

PROPOSED BANK STABILIZATION SOLUTIONS

Riprap

Riprap is the most common form of bank protection in the Pacific Northwest. It consists of armoring the bank with large angular rock. This technique is highly effective at stopping erosion over the long term, but it also results in permanent adverse impacts to fish habitat and lost large woody debris and sediment recruitment. If riprap is not installed properly, it also tends to (1) create downstream scour (erosion due to water) at the transition to the natural bank, and (2) undermine the toe of the slope. Cost for this method depends on the size and availability of rock appropriately-sized to withstand the hydraulic forces of the river.



Riprap on the Hoh River, 2014.

Stream Barbs



Row River near Cottage Grove, OR, 2011.

Barbs are structures installed at low elevations that extend into the channel of a stream or river from its bank and are angled upstream to redirect flow away from the bank in order to control erosion. They function by reducing water velocity near the bank. They also interrupt sediment transport, which usually leads to sediment build-up between the barbs. Barbs can be constructed of rock, large wood, or a combination of both. Barbs are generally one of the more cost-effective bank stabilization solutions since they typically minimize the need for bank protection in between the barbs. Other bank protection measures can be installed in between barbs to reinforce the stream bank.

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Groins used in a marine setting to control erosion.

Roughened Rock Toe

Roughened rock toe is a stabilization technique that prevents erosion at the toe of a streambank where erosion is typically the greatest along a river. They provide rock armoring at the most vulnerable point of the streambank while still allowing more natural techniques such as planting to be used on the upper streambank. Large woody debris is often incorporated into this technique to improve habitat value and further decrease water velocities adjacent to the bank. Similar to riprap, roughened rock toe will reduce sediment recruitment from the streambank as well as large woody debris recruitment.



Roughened toe near SR 520 in King County, Washington, 2014.



ELJ with dolosse on Skagit River looking upstream 2013.

Stream Groins

Groins are very similar to barbs, except that they usually extend above the high flow water surface elevation, and thus tend to change the cross-section of the stream more than barbs would by deepening and narrowing the channel. Groins can be constructed of rock, large woody debris, or both. Groins constructed of large woody debris typically allow more water to flow through them, which tends to create less scour and less channel reshaping than a rock groin. Groins can cause more significant changes to downstream and upstream erosion patterns than barbs. They are often used in the marine environment.

Log Crib Wall

Log crib walls are essentially large rectangular log boxes filled with rocks and soil. They are oriented parallel to the direction of streamflow. Planting spaces are formed in the wall by stacking the wall logs in alternating fashion. These structures are usually used in situations where streambanks are experiencing mass failure or significant erosion from subsurface drainage. While not as permanent as riprap, log crib walls will still last for decades. As a vertical structure, log crib walls are susceptible to forces such as undermining and settling of soils within and behind the wall. Log crib walls tend to be one of the more expensive stabilization methods to construct.



Log crib wall, Fanno Creek, OR.

Engineered Log Jam with Dolosse

Engineered log jams are collections of large woody debris that redirect flow and provide stability to a streambank or downstream gravel bar. Installation is patterned after stable, natural log jams and can be unanchored or anchored in place using man-made materials, such as dolosse, which are like large concrete jacks. Naturally-occurring log jams are usually formed by large trees with rootwads attached that stabilize and anchor other debris that stacks up against them.