

# **The Second Life of Logs**

## **Developed by:**

Richard Burton

## **Adapted from:**

Council of Environmental Education. 2004. "Wetland Metaphors" *Project Wild Aquatic: K-12 Curriculum and Activity Guide*. Houston, TX: Council of Environmental Education.

Remich, Jason. 2002. *Ohio Stream Management Guide: Large Woody Debris in Streams*. Columbus, Ohio: Ohio Department of Natural Resources.

Swanson, F.J., Lienkaemper, W.L., and Sedell, J.R. 1976. History, physical effects, and management implications of large organic debris in western Oregon streams. General Technical Report PNW-56. USDA Forest Service, Pacific Northwest forest and range experiment station, Portland, Oregon.

Swanson, F.J., Lienkaemper, G.W., 1978. Physical Consequences of Large Organic Debris in Pacific Northwest Streams. General Technical Report PNW-69. USDA Forest Service, Pacific Northwest Forest and Range Experimental Station, Portland, OR.

Neeley, Lyn. 2003. *What are old growth forest?* (Powerpoint slideshow). NSF Research Experience for Teachers grant.

**Time:** 25-35 minutes

## **Overview**

This activity introduces participants to the characteristics of large woody debris (LWD) in streams using metaphorical pictures.

## **Benchmarks Addressed**

This activity meets Oregon Academic Content Standard benchmark 3: SC.08.2.C.1 (1) Identify and describe factors that influence or change the balance of populations in their environment. This activity is a valuable addition to a comprehensive forest ecology curriculum. When used on the Lookout Creek hike, it enhances the experience in the forest by developing a more multi-faceted understanding of the roles logs play in stream ecosystems. Where once someone might have seen just an isolated pile of lifeless wood, someone might see the wood teeming with life and connected to the surrounding environment providing multiple benefits through various roles.

## **Learning Objectives**

By the end of this activity, participants will be able to describe the characteristics of LWD in stream channels.

## **Materials**

Metaphor Cards

1. suit of armor
2. backhoe
3. slow down sign
4. catcher's mitt
5. camouflage
6. shade umbrella
7. neighborhood

Supplementary pictures of LWD for classroom presentations: Can be developed into overheads or used in a computer presentation.

### **Background Material**

Large woody debris (LWD) is a term referring to dead branches, logs, and rootwads fallen in a stream corridor, whether placed there naturally or artificially. Rootwads are the mass of roots that has been pulled out of the ground when a tree has fallen over. This wood adds structural diversity to the stream corridor. The LWD interacts with the riparian ecosystem in many ways: increases structural diversity of the stream corridor by creating pools, riffles, meanders (bends in the stream), and side channels; reduces erosion of the banks; captures and slows the downstream transport of sediment and suspended organic material; and provides habitat at different levels of the riparian food chain from the insects in the fine sediment to the amphibians, fish, and riparian mammals using the LWD as shelter.

An exciting idea to point out is that a tree may live 400 years, but that is only its "first" life. In its "second life," a dead tree provides nutrients and shelter for organisms until it decays. If a tree falls into a stream, it can stay in the stream for over a century, where it provides the benefits described above. Other than the gradual breakdown of the LWD, in little streams a dead tree is only moved downstream by large floods, such as the one that occurred in Lookout Creek in 1996.

Prior to research done on the interactions of LWD with the riparian ecosystem, it was appropriate in forest management practices to remove LWD from streams as a means to provide habitat for fish and reduce the threat of debris torrents. Research showed that this practice was not beneficial and other more suitable means were developed to accomplish these goals. The LWD actually provides critical habitat for fish by shading the water, providing camouflage for hunting fish, scouring pools downstream of the log with deeper, cooler, slower water that shelter fish, creating stream meanders with gravel beds suitable for spawning, and creating habitat for organisms at the base of the food chain that are prey for fish directly or indirectly. The threat of debris torrents was found to be better resolved by changing logging and road building practices than by removing LWD from streams. Where forests were clear cut and roads were poorly designed and built, it was found that debris torrents increased (Swanson 1978). This led to a change in the logging and road building operations instead of removing LWD as a solution.

