



Lesson Four: Survival of the Fittest

Grade Level: 5th Grade

Time: 60 minutes

Essential Question: How can we be stewards of Wyoming's agriculture to benefit current and future generations?

Objectives: Students will:

- Use previous models to make sense of the needs of animals.
- Use a variety of resources to begin to explore plant needs.
- Watch a video explanation of photosynthesis to understand that animals get energy from the sun through plants.

Purpose: Students understand that organisms can survive only in environments in which their particular needs are met. Students understand that the needs of plants and animals are different but interdependent.

Required Materials/Resources:

- Example Food Web from Lesson 3 (one for the teacher to display and one per student)
- Sets of highlighters or colored pencils with a different color for each food web interaction that was mapped in Lesson 3 (one set per student)
- Student Recording Sheet from Lesson 3 (one per student; students should have their own copies)
- Chart paper (optional)

- Video: <https://www.youtube.com/watch?v=Lk0grxwZqWk>
NOVA Photosynthesis Science Video PBS Learning Media
(Source 1) *Video length: 2 minutes 25 seconds*
- Paper for quick write (one piece per student)
- Check for understanding (one per student)
- Scenario 2 card (one per student) - (Sources 2, 4)
- Student Recording Sheet - Scenario 2 (one copy per student)
- Ag Ecosystem Graphic from Lesson 2 (one per student and the teacher copy. Students should have their own copies on which they recorded the components of the ecosystem.)
- Ecosystem game (optional) - (Source 3)
<http://www.ecosystemforkids.com/games/5th-grade/ecosystems/activity.html>

Suggested Teacher Preparation:

- Prepare the T-chart for step 4 either on chart paper or on the board.
- Review lesson and decide if you have time for students to play the optional ecosystem game. (See step 14)
- Have papers from previous lessons ready to pass back to students.

Standards:


Science: 5-PS3-1, 5-LS1-1 (DCI), 5-LS2-1, 5-ESS3-1 (Explicit), 3-5-ETS1-2 (DCI, SEP) - (Practiced/Encountered)

ELA: 5.W.8 (Practiced/Encountered)

Vocabulary:

- **Herbicide** - a substance that is toxic to plants and is used to destroy unwanted vegetation
- **Photosynthesis** - a natural chemical-process by which chlorophyll (magnesium-containing pigment in green plants, blue-green algae, phytoplankton, and green and purple bacteria) uses sunlight (radiation) energy to convert (synthesize) water and atmospheric carbon dioxide into life sustaining organic compounds, such as glucose; responsible for almost all the oxygen in the atmosphere, photosynthesis is the basis of all life on earth

Instructional Procedure/Steps:

1. Say: **“What do you need in order to survive?”** Use this question as an opportunity to delineate between needs and wants. Let students respond. Ask: **“What do animals need in order to survive?”** *Water, shelter, space, air, and food.* As students discuss food, ask: **“Do all animals eat the same types of food?”** *Bring forward the idea that some animals eat plants (herbivores), some animals eat other animals (carnivores), and some animals eat a combination of plants and animals (omnivores).*
2. Next, students will work to connect the idea of “needs in order to survive” to the concept of food webs from Lesson 3. Display the example food web from Lesson 3 and use a highlighter to trace the arrows in the web to identify the source or “starting point.” Have students repeat this mapping process using their own copy of the example food web from Lesson 3. Students should use a different color highlighter/colored pencil to follow each arrow chain.
3.  Once students have completed the mapping process, have them spend one minute silently studying their food webs to make note of what they notice about the source of each colored chain. After they've had an opportunity to study their food webs, ask the following questions to the class:
 - **“What do you notice about the source of each colored chain on your web?”** *It starts at a plant.*
 - **“What could we say about what animals need to survive based on our food webs?”** *Animals need plants, even if they don't eat plants.*
 - **“What could we say about what plants need to survive based on the food web?”** *Not sure, it doesn't show.* Say: **“Food webs provide information about how some animals' needs**



In this task, students will be engaged in the higher order thinking skill of analysis.

are met, but the model does not provide information about how plants' needs are met. It also does not show if or how plants need animals in order to meet their resource needs."

TEACHER NOTE:


The T-Chart will serve as a visible record of some of the key ideas that students will need to take away from the lesson and apply to the scenario. It is critical that you take time to anticipate what information students will provide regarding animal and plant needs, and how you will record that information on the chart, so it will be understandable and usable for students moving forward.

