



Performance Expectations: Next Generation Science Standards:

MS-LS2-1.

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

<http://www.nextgenscience.org/msl2-ecosystems-interactions-energy-dynamics>

Key Understandings

Organisms in a specific site each have an associated species name that identifies interbreeding groups of organisms. Each site contains many interbreeding populations of organisms. To understand ecosystem interactions in a specific area, these species need to be identified.

Lesson 5: Biodiversity Determination

What species live in our study area?

Grade Level: Middle School 6-8

Essential Question:

How do interactions between abiotic and biotic factors in ecosystems affect the biodiversity of those ecosystems?

Objectives:

At the end of this lesson, students will have:

- more closely *examined* and *identified* species and some of the organisms in their study site.

Assessment opportunities:

At the end of this lesson, you will be able to assess students through:

- Journal entries
- Group presentations
- Data entry into WyoBio

Background Information

Students will need to be instructed in using the field guides for identifying organisms. Include trees, grasses, shrubs, insects, spiders, birds, mammals, amphibians, birds, reptiles, etc. A good source is the National Audubon Society Field Guide to the Rocky Mountain States by Peter Alden. Many more online and paper-based resources can be found on the WyoBio identification resource page. Students will also access the WyoBio website for information helpful in their species identification.

Common Student Misconceptions or Challenges

Many students will not realize that there are species that may look very similar. For example, it might be difficult for students to recognize there are different “black birds.” Doing a brief introduction to field guides before going into the field may help with this misconception and allow practice as well.



Lesson 5: Biodiversity Determination

What species live in our area?

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Materials:

- Local field guides
- Butterfly nets
- Binoculars
- Cameras
- Collecting containers (petri dishes, specimen jars, etc.)

Time Commitment:

1-2 45 minute class period.

Preparation:

- Divide students into cooperative groups of 2-4 students, depending on the size of your class and amount of available materials.

Directions:

1. Students will research and brainstorm a list of species that could be found in their local study site. This will serve as a basis for identifying the organisms they find in the following investigation.

Have the *hypothesis* from the data they collected during lesson 4, how might that influence what they collect in lesson 5?

2. Have students practice using field guides by selecting a few common species on WyoBio and displaying them while students in small groups identify them.

3. Students will visit the study site and list all the types of organisms they see in the plot using common names, being as specific as possible. Descriptors can also be used to distinguish different kinds of organisms (e.g., black beetle, green beetle). Categorizing species may

make it easier to see trends in the data later. Possible categories are: Shrubs, Non-shrub plants, Insects, Spiders, Birds, Mammals.

5. Students will also gather specimens or take photos of specimens to identify to the species level (if possible). They will use field guides and the WyoBio Website to identify the species they have found. Students can note any macro species they observe in the area (herps, amphibians, birds, insects, etc.) as well as animal traces.

Develop a class list divided into kingdoms and that list both common name and species name. Later identify which class or order if possible for each species listed.

6. Using a measurement of biodiversity (such as, species richness, Simpson index or the Shannon-Wiener index, as examples) have students calculate the biodiversity in their given site.

7. **Wrap-up:** Have students answer the following questions:

- What was your favorite organism that we found? Why?
- Compare and contrast two of the organisms that we found. How are they alike? How are they different?
- What characteristics did you use to identify organisms? Give an example.
- Explain why a species name is important.
- How do you think the abiotic data you collected in lesson 4 impacts the data you collected in lesson 5? Aka how do the abiotic forces influence the biotic forces in your study site?

8. **Presentations:** Once students have answers to the above questions, have small groups present their findings, from lesson 4 and 5, to the rest of the class. Presentations should include their hypothesis, their evidence (the graph) that supports (or not) their hypothesis, followed by class discussion about which correlations are the strongest, and which abiotic and biotic factors may best explain biodiversity at the study site.

9. **Data entry:** Have students upload photos and specie identification data to WyoBio.

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