Module 12: Urban Wildlife   Urban EcoLab

April 2021

Outline - Coyote Population Dynamics

Center for Urban Resilience

LESSON #2: Coyote Population Dynamics

OVERVIEW:
The purpose of this lesson is to encourage students to begin thinking about the interactions between animals in an environment and the ways in which those interactions affect each animal. Students will learn about predator/prey dynamics and ecosystem biodiversity through the lens of coyotes and other city predators, primarily cats, by learning about their diets and movement patterns. They will then be asked to consider the impacts of humans and feral cat colonies on urban environments. Students will learn through discussion and interactive activities before presenting their findings via a management plan presentation.

SUB-QUESTIONS:
- How do predators affect each other's diet and movement patterns?
- How do predators affect the other animals in the environment?
- How do human behaviors, such as supplemental feeding, change the habitat for animals?
- How do introduced species, such as the cat, affect native animal populations? How can we mitigate those impacts?
- How does resource availability change population dynamics?

WAYS OF KNOWING URBAN ECOLOGY:

	Students will…
Understand	. Learn about predator dynamics and the ways in which those impact diet and movement patterns.
Talk	. Discuss cat-coyote interactions, human impacts and solutions for dealing with these.
Do	. Monitor diet and movement patterns of an urban animal: you!
Act	. Create a cat management solution and present it to peers.

SAFETY GUIDELINES:
When observing animals, please do not interact with them unless it is a domesticated pet and an adult is there to guide you. Keep a safe distance from all unknown animals and do not attempt to feed them.

PREPARATION:
Time: **Four (4) class periods (50 mins ea).**

MATERIALS:
Activity 2.1 (1ˢᵗ class; *10 minutes*): Predator-Prey Dynamics Activity
- Laptop
- Projector & Screen
- Introduction PowerPoint Slide – Moose and Wolves of Isle Royale
- Assign students to be either a moose or coyote (six students only)
- A resource that students can gather such as marbles, notecards, M&Ms, etc
- Wipe board and marker to record results
- Pencils/Pens
- Student Handout for note-taking (M12_L2_A2.1_SH1)

Activity 2.2 (remainder of 1ˢᵗ class except final 5 minutes): PowerPoint – Urban Animal Population Dynamics
- Laptop
- Projector & Screen
- Instructional PowerPoint Slides – Urban Animal Population Dynamics
- Pencils/Pens

Activity 2.3 (final five minutes of 1st class): Activity – Track Your Diet
- Student Diet and Activity Tracker Handout (M12_L2_A2.1_SH2)

Activity 2.4 (2nd class; 20 minutes): Activity – Urban Diet Overlap
- **Assign students into six mesopredator groups**
- Wipe board and marker for notes
- Student laptops or access to computer lab for research
- Pencils/Pens
- Student Handout for note-taking (M12_L2_A2.1_SH1)

Activity 2.5 (remainder of 2nd class): PowerPoint – Building Background Knowledge
- Laptop
- Projector & Screen
- Instructional PowerPoint Slides – Urban Animal Population Dynamics
- Pencils/Pens
- Student Handout for note-taking (M12_L2_A2.1_SH1)

Activity 2.6 (15 minutes; 3rd class): Activity – Diet Presentation
- Completed Student Diet and Activity Tracker Handout (M12_L2_A2.1_SH2)

Activity 2.7 (5 minutes; 3rd class): PowerPoint – Cats and Wildlife
- Laptop
- Projector & Screen
- Instructional PowerPoint Slides – Urban Animal Population Dynamics
- Pencils/Pens
- Student Handout for note-taking (M12_L2_A2.1_SH1)

Activity 2.8 (remainder of 3rd class): Activity – Develop Cat Management Solutions
- **Keep students in their six mesopredator groups**
- Student laptops or access to computer lab for research

- Pencils/Pens
- Student Handout for note-taking (M12_L2_A2.1_SH1)

Activity 2.8 (45 minutes; *4th class*): Present Cat Management Solutions

- No materials necessary

Activity 2.9 (5 minutes; *4th class*): PowerPoint – Cat vs Coyote Behavior

- Laptop
- Projector & Screen
- Video: Cat Fights Off Three Coyotes
  https://www.theeastsiderla.com/lifestyle/caught-on-camera-cat-fights-off-three-coyotes/video_4838f108-36f4-11ea-8e64-1b82debd9955.html
- Instructional PowerPoint Slides – Urban Animal Population Dynamics

Instructional Sequence (4 class periods):

Activity 2.1 (1ˢᵗ class; *15 minutes*): Predator-Prey Dynamics Activity

- <u>Pre-Lesson:</u> Have resources set out and ready for students to collect. If M&Ms, marbles, paper clips or something small, have them set on small plates. If larger item, just have a few distributed around the room. There should be exactly enough resources for each of the students in the class minus 14 (so if your class has 36 students, you would have 22 resources).

- <u>Step 1: Introduction:</u> Introduce the topic with the first two slides, an introduction and a description of the Isle Royale research. Tell students that they will be a part of the research in this activity.

- <u>Step 2</u>: Assign six students to be wolves (can be volunteer or selected) and then assign the rest of the students to be moose.

