

Stream Networks

by Bruce Rieman and Ladd Knotek

Streams, rivers, and lakes are an important part of our way of life. If we need reminders our place names -- Seeley "Lake", "Clearwater" Valley-- are good ones. We are fortunate to have a bounty of high quality streams and lakes in our part of Montana. The health of our wildlife and community depends, in an important part, on the health of watersheds and the aquatic systems linked to them. As we face the changes coming to these valleys it may be important to think about the role of streams and how we affect them and the values they support.

We often think about the interconnected branching of lakes, rivers and streams as "networks". Stream networks bring water for our homes, farms, and places to recreate, and in the process we use and modify them extensively. Stream networks are often extended and redirected through dams, diversions, storage and delivery systems that lead all the way to the kitchen sink (and ultimately back to streams). Highways and road crossings of human transportation networks often interact with streams requiring culverts, bridges, or dikes when the two come together. We redirect streams and rivers using levees and bank armor or riprap to minimize flooding or the effects of erosion. And we like to live next to them, sometimes removing stream side vegetation or modifying the banks so we can be closer or have a better view of the stream itself.

Stream networks are also critical for other organisms, although how and why may be less apparent. Many native fishes rely on these networks to complete their life cycles, migrating to and from spawning, feeding, and wintering areas at least once during their lives; some every year. Frogs, salamanders, and even insects move up and down stream "corridors" though sometimes less extensively. "Riparian areas" represented by the plant communities along streams are important networks for many non-aquatic species as well, especially birds, but even bears and other animals that regularly move between low and high elevation forests.

Native fishes like bull trout and westslope cutthroat trout found in lakes and rivers of the Clearwater, Blackfoot, and Swan typically move into smaller tributary streams to spawn. Some individuals stay within a mile of their home stream their entire life of 3 to more than 10 years. But others migrate extensively, leaving their home stream after 1 or 2 years to feed and grow in larger rivers or lakes before returning when they mature. It is these migratory individuals that capture the interest of anglers because they generally grow much larger than fish that stay in small streams. The reason is that larger rivers and lakes produce more food, so fish that migrate grow larger and also produce more young fish for future generations. Bull trout and cutthroat trout can move hundreds of miles. In the Blackfoot watershed some are known to have moved from the mouth of the river near Milltown Dam to the headwaters of streams in the upper reaches of the basin. Historically fish like bull trout probably moved over much greater distances among these and other lakes, rivers, and streams of the entire Clark Fork River basin.

The ability to migrate is important to these fish for other reasons as well. Large disturbances like our recent wildfires and extended drought, or large storms and floods, can eliminate fish from small and even moderate size streams. When that happens, migratory individuals often "recolonize" the empty habitats. This is a natural process that has been important to native fishes for millions of years... the fact that our streams and lakes are filled with fish after glaciers covered much of this landscape 15,000 to 20,000 years ago is evidence of the power of migration on a grand scale.

The problems of conserving stream and river networks for fishes and aquatic ecosystems are substantial. Much of what humans require can directly effect and even destroy linkages among streams. Road crossings with culverts, water diversions, and small dams are some of the most important problems in our nearby watersheds. It is possible to minimize some effects with fish friendly alternatives such as bridges, “bottomless arch” culverts, well screened and maintained diversion structures, and even fish ladders that allow migrants to move over or around a barrier. But these can be expensive, so careful planning and prioritization is important.

It’s also important to not create new barriers whenever possible. With changing climate, dryer hotter summers can translate into lower stream flows, higher water temperatures and large wildfires. As that happens well connected stream networks become even more important. The potential for conflict with human demands also will likely increase. Many people noted the extremely low flows in the Clearwater River and other streams this past summer, and some naturally responded by trying to dam those flows to retain traditional access to lakes or create pools for just cooling off.... unintentionally breaking connections in the streams. If climate change plays out as now predicted, we can anticipate other conflicts as the availability of water for human networks changes as well. If we want to maintain much of the natural stream resources we also value we’ll need to find more thoughtful solutions.

The importance of well connected stream networks in the Clearwater and Blackfoot watersheds has gained a lot of attention recently. The Lolo National Forest, University of Montana, Department of Fish Wildlife and Parks, and Northwestern Energy are collaborating on a study of bull trout migration patterns. They now have fish carrying small radio transmitters moving, or in some cases stranded, throughout the upper Clearwater basin. They are also engaged in an annual inventory of fall spawning fish to understand how populations fluctuate with year to year changes in flow, temperature and stream connection. In other work the Forest Service Rocky Mountain Research Station is collaborating with the U.S. Fish and Wildlife Service, the Lolo National Forest and others to study the survival of cutthroat populations above impassable road barriers. Their goal is to find out how small an area above a barrier is too small to support a healthy population in the face of environmental change.

The Clearwater Resource Council is collaborating in these and other projects to build our understanding and help manage stream networks throughout the area for the benefit of our communities both human and aquatic. Look for more discussion of these and related topics at monthly meetings.

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