

Salmon restoration guidebook

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Salmon numbers in the Pacific Northwest have been declining for more than a century and one of the major causes has been the decline and disturbance of their natural stream habitat. In 1992 a landmark study titled “Pacific Salmon at the Crossroads: Stocks at Risk from CA, OR, ID, and WA,” identified 214 wild spawning salmon stock that were at risk of extinction or of special concern. In response to this crisis, the Washington Department of Fish and Wildlife has determined that Northwest stream restoration is a vital and integral step essential for protecting and preserving the northwest’s wild salmon habitat and population:



*Coho salmon swimming upstream at Clear Creek.
Photo by Rick Marsch.*

Healthy riparian systems are vital to preserving salmon habitats. Working properly, they mitigate natural ranges of flow, sediment movement, temperature, and other variables, in what is termed “dynamic equilibrium.” All of these functions directly impact the quality of salmon habitat. Over the years, human activities have contributed to disturbance in the dynamic equilibrium of stream systems across the Pacific Northwest resulting in the loss of habitat.

Importance of native plants



Thornton Creek

A diverse and healthy native vegetation cover is the most important factor for a healthy “dynamic equilibrium” in a riparian zone, providing for salmon habitat in a plethora of ways. Three of the most important ways native plants contribute to a complete system are in the areas of water quality, stream structure and habitat.

Through an abundance of cover and shade provided by various heights of vegetation, water temperatures are kept cool for fish and oxygen levels stable. Other water quality issues can be affected by keeping peak flows regulated and keeping slopes stable, both effectively done by planting the right vegetation. A varied mixture of trees and other vegetation slow flood waters and runoff, filter out sediment and pollutants from runoff entering the streams, in turn keeping the waters quality high.

The rate of water entering a stream is an important factor affecting stream health. Higher than normal flows may cause bank erosion and subsequent loss of riparian habitat. Lower than normal water flows inhibit silt from being washed from the gravel beds on which many aquatic species rely for spawning.

Select slope stabilizing plants	
Vine Maple	<i>Acer circinatum</i>
Oceanspray	<i>Holodiscus discolor</i>
Tall Oregon-grape	<i>Nahonia aquifolium</i>
Black Hawthorn	<i>Crataegus douglasii</i>
Snowberry	<i>Symphoricarpos albus</i>

Besides increasing water quality, proper native vegetation contributes positively to the structure of a river. Large woody debris, rootwads and other downed wood create pools which are used for hiding and resting areas for salmon. Red Alder (*Alnus rubra*) has a very shallow root system and is prone to falling into streams making this tree a great source of pool forming woody debris.

Healthy and diverse plant communities provide food and shelter for over three hundred species of wildlife in Washington including the aquatic insects that provide a primary source of food for Northwest salmon. Different trees, shrubs and herbaceous species contribute to the biotic communities in different ways.



Red-flowering currant

Red alders are a very important species in restoring salmon streams. Streams near alder stands have been found to have higher levels of nitrogen, phosphorus, magnesium, calcium and iron, increasing microbial and algae populations, an important food of invertebrates, which is an important food for salmon. Furthermore, willows provide for habitat for aphids, another insect eaten by salmon.

A vertical canopy should consist of a variety of plants, both deciduous and evergreen. Deciduous plants provide litter and food for the insects that salmon feed on. Conifers provide shade year-round.

Select plants to attract wildlife	
Red-osier Dogwood	<i>Cornus stolonifera</i>
Red Alder	<i>Alnus rubra</i>
Black hawthorn	<i>Crataegus douglasii</i>
Red-flowering currant	<i>Ribes sanguineum</i>
Ninebark	<i>Physocarpus capitatus</i>

Invasive Species

When restoring riparian systems to a more natural state, it is important to remove invasive species that have more than likely taken over the area, and re-introduce native species.



English Ivy

Invasive species are detrimental to healthy plant communities in a variety of ways. Most invasive species are aggressive colonizers, completely monopolizing an area and allowing for little plant diversity. This plant diversity is important for attracting a variety of insects and animals to inhabit the area and for creating a varying structure of canopies and underbrush and root depths and types for better slope stability.

Both Himalayan Blackberry (*Rubus discolor*) and English Ivy (*Hedera helix*), two local invasives, negatively affect slope stability and in turn water quality

by increasing erosion on streamside banks thus resulting in more sedimentation in the river. This sheer dominance also disallows for a varying vertical structure that does not allow for shade thus increasing water temperature, another water quality issue, which is quite detrimental to salmon health and the insects that support salmon populations.

Planting Natives

Julie Whitacre, botanist Four Corner Nurseries provides these guidelines for site evaluation for planting native species in stream restoration. When choosing native trees and shrubs for restoration projects:



Vine Maple

- 1) Choose a reference site
- 2) Document existing vegetation on the project site
- 3) Look at hydrology in all seasons
- 4) Determine sun or shade levels
- 5) Determine soil type(s)
- 6) Establish height requirements or restrictions
- 7) Consider wildlife value of plants
- 8) Consider invasiveness of plants
- 9) Consider disturbance regime
- 10) Consider the availability of plant material and timing of availability

All of these suggestions will help you to plan a varied and functional stream site that will grow into a healthy self-sustaining ecosystem.

In conclusion, plants satisfy a variety of needs in a healthy riparian zone. Three of the most important goals to plan for in re-creating a stream ecosystem are good water quality, good stream structure and good habitat for wildlife and insects. Researching and choosing the right plants that satisfy all these needs are essential in the planning stage of a restoration project. Furthermore, restoring the dynamic equilibrium of a stream will ensure that aftercare of a restoration project will be more self-sufficient in the long run.

Photo Credits

All photos by Molly Deardorff unless indicated otherwise. Thanks for Rick Marsch for letting us use his salmon photos.

Sources

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Salmon Friendly Gardening from King County

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<http://dnr.metrokc.gov/wlr/pi/go-native/>.