Lesson 5: All Together Now: Predator, Prey, and Plants

Overview

This lesson allows students to explore the interactions of two animal populations (wolves and moose) and plants within an ecosystem. The populations and the plants rise and fall (oscillate) over time as they interact and impact one another.

Learning Goals:
- Match predators with corresponding prey animals.
- Match prey with corresponding food sources.
- Explore a population simulation with two interacting populations and a food source.
- Represent and interpret data on a line graph.
- Tell the story of how and why two populations and a food supply go up and down (oscillate) over time.

Lesson 5 – Level A – Ages 5+

Time:
Two or three 45-minute periods

Materials:
- One computer for every 2-3 students
- Simulation online at http://www.clexchange.org/curriculum/complexsystems/oscillation/Oscillation_BiomassA.asp
- Handouts (See page 4-9)

Curricular Connections:
- Science: Populations, ecosystems, scientific method
- Math: Representing and interpreting data*
- Reading: Describing connections among ideas*

* Common Core Standards

Key system dynamics concepts and insights:
- Populations do not exist in isolation; other factors (e.g., number of prey, amount of food supply) affect their growth and decline.
- Predators, their prey, and food for the prey form a type of complex system that can exhibit oscillatory behavior.

Student Challenge

Set up a level of hunting that keeps the populations of predators and prey at healthy levels.

Figure 1: Title Screen
Lesson Details

Preparation:
1. Create groups of two to three students each.
2. Copy included handouts for each student or student group. Make multiple copies of the simulation record sheet, depending on how many runs you’d like students to complete.
3. Cut or have students cut out cards for predators, prey, and food (Handout 1, page 4).
4. Check computers to make sure you can access the simulation.

Session 1:
1. Introduce vocabulary terms (predator, prey, food, ecosystem, etc.) as needed.
2. Distribute card sets to student groups and have them find matches for the different predator/prey animals. Students can use the chart on page 5 (Handout 2) to classify their cards. Optional: Provide some blank cards for students who would like to draw additional animals and plants. Students may have varying answers. This is one set of answers. Note that only plant-based food was included in the set of cards. Some prey animals may eat other organisms or may be omnivores. For example, a roadrunner eats lizards and a lizard eat insects.

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<thead>
<tr>
<th>Predator</th>
<th>Prey</th>
<th>Food</th>
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<tbody>
<tr>
<td>Wolf</td>
<td>Moose</td>
<td>Balsam Fir</td>
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<td>Coyote</td>
<td>Rabbit</td>
<td>Grassland</td>
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<td>Owl</td>
<td>Mouse</td>
<td>Wild Rice</td>
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<td>Lion</td>
<td>Deer</td>
<td>Wetlands</td>
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3. Briefly compare and discuss the different matches. You may want to note that some predators may have multiple food sources, e.g., a coyote may eat rodents, rabbits, cats, and other small mammals.
4. Show students the simulation in the classroom and read the introduction together (Figures 2 and 3).
Lesson Details

5. Have students work in their small groups to “Make Decisions” (Figure 4). The simulation is initially set with no “real world” problems and no hunting.
6. Have students continue to “See What Happens” (Figure 5), recording their data on Handout 3 on page 6. After completing the initial baseline run, students can continue to explore, asking “What if” questions (Handout 4, page 7) relating to the wolves, the moose, and the food (plants) while using additional copies of Handout 3.

Session 2 and beyond:
1. If needed, have students complete the simulation within their small groups.
2. After running the simulation multiple times, students continue to the “Think About It” section (Figure 6).
3. Debrief the simulation experience using ideas for bringing the lesson home and assessment (Handouts 5 and 6, pages 8 and 9).

Bringing the Lesson Home:
- Explore the “Think About It” section of the simulation within small groups or as a class.
- Consider why the animal populations and food went up and down (oscillated) over time.
- Discuss issues and test ideas back in the classroom using a computer/projector. For example:
  - settings that flatten the oscillations.
  - settings that allow for hunting of moose while keeping the ecosystem healthy.
  - settings that keep people and their animals safe.

Assessment Ideas:
- Have students complete the assessment handouts to tell the story of the loops; to identify other predators, prey, and food; and to share what they learned. You may prefer to have students orally tell the story of the loops. The assessment questions can also be part of a class discussion.
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<thead>
<tr>
<th>Deer</th>
<th>Rabbit</th>
<th>Owl</th>
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Predator/Prey/Food Simulation Record Sheet

Real-World Problems:_____________________
Hunting for Prey (Moose):________________
Killing Predators (Wolves): Yes or No

Draw and label the graphs for both animals and food.

What happened?

activity.module3
Predator/Prey/Food Simulation Questions

Try ideas one at a time and then record what happens on a new sheet.

Question 1: What happens if I make no changes?

Question 2: What happens if the moose get a disease?

Question 3: What happens if it doesn’t rain and there’s a drought?

Question 4: What happens if people hunt for a lot of moose?

Question 5: What happens if people kill all the wolves?

Question 6: How can people hunt and still have a healthy ecosystem?

Question 7: What are some other questions you could explore? Write a question below and then try your idea.
Assessment 1
Tell the story of the predator/prey/food loops.
If the wolf population goes up, then ...

Other Predators:

Other Prey:

Other Food:
Assessment 2
What have you learned about predators, prey, and food?

Why do populations go up and down?

Why does the food go up and down?
Acknowledgements:
Lesson 5—Level A
All Together Now: Predator, Prey, and Plants
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This model with accompanying lesson is one in a series that explore the characteristics of complex systems.

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