



# Watershed Management

4<sup>th</sup>-6<sup>th</sup> Grade Lesson Plan, BLM Campbell Creek Science Center

**Big Ideas:** Systems, Interconnectedness, Diversity, Stewardship

**Enduring Understandings:**

- People modify watersheds to meet their needs.
- Human modifications to watersheds benefit people but may impact natural ecosystems.
- People use science to identify problems and take action in their watersheds.
- Land managers balance the needs of human communities and the health of natural ecosystems.

**Module Questions:**

- What natural resources do you get from your local watershed?
- What are the consequences of human modifications to watersheds?
- How do communities balance the needs of people and the health of watersheds?

**Standards:**

**Science**

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

*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.*

*3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.*



*MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.*

## **English Language Arts**

*CCSS.ELA-LITERACY.W.4.7 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.PRACTICE.MP1 Make sense of problems and persevere in solving them.*

## **Social Studies**

*D2.Geo.2.3-5. Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their environmental characteristics.*

*D2.Geo.4.3-5. Explain how culture influences the way people modify and adapt to their environments.*

*D2.Geo.8.3-5. Explain how human settlements and movements relate to the locations and use of various natural resources.*

*D2.Eco.2.3-5. Identify positive and negative incentives that influence the decisions people make.*

*D2.Civ.2.3-5. Explain how a democracy relies on people's responsible participation, and draw implications for how individuals should participate.*

*D2.Civ.6.3-5. Describe ways in which people benefit from and are challenged by working together, including through government, workplaces, voluntary organizations, and families.*

*D2.Civ.9.3-5. Use deliberative processes when making decisions or reaching judgments as a group.*

*D2.Civ.10.3-5. Identify the beliefs, experiences, perspectives, and values that underlie their own and others' points of view about civic issues.*

*D4.6.3-5. Draw on disciplinary concepts to explain the challenges people have faced and opportunities they have created, in addressing local, regional, and global problems at various times and places.*



## Activities:

- I. Module Introduction: Watershed Management
- II. Lesson 1: The Eklutna Watershed
- III. Lesson 2: What Is a Dam?
- IV. Lesson 3: Impacts of a Dam
- V. Lesson 4: Balancing Act
- VI. Module Reflection: Watershed Steward
- VII. Unit Reflection: Head, Heart, Hands

## Assessments:

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

## Learning Activities:

### **Module Introduction: Watershed Management (30 min.):**

**Objective:** After learning about natural resources and land management in the introduction, students will identify natural resources in their community and the sources of those resources.

#### **Materials:**

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

#### **Procedure:**

Read the slides and relate background knowledge to answer questions about the sources of the natural resources in your community and learn about land management.

#### **Reflection:**

What natural resources do you use in your community?  
Where do they come from?



## Lesson 1: The Eklutna Watershed (60 min.):

**Objective:** After viewing the slide show to explore the Eklutna Watershed during the lesson, students will correctly describe how people have modified the watershed and accurately identify natural resources and opportunities the watershed provides.

### Materials:

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

### Procedure:

Have students view the slide show tour of the Eklutna Watershed.

### Reflection:

How have people modified the Eklutna Watershed?

What natural resources and opportunities does the Eklutna Watershed provide for people?

## Lesson 2: What Is a Dam? (60 min.):

**Objective:** After learning why people construct dams and building a model dam during the lesson, students will correctly identify one reason people might build a dam and logically explain how dams can change watersheds.

### Materials:

Optional materials:

- cake pan or a similar waterproof container
- flour or fine dirt
- water
- a rock or other waterproof barrier
- measuring cup
- blue food dye (optional)

### Procedure:

Review the slides to learn the parts of a dam and why dams are built. Optional: Create a watershed model that includes a dam following the slide directions included below.



1. Scoop some flour or dirt into your cake pan. Arrange it so there is a high elevation side and a low elevation side.
2. Use your fingers to create a riverbed from the high elevation side of the pan to the low elevation side. Feel free to add some curves to your riverbed.
3. Choose a spot to build your dam by placing the rock, or other waterproof barrier, so that it completely blocks the riverbed.
4. Fill a cup or container with water. Add a drop of blue food coloring if you would like the water to be more visible.
5. Slowly pour a small amount of water upstream from the dam. Do not pour all of the water yet.
6. Gradually add more water until it starts to spill over the top of the dam.
7. Experiment with your watershed model. Feel free to create new rivers, mountains, dams, spillways, and diversion tunnels.
8. Clean up your model materials. A recipe is provided to make playdough with the used flour as part of step 8.

**Reflection:**

What is one reason people might build a dam in their watershed?

How do dams change watersheds?