4. Create a T-chart on either chart paper or on the board with one column labeled **"Animal Needs"** and the other labeled **"Plant Needs."** Fill in the **"Animal Needs"** column. Place on the chart **"Animals need plants to survive."** You will also want to record the other needs that animals have: **water, habitat, air, and to reproduce.**
5. Say: **"We will now watch a short video that will show us what plants need to survive. Listen carefully to identify what plants need to survive."** Show the Photosynthesis video.
<https://www.youtube.com/watch?v=Lk0grxwZqWk>
6. Now have students fill in the **"Plant Needs"** column. Have students share the needs they identified based on the video: *sunlight, water, soil or other nutrient source, CO₂.* The idea that plants need to reproduce is not in the video, so if students don't suggest it, you will need to introduce the idea during this discussion. Say: **"Like animals, all species need to be able to reproduce, otherwise, the species would die off."** Record these needs on the class T-chart.
7. Pass out paper for the quick write. Say: **"I want you to use our T-chart and your knowledge to compare and contrast the needs of plants and animals by thinking about their needs and how they meet them. You will have 5 minutes do a quick write that answers the following questions:**
 - **Are there any needs that plants and animals have in common?**
 - **Which needs are different?**

- **Are there any needs that plants help to meet for animals?**
- **Are there any needs that animals help to meet for plants?**

Give students five minutes to work independently to complete the quick write.

8. Once students have completed the quick write, have them share their responses with an elbow partner. Make sure students take time to reconcile any differences in their responses to questions.
9. Bring the whole class together, and ask: **“Did any partners encounter problems or issues as you discussed the questions?”** If there are questions or disagreements among students, take time to address these. Ensure that all of the students have a shared understanding of the basic needs of plants and animals and how these are similar and different.

10.  As a check for understanding, ask the whole class: **“Do you think that animals are as important to plants as plants are to animals? Why?”** As thinking is being shared, support students in concluding that plants need animals and animals need plants, but the needs that are met in each of these relationships are different. Pass out the check for understanding for students to complete. When students are finished, collect them. Review these before moving on to Lesson 5. It will be important that students understand the relationship between plants and animals before moving on to the idea that multiple species can live in the same space if their needs are met. Students might also add two arrows between the graphics to demonstrate the interdependence between plants and animals.

11. Pass out Scenario 2 and the Student Recording Sheet. Follow the same protocol as in the previous lesson. Use students’ scenario responses to assign game points.

TEACHER NOTE:
The additional work with the Ag Ecosystem graphic will move students closer to understanding the Cross-Cutting Concept named in 5-ESS3-1. “A system can be defined in terms of its components and their interactions.”



In this task, students will be engaged in the higher order thinking skill of analysis by organizing their ideas about the relationship between plants and animals.

Scenario 2 - Weed Infestation:

- **1 point** - Student accurately responds to: **What is the problem in this scenario?**
- **1 point** - Student accurately responds to: **How does it (student choice) support the plant in meeting its needs?**
- **1 point** - Student accurately responds to: **How does it show good stewardship of the agricultural resources?**

12. After students have completed the scenario, pass out the Ag Ecosystem graphic from Lesson 2. Say: **“On your Ag Ecosystem graphic, draw arrows between the components of the ecosystem to identify which components are interrelated in that system.”** *Students should draw ONE arrow pointing from the sun to plants and ONE arrow pointing from the plants to the animals. Students will also need to add a decomposer to the model, if they haven’t already, in order to connect the animal back to the plant. They should draw ONE arrow from the animal to the decomposer and ONE arrow from the decomposer to the plant. They should examine the relationship between each of the components and note what the interaction is.*
13. Conclude the lesson by asking: **“What do you think is the source of ALL of the energy in this ecosystem?”** Allow students to share their thinking. It is likely that one or more students will recognize that the sun is unique in the graphic. When students share this observation, draw the students’ attention to the unique relationship between the sun and plants. *It is one direction sun → plants.* Say: **“The sun is the source of all energy in this ecosystem. Do you think it is the source of all energy in any ecosystem we could create?”** *If students are not yet convinced that it IS the source of all energy, offer bonus game points for any team who (on their own time) can find*

an ecosystem in which the sun is NOT the source of all energy.

14. If time allows, have students play the game:

<http://www.ecosystemforkids.com/games/5th-grade/ecosystems/activity.html>. One option would be to allow students to play the game while the teacher scores their response sheets. That way students can see how many points they've earned during the lesson. The game can also be played during future lessons as a review.

Assessment: See steps 10 and 11.

Credits/Sources:

1. ECScie. (2017). *Nova: Photosynthesis Science Video PBS Learning Media*. Retrieved June 11, 2020 from <https://www.youtube.com/watch?v=Lk0grxwZqWk>
2. University of Wyoming, Department of Plant Science, Dr. Andrew Kniss.
3. Mphoweh,Jude.ecosystemforkids.com. (2017). *Ecosystem interactive game for 5th grade*. Retrieved August 23, 2017 from <http://www.ecosystemforkids.com/games/5th-grade/ecosystems/activity.html>
4. Dr. Andrew Kniss. Control Freaks. (2015, December 15). *The role of reflected light quality in crop-weed interactions*. Retrieved August 24, 2017, from <https://plantoutofplace.com/category/weedcontrolfreaks/page/2/>