

# APPENDIX C

## Duwamish Blueprint

November 6, 2014

### Duwamish Revegetation Recommendations

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Upland terrestrial and riparian vegetation should favor tree species historically present in the Duwamish (Collins and Sheikh, 2005), and a diversity of plants that will support a wide variety of terrestrial insects, which juvenile salmonids eat when available. Tree species composition should be shaped by historical information along with expected soil and moisture characteristics. Plants may need to be irrigated during the first two seasons until established.

“Streamside tree species being both relatively common and large in diameter . . . include Douglas fir (*Pseudotsuga menziesii*, which may actually have been partially or dominantly Sitka spruce, *Picea sitchensis*), western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), and black cottonwood (*Populus trichocarpa*). The valley floor was dominated in frequency (but not basal area) by red alder (*Alnus rubra*) and Oregon ash (*Fraxinus latifolia*) (Collins and Sheikh, 2005).”

Revegetation recommendations from the U.S. Forest Service (R. Beal, pers. comm.):

- Conduct adequate site preparation by fully removing invasive species (mechanical removal with crews and/or herbicide treatment with follow-up one or two times to grub roots or reapply, depending on species) within a defensible project boundary (extend projects so they are bordered by a road, trail, water terrace or other). Avoid soil disturbance after treatment to minimize growth of invasive seeds that may be deeper in the soil.
- Use reference / least disturbed sites to inform your plant species selection, stem densities, tree-shrub ratios to build a trans-successional palette (vs. one that is early or late seral only). Typical densities are between 2200-2600 stems per acre, with an interplant the following year or two as needed to address any loss.
- Plant in tight meandering rows that are conducive to maintenance (typically ring spray in early spring); mowing is not necessary if you use a cover crop of native low stature grasses.
- Use plant stock that is sourced from the area and grown to a specification that will facilitate the best chance for survival. We use 1-0 bare root stock that are contract grown to a certain shoot height and root length (varies by species). They fit easily into planting bags, which increases planting efficiency, and are most appropriate in terms of the root-to-shoot ratio.
- Plant handling is very important for survival – plant during cooler temperatures, no more than two days in the cooler, hydrate the roots before planting, and ensure roots do not dry out while staging.
- Professional planting crews are by far the most economical and effective in installing the plants properly and in large quantities. Typical seasoned crew members can plant 1,000 plants per day, per person, on average.

- Maintenance is key to the success of any planting project - the first two years are most intense, with either ring herbicide sprays or hand weeding around plants to keep weeds under control. It takes approximately 5-7 years to get a site to a free to grow state with little to no invasive cover <5%, on average.
- Irrigation is not generally needed; but it may be on drier sites. Interplanting (planting at high densities) is cheaper than installing and maintaining irrigation in most cases.
- Plant tubes and plant fencing should be needed only where the site is small and plants cannot keep up with the grazing. Plant tubes and fencing often end up as trash in the rivers or crush plants during floods. The plant palette selected can help with beaver/nutria damage, the ring sprays help with rodents, and with enough plants on site, wildlife have enough to eat without wiping out the whole lot (intense browse on a few plants, vs. moderate browse on a lot of plants). Tolerate some plant damage if plants can still become established.
- Monitoring should focus on the trajectory of riparian condition recovery - not on percent survival of individual plants. Stem density, species diversity, growth, native cover composition, and invasive cover are more representative of what is going on in the riparian area vs. a survival count. Plus, it is typically impossible to tell after 3-5 years which were planted vs natural regeneration.
- With all the costs accounted for (project management, plant supplies, contractors) the typical site costs 5-10K per acre to establish. Note that it is often much less costly to revegetate as a best management practice rather than as a mitigation or other requirement, where ecosystem services accounting is required, with costs for risk factors, legal, payments to landowners, overall program costs (middle men), extensive monitoring, reporting, verification, etc.