

LESSON TITLE: **Lesson 5: Species Interactions, Ecological Succession, and Population Control**

GRADE: 9-12

Amount of Preparation Needed Prior to Class: 15-20 minutes to review the resources. Review the Walk the Line and Vacant Lot activities before handing them out. Vacant Lot activity may need to be handed out sooner so students have time to get pictures.

Learning/Lesson Plan

Environmental Concept

NGSS Standards: For more details on the standards and clarification statements click here: [NGSS](#)

[HS-LS2-1](#). Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

[HS-LS2-2](#) Use mathematical representations to support and revise explanations based on evidence about factors effecting biodiversity and populations in ecosystems of different scales.

[HS-LS2-6](#) Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.

[HS-LS2-7](#) Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Objective(s) and Essential Questions

(What will a student know [content] and be able to do [skills/process]?)

Overview: The purpose of this lesson is to emphasize to students the relationships between individuals and populations in ecosystems.

- Explain how species compete with one another for certain resources.
- Recognize feeding relationships as a major category of interaction among species.
- Understand how interactions between predator and prey species can drive each other's evolution.
- Differentiate among parasitism, mutualism, and commensalism.
- Understand how species composition of a community or ecosystem can change.
- Recognize that living systems are sustained through constant change.
- Identify the variables that govern changes in population size and the factors that limit population size.
- Explain reproductive and survivorship patterns of populations.

Essential Questions

- How do species interact?
- How do ecosystems respond to changing conditions?
- What limits the growth of populations?

Assessments Summative and Formative

(What strategies will be employed? How will we know instruction has been successful?)

- Bell Ringers
- Exit Activities
- Mini Quizzes
- Discussions
- Lesson 5 Assessment (Summative)

Materials Needed

- Beach Ball
- Computer
- Projector or a way to share a presentation
- Access to a computer lab or iPad cart or some other mean to do research
- Colored Pencils
- Graph Paper
- Assorted Paper/Poster Board
- Additional Ecology and Population Supporting Materials can be found in our Biology curriculum in [Lesson 17-Ecology](#) or [Lesson 18-Populations and Human Impact](#)

Setting the Stage/Beginning the Lesson/Engagement*

(How will new learning be introduced? How will students get motivated/excited regarding new learning? How will prior knowledge be tapped and assessed?)

Day 1 [Engagement]– Species Interactions, Ecological Succession, and Population Control- See Slide 2. Have a piece of paper, waiting for students as they enter. Have the students answer the questions from **slide 2** (projected) on their paper. There is also an option to print the bell ringer and hand out a paper with the questions. Use your established method for calling on students.

Day 2 – Hand out **Day 2 Bell Ringer 5.2 activity (KWL Chart)** and instruct the students to hold on to it for after lecture since they will complete it then. **Slide 17** of the presentation gives an example to show students how to do the chart.

Day 3 – Students will complete **Day 3 Bell Ringer 5.3**. The questions are also located on **slide 28**.

Day 4 – Students will complete the **Day 4 Bell Ringer 5.4** projected on board, **slide 43** on presentation. There is also an option to print the bell ringer and hand out a paper with the questions.

Day 5 – Engagement: (Before class, draw a logistic growth and an exponential growth chart on the board or have one pre-made on a large sheet of paper). Place the charts in a highly visible spot in the classroom or hold it up to the class. While pointing out (or holding up) the charts, tell the student to think about the charts. Hand out the **Bell Ringer 5.5 worksheet**. It asks the students “why does the logistic growth graph level out halfway through?” and “Could the population shown in the exponential growth chart continue in the growth pattern? Why or why not? “

Day 6 - Vocabulary Quiz (terms from the Quizlet Only). The species interactions, ecological succession, and population control areas are assessed within the activity. The teacher may choose to review the vocabulary using Quizlet Live or printed flashed cards prior to the vocabulary Quiz.

Day 7- Have students begin working on the **lesson 4 test review** right away so there is time to go over it and answer questions students may have prior to the test review.

Acquisition of Skills/Developing the Lesson/Exploration*/Explanation*/ Elaboration* (What will Modeling, Guided Practice, Independent Practice, and Checking for Understanding look like?)

Day 1: Present slides 1-15. Students should complete their Guided Notes as you present the content. **Presentation tips:** Review the slide prior to teaching this for the first time. Bring enthusiasm to the content. Make personal connections and share them with your students. Students will complete the **Identifying Relationships Worksheet**. The Teacher will go over it as a class.

