Low Impact Development
Plant Selection and Propagation for LID
May 14, 2013
How to Participate in a Webinar

How Can Nurseries Prepare to Meet the Native Plant Needs of LID?

Associate Ecologist
Herrera Environmental Consultants
Using Chat

How Can Nurseries Prepare to Meet the Native Plant Needs of LID?

Associate Ecologist
Herrera Environmental Consulting
Polling

1. are you there?
   a. yes
   b. no

The poll has ended.
Patty Anderson
Executive Director
www.walp.org

Breanne Chavez
Executive Director
www.wsnla.org
Look for Upcoming Articles In:

Happy Earth Month!
low impact development

Plus, 2013 NW Flower & Garden Show Picture Review!
Low Impact Development

Introduction
Low Impact Development (LID)

Is a design, planning and engineering approach to managing stormwater runoff

LID includes:
- Rain gardens
- Bioretention
- Permeable pavement / pavers
- Green roofs
- Rain water harvesting
- Green walls
Stormwater Runoff

- **Impervious Surfaces**
  - Roads
  - Roof tops

- **Pollutants**
  - Oil
  - Heavy metals
  - Silts

- **Affected Natural Areas**
  - Wetlands
  - Streams
  - Water bodies
Stormwater Runoff Can Lead To:

- Erosion
- Pollution of Soils and Water Bodies
- Sedimentation to Water Bodies
- Combined Sewage Overflows
- Loss of Wildlife Habitat
LID principles

Conserve
- trees
- plants
- healthy soils

Minimize
- impervious surfaces
- native vegetation loss
- stormwater runoff
Benefits of LID

- Reduces and slows stormwater runoff
- Protects water quality
- Restores ecosystem services including:
  - Water infiltration
  - Groundwater recharge
  - Pollution interception and filtration
  - CO2 sequestration
  - Protection of habitat for beneficial wildlife

Hydrologic (water) cycle
LID Strategies That Use Plants

- Rain Gardens
- Bioretention Facilities
- Green Roofs or Walls
- Some Permeable Pavers
Stormwater is Regulated

- Clean Water Act
- National Pollution Discharge Elimination System (NPDES)
- Washington State Department of Ecology
- Municipal permits
Regulatory Changes are Coming

• Western Washington - LID will be required in new development and re-development
• Eastern Washington - LID allowed
• Timeline depends on population size
  • Earliest: 2015 (Seattle and surrounding cities)
  • Latest: 2018
Give Input

Get in touch with your local officials while regulations are being made:

http://www.mrsc.org/research/research.aspx
Peggy Gaynor

http://www.gaynorinc.com/

Thornton Creek Water Quality Channel at Northgate

Madrona Park Creek Daylighting and Restoration
Len Ballek

- Ecologist at Herrera
- Co-founder of Bitterroot Restoration
- Forestry Technician with the USDA
- lballek@herrerainc.com
Plants for Low Impact Development

Presented by:

Peggy Gaynor, FASLA
Principal Landscape Architect

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Sustainability Acronyms, Trademarks & Terms

What do they all mean?

LID
Green Infrastructure

LEED
Leadership in Energy & Environmental Design

RainWise

SITES™
Sustainable Sites Initiative

Eco-friendly

Natural Drainage Systems
It's all about WATER

- Protecting natural water bodies – streams, lakes, rivers, aquifers and ultimately Puget Sound
- Managing quantity & quality of urban stormwater runoff
- Conserving water

For Landscape Industry, this means:

- Efficient irrigation systems
- Reduced, temporary or no landscape irrigation
- Less lawn
- More native and drought-tolerant plants
- Onsite drainage treatment features like rain gardens, bioswales & green roofs
- Organic products & integrated pest management instead of chemicals used in landscape maintenance
How do plants contribute to LID

- Absorb, filter, detain and transpire stormwater runoff & rainfall
- Intercept rainfall before it reaches the ground - particularly evergreen trees
- Use of drought-tolerant and native plants reduce need for irrigation & conserve water
- Mitigate urban heat island effect, saving energy (air conditioning) & water (irrigation)
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?
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.
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.

