Urban Habitat Restoration
Notes from 30 Years of Projects

North Creek, Bellevue
Meadowbrook Pond, Seattle
Madrona Park Creek, Seattle
PART TWO: Construction & After

- Native Plants - think plant communities & succession; don't forget native forbs esp lupine
- Restoration-Style Planting Plans
- Preventative Maintenance – incorporate access & other strategies into designs
- Construction – be involved if possible; convey design intent; answer questions
- Post-construction Monitoring & Maintenance – written plan important to inform & empower others; strike right balance of nurture vs control
Why Native Plants

- Pacific NW native plants are adapted to our region's unique low summer rainfall precipitation pattern, as well as its overall climate and soils.
- Using NW native plants instead of ornamentals results in reduced need for supplemental watering, fertilization and pest control.
- Conclusion: Water conservation and chemical-free or low maintenance goals are better achieved with natives than ornamentals.
To address “why native plants” over ornamentals, compare the annual precipitation charts for Beijing, China, Columbia, South Carolina & Seattle.

Precipitation patterns vary by ecoregion & habitat.

NW China and SE USA – regions which provide many of our ornamental plants – are temperate broadleaf and mixed forest habitats with high – moderate summer rainfall.

Western Washington is a temperate coniferous rain forest. Rainfall here is lowest in summer / highest in fall & winter – the opposite of the other two regions.

What happens after planting ornamentals – from these & other higher summer rainfall regions – in the Pacific NW?

Answer: Supplemental summer watering to meet ornamental plant needs.
But our native plants are so limiting

Au contraire, mes amis! Our region (incl Oregon – N California) offers a much wider array of hardy, attractive plants – from trees to perennial wildflowers – than most realize. And more & more natives are becoming available from local nurseries.

Western Larch (Larix occidentalis)

Oval-leaf Blueberry (Vaccinium ovalifolium)

Green False Hellebore (Veratrum viride)

Cascade or Coast Penstemon (Penstemon serrulatus)

Subalpine Plant Community Species

Images: google.com sources except Sitka mt ash

Sitka Mountain Ash (Sorbus sitchensis)
Increase your knowledge of NW native plants

Learn about Pacific NW plant communities* vs individual plant species

- Research specific native plant communities* – such as Wet Meadow, Riparian or Subalpine – to discover plants well-suited to rain gardens, bioswales or other LID & natural drainage situations

- Or Western Washington Prairie, Oak Savannah or Serpentine Soil plant communities to discover plants well-suited to green roofs and other droughty, poor, thin soil or tough urban situations

Western Washington Prairie: Visualize as a green roof?
Camas, Idaho fescue, violets, prairie lupine, grassland saxifrage, checker lily, balsamroot, sea thrift & more

*Plant Community = Plants co-existing in a shared habitat or environment. Similar: Plant Association.
Shop for natives at the growing number of local native plant nurseries

- Link to King County listing of native plant nurseries

Serpentine Grassland w/ California Goldfields (Lasthenia californica)

Siskiyou Buckwheat (Eriogonum siskiyouense)

Siskiyou Fireweed (Epilobium siskiyouense)

Skepentine Dune Habitat w/ Sedum

Serpentine Soil Plant Communities & Species
Note that many of these plants originate from the Siskiyou Mountains in Oregon

Images: google.com sources
Upland plant communities: oak savannah, grassland, dry slopes, serpentine

Camas (*Camassia quamash*)

Garry Oak (*Quercus garryana*)

Shrub Tan Oak (*Lithocarpus densiflorus echinoides*)

Nodding Onion (*Allium cernuum*)
Wetland plant communities: bog, forested wetland

Bog Laurel (*Kalmia microphylla v occidentalis*)

Bog Rosemary (*Andromeda polifolia*)

Labrador Tea (*Ledum groenlandicum*)

Deer Fern (*Blechum spicant*)
Western Azalea (*Rhododendron occidentale*)

Subalpine Spirea (*Spiraea splendens* or *densiflora*)

California Bay dwarf form (*Umbellularia californica*)

Swamp Currant, Black Gooseberry (*Ribes lacustre*)
Wetland plant communities: wet meadow

Henderson’s Checkermallow (*Sidalcea hendersonii*)