In more recent years, restoration projects put LWD back into streams. This is a great example of science influencing management practices by better informing the decision making process. Much of the scientific research done to support this change came from scientists here at the H. J. Andrews experimental forest. As early as the

1970s, research was done on LWD that later resulted in management practices aligned with improving stream habitat with LWD.

### **Activity Description**

#### **Pre-activity preparation:**

Print out the eight attached photos to page size prints. Laminate these to create the metaphor cards. These will be lightweight enough to be carried and used on the Lookout Creek trail outing. Also print out the lesson plan to take along with you on the hike along the trail. If hiking the Lookout Creek trail, this activity would be most suited for a site with a clear view of the stream corridor.

#### **Step 1. (5 min.) – Introduce activity**

Open the activity by asking how old do students think the trees are in this old-growth forest. State that the Lookout Creek old growth forest is 400+ years old. During their life, the trees of the forest provide benefits such as creating habitat for forest animals. Ask whether students think that trees are still useful to the forest after they die. Explain that trees have a “second life” providing habitat and organic material to the forest for a long time after their death. Point out the dead wood in the stream (use the pictures provided if in the classroom) and define large woody debris. State that LWD can be there for over a hundred years playing different roles and providing benefits to the stream ecosystem.

#### **Step 2. (10 min.) – Have students discuss metaphor cards**

- Have students form up to seven equal groups. Fan the metaphor cards out in your hands with the pictures facing away from the students. Tell the students that you are holding pictures that represent the roles of LWD in the stream ecosystem.
- Instruct the students that their task is to work together in their groups to figure out how the picture on their card represents a role of LWD to the riparian ecosystem and two examples of its impacts. Either helpful or hurtful impacts on living organisms and habitat are acceptable answers.
- Activity introduction dialogue:
  - First, figure out how the picture you have represents a role of LWD in streams.
  - Then figure out how this role of LWD interacts with its environment.
  - (Clarify) What could the LWD interact with in a stream environment? Possible answers: water, plants, animals, stream bed, banks
  - Give two examples of how the environment benefits or is hurt by this role. Be specific i.e. animals like the shade from LWD's is not as good as fish use the shade because of the cooler water
- It is helpful to do one together as a group as an example before you give out the cards. The shade umbrella picture should be used for this as it is straightforward. Show the picture to the group and ask how the picture represent a role of LWD and what are two examples of organisms that might benefit from it. Possible answers:

fish that desire cooler water or moss that retains necessary moisture because it is not exposed to direct sunlight.

- Have a student from each group come forward and select a metaphor card. If there are less than seven groups, divide up the extra cards as you see fit. Give students up to 10 minutes to discuss in their groups and answer any questions and give any assistance needed at this time.

### **Step 3. (10 min.) – Discuss as a whole group**

Reconvene the students and have one representative per group tell the whole group what their group thinks the connection is between their picture and the role of LWD's. Have them show the group the picture on the card. Validate the students' ideas and expand with the information provided for each card. Lead the discussion going through each group's findings.

Guided inquiry works best for this discussion by posing questions that will lead to discussing the points below. The goal of guided inquiry is to guide students by posing questions that stimulate them to come up with as much of the below information about LWD as appropriately possible. Students will often focus in on the living organisms that benefit from the LWD. It is more of a challenge to have students think of how an organism might be harmed by the LWD or how the habitat might be affected by LWD. These cards will inspire all kinds of answers, many of them valid, and some that are not listed below. Validate appropriate answers and redirect back to those given below. It is important that benefits, harms, and habitat impacts are addressed to reinforce proper framing of the lesson. By addressing all types of interactions of LWD with the environment as roles, one is avoiding narrow labels like "good" or "bad".

The following is a list of the metaphor cards and the LWD roles that they represent. Review the cards in this order by asking which group has the camouflage, then the suit of armor, etc.