Subalpine Plant Community Species

Western Larch (Larix occidentalis)

Oval-leaf Blueberry (Vaccinium ovalifolium)

Green False Hellebore (Veratrum viride)

Cascade or Coast Penstemon (Penstemon serrulatus)

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.
Stock your “library” with native ecosystem and plant resources

A Short List of Resources:

- Natural Vegetation of Oregon and Washington, Franklin and Dyrness
- 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](http://www.wnps.org/landscaping/herbarium/native_alliance_urban_complete.pdf)
- Why Landscape with Native Plants web page by Washington Native Plant Society
- Library, book list web page by Washington Native Plant Society, Columbia Basin Chapter
  [http://www.wnps.org/cbasin/library.html](http://www.wnps.org/cbasin/library.html)
- Northwest Habitat Institute web page on native habitat types
  [http://www.nwhi.org/index/habdescriptions](http://www.nwhi.org/index/habdescriptions)
Shop for natives at the growing number of local native plant nurseries

- Link to King County listing of native plant nurseries

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

Images: google.com sources

Serpentine Grassland w/ California Goldfields (Lasthenia californica)

Siskiyou Buckwheat (Eriogonum siskiyouense)

Siskiyou Fireweed (Epilobium siskiyouense)

Serpentine Dune Habitat w/ Sedum
Planting a rain garden or bioswale can be more complex, diverse & interesting from an ecosystem and plant community perspective.

Environmental and hydrologic conditions likely vary from top to bottom. Select native species from dryland to wetland plant communities to thrive in the various zones & conditions of a natural drainage feature.
Peggy's “In Progress” Rain Garden

Natives from bog, wet meadow, riparian, subalpine, oak savannah & serpentine soil plant communities. Site Conditions; Sandy, sun – part shade.

Top of slope / Upland zone:
garry oak (*Quercus garryana*)
shrub tan oak (*Lithocarpus densiflorus var. echinoides*)
nodding onion (*Allium cernuum*)
Canada goldenrod (*Solidago canadensis*)

Top or Side slopes / Transition zone:
western azalea (*Rhododendron occidentale*)
western columbine (*Aquilegia formosa*)
nodding onion (*Allium cernuum*)
Oregon iris (*Iris tenax*)
Henderson's checkermallow (*Sidalcea hendersonii*)

Bottom / Wetland zone:
deer fern (*Blechum spicant*)
fox sedge (*Carex vulpinoidea*)
big laurel (*Kalmia microphylla*)
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 (*Blechnum 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*)
Planting a rain garden or bioswale can be more complex, diverse & interesting from an ecosystem and plant community perspective.

Environmental and hydrologic conditions likely vary from top to bottom. Select native species from dryland to wetland plant communities to thrive in the various zones & conditions of a natural drainage feature.
# PACIFIC NW NATIVE PLANT PALETTE

## DECIDUOUS TREES
- **Paper Birch** (Betula papyrifera) **T/W**
- **Oregon Ash** (Fraxinus latifolia) **T/W**
- **Quaking Aspen** (Populus tremuloides) **T**
- **Garry Oak** (Quercus garryana) **U**

## EVERGREEN TREES (Coniferous & Broadleaf)
- **Tan Oak** (Lithocarpus densiflorus) **U**
- **Douglas fir** (Pseudotsuga menziesii) **U**
- **Pacific Yew** (Taxus brevifolia) **U/T**
- **Western Hemlock** (Tsuga heterophylla) **T**
- **Shore Pine** (Pinus contorta v contorta) **U**
- **Canyon Live Oak** (Quercus chrysolepis) **U**
- **Western Red Cedar** (Thuja plicata) **T/W**
- **California Bay** (Umbellulaira californica) **T/W**

## DECIDUOUS UNDERSTORY TREES
- **Vine Maple** (Acer circinatum) **T/W**
- **Douglas’ Maple** (Acer glabrum) **U**
- **Black Hawthorn** (Crataegus douglasii) **T/W**
- **Pacific Dogwood** (Cornus nuttallii) **U/T**
- **Western Hazelnut** (Corylus cornuta) **U**
- **Pacific Crab** (Malus fusca) **T/W**
- **Bitter Cherry** (Prunus emarginata) **T**
- **Cascara** (Rhamnus purshiana) **T**
- **Red Elderberry** (Sambucus racemosa) **T**