- <u>Step 3:</u> Complete the activity:
  - o <u>1.</u> Have all but 10 moose walk up to collect a resource. Ask students if there were enough resources for all the moose. Have them return the resources.
  - o <u>2.</u> Now 10 new moose join the population. Have them all walk up and get a resource. Ask them what has happened now. What happens to the moose who can't get enough to eat? Return the resources.
  - o <u>3.</u> Repeat step 2 but tell three wolves that they have 10 seconds to tag as many moose as they can while they are collecting their resources. Tell students they all must still walk and be gentle. If a moose is tagged, it is eaten and cannot collect its resource. How many moose are left in the population? How many resources? Return the resources.
  - o <u>4.</u> Repeat step three but with all six wolves. How many moose are left? If each wolf needs one moose to survive, would every coyote survive another round? What happens if there aren't enough moose? What has to happen for a population to be stable? What role does the predator play in stabilizing the ecosystem?

o Have students take notes on what they learned from this activity. You can take notes on the board after each step to help them remember.
- Allow time for questions and clarify understanding and any misconceptions.

Activity 2.2 (remainder of 1st class except final 5 minutes): PowerPoint – Urban Animal Population Dynamics

- Pre-Lesson
  o Teachers are encouraged to read background articles on coyotes, provided in Reading and Reference Materials under Module Resources. In addition, see "Educator Resource – Building Background" on Module 12 Outline.
  o Teacher may want to assign selected articles or other coyote reading for homework, to build background knowledge.
- Step 1: Present introductory PowerPoint slides to students (Slides 3-9). These will elaborate on the previous activity by presenting a similar example with animals that they see in their everyday environment. Keep the lesson interactive by asking lots of questions (as presented in the PowerPoint).
- Step 2: Challenge students to think about how these animals might overlap and how this might change the behavior of each animal.
- Step 3: Finish up by focusing in on cat-coyote interactions and presenting data on how their movements influence one another.

Activity 2.3 (final five minutes of 1st class): Activity – Track Your Diet

- Step 1: Present students with Diet Tracker Handout.
- Step 2: Have them write down everything they have eaten that day and any physical activities they have completed.
- Step 3: Explain to them that they will be doing this for a week, keeping track of everything they eat and their physical activities.

- Step 4: Conclude by telling students that they will start learning about urban animal diets during the next lesson.

Activity 2.4 (20 minutes; 2nd class): Activity – Urban Diet Overlap

- Step 1: Assign students to six mesopredator groups: raccoons, opossums, skunk, cat, coyote and dog. Tell students to spend five minutes researching the diets of these animals online.
- Step 2: Bring students back together and have them describe to their classmates what each animal eats. Write it on the wipeboard so that students can easily compare.
- Step 3: Ask them which diets overlap most closely. How would this affect each animal? How might it change movement patterns, as discussed in the previous class? Ask them how diet might affect other parts of life, such as movement.

Activity 2.5 (remainder of 2nd class): PowerPoint – Building Background Knowledge

- Step 1: Show additional PowerPoint slides to students (Slides 10-20). These will introduce students to coyote diets and the ways in which diet can influence behavior, such as changes in movement pattern and reproduction. This will conclude with a discussion on anthropogenic resources and changes they might cause.
- Step 2: Allow time for questions and clarify understanding and any misconceptions.

Activity 2.6 (15 minutes; 3rd class): Activity – Diet Presentation

- Step 1: Start by discussing the results of the student diet notes. Make notes on the board common items that students eat. When were they active? Was there any correlation between the food they eat and their activity?

- Step 2: Which mesopredator does their diet mirror most closely and why? Which of these animals might benefit most from human diets? Allow no more than 10 minutes for this.

Activity 2.7 (5 minutes; *3rd class*): PowerPoint – Cats and Wildlife

- Step 1: Present students with PowerPoint slide 21, which will introduce students to the effects that cats have on wildlife.
- Step 2: Challenge them to do additional research on the impact of cats on wildlife in their small groups.

Activity 2.8 (remainder of *3rd class*): Activity – Develop Cat Management Solutions

- Step 1: Put students back in their mesopredator groups. Have them research solutions to feral cat problems. What dangers do cats present? What have other countries or cities done to reduce their effect? What can owners do?
- Step 2: Tell them they will be presenting their solutions to the class during the next class period so prepare detailed notes on their handouts.

Activity 2.9 (45 minutes; *4th class*): Present Cat Management Solutions

- Step 1: Give each student group 5-7 minutes to discuss their management plans.
- Step 2: Once all of the groups have presented, have a discussion about which ideas seemed the best and how you might present those to cat lovers in your community.

Activity 2.9 (5 minutes; *4th class*): PowerPoint – Cat vs Coyote Behavior
- Step 1: Present final PowerPoint slide with video. Use this to discuss cat-coyote behavioral interactions and talk about Feline Fight Club.
- Step 2: Wrap up and leave time for questions.

Summary Notes/Conclusion: By the end of Lesson 2, students will be able to (SWBAT):
- Understand many topics related to urban animals such as coyotes, including diet and its effects on reproduction and movement patterns
- Make observations and draw conclusions through video analysis
- Take notes during video and PowerPoint presentations
- Conduct research on various assigned topics
- Work as a team to successfully complete a project
- Develop a solution to a real-life problem
- Present that solution to the class