Day 2: Present slides 18-26. Students should complete their Guided Notes as you present the content. Students will complete the **Walk the Line** activity. Have students stand in a line and tell them you will read several statements. After reading each statement, tell students to stay on the line if they agree or take a step forward if they disagree. The students who disagree should then turn and face the students still standing on the line. Have students pair up with someone on the opposite line and explain why they agreed or disagreed with the statement. Statements are on the activity sheet labeled **Walk the Line**.

Day 3: Hand out the **Vacant Lot activity** paper and discuss it. It may be a good idea to have some backup samples for students who may not have access to a vacant lot. You could mention that they can use an old field as an option that can be compared to the vacant lots) This should only take about 5 minutes. Present slides 29-42. Students should complete their Guided Notes as you present the content. Have students use one of the population growth simulators available on the internet. Ask students to adjust variables, such as availability of food, predators, and pollution, and have the record, either in a document or on a sheet of paper, their results before and after each adjustment.

Below are some population simulator options.

- <https://www.biointeractive.org/classroom-resources/population-dynamics>
- <https://www.learner.org/wp-content/interactive/envsci/ecology/ecology.html>

Day 4: Show video on population growth rates. The video is 12 min 9 sec. It is very informative. Have students answer questions on the handout for the video, labeled **Bozeman Science Population Ecology questions**. Discuss questions on hand out after the video is complete.

<https://www.youtube.com/watch?v=PQ-CQ3CQE3g>

Day 5- Students bring in **Vacant lot activity** pictures and samples. Have students show pictures. Students should create a poster presentation using the pictures and data that they collected. Students should research the species that are present and be able to justify how long they think the lot has been vacant. They should include their points on the poster.

Day 6 – Students will finish their poster presentations and present them to the class. The teacher may choose to do a gallery walk or have students present their presentations individually. The teacher will use the rubric to grade the presentation.

Day 7 Review Day(s)- Complete the Lesson 5 Review.

Day 8 - Assessment

Closing the Lesson/Summary of Learning/Evaluation*
(How will learning be explained, summarized, applied to assure student understanding?)

Day 1 – Students will complete and discuss the questions on **slide 16 (Exit Questions 5.1)** of the **Lesson 1 Presentation**.

Day 2 – Students will complete and discuss the questions on **slide 27 (Exit Questions 5.2)** of the **Lesson 2 Presentation**.

Day 3 – Discussion of the observations students made and use the data students observed to make a graph to display some aspect of the information that was shared today. (This is a great way to get students thinking critically and categorizing information) You may want to have an example or two based on correlations that you saw in the data.

Day 4 – [Beach Ball Activity \(click here to see my post on how to do this activity\)](#) (Possible Key Terms-mutualism, parasitism, commensalism, coevolution, resource partitioning, intraspecific and interspecific competition)

Day 5 – Students will play Quizlet Live or you can go to the Quizlet set and print the flashcards if students do not have access to devices to play Quizlet Live. You can also quickly create and print Quizzes from Quizlet.

[Quizlet Link](#) Remind students to study their vocabulary for a vocabulary quiz tomorrow. They can also access the Quizlet by sharing the link with them.

Day 6 – **Class Discussion:** Use the name cards to call on students. Give the students one or two minutes to write down their answers to the question: What is the most important topic in this lesson? Justify your response.

Day 7- Students will go over the test review and ask questions about concepts they do not understand. If time permits, complete a Quizlet Live to Review Vocabulary.

Day 8 - assessment

Differentiating the Lesson
Differentiations will be based on students' needs

Higher Differentiation – For the quizzes and test remove the word banks. Students can research Isle Royal, Michigan and an area of farmland in North Carolina, and compare and contrast the ecosystems of each, explaining the differences and similarities.

Lower Differentiation- Use the modified versions of the quizzes/tests. Strategically group students and possibly have them submit a group sheet for the Vacant Lot activity. Strategically partner the students when completing the Walk the Line activity. Include more in class study time.

Learning/Lesson Reflection

(What went well? What may need revision the next time I use this lesson? How did students react? etc.)

Learning/Lesson Extension

(What web sites, references, field experiences, related topics, or activities might offer enriched or enhanced learning opportunities?)

1. **Mini-project idea:** Students create a poster displaying population growth charts of an animal of their choice in a given population. I.e. Deer in Southwest Missouri.
2. Calculate the population density of your class, cafeteria, or whole school.
3. Dandelion Population Survey of your School.
4. An excellent resource and fun activity: Elephant Census HHMI:
<https://www.biointeractive.org/classroom-resources/great-elephant-census>