the waters became warmer? How would this change where you would fish?