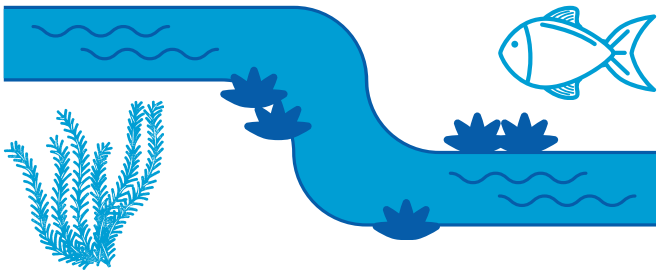
ACTIVITY 3: SIMULATING SPECIES COMPETITION FOR FOOD



The purpose of this activity is for students to simulate and understand the competition for food resources between fish eggs and invasive species in an ecosystem.

Materials:

- Graph paper with at least 1,000 boxes that could fit centimeter cubes in them
- Four different colors of centimeter cubes (roughly 100 of each per group)
- Scissors (if using individual sheets of graph paper)
- Dice (for species distribution)
- Notebooks and pens to record data

First, inform students that they will be simulating the competition for food resources that takes place between whitefish and zebra mussels.

Then, have students form groups of 4 and obtain the materials needed to perform the simulation.

Next, have them review* the rules of the game. Two students from each group will strategically represent the fish and the other two will strategically represent the zebra mussels. Each team is competing for the food resources needed to allow its species to survive, reproduce, and live on to see another generation.

Set up of the game:

- Each group receives a sheet of graph paper.
- Place 100 of one color of centimeter cubes in some squares on the grid within the entire area to represent food sources for the species.

Teaching Tip: two colors can be used to represent two different food sources, if desired, which might represent higher nutrients, and thus may cut in half the amount needed to eat to reproduce.

Simulation Game Rules:

1. Begin by distributing the centimeter cubes representing fish eggs and zebra mussels on the graph paper. Students can strategically select placements or randomly set them on the grid.
2. Students take turns rolling the dice to determine how many additional zebra mussel cubes they can add to cover more food source squares on the graph paper. Placement of the invasive species can be strategic (e.g., clumped distribution, uniform arrangement, or random placement).
3. After placing the invasive species for the round, roll the dice again to determine the number of cubes representing fish eggs to place. Fish eggs should be clumped together to simulate spawning in concentrated areas. *Note: If there aren't enough squares to clump all the fish eggs, only add as many as there are available squares.*
4. At the end of each round, count the number of zebra mussels and fish eggs remaining on squares within the grid.
5. Determine survival and reproduction based on the number of food source squares occupied, e.g., fish eggs require 6 squares, while zebra mussels need 4 to reproduce.
6. Introduce additional fish egg and zebra mussel cubes in subsequent rounds based on surviving populations and reproduction rates, but don't remove existing cubes.
7. The game progresses through 5 rounds, or until no food sources (or cubes) remain.
8. Be sure to record the number of each species at the start and end of each round.

Post Game Discussion:

Last, after playing the game for some time, have students graph the populations of each species over time on chart paper and be prepared to present their findings. Facilitate a discussion with the whole class to compare the outcomes of each round. How did the distribution of fish eggs and invasive species impact food availability and reproduction? How does this simulation reflect competition in natural ecosystems affected by invasive species? Relate the simulation findings to whitefish ecological challenges and conservation efforts.