**Lesson 3: Impacts of a Dam (60 min.):**

**Objective:** After recording observations and analyzing information from the Eklutna Watershed, students will accurately describe how the Eklutna Dam impacts the abiotic and biotic parts of the ecosystem and make a logical conclusion about the health of the Eklutna River.

**Materials:**

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

**Procedure:**

“Visit” four sites along the Eklutna River downstream of the dam. At each site, record observations, questions, and predictions about the area. Then, evaluate water quality, including temperature, dissolved oxygen, and sedimentation. Use the information you gather to consider the impact of the dam on biotic parts of the ecosystem, including macroinvertebrates and salmon.

**Reflection:**

Describe one way the Eklutna Dam impacts the abiotic (nonliving) parts of the ecosystem.

Describe one way the Eklutna Dam impacts the biotic (living) parts of the ecosystem.



Based on your observations, do you think the Eklutna River is healthy for animals and plants that live in and around the waterway? Why or why not?

#### **Lesson 4: Balancing Act (60 min.):**

**Objective:** After learning about and practicing the role of a land manager during the lesson, students will synthesize perspectives from community groups related to the imaginary example watershed.

#### **Materials:**

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

#### **Procedure:**

Follow the slides to learn about the role of a land manager and explore example perspectives from community groups within an imaginary watershed.

1. Read each community group's perspective or listen by clicking the speaker symbol on each slide.
2. Create a separate page for each group. Break your notes into four sections:
  - a. Group's Name
  - b. How do they use the watershed?
  - c. What do they want to change?
  - d. How can they help the other groups?
3. Continue navigating through the slides to answer additional questions about each group.
4. Compare the information in your notes about the imaginary watershed to a real-world land management scenario in the Eklutna Watershed.

#### **Reflection:**

Think back to the different community groups in the imaginary example watershed activity: local village, outdoor enthusiasts, utility company, and environmental organization.

- What is one thing you think each group can do to help the health of the watershed?

How does our culture shape our relationship to the land and the decisions we make about it?

#### **Extension Activity: Watershed Forum**

Debate and compromise on uses in an example watershed. The goal is to collaborate together to come up with a preferred solution that considers environmental factors and



allows each group to use the watershed.

1. Divide into four groups, each representing one of the community groups in this lesson (Outdoor Enthusiasts, Local Village, Utility Company, and Environmental Organization).
2. As representatives of the community group, debate your stance on the watershed with the other groups.
  - a. Listen to the perspectives of the other groups to identify viable solutions and compromises.
  - b. Study the research done by the fish and wildlife biologists.
    - i. Ensure your compromises also prioritize the health of the ecosystem.
3. Decide on a preferred solution that protects the health of the natural ecosystem and addresses the needs of each community group.
4. Debrief the activity, using the following questions to guide your discussion.
  - How did you feel:
    - During the debate?
    - After coming up with the solution?
    - Now?
  - Did any group get everything they wanted?
  - What compromises did you have to make?
  - How intense did the debate get? Did this affect your reactions?
  - Did you feel that people listened to you?
  - Does this happen in real life?
  - What communities are you a part of in your watershed?
  - How can you get involved in your watershed?

### Module Reflection: Watershed Steward (60 min.):

**Objective:** After completing the lessons in Module 5, students will practice making decisions in a watershed and logically explain how human decisions may affect their local watersheds.

#### Procedure:

Review the meaning of the word “steward” and then follow the slides to navigate through situations a person might face in their watershed.

1. In each slide, click on the image above your decision to discover what effect that decision might have on the watershed.
2. Learn the possible outcome of your decisions and continue until the end of the game.
3. Optional: replay the game to discover how different decisions might impact the



watershed.

4. When you are done playing the game, think about the situations you might encounter in your own watershed.

**Reflection:**

Describe a decision you might make in your local watershed. Explain how the decision could impact the watershed.

**Extension Activities:**

The Watershed Game by Native Plant Society of Saskatchewan

- Examine the issues of each area of this watershed to receive a score of the impacts of your choices: <https://www.npss.sk.ca/bell-games/watershed/>

Rock Your Watershed Game by Iowa State University

- Select a land use for 10 parcels along a watershed to balance profit, nutrients, sediment, and biodiversity: <https://water-rocks.herokuapp.com/game/index>

**Unit Reflection: Watershed Wonders (30 min.):**

**Objective:** After completing the unit, students will reflect on their experience with Watershed Wonders through the Head, Heart, Hands activity.

**Procedure:**

Consider your experience with the Watershed Wonders Unit in terms of what it made you think, how it made you feel, and what it made you want to do.

**Reflection:**

Head: What is one important thing you learned in this unit?

Heart: How do you feel about what you learned in this unit? Why?

Hands: What will you do with the knowledge you gained in this unit?