Conservation and Management of Rare and Endangered Plants in Washington State

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Outline

- Define rarity
- Abiotic, biotic and human factors
- Examples of rare plants in WA and UW research conducted on plant rare taxa
- Who is responsible for management and conservation of rare plant taxa?
- Tools for conservation *In situ* vs. *Ex situ* conservation
- What you can do to contribute to the conservation effort
Defining Rarity…

- Abundance
- Range size
- Habitat specificity
- Temporal persistence (e.g., taxon age)
- Gene flow
- Genetic diversity
- Endemism (i.e., restricted to particular place)
- Taxonomic distinctness (i.e., monotypic taxon)
- Threat (probability of, or time to, extinction)

(Gaston 1994)
Rarity...an ecological concept
  7 Forms of Rarity (Rabinowitz 1981)

- Geographic range (small or large)
- Local population size (small or large)
- Habitat specificity (wide or narrow)

*Fritillaria camschatcensis* (Black lily)
- Large range
- Few individuals in each population
- Found in several habitats (e.g., bogs, wetlands, forest)

*Hackelia venusta* (showy stickseed)
- Small range
- Few individuals in each population
- Found in specific habitat (e.g., granitic soils)

Global distribution: One population in eastern WA!
Defining Rarity...a simple definition

The state of having low abundance (individuals and/or populations) and/or small geographic range.

Rarity is a scale-dependent concept.

(Gaston 1994)

Delphinium viridescens
Wenatchee larkspur, State Threatened
USFWS Species of Concern
Natural Causes of Plant Rarity

Species traits
- High levels of self-compatibility or asexuality
- Lower reproductive investment
- Higher levels of homozygosity (low of genetic diversity)
- Reduced dispersal ability
- Require specialized habitats and/or occupy narrow niches

Ecological and historical factors
- Temporal persistence (neoendemic vs. paleoendemic)
- Climatic changes, isolation
- Pathogens, herbivores, pollinators…

(Kunin and Gaston 1997)

Wenatchee mountain checkermallow
(*Sidalcea oregana* var. *calva*)
State endangered
USFWS Endangered species
Human influences of Plant Rarity

- Habitat loss /degradation/fragmentation
- Agriculture/grazing
- Pollution and contamination
- Climate change (i.e., possible shift species ranges or…extinction?)
- Invasion of non-native species (i.e., competition w/ cheatgrass)
- Pathogens and herbivores
- Overharvesting

_Lasthenia glaberrima_
Smooth goldfields, State Endangered

www.vernalpools.org
Imperiled Plants

Plants vulnerable to extinction due to low population numbers or serious threats to the populations.


Wenatchee larkspur
(*Delphinium viridescens*)
State threatened
USFWS Species of Concern
Astragalus geyeri
Geyer's milk-vetch
WA State Threatened
**Phacelia lenta**
sticky phacelia
State Threatened, USFWS Species of Concern

- Currently known only from Douglas County, WA, from an area approximately 12 x 8 miles
- Habitat: Basalt cliffs and ledges and cracks in basalt outcrops

Long-exerted purple filaments
**Lupinus oreganus var. kincaidii**

Kincaid’s sulfur lupine

- Regional endemic currently known from 2 locations in Washington less than a mile apart
- Upland prairie and oak woodland habitat in Lewis County, WA and Douglas County, Oregon
Astragalus arthurii
Arthur’s milkvetch
Washington State Sensitive
Regional endemic
**Fritillaria camschaticensis** L. Ker-Gawl

Black lily

State Sensitive

- Occurs wet meadows, marshes, sphagnum bogs, wet coniferous forested wetlands

- Threats: timber harvesting, trampling, hydraulic changes, seed collecting

Alaine counts individuals in a Washington estuary.

Alaine Sommargren’s M.S. work
**Trifolium thompsonii** Morton
Thompson’s clover
State Threatened
USFWS Species of Concern

- Endemic to southeastern Chelan County and adjacent Douglas County, WA.
- Threats: Competition with cheatgrass (*Bromus tectorum*) and knapweed (*Centaurea diffusa*), habitat conversion

Known distribution

Richy Harrod’s Ph.D. work
**Sidalcea oregana var. calva**
Wenatchee checkermallow

State Endangered, USFWS Endangered

Known distribution of *Sidalcea oregana var. calva* in Washington State

- Threats: Habitat conversion, fire suppression, forest encroachment, insect herbivory
- Habitat: Open meadows with coniferous forests dominated by *Pinus ponderosa* and *Pseudotsuga menziesii*

Tara Goldsmith’s M.S. work

Botanists from the Forest Service and Washington State Department of Natural Resources Natural Heritage Program (WNHP) conduct a plant survey. Photos by Ben Legler.
**Castilleja levisecta**
Golden paintbrush
State Threatened, USFWS Threatened

