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Eye on the Environment: Logjams Create Key Habitats For Fish

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You might be convinced if you stumble around familiar creeks in the Swan Valley in waters that they sure don't need any more logjams. Around every bend, gigantic collections of whole trees redirect water into various old side channels.

It turns out that our streams, in fact, have timber-dependent economies. Logjams happen to be an integral part of streams like Lion, Elk and Cold Creeks, contributing to both their physical and biological stability.

Large woody debris is responsible for over half of all trout habitat in our small streams. Big wood - large diameter trees, their rootwads and the debris jams they form - creates pools. Availability of high quality pools is one reason bull trout, and many other species, flourish in the Swan's tributaries. Pools offer areas of low water velocity for resting. Pools with woody structure also provide cover so more fish, and fish of different species, size and age, can all use them without being crowded. Deep pools in particular afford overhead protection from predators.

During low flows in late summer, pools may be the only suitable habitat for large fish. In addition to pools, debris jams create lateral habitats that are important cover and rearing areas during high flows. And debris jams trap fine sediments that might otherwise fill spawning gravels, suffocating eggs and invertebrates living there. All of these benefits are derived from big trees falling into our small streams and catching other wood floating downstream.

The benefits of logjams to aquatic life don't end with the physical habitats created. Streams without debris jams function like pipes: water and the nutrients it carries are flushed quickly downstream without being much use to aquatic life. Since our headwaters streams are so cold and shaded, they don't produce much living plant material, like algae, that feed larger organisms. They instead rely on wood products from the streamside forest: the vast windfall of leaves which the deciduous riparian area releases every year at this time as well as the tree needles and small branches which seasonal storms bring down. All of this organic material is immediately set upon by bacteria and wood-ingesting invertebrates.



The nutritious bacteria-covered and partly decomposed litter then forms the base of the stream's food web; the tiniest creatures in the stream devour this windblown manna and in turn become food for ever larger organisms. By contrast, large, low-elevation rivers that can produce their own biological energy in the form of algae don't depend as much on logjams as our small streams do. Anchored to rocks, algae isn't in any danger of disappearing downstream, away from hungry mouths.

The calm side channels and backwaters created by debris jams on small streams accumulate organic matter where invertebrates can begin the breakdown process without them or their food being swept away. Because water movement is delayed through the obstacle courses they create, logjams allow aquatic life time to access and process nutrient sources onsite, keeping money in the local economy. The efficiency with which our streams

use their imported nutrients is largely dependent on the quality and number of fallen trees in the stream.

Debris jams store sediment in a wedge behind each tangled mass of branches. Water backs up behind these jams and the sudden decrease in velocity forces the stream to dump the small stuff it's carrying. I imagine streams operating like banks, with certain inputs (deposits) of nutrients and sediment; certain places where these resources get deposited in the system for various lengths of time (checking or savings accounts); and withdrawals, ways that nutrients move out of the bank.



When I go exploring upstream of a log jam, I find leaves, berries, catkins, branches, insects, and literally a ton of other organic matter that got mixed up with the sediment and buried. Almost 90% of the total amount of fine sediment in a stream gets deposited within and behind debris jams, if they exist. Where fine sediments are buried, nutrients are buried as well. And sediments happen to be an excellent transport vehicle for dissolved nutrients, which adhere to the tiny clay particles. Since they act as so many savings accounts, each storing

organic matter for later withdrawal by the stream, log jams buffer the stream's energy supplies through times of drought and flood.

The future of logjams should be on our radar screen. Disturbances in the streamside forest may have more effect on streams than on the forest itself. When we cut large trees from the riparian area, we can deplete the supply of large wood to channels. Logs of sufficient size to form stable debris jams won't be available to enter streams until the streamside forest matures; the small wood that streams capture during forest succession is not large enough to form solid debris jams capable of storing sediment or accumulating organic matter.

When assessing the many logjams formed by last summer's wind storms in the Swan Valley, management agencies and the citizens of our valley have much to consider. The wind preferentially affected the taller trees with large crowns – the big, old trees with the best potential to form long-term debris jams. On the one hand, wind-thrown trees are prime real estate for bark beetles, potentially creating a larger forest health problem. And much of that wood is high value, which can be salvaged and sent to the mill. On the other hand, our streams appreciate a pulse of large wood: material used to create aquatic savings accounts. Currently, the Swan Lake Ranger District is trying to balance both of those needs by designing the Mid-Swan Blowdown Salvage Project. The Forest Service is looking to support both kinds of timber-dependent communities: the dynamic streams of the Swan Valley as well as the people who live among them.

Learn more about this project at http://www.fs.fed.us/r1/flathead/nepa/mid_swan_blowdown/scoping_index.htm.

Photos by Zach Wallace, Northwest Connections.