## BROADLEAF EVERGREEN SHRUBS
- **Bog Rosemary** (Andromeda polifolia) **W**
- **Silk-tassel Bush** (Garrya elliptica) **U**
- **Labrador Tea** (Ledum groenlandicum) **W**
- **Bog Laurel** (Kalmia microphyllum) **W**
- **Shrub Tan Oak** (Lithocarpus densiflorus v echinoides) **U**
- **Oregon box** (Pachistima myrsinites) **U**
- **Oregon Grape** (Mahonia aquifolium & cultivars) **U**
- **Pacific wax myrtle** (Myrica californica) **U/T**
- **Huckleberry Oak** (Quercus vaccinifolia) **U**
- **Pacific Rhododendron** (Rhododendron macrophyllum) **U/T**
- **Evergreen Huckleberry** (Vaccinium ovatum) **U/T**
- **Dwarf California Bay** (Umbellulaira calif. dwarf form) **T**

## TALL DECIDUOUS SHRUBS (6 – 15+ feet)
- **Western Serviceberry** (Amelanchier alnifolia) **U/T**
- **Redtwig Dogwood** (Cornus sericea) **T/W**
- **Western Mock Orange** (Philadelphus lewissii) **U/T**
- **Twinberry** (Lonicera involucrata) **T/W**
- **Western Ninebark** (Physocarpus capitatus) **T/W**
- **Red-Flowering Currant** (Ribes sanguineum) **U/T**
- **Himalayan Blackberry** (Rubus spectabilis) **W**
- **Baldhip Rose** (Rosa gymnocarpa) **U**
- **Peafruit or Wild Clustered Rose** (Rosa pisocarpa) **T/W**
- **Nootka Rose** (Rosa nutkana) **T**
- **Sitka Mountain Ash** (Sorbus stenchnsis) **U**
- **Highbush Cranberry or Mooseberry** (Viburnum edule) **W**

## LOW DECIDUOUS SHRUBS (2 – 6 feet)
- **Swamp Currant** (Ribes lacustre) **W**
- **White or Birchleaf Spirea** (Spirea betulifolia) **U/T**
- **Sabalpine Spirea** (Spirea splendid or densiflora) **W**
- **Shrubby Cinquefoil** (Potentilla fruticosa) **T/W**
- **Western Azalea** (Rhododendron occidentalis) **U/T**
- **Snowberry (Symphoricarpus albus)** **U/T/W**
- *** May get taller in shade**

## GROUND COVERS
- **Maidenhair Fern** (Adiantum pedatum) **W**
- **Wild Ginger** (Asarum caudatum) **U/T**
- **Kinnikinnick** (Arctostaphylos uva-ursi) **U**
- **Lady Fern** (Athyrium felix-femina) **W**
- **Deer Fern** (Blechnum spicant) **W**
- **Tufted Hairgrass** (Deschampsia cespitosa) **W**
- **Strawberry (Fragaria species) **U/T**
- **Twinflower** (Linnaea borealis ssp longiflora) **U/T**
- **Long-leaved Mahonia** (Mahonia nervosa) **U/T shade**
- **Creeping Mahonia** (Mahonia repens) **U/T sun**
- **False Lily-of-the-valley** (Maianthemum dilatatum) **T/W**
- **Western Starflower** (Trientalis latifolia) **U/T**
- **Inside-out Flower** (Vaccinium virgareum) **U/T**