Oregon Iris (*Iris tenax*)

White Shooting Star w/ Nodding Onion behind (*Dodecatheon dentatum* w/ *Allium cernuum*)

Fox Sedge (*Carex vulpinoidea*)
Wetland plant communities: wet meadow, emergent wetland

Turfted Hairgrass (*Deschampsia cespitosa*)

Big-headed Sedge (*Carex pachystachya*)

Pacific Silverweed (*Potentilla pacifica*)

Daggerleaf Rush (*Juncus ensifolius*)
**Plant Quantity Formulas:**

Step 1 - planting area x % of coverage of layer / square of spacing = total plants in layer

Step 2 – Total plants in layer x % of each species in layer mix
Preventative Maintenance Measures

- Maintenance access points (ramps, gates, laydown areas, etc.) included in design plans
- Compost amendment as needed / desired
- Cardboard sheet mulch & arborist chips – will reduce weeds & weeding for 1st year or so, conserve water and promote plant survival
- All habitat layers planted at spacings that allow for mature size with no pruning needed
- Quick cover, nitrogen-fixing lupine ( & other native forbs) overseeded as last step
- Temporary irrigation for plant establishment
Lupines!
Quick cover, nitrogen-fixing, low-level shade & aesthetics

Madrona Park Creek, Seattle
Cromwell Park, Shoreline
140th 1:1 Reinforced Slope, Renton
Meadowbrook Pond, Seattle
Native Forb, Upland Seed Mix #2: Native Lupine-Wildflower Seed Mix, for Horse Creek Channel Upland and Transition Zone Planting Areas, as shown on plans, shall be Composed of the following species, specified as follows:

<table>
<thead>
<tr>
<th>BOTANICAL NAME; COMMON NAME</th>
<th>OZ/ACRE</th>
<th>% BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achillea millefolium; yarrow</td>
<td>0.8</td>
<td>1%</td>
</tr>
<tr>
<td>Achlys triphylla; vanilla leaf</td>
<td>3.2</td>
<td>4%</td>
</tr>
<tr>
<td>Anaphalis margeritaceae; pearly everlasting</td>
<td>0.8</td>
<td>1%</td>
</tr>
<tr>
<td>Aster chilensis; Pacific aster</td>
<td>1.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Aquilegia formosa; sitka columbine</td>
<td>1.6</td>
<td>2%</td>
</tr>
<tr>
<td>Dicentra formosa; Pacific bleeding heart</td>
<td>1.6</td>
<td>2%</td>
</tr>
<tr>
<td>Fragaria vesca v. bracteata; woodland strawberry</td>
<td>1.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Lupinus latifolius; broadleaf lupine</td>
<td>20.0</td>
<td>25%</td>
</tr>
<tr>
<td>Lupinus polyphyllus; many leaved lupine</td>
<td>20.0</td>
<td>25%</td>
</tr>
<tr>
<td>Lupine rivularis; streambank lupine</td>
<td>20.0</td>
<td>25%</td>
</tr>
<tr>
<td>Smilacena racemosum; false solomon’s seal</td>
<td>3.2</td>
<td>4%</td>
</tr>
<tr>
<td>Solidago canadensis; Canada goldenrod</td>
<td>1.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Tellima grandiflora; fringe cup</td>
<td>1.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Tierella trifoliata; foamflower</td>
<td>1.2</td>
<td>1.5%</td>
</tr>
<tr>
<td>Trillium ovatum; western trillium</td>
<td>2.8</td>
<td>3.5%</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>80.0</strong>*</td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Seed Mix Application Rate: 5 LBS/AC
Maintenance Focus over Life of Project

- Year 1 – Summer watering for plant survival; replace dead plants; some weeding
- Year 2 & 3 – Continue watering; more weeding & re-mulching as needed; replace dead plants or 2nd phase planting
- Year 4-6 – Continue weeding & mulching; less water needed except for replacement or subsequent phase plantings
- Year 7-11+ - Project adolescence is time for thinning, limbing up & other adjustments for visibility, safety & other site considerations
North Creek Relocation: Example of Little to No Maintenance

