Riparian ecosystems—At your service

BY TIM FRANKLIN*

Though we may not know the term, most of us recognize a riparian ecosystem as the lands adjacent to a stream supporting vegetation that is largely dependent on the stream: willows, alders, ash, cottonwoods, conifers, and a diverse array of shrubs, forbs, and grasses. The word riparian comes from the Latin *ripa*, "riverbank." Riparian areas are transition zones between the aquatic ecosystems and adjacent terrestrial ecosystems. Riparian systems provide a number of important ecological functions.

Streambank stabilization and channel morphology

The roots of riparian vegetation exert strong influences on streambank characteristics and the shape of the stream channel (channel morphology). Because roots hold soil in place, they help prevent erosion from flowing water and the loss of lands near streams to high-water events.

Large roots provide structural support and, where they are exposed to streamflow, form a more complex channel shape by causing scouring. Large trees that fall into the stream channel create pools, adding to stream complexity. The more complex the shape of the channel is, the more diverse the aquatic habitat and the better the stream hydrologic processes.

Hydrology

Riparian vegetation increases the hydraulic roughness of the streambanks. Roots that extend into the stream channel create scoured pools and increase the roughness of both the stream bed and streambanks.

These factors slow down streamflow, which increases the amount of time water spends in the watershed. The longer it takes water to flow through the watershed, the greater the opportunity for the adjacent land and vegetation to capture the stream's energy in the form of water and nutrients. And the more efficient the watershed is at capturing stream energy, the more vigorous and productive watershed ecosystems will be.

Nutrient cycling and water quality

Riparian vegetation takes up and sequesters many of the nutrients transported into the riparian ecosystem via groundwater or surface flows. Organic debris from the trees—leaves, fruits, twigs, and insect bodies—falls into the stream, providing carbon and nutrients that drive the biological communities of the stream. Through these processes, riparian vegetation can absorb or attenuate nutrient pulses from land uses on adjacent lands.

Unusually nutrient-rich groundwater or runoff, which can be caused by forest clear-cutting, fertilizer applications, or high numbers of livestock near a stream, can result in excess nutrients in the stream. High nutrient levels, especially of phosphate and nitrogen, can result in algal blooms and depletion of the levels of oxygen necessary to support aquatic life.

Riparian ecosystems also maintain or improve water quality by preventing bank erosion and capturing sediment in surface runoff. Fine sediments can bury spawning gravel for salmon, suffocating eggs or preventing fry from emerging after the eggs hatch. They also degrade habitat for the insects that salmon and other aquatic and terrestrial species depend on for food.

Shade provided by riparian canopies helps maintain cool temperatures required by anadromous fish and many of their food sources in the stream. Stream temperatures are a particular concern for the Applegate River and the lower reaches of many of its tributaries.

Wildlife habitat

Riparian ecosystems provide habitats for a disproportionately large number of birds, reptiles, amphibians, and mammals. Average bird densities are approximately twice as high in riparian areas as they are in upland habitats. In fact, riparian areas support more wildlife species than all other habitats combined. Healthy riparian ecosystems produce abundant food, water, and shelter and provide forested corridors for animal migration and dispersal.

The composition of the organic matter provided by the riparian vegetation influences the composition of the aquatic community. As the amount and type of riparian plant species change or are altered, the amount and type of insects, fish, amphibians, reptiles, birds, and mammals will also change.

Tim Franklin

***Tim Franklin**, an Applegate community member and Applegate Partnership & Watershed Council (APWC) project manager, wrote this article before he passed away in 2011. His article is timeless, and we felt his passion and expertise in riparian restoration should continue to be shared. Jakob Shockey has filled Tim's shoes at APWC and continues to follow and enhance the practices that Tim implemented.

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