Reintroduction of Golden Paintbrush (**Castilleja levisecta**) to Puget Sound Prairies

- Occurs in open grasslands in the Puget Trough
- Currently known only from 10 sites in Washington and two in British Columbia.

http://courses.washington.edu/rarecare/Research%20Page%204.htm

Wendy Brown’s M.S. work
**Hackelia venusta**
showy stickseed
State Endangered, USFWS Endangered

- Local endemic Wenatchee Mountains, Chelan County, WA.
- Currently only one extant population
- Dry, loose granitic sand and crevices in granite or talus

Jeanne Taylor’s M.S. work
**Astragalus sinuatus**
Whited’s milk-vetch
State Endangered, USFWS
Species of Concern

- Narrow endemic currently known from 8 locations in Washington
- Threat: grazing, competition w/ cheatgrass, insect herbivory

Images by: JK Combs
How many rare and imperiled plants in Washington State?

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<td><strong>416</strong></td>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
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< 5% of WA ETS species have legal protection

Ross’s avens  
(*Geum rossii* var. *depressum*)  
State endangered  
Photo by Wendy Gibble
Four Federally Listed WA Endangered Plants

*Sidalcea oregana* var. *calva*  
(Wenatchee checkermallow)

*Hackelia venusta* (showy stickseed)

*Arenaria paludicola*  
(swamp sandwort)

*Lomatium bradshawii*  
Bradshaw’s lomatium
Six Federally Listed WA Threatened Plants

*Castilleja levisecta*
Golden paintbrush

*Lupinus oreganus var. kincaidii*  
(Kincaid’s lupine)

*Howellia aquatilis*  
(howellia)

*Silene spaldingii*  
Spalding’s silene

*Sidalcea nelsoniana*  
Nelson’s checker-mallow

*Spiranthes diluvialis*  
Ute ladies’ tresses
Management, Conservation and Protection

Federal
- U.S Fish and Wildlife Service (Endangered Species Act 1973)
- U.S. Forest Service, Bureau of Land Management

State
- Department of Natural Resources (DNR): Washington Natural Heritage Program (WNHP)
- Inventory 416 rare plants in WA
- Natural Area Preserve (NAP 30,900 acres) and Natural Resource Conservation Area (NRCA, 86,500 acres in Washington State

Smoky Mountain sedge (Carex proposita)
State threatened
Photo: Wendy Gibble
Management, Conservation and Protection

Private Non-Profit

• Nature Conservancy
• Center for Plant Conservation Network
• Washington State Native Plant Society
• Plant Conservation Alliance (Seeds of Success program)

Institutional

• Applied Academic Research
• Rare Plant Care and Conservation, UW Botanic Gardens

Pale alpine forget-me-not
(Eritrichium nanum var. elongatum)
State sensitive
Photo: Richard Ramsden
Mission:

- **Ex situ** and **In situ** conservation
- Rare plant monitoring
- Research
- Reintroduction
- Education
- Volunteers help monitor
- ~ 370 rare and imperiled plants

Volunteer Sarah Bailey prepares *Sidalcea nelsoniana* seeds for long term storage in the Miller Seed Vault.

Currently over 150 volunteers
Collaboration in Conservation
~ Rare Plant Monitoring~

Project partners: UW Rare Care and Washington Natural Heritage Program (WNHP)

Rare Care monitoring goal: revisit known occurrences of rare plants and document species status and identify potential threats.

Pale alpine forget-me-not (*Eritrichium nanum* var. *elongatum*), State sensitive

Photo: Richard Ramsden
How do we conserve?

*Ex situ* versus *In situ* Conservation

Seed Banks

Living Collections

Research and Reintroductions

Land conservation

Natural Area Preserve, Eastern WA
How can you be involved in rare and endangered species conservation?

- **Learn about your native flora** and be informed on conservation issues
- **Volunteer for local activities** – Invasive species removals, restoration plantings, Rare Care monitoring and seed collection
- **Learn about invasive species** and avoid using them in your yard
- **Share what you know** with friends, neighbors and family
- **Inform your local representatives** on plant conservation issues
- **Support conservation organizations** and their budgets

*Delphinium viridescens*
Wenatchee larkspur (WA State Threatened)
Resources to learn more about rare and endangered Washington flora

• Dept. of Natural Resources Washington Natural Heritage Program website: http://www.dnr.wa.gov/nhp

• Rare Plant Care and Conservation (UW) website: http://courses.washington.edu/rarecare/index.htm

• Washington Native Plant Society website: http://www.wnps.org

• Center for Plant Conservation website: http://www.centerforplantconservation.org/


*Delpinium viridescens*

Wenatchee larkspur (WA State Threatened)