#### Metaphor Cards

1. shade umbrella – fish use LWD for shaded, cooler water; moss are shaded and stay moist
2. camouflage – fish use LWD as camouflage for hunting and hiding; rough skinned newts can use it to hide from predators
3. suit of armor – increases resistance to high water erosion events by dissipating the force of the water on the banks; this works similar to a jetty breaking up the force of incoming waves so that the water is calm in the harbor
4. backhoe – induces erosion of the stream bottom and bank: water running over the top of logs scours deep plunge pools downstream; rootwads and logs deflect stream flows around themselves when located just offshore from the bank and push the current into the bank causing erosion and inducing stream meander (creates new bends in the stream);  
LWD can either protect or excavate the stream channel; these two cards presented back to back show that LWD can play different roles depending on how it is situated in the stream; the mix of protection and erosion contribute to the structural diversity of the stream

5. pool – pools scoured by LWD have deeper, cooler, and slower water that provides refuge for fish in the summer when water levels drop
6. catcher's mitt – catches organic debris increasing productivity of riparian area; catches fine sediment providing habitat for benthic (bottom) dwelling organisms; slows the transfer of organic material through the stream system allowing processing organisms more opportunity to work over the material; slows the transfer of sediment downstream
7. neighborhood – provides shelter and habitat for insects, frogs, fish, birds, and small animals; supports food chain at various levels as habitat: macroinvertebrates, such as springtails and pseudoscorpions, use LWD for shelter, and in doing so, break down the LWD into detritus that bacteria and insects use as habitat, which are in turn prey for fish, amphibians, birds, and riparian mammals; the slower water of pools catches sediments that allow plants like algae and moss to grow. These plants attract many species of herbivores like insects. Carnivores like salamanders, newts, frogs, birds, and fish find food like the insects here. This in turn attracts larger carnivores like bears, owls and cougars to find prey around the streams. Pools provide protection and homes for many species.

#### **Step 4. Gauging Understanding (5 minutes)**

After the group discussion has ended and all questions have been answered, instruct students to turn to someone next to them and tell that person two roles that LWD plays in the stream ecosystem and give two example of affected organisms or habitat elements. Listen in and engage conversations when appropriate.

#### **Step 5. Wrap Up (3 minutes)**

Ask if anyone has anymore questions. Explain that this knowledge about LWD is a great example of science informing and improving management practices. Use the background information provided above to elaborate on this subject. Conclude with a chance for students to explore the stream area.

#### **Materials**

- Metaphor card pictures
- Pictures of LWD in Lookout Creek where the activity would be done if on the trail for classroom presentations

