Creek Critters

4th-6th Grade Lesson Plan, BLM Campbell Creek Science Center

Big Ideas: Systems, Interconnectedness, Diversity, Stewardship

Enduring Understandings:

- Energy and matter flow among the living and nonliving parts of a watershed.
- Aquatic habitats and riparian ecosystems provide food, water, and shelter to many living things.
- Scientists evaluate the health of waterways by identifying indicator species, such as mayflies, stoneflies, and caddisflies (aquatic macroinvertebrates).
- Aquatic macroinvertebrates have adaptations that help them survive and complete their life cycle.

Module Questions:

- How does energy flow through ecosystems?
- How do adaptations help aquatic macroinvertebrates survive?
- Why do scientists look for indicator species?
- How do scientists determine if a waterway is healthy?

Standards:

Science

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

5-LS2-1 Develop and describe a model that describes the movement of matter among plants, animals, decomposers, and the environment.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

English Language Arts

CCSS.ELA-LITERACY.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.4.7 Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.

CCSS.ELA-LITERACY.W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

CCSS.ELA-LITERACY.RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Mathematics

CCSS.MATH.CONTENT.3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.

CCSS.MATH.PRACTICE.MP4 Model with mathematics.

CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.

Activities:

I. Module Introduction: Creek Critters
II. Lesson 1: Food Webs
III. Lesson 2: Aquatic Macroinvertebrates
IV. Lesson 3: Indicator Species
V. Lesson 4: Campbell Creek Critters
VI. Module Reflection: Draw a Riparian Ecosystem

Assessments:

- Lesson reflections
- Module reflection
- Module pre- and post-assessment

Learning Activities:

Module Introduction: Creek Critters (30 min.):

Objective: After learning about riparian ecosystems and reviewing biotic (living) and abiotic (non-living) factors in the introduction, students will identify biotic and abiotic organisms within their local riparian ecosystem.

Materials:

- science journal or a piece of paper
- pencil (or something to write with)

Procedure:
Read through the slides to relate background knowledge to aquatic habitats and riparian ecosystems. Distinguish between living and nonliving parts of an ecosystem and learn about biodiversity by counting all the different living things in an example riparian ecosystem.

Reflection:
Think about a river, creek, lake, or other waterway you are familiar with.
What plants and animals live in and around the waterway?
What are the nonliving parts of the waterway?

Lesson 1: Food Webs (60 min.):

Objective: After analyzing food chains and food webs in the lesson, students will construct a logical food chain and tell a story about how energy flows within that food chain.

Materials:

- science journal or a piece of paper
- pencil (or something to write with)
- coloring supplies (optional)

Procedure:
Learn about riparian food chains through examples in the slides and then draw your own food chain. Start with the sun, and then draw a plant, an animal that eats plants, and an animal that eats other animals. Draw arrows to show how energy flows through the food chain and label each part. Next, follow the slides to arrange the sun, plants, and animals in an example food chain in order of energy flow. Then, use an example food web to make predictions about a disturbance in a riparian ecosystem.

Reflection:
Tell a story about one of the food chains in this lesson. Describe how energy moves from the sun to the plants and animals in the food chain. Your story should be at least four sentences long. Include the words "sun," "producer," and "consumer."

Extension Activity:
Complete a fun outdoor activity about connections between living and nonliving things in an ecosystem:
https://www.blm.gov/sites/blm.gov/files/documents/files/Learn_CCSC_Nature-Learning-Downloads_Ecosystem-Connections.pdf

Lesson 2: Aquatic Macroinvertebrates (60 min.):

Objective: After learning about aquatic macroinvertebrate adaptations and crafting their own macroinvertebrates, students will use their creations to describe at least three adaptations that help their aquatic macroinvertebrates survive.

Materials:
- science journal or a piece of paper
- pencil (or something to write with)
- craft supplies that you have available

Procedure:
Read through the slides to learn about aquatic macroinvertebrates, the role they play in the ecosystem, and the variety of adaptations that aquatic macroinvertebrates use to stay alive. Then, create their own imaginary aquatic macroinvertebrates using available materials:

1. Gather craft materials, such as cardboard, glue, tape, ribbon, or materials from the recycling bin.
2. Using the materials you gathered, design an aquatic macroinvertebrate.
3. Think about what adaptations your imaginary critter needs to survive in a stream habitat.

Reflection:
Answer the following questions about your aquatic macroinvertebrate:

- What is its name?
- What is its habitat (where does it live)?
- What does it eat? How does it get its food?
- How does it defend itself?
- What other adaptations does it have?

Lesson 3: Indicator Species (60 min.):

Objective: After students read or listen to the story about aquatic macroinvertebrate indicator species in the lesson, they will accurately summarize the story and correctly answer three questions about indicator species in riparian ecosystems.

Materials:

- paper
- pencil (or something to write with)
- coloring supplies (optional)

Procedure:
Read or listen to the story about aquatic macroinvertebrate indicator species and create a cartoon that depicts the plot. Start by folding a piece of paper in half three times to create eight equal boxes. In each box, draw a picture to represent a different part of the story. Instructions in the slides prompt when to draw and questions in the slides prompt checks for understanding.

Reflection:
Summarize the story using your cartoon.
Answer the following questions about the story:

- Why did Micah and Malia sort the critters they found in the creek?
- Why did Micah and Malia find many leeches but just a few mayflies, stoneflies, and caddisflies?
- If there are no mayflies, stoneflies, and caddisflies, what do you think might happen to salmon and other living things in the creek?

Lesson 4: Campbell Creek Critters (60 min.):

Objective: After analyzing temperature, dissolved oxygen, and aquatic macroinvertebrate biodiversity data during the lesson, students will make a conclusion about the health of Campbell Creek and provide at least two examples of supporting evidence.

Materials:

- science journal or a piece of paper
- pencil (or something to write with)

Procedure:
In this virtual stream study, "measure" temperature, dissolved oxygen, and aquatic macroinvertebrate diversity in Campbell Creek. Slide instructions prompt you to record observations, make predictions, and analyze data, including information in a bar graph, to draw conclusions about the health of the waterway.

Reflection:
Use the information you collected in this lesson to answer the following question: Is Campbell Creek healthy? Explain why or why not and be sure to give at least two reasons to support your answer.

Module Reflection: Draw a Riparian Ecosystem (60 min.):

Objective: After completing the lessons in Module 3, students will design a riparian ecosystem, including all of the required elements, and accurately interpret the health of the ecosystem they created.

Materials:

- science journal or a piece of paper
- pencil (or something to write with)
- coloring supplies (optional)

Procedure:
Use knowledge gained in the module and creativity to design a riparian ecosystem. The ecosystem must include but is not limited to:

- the sun
- a waterway
- at least one producer (plant)
- at least two consumers (animals)
    - one animal that eats plants
    - one animal that eats other animals
- aquatic macroinvertebrates

Reflection:
Describe your riparian ecosystem:

- What producer(s) did you include?
- What consumers did you include?

- Can you describe at least one food chain in your riparian ecosystem?
- Is your riparian ecosystem healthy? Why or why not?