Topography, swales, creek channels & boardwalk all intact; Native vegetation needs help.
Viewlands Cascade: Example of Good Maintenance
Native vegetation properly limbed up, thinned and cut back for clearances & visibility.
Maintenance Tasks: Nurture Approach

- Cardboard Sheet Mulching
- Arborist Chip Mulching
- Hand Weeding
- Drip & Other Temporary Irrigation
Useful maintenance guide for any new planting, available online at http://www.seattle.gov/util/cs/groups/public/@spu/@usm/documents/webcontent/spu02_020021.pdf

A Care Manual for Natural Drainage Systems

What's in this Manual?
This manual includes helpful tips for major landscape maintenance tasks needed to establish and nurture Natural Drainage System plantings, or to maintain any residential yard, such as...

Watering
Answers questions about how much and how often plants need to be watered.

Weeding
Answers questions about which plants are weeds and how to minimize weeding.

Mulching
Answers questions about why mulch is good, how to mulch and with what materials.

Other Gardening Tasks
Other maintenance tasks include trash removal, lawn care, fall leaves, pruning, fertilizing and pest/disease control.

Landscape Maintenance Calendar & Guide Card
Summarizes tasks and tips, and illustrates common weeds likely to sprout. Take the laminated version, located in the back pocket of this guide, outside with you while gardening or post it in your home or garden shed.

Plant Identification
Illustrates a typical planting cross section, and provides photos and descriptions of plants installed for the Natural Drainage System in your neighborhood.

Resources
Bibliography, web sites, contact numbers.

Additional publications included in the manual:
Natural Yard Care
Natural Lawn Care
Smart Watering
Saving Water with Soaker Hoses

Natural Pest, Weed & Disease Control
Growing Healthy Soil
Get to Know Your Soil
Choosing the Right Plants
Maintenance & Monitoring Plans
Important Content

- Permit & Other Regulatory Requirements
- Description of Project & Design Intent
- Preventative Maintenance Measures included
- General Monitoring & Maintenance Approach
- Detailed Monitoring & Maintenance Tasks
- Figures – Maintenance Access Plan, Summary Calendar of Maintenance & Monitoring Tasks
- Appendices – Environmental Permits, Design Plans, Special Provisions
# Maintenance & Monitoring Plans
## Sample Summary Calendar from Horse Creek Channel Plan