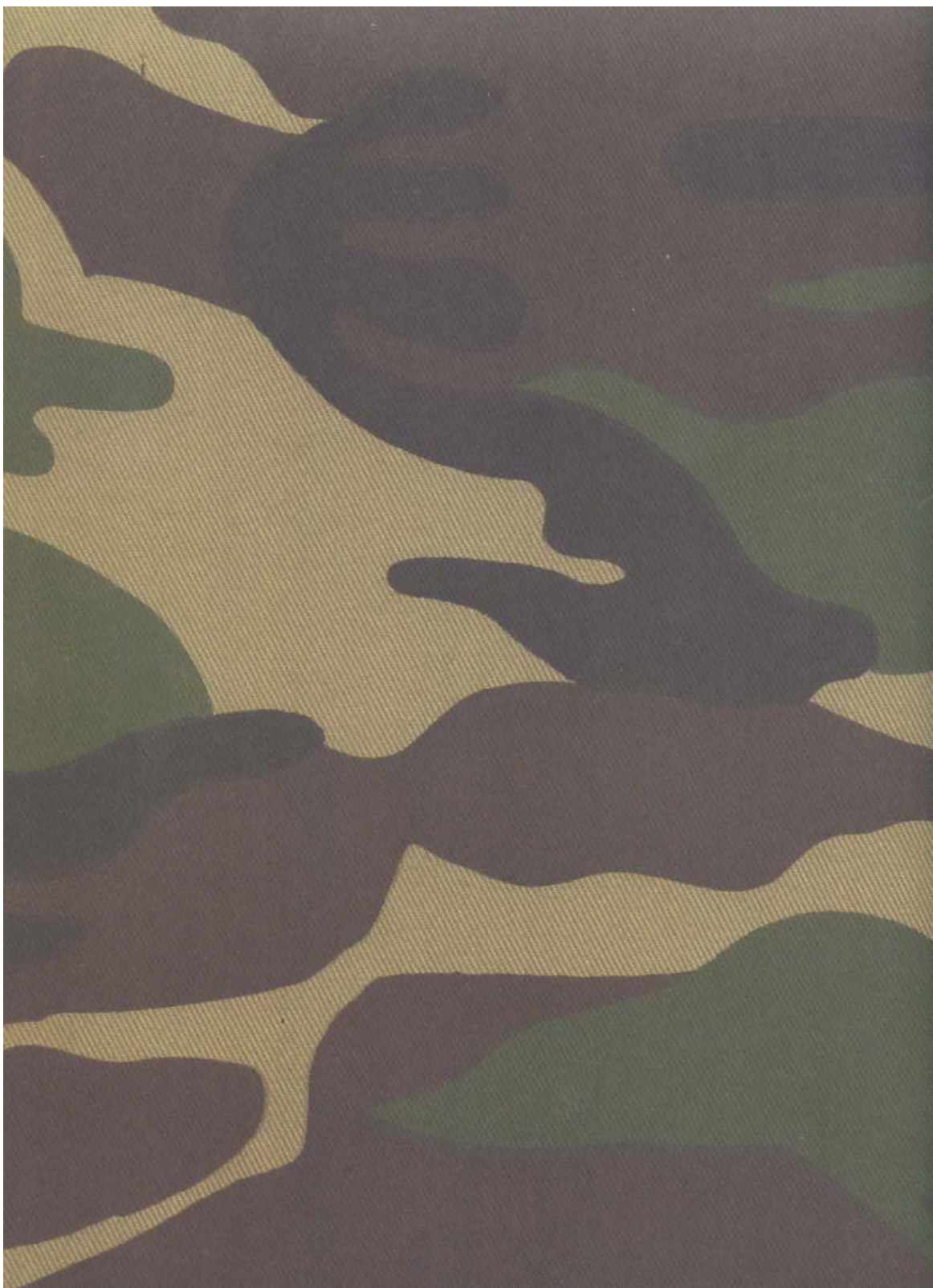
## Shade Umbrella



<http://www.friedmanarchives.com/Caribbean/pages/Thatched%20Umbrella%203%2030%20dpi%20PICT3195.htm>



## Camouflage



<http://www.giraffebeanbags.com/images/Swatches/camouflage.jpg>

Suit of Armor



[http://www.swordsandarmor.com/images/AR008\\_White\\_Knight\\_Armor.JPG](http://www.swordsandarmor.com/images/AR008_White_Knight_Armor.JPG)



## Backhoe



[www.snowpars.com/.../images/backhoe285.jpg](http://www.snowpars.com/.../images/backhoe285.jpg)

## Swimming Pool



<http://www.kcbluehaven.com/Picture%20files%202/Blank%20smaller%20image.JPG>

Catcher's Mitt



[http://scoop.diamondgalleries.com/news\\_images/7060\\_18923\\_1.jpg](http://scoop.diamondgalleries.com/news_images/7060_18923_1.jpg)



Neighborhood



<http://kevino.net/images/kevino.net/fullsize/l-3houses.jpg>

## Lookout Creek in the HJA



[http://www.aslo.org/photopost/data/504/8Large\\_Woody\\_debris\\_Andrews\\_Forest\\_OR-med.jpg](http://www.aslo.org/photopost/data/504/8Large_Woody_debris_Andrews_Forest_OR-med.jpg)



Lookout Creek in the HJA



Kathryn Lynch photo



Lookout Creek in the HJA



Kathryn Lynch photo