## PERENNIALS
- **Western columbine** (Aquilegia formosa) **T/W**
- **Nodding Onion** (Allium cernuum) **U/T**
- **Pearly Everlasting** (Anaphalis margaritacea) **U**
- **Sea Pink or Thrift** (Armeria maritima) **U/T**
- **Goatsbeard** (Aruncus sylvestris) **U**
- **Bunchberry** (Cornus canadensis) **U/T**
- **Camas** (Camassia quamash) **U/T/W**
- **Shooting Star** (Dodecatheon dentatum, hendersonii) **T/W**
- **Shows Fleabane** (Erigeron speciosissum) **U**
- **Tiger Lily** (Lilium columbianum) **U/T**
- **Barrett’s Penstemon** (Penstemon barrettiae) **U**
- **Cascade Penstemon** (Penstemon serrulatus) **T/W**
- **Douglas’ Iris** (Iris douglasiana) **U/T**
- **Oregon Iris** (Iris tenax) **U/T**
- **Henderson’s Checkermallow** (Sidalcea hendersonii) **T/W**
- **Blue-eyed Grass** (Sisyrinchium idahoensis) **T/W**
- **Yellow-eyed Grass** (Sisyrinchium californicum) **T/W**
- **False Solomon’s Seal** (Smilacena racemosa, stellata) **T**
- **Fringecup** (Tellima grandiflora) **T/W**
- **Youth-on-age** (Tolmiea menziesii) **T/W**
- **Trillium** (Trillium ovatum) **U/T**

## WETLAND EMERGENTS
- **Big-headed sedge** (Carex pachystachya) **T/W**
- **Dewey’s Sedge** (Carex deweyana) **W**
- **Fox Sedge** (Carex vulpinoeidea) **W**
- **Slough Sedge** (Carex obnupta) **W**
- **Sawbreak Sedge** (Carex sippata) **W**
- **Daggerleaf Rush** (Juncus ensifolius) **W**
- **Pointed Rush** (Juncus oxysermis) **W**
- **Pacific Silverweed** (Potentilla pacifica) **W**
- **Small-fruited bulrush** (Scirpus microcarpus) **W**
How Can Nurseries Prepare to Meet the Native Plant Needs of LID?

Associate Ecologist
Herrera Environmental Consultants
Len Ballek

• Greenhouse nursery work through High School and College

• B.S. in Forest Resource Management and Restoration Ecology Certificate from the University of Idaho

• Sixteen years with USFS in site examinations, habitat typing/native plant ID, reforestation surveys

• Bitterroot Restoration 1987-2006 nursery production of native plants and restoration services

• Herrera Environmental Consultants 2006-Present- native plant restoration planning, oversight and training
Personal Interests in Nursery Production and Native Plants
Presentation Outline

• Natives vs. Non Natives
• Importance of Seed Sources
• Challenges in Growing Native Plants
• Types of Plant Stock
• Additional Resources
• Wider Variety of Natives
• Final Thoughts
Natives vs. Non Natives
Why Use Natives

• Preserve our natural heritage for future generations
• Provide appropriate habitat for birds wildlife and native pollinators
• Native plants are becoming more popular with homeowners
• Native plants are recommended for LID applications by regulators
Why Move Away From Non-Natives?

• Non-natives generally require intensive input of fertilizer, pesticides and maintenance
• Non-natives are not adapted to harsh conditions such as periodic drought and/or inundation
• Can become invasive because of lack of natural controls
• Non-natives result in loss of habitat and bio-diversity
“Invading non-indigenous species in the United States cause major environmental damages and losses adding up to more than $138 billion per year. There are approximately 50,000 foreign species and the number is increasing. About 42% of the species on the Threatened or Endangered species lists are at risk primarily because of non-indigenous species”
Importance of Seed Sources

• Growing cycles tied to local climate
• Natural resistance to local insects and disease
• Habitat and food in the critical seasons
• Prevent contamination of local gene pool
Choosing Appropriate Seed Sources
EPA Ecoregions Map

2. Puget Lowland
Challenges in Growing Native Plants
Germination of Native Plant Seeds

- Native plants are not like tomatoes!!
- Each species has it’s own requirements
- Some hard seeded species
- Light dependent species
- Seed stratification
Nootka Rose Seed Cold Stratification
Seed Scarification With Rock Tumbler
Acid Scarification of Seeds
Examples of Seed Germination Requirements

• **Birch** - requires light for germination - no stratification
• **Red osier dogwood** - cold stratification 90 days
• **Nootka rose** – cold stratification 90 days
• **Snowberry** - acid scarification - warm stratification 30-60 days - cold stratification 120-180 days

