

Douglasia



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Journal of the
WASHINGTON NATIVE PLANT SOCIETY

To promote the appreciation and
conservation of Washington's native plants
and their habitats through study, education,
and advocacy.



About This Issue

by David Giblin

By the time you receive this issue of *Douglasia*, some inkling of spring will likely have arrived in many parts of Washington. What a relief. As I write this note, I-90 is closed eastbound due to snow, the Mount Baker Ski Area has a snowpack over 12-feet deep, and a bone-chilling rain is falling in every corner of the state. Fortunately, the reward for enduring winter's climatic assault on the spirits is another season of botanical exploration and discovery.

This issue provides readers with plenty of ways to engage with and appreciate our native flora. WNPS president Don Schaechtel reminds us of the many benefits that WNPS membership offers and encourages us to partake in the wealth of field trips and botanical gatherings offered throughout the year.

For those interested in bringing native plants into their gardens through their own handiwork, Bridget McNassar, head propagator at Oxbow Farm and Conservation Center, provides guidance on how to succeed in such endeavors. On the plant conservation front, the Washington Natural Heritage Program's new rare plant botanist, Dr. Walter Fertig, introduces himself and shares how his past experiences have shaped his responsibilities in conserving Washington's rare plants. If foraging is your thing, or even if it's not, Abe Lloyd's article on miner's lettuce will forever change the way you appreciate our abundance of *Claytonia* species. Speaking of changing how you look at things, be sure to read Dr. Fred Rhoades' insightful review of Kem Luther's *Boundary Layer*—a book about a world most of us walk or look past.

There's plenty more to read between the covers: tips for taking better wildflower photos on your smartphone, and suggestions of places to go, plants to look for, grants to apply for, and other books to read. Enjoy it all, along with the magic of our incipient spring!



On the cover:

Miner's lettuce (*Claytonia perfoliata*), photographed at Catherine Creek in the Columbia Gorge. PHOTO: MARK TURNER

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* WNPS Fellow is the highest honor given to a member by our society. This title is given to those who have made outstanding contributions to the understanding and/or preservation of Washington's flora, or to the success of WNPS.

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Members and others are invited to submit material for publication in *Douglasia*. Articles, book reviews, poetry, photography, or illustrations are welcome. All materials submitted should relate to the study of Washington's native plants. Acceptance will be based on space and appropriateness, and materials are subject to copyediting (substantive editing with author's permission). Contributors are reminded that the *Douglasia* audience ranges from the professional botanist to the interested enthusiast. For more information about how to contribute, see: www.wnps.org/publications/douglasia/douglasia_contributors.html.

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President's Message: The View from Here

2018 is Going to Be a Great Year

by Don Schaechtel

Dear Fellow WNPS Members,

This is a great year to be a member of the Washington Native Plant Society.

To start with, our two big annual events are in special places this year. Excitement is already building around our Study Weekend destination, the Columbia River Gorge, which is renowned for its spring wildflower displays. The dates for this event are May 4–6, 2018. What better way to experience the Columbia River Gorge than by joining other WNPS members for trips to some of the best wildflower viewing areas. Where else can you find the variety of activities, led by experienced guides, than at a Study Weekend? We can thank Don Hardin of the Suksdorfia Chapter and Bill Brookreson of the South Sound Chapter for doing the legwork to pull off this exciting event.

Or perhaps Botany Washington, the more technical of the two events, is more to your liking (and you can always attend both). Co-sponsored by the WNPS and the University of Washington Herbarium at the Burke Museum (WTU), this year's Botany Washington will be held June 8–10, 2018 on the Long Beach Peninsula in southwestern Washington. Participants can choose between sessions focused on certain plant families or on improving your keying skills, or you can join the many field trips to nearby destinations with botanical interest. With all of the diversity of ecosystems in Washington, this part of the state is an area that many of us have overlooked. I have only been there once, and that was in 1977! I am looking forward to a return visit to spend time learning about the botanical diversity that awaits us on the shores of Willapa Bay.