### Horse Creek Channel Monitoring and Maintenance Calendar & Guide

<table>
<thead>
<tr>
<th>LANDSCAPE TASKS</th>
<th>WATERING &amp; PLANT REPLACEMENT Year 1 thru Long-term</th>
<th>WEEDING Year 1 thru Long-term</th>
<th>MULCHING Year 1 thru Long-term</th>
<th>OTHER LANDSCAPE TASKS Year 1 thru Long-term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPRING:</strong> March April May</td>
<td>Turn on irrigation systems in April – May. Year 1: If hot &amp; dry, one inch, weekly — every other week in late spring. Years 2 – 5+ &amp; Long-term: Deep water stressed plants only in late spring. Year 1 – 5: Replace emergents, April – May</td>
<td>Year 1: Monitor &amp; do monthly. Years 2 – 5: Monitor &amp; do in early spring (or late winter). Long-term: Monitor &amp; do in early spring. Weed well in spring to save time in summer.</td>
<td>Years 2 – 5: Monitor &amp; do to maintain 3–4 inches of arborist wood chip mulch. Mulching in spring (or winter) saves weeding and watering time in summer. Long-term: Where ground cover filling in, add thin layer (dusting) of mulch &amp; broom in.</td>
<td>Years 1 – 5 &amp; Long-term: Pick up trash and remove graffiti as needed. Long-term (early spring): North of SR 522, prune for visibility and safety, as needed. South of SR 522, prune only dead or broken branches to remove windfall from paths.</td>
</tr>
<tr>
<td><strong>SUMMER:</strong> June July August</td>
<td>Year 1: One inch, weekly — every other week depending on site conditions. Year 2 – 3: One inch, every other week — monthly, depending on site conditions. Year 4 – 5+: Monthly – as needed, esp during heat or drought &amp; depending on site conditions. Long-term: Deep water stressed plants only.</td>
<td>Years 1 – 5: Monitor and do monthly or as needed. Long-term: Monitor and do as needed.</td>
<td>Years 1 – 5 &amp; Long-term: Mulch in spring - or fall or winter!</td>
<td>Years 1 – 5 &amp; Long-term: Pick up trash and remove graffiti as needed. Install beaver-exclusion fencing as needed.</td>
</tr>
<tr>
<td><strong>FALL:</strong> September October</td>
<td>Year 1 – 5+: If rain soaks 12–18 inches deep, relax. If not, deep water plants – especially evergreens – to help plants resist drying from winter sun and wind. Long-term: No watering usually needed. Winterize irrigation systems in October.</td>
<td>Year 1 thru Long-term: Do one thorough weeding and clean up during fall.</td>
<td>Years 1 – 5 &amp; Long-term: Leave or use fall leaves as mulch around plants, and keep down winter weeds. Or compost leaves and add in spring.</td>
<td>Years 1 – 5 &amp; Long-term: Pick up trash and remove graffiti as needed. Remove leaves from sidewalks &amp; paths. Leaves may remain on beds as mulch.</td>
</tr>
<tr>
<td><strong>WINTER:</strong> November December January February</td>
<td>No watering needed. Year 1 – 5: Replace plants as needed. Replace emergents, Oct – Nov, although April – May preferred. See SPRING.</td>
<td>Years 1 – 5: Monitor &amp; do monthly or as needed, esp in late winter. Long-term: 1–2 times during winter months, esp in late winter.</td>
<td>Years 2 – 5 &amp; Long-term: Alternative season for mulching as needed. See also SPRING &amp; FALL.</td>
<td>Years 1 – 5 &amp; Long-term: Pick up trash and remove graffiti as needed. Long-term (late winter): North of SR 522, prune for visibility and safety, as needed. South of SR 522, prune only dead or broken branches to remove windfall from paths.</td>
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<tr>
<th>CHANNEL TASKS</th>
<th>HABITAT STRUCTURE MONITORING / REPAIR</th>
<th>SEDIMENT / DEBRIS REMOVAL</th>
<th>STREAM FLOW / WATER QUALITY MONITORING</th>
<th>CULVERT &amp; BRIDGE MONITORING / MAINTENANCE</th>
</tr>
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<tr>
<td><strong>SPRING:</strong></td>
<td>Visual Inspection, esp after storms</td>
<td>Only as determined to be needed</td>
<td>To be determined</td>
<td>Visual Inspection, esp after storms</td>
</tr>
<tr>
<td><strong>SUMMER:</strong></td>
<td>Visual Inspection, esp after storms</td>
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Resources

Native Plant Communities


Natural History of the Pacific Northwest, Arthur Kruckeburg

Gardening with Native Plants of the Pacific Northwest, Arthur Kruckeburg

Plants and Animals of the Pacific Northwest, Eugene Kozloff

Plants of the Pacific Northwest Coast, Pojar & MacKinnon

A Manual of Native Plant Communities for Urban Areas of the Pacific Northwest, Charles Anderson
http://www.wnps.org/landscaping/herbarium/native_alliance_urban_complete.pdf

Why Landscape with Native Plants web page by Washington Native Plant Society
http://www.wnps.org/landscaping/landscaping_why.html


Northwest Habitat Institute web page on native habitat types http://www.nwhi.org/index/habdescriptions

Stream Morphology

Water in Environmental Planning, Dunne & Leopold

Resources

**Stormwater Design, Rain Gardens & Rain Barrels**

http://www.psparchives.com/our_work/stormwater/stormwater_resources.htm#bio

Link to Puget Sound Partnership's Stormwater Resources page containing wealth of links to great information on Green Infrastructure.


http://www.seattle.gov/transportation/rowmanual/manual/6_4.asp Link to Seattle Public Utilities page summarizing Natural Drainage Systems, with links to more detail

http://www.metro-region.org/index.cfm/go/by.web/id=25102

http://www.metrofieldguide.com/?p=86


http://www.seattlepi.com/nwgardens/253820_raingarden31.html


**Landscape Maintenance**

Practically Easy Landscape Maintenance: A Care Manual for Natural Drainage Systems, Seattle Public Utilities