*Data from “Seeds of Woody Plants in North America” Young, Dioscorides Press*
Challenges in Cultivating Native Plants

- Widely differing water usage
- Day length issues
- Dependence upon soil microorganisms
- Disease problems from growing in moist environments
Differing Irrigation Needs

- Use well drained media for dryland species
- Group according to common water needs
- Shields to prevent overwatering edges
- Programmable irrigation booms
- Hand water small lots
Beneficial Soil Microorganisms

• Mycorrhizal fungi (most native plants)
• Rhizobium (legumes)
• Frankia (birch, alder)
• Other organisms
Types of Plant Stock

Traditional Nursery Containers

- Widely available
- Problems with root spiraling
- Poor root to shoot ratio
- Shallow depth of container
Tubelings

- Less expensive than traditional containers
- More expensive than bare root
- Better survival than both
- Smaller initial top but rapid growth and establishment.
Container Grown Wetland Plants

- Grown in small inexpensive containers
- Install large numbers quickly
- Excellent survival if proper hydrology exists
- Plant when actively growing
Plant Stock - Bare Root

- Relatively inexpensive
- Easy to install
- No problems with root Spiraling
  - Require consistent moisture
  - Careful plant handling is critical
  - Limited season of availability and installation
Plant Stock - Cuttings

- **Advantages:**
  - Low cost

- **Constraints:**
  - Restricted collection and planting period
  - Storage time is limited
  - Labor intensive
  - Limited species
  - Low survival
Ball and Burlap

- Immediate visual impact
- Difficult to work with
- Expensive
- Some poor survival
Root Control Bags

• Immediate visual impact
• Easy to work with
• Less expensive than B&B
• Better survival than B&B
Plants for Green Roofs

• Sedums are the most common species because they can live in a lightweight shallow growing medium
• Can be grown as plants or mats
• Future designs may include other types of plants
Additional Resources and Skills for native plant production

• Seed storage and treatment facilities
• Effective seed source tracking system
• Programmable photoperiod light system
• Efficient and flexible irrigation system
• Automatic and programmable vent system
• Trained seed treatment staff
• Training in the use of inoculums for beneficial soil microorganisms
• Integrated pest management training
Photoperiod Lights
Traveling Boom Irrigation System
Venting Systems To Control Humidity
Wider Variety of Native Plants

**Suggested additional shrubs**
- Kinnikinnik (Arctostaphylos uva-ursi)
- Oregon box (Pachystima myrsinites)
- Twin flower (Linnaea borealis)
- Labrador tea (Ledum groenlandicum)
- Mt. Balm (Ceanothus velutinus)
- Tree tea (Ceanothus sanguineus)
- Scoulers willow (Salix scouleriana)
- Mtn. Ash (Sorbus scopulina)
- Red elderberry (Sambucus racemosa)
- Blue elderberry (Sambucus cerulea)

**Suggested additional herbaceous perennials**
- False Solomon’s seal (Smilacina racemosa)
- Twisted Stock (Streptopus amplexifolius)
- Western trillium (Trillium ovatum)
- Bunchberry dogwood (Cornus Canadensis)
- Bedstraw (Galium triflorum)
- Twin flower (Linnaea borealis)
- Shooting star (Dodecatheon hendersonii)
- Purple monkey flower (Mimulus lewisii)

**Suggested additional emergent plants**
- Chairmaker's bulrush (Schoenoplectus americanus)
- Hardstem bulrush (Schoenoplectus acutus)
Final Thoughts

- Regulations requiring native plants- increase the demand
- Green minded people using natives
- Climate change and water shortages
- Production of native plants will differentiate you from your competitors!
Arctostaphylos uva-ursi

kinnikinnick
Sambucus cerulea

blue elderberry
Schoenoplectus americanus

chairmaker's bulrush
Sorbus scopulina

Mountain Ash
Natives are Beautiful!!!
Contact information

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Sign Up For More Webinars!
Rain Gardens and Bioretention Facilities, May 22, 6:00pm – 7:30pm
Permeable Paving, June 11, 6:00pm – 7:30pm

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