Among the great benefits of being a WNPS member are the many opportunities to get outdoors and learn about our native plants with other native plant enthusiasts. Besides our two major events, our chapters host numerous field trips led by members who are eager to share their knowledge. A mistake I made early in my WNPS membership was not signing up for chapter field trips soon enough. So learn from my mistake and supercharge your learning with help from your fellow members. Make a point to attend a chapter field trip this year.

And attending events doesn't have to be limited to those in your home chapter. With our new, monthly e-Newsletter, in addition to news and information about special events, you will get a calendar of events happening in all chapters around the state. Speaking for my home chapter, Wenatchee Valley, I know we always enjoy sharing the botanical wonders of our area with other WNPS members. So don't hesitate to ask about joining a field trip or program.

Our rebuilt website (www.wnps.org) will be rolled out this spring, and you can access chapter websites from here too. We are grateful for board member Sarah Verlinde, who has been working hard on this new website, which has many features that make it more user-friendly as well as the capabilities to more easily share information.

We are all excited about the revised edition of *Flora of the Pacific Northwest*, which will be available this year. Now we no longer have any excuses for not learning new scientific names and rearranged family relationships, right?

Soon we will also have a new database for our 700 vascular plant lists. Ben Legler at WTU is developing this database, with financial support from our WNPS chapters and a grant from the Garneau-Nicon Family Foundation in Seattle. This database will reside on www.wnps.org, but it will also be connected to the Flora of Washington Checklist so species and family scientific names can be updated automatically. In the initial development, all 700 of our lists will be updated with new names. The beauty of the new database is you will be able to download custom plant checklists with currently accepted names and former names. This makes our lists an even better tool for exploring plants on a given trail or in a given area; it would be difficult to memorize the new names at home. But seeing them in the field, with a list with both names in hand, will improve our chances of learning them.

So you can see that I wasn't kidding you. It IS a good year to be a WNPS member.



Woolly-pod locoweed (*Astragalus purshii*). Ginkgo Petrified Forest State Park. PHOTO: MARK TURNER

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One-Headed Pussytoes (*Antennaria monocephala*): First Record from Washington State

by Matt Below

While on a four-day climbing trip in Washington's North Cascades over the Fourth of July weekend, I discovered an occurrence of one-headed pussytoes (*Antennaria monocephala*), a species previously unknown to Washington State. According to the Consortium of Pacific Northwest Herbaria (www.pnwherbaria.org), this find represents a nearly 400-mile range extension westward from the nearest populations documented in the Anaconda Range (Rocky Mountains) in Montana. According to Jamie Fenneman (PhD candidate, University of British Columbia), the closest population to the north is located in the Ilgachuz Range (Coast Range) of British Columbia, and this find represents another example of an Arctic species with disjunct populations documented in the North Cascades of Washington.

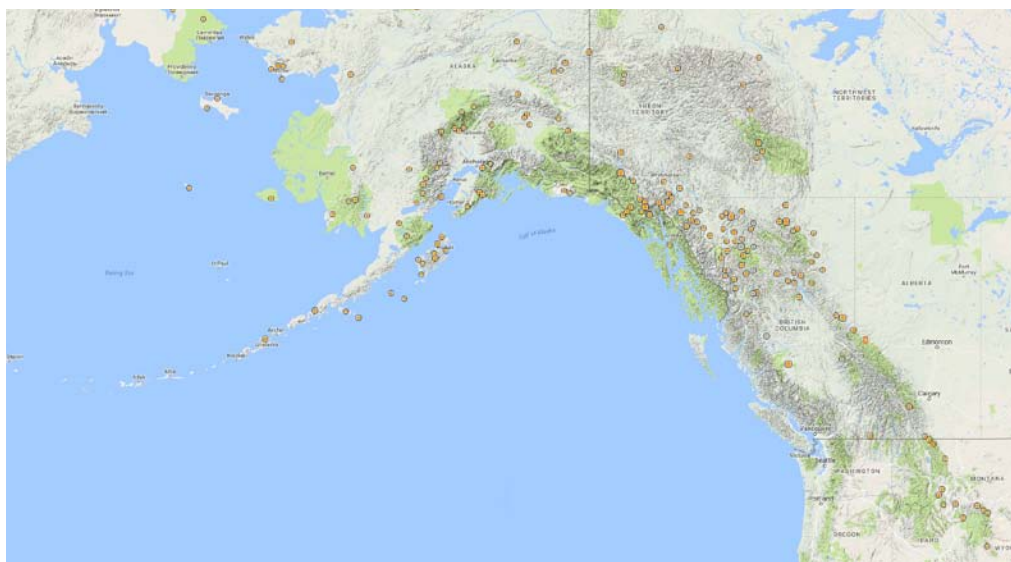
Antennaria monocephala is in the Asteraceae (composite) family and is native to the alpine and Arctic regions of North America and Greenland. In North America it occurs in British Columbia, Alberta, Northwest Territories, Yukon Territory, Nunavut, Quebec, Montana, Wyoming, and Alaska (Bayer 2006). The species prefers partially drained slopes and ridges and has been documented tolerating sea spray (Aiken, et al. 2007).

The new Washington population was found growing in coarse, loose substrate at a notch in a ridgeline, east of Spire Point and northwest of the well-known mountaineering destination of Dome Peak in Skagit County. This site is a wind-scoured gap in the ridge at an elevation of roughly 7,700 feet. The locale is fairly remote and is situated on the west side of



One-headed pussytoes (*Antennaria monocephala*) in the North Cascades, Washington. PHOTO: MATT BELOW

the Cascades crest within the Glacier Peak Wilderness. Associated species inhabiting this site included showy Jacob's-ladder (*Polemonium pulcherrimum*), Yellowstone draba (*Draba incerta*), alpine lake false dandelion (*Nothocalais alpestris*), and short-fruited Smelowskia (*Smelowskia ovalis*). It is also worth noting that the popular Ptarmigan Traverse route passes near the col to exit the Dana Glacier.



Regional distribution of one-headed pussytoes based on records in the Consortium of Pacific Northwest Herbaria database. Localities are indicated by orange dots (south-central BC dot is errant).

The genus *Antennaria* has its highest species diversity in North America, and also occurs in South America and Eurasia. This diversity, in addition to species hybridization, makes identification of some *Antennaria* species challenging. For this reason, they are divided into two major lineages: the Leontipes and the Catipes. The Leontipes group is composed of species that are primarily diploid (two sets of chromosomes) and is considered to have evolved prior to the Catipes lineage. Species in the Leontipes group reproduce sexually (exchange gametes) and lack stoloniferous growth. The Catipes are considered

the more specialized of the two groups and contain both diploids and tetraploids (four sets of chromosomes). These plants can reproduce sexually and asexually through the production of stolons and rhizomes (Bayer 2006).

Antennaria monocephala is a perennial belonging to the Leontopos group and has short, erect stems. The plants have alternate basal and cauline (stem) leaves with entire margins, and the blades vary from cuneate (wedge-shaped) to linear in form. The flower heads are discoid (that is, ray flowers are absent) with 20 to 100+ florets and are most often solitary, but they can also occur in clusters. The heads are enclosed by dark, relatively narrow phyllaries (involucral bracts) (Bayer 2006).

The genus name *Antennaria* refers to the antenna-like appearance of prominent stamens in the flowers of some species (Bayer 2006). Species known in Washington that most closely resemble *A. monocephala* are *A. alpina* and *A. umbrinella*. *Antennaria alpina* produces stoloniferous growth and has multiple flower heads, while *A. umbrinella* is also stoloniferous and can be found in forested areas at lower elevations.

If this occurrence of *A. monocephala* is to be considered a satellite of the British Columbia population, many rocky alpine ridgelines and passes in the North Cascades could also be home to similar alpine plant communities. It is possible that this species occurs elsewhere in Washington State and potential areas of interest include high passes, ridgelines, and peaks located north of the Glacier Peak area. I will surely be on the lookout during future excursions in the North Cascades.

Matt Below is an outdoor enthusiast and biologist, who works for the King County Noxious Weed Control Program. He can be contacted at bluebusrider@gmail.com.

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- Aiken, S.G., Dallwitz, M.J., Consaul, L.L., McJannet, C.L., et al. 2007. Flora of the Canadian Arctic Archipelago: Descriptions, Illustrations, Identification, and Information Retrieval. NRC Research Press, National Research Council of Canada, Ottawa. Accessed October 19, 2017. <http://nature.ca/aafloora/data>
- Bayer, R.J. 2006. *Antennaria*. Page 388 in Flora of North America Editorial Committee (eds.), *Flora of North America North of Mexico*, Vol. 19, 20, 21. New York and Oxford. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=101977



"Sometimes I wish I could photosynthesize so that just by being, just by shimmering at the meadow's edge or floating lazily on a pond, I could be doing the work of the world while standing silent in the sun."

— Robin Wall Kimmerer, author of
Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants

Growing Natives from Seed: Simple Seed Propagation Methods for Native Plants

Part 1: Introduction and Seed Collection

by Bridget McNassar

One of the most powerful ways to appreciate and gain an understanding of plants is to observe how they begin their lives. A bond is created between a grower and a plant when we are privileged enough to see them at their most tender and vulnerable. Even after many years of growing, I still feel that magical element of surprise when I see a seedling emerge from a seed that showed no signs of life just months ago.

As native plant enthusiasts, we all agree that we need more natives in the landscape. In a world where availability at nurseries hasn't quite caught up to demand, propagating some of your own native plants from seed might be just the solution for restoration projects, educational gardens, or backyard habitats.

Growing from seed—especially locally collected seed—allows us to keep more genetic diversity in the landscape, rendering native plants more resilient in years to come. Many will find that seed collection is an enjoyable endeavor, a botanical treasure hunt that sometimes leads to a slight obsession.

Growing natives from seed may seem intimidating, but the varying levels of challenge allow amateur growers to have success, while experienced growers will still have many species to work with. This and the future articles in the series are intended to inspire you to try something new with seed propagation regardless of your experience level.

Collection Tools

You need only a small number of simple tools to collect seeds, starting with bags or containers to hold them. I use plastic zip-top bags for fleshy fruits and either paper or cloth bags for dry fruits. These bags can be hung to allow the fruit to continue drying if needed. Labeling supplies is vital: pencils, permanent markers, and blue painter's tape all work well. For any seeds that can't be plucked with just my fingers, I use my trusty cut-n-hold pruners, which can clip a plant's fruit or inflorescence and grip it so that I can use my other hand to hold a container to drop the fruits into.

Plant ID books and a hand lens help to double-check your species, and a map or GPS unit will allow you to return to your collection site in the future. I never collect without my notebook, in which I jot down information like location, appearance of the collected species, and the phenology of other species that I may want to collect from later.

At home, you may need to dry or after-ripen the seed before you clean it. At Oxbow Farm and Conservation Center, we store inflorescences upside-down in an open, tall container (like a quart-size yogurt cup) for species that produce very



Common camas (*Camassia quamash*) capsules dry and turn brown when ripe and seeds turn black. PHOTO: BRIDGET MCNASSAR

small, dry seed in dehiscent (splitting open) fruits. The containers capture the seeds as they fall out. Penstemons (*Penstemon* spp.) or fringecup (*Tellima grandiflora*) inflorescences are good examples. Additionally, trays with screens or newsprint in the bottom of them work well for drying larger fruits and seeds.

Timing the Collection Process

