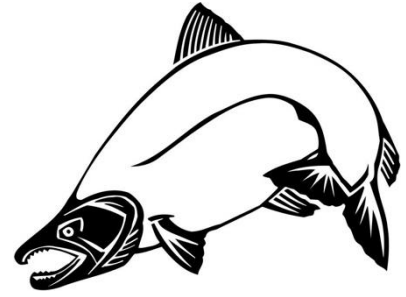# Modeling Local Watersheds

Purpose:

- This lesson teaches students about how the landscape features in a watershed affect the flow of water. Students build and test a model to determine which features are most prominent in forming their local watersheds.

Objectives:

- Students will use maps to design a model of one of the five sub-basins of the Rogue River Basin with an accurate representation of the landscape features.
- Students will use observations of their model to predict how water will flow across it.
- Students will use observations of the class' large model watershed to predict how actions in one sub-basin affect the other watersheds.

Materials:

Provided:
- Rogue River Basin Maps PowerPoint
- Map of the Rogue River Basin
- Map of the Lower Rogue Sub-basin
- Map of the Illinois River Sub-basin
- Map of the Applegate Sub-basin
- Map of the Middle Rogue Sub-basin
- Map of the Upper Rogue Sub-basin
- Sub-basin templates for model bases
- Spray bottle

Not Provided:
- Large, thick pieces of cardboard for model bases

Time Required: 3-4 days, 1+ hours each day

Appropriate grades: 6-8

NGSS and Common Core Standards:

5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

CCSS.ELA-LITERACY.SL.6.1.C: Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

- Newspaper
- Masking/duct tape
- Cereal boxes
- Papier-mâché mix: white flour and water
- Large bowls or buckets for mixing
- Water, paint, paintbrushes
- Plastic wrap
- Optional: Waterproof sealant—mod podge glue

Activity:

Introduction	- Prep: - Before planning the activity, ask students to bring in old cardboard, newspaper, and cereal boxes from home. - Use the sub-basin templates to make bases for each group out of cardboard. - Class discussion: What is a watershed? What features are in a watershed? What watershed is your school in? What activities do you do in your watershed? (See *What is a Watershed?* lesson for an introduction to the topic).
Body	Step One: Papier-mâché 1. Show the class the map of your watershed (see Rogue River Basin Maps PowerPoint). Describe how to read the map and its features. 2. Discuss as a class what the word "basin" means. Point out on the map where the mountains are, and show how the mountains surrounding valleys create bowl shapes. Explain that the Rogue River Basin is made up of five smaller basins, or "sub-basins" (see PowerPoint slides for sub-basin maps). 3. Break the class into 5 groups and give each group a map of one of the 5 Rogue River sub-basins. Explain that as a class, they will be building the entire Rogue River Basin. Students should read their map and identify key features to plan their watershed model. 4. Distribute papier-mâché supplies. Each group should receive: 1 thick cardboard base that has been cut out using the templates provided, 1 bowl of papier-mâché mix, pile of newspaper, a couple of cereal boxes, and masking/duct tape. 5. Students use cereal boxes, crumpled newspaper and tape to form their

main physical features like mountains, ridgelines, and valleys.

6. As students create features, prepare the papier-mâché mix by combining white flour and water in a large bowl or bucket. It should be a similar consistency to pancake mix. Older students can also make their own mix in their groups.

7. To apply papier-mâché, students will tear the newspaper into strips, soak strips in papier-mâché mix, wipe off excess between fingers and apply to base.

8. Let the models site in a warm spot until dry.

Step Two: Paint Your Model

9. When models are completely dry, it's time to paint! Encourage students to include the features detailed on their maps as well as what they know about the watershed such as snowcapped mountains, ponds, tributaries, towns, houses, wildlife, farms, etc.

Step Three: Waterproofing and Testing

10. After the paint is dried, apply a waterproof sealant, such as mod podge glue, to each model. Students can also cover their models with plastic wrap to serve the same purpose.

11. Students should predict where they think water will flow and collect on their model and explain why.

12. Students can test their model and their predictions by spraying water on top of it. Students should note if their initial predictions were correct and why or why not.

13. Instruct students to piece their models together to make the Rogue River Basin (this may be best done outside on a flat area).

14. Each group can present their watershed model: sharing the essential features of their watershed, how water would flow through their watershed, and any factors that might affect water as it flows through the watershed (flows through a dam, farming area, city, etc.).

15. Ask students to predict how the water would flow between the different sub-basins.

16. Apply plastic wrap over the gaps between the different sub-basins to make it one cohesive watershed.

	17. Add water to the entire Rogue River Basin to test whether the student's predictions were correct. 18. Discuss what was observed.
Closure	• Class discussion: How does your model connect to the other watersheds? Do actions in the other watersheds affect yours? • Other discussion questions could involve factors not on the models that might affect water in the watershed, such as: What is a healthy watershed? What might make a watershed unhealthy?

Modifications:

- **Elementary:**
    - Create a more basic model of a watershed and just talk about the Rogue River Basin, rather than building it (see *What is a Watershed?* lesson)
    - Focus on just the local sub-basin, and work as a class to build it.
- **High School:**
    - In groups, research the specific threats to their watershed (places with huge amounts of erosion, sources of pollution) and present findings along with the watershed model.
    - Write a letter to the local government about how to improve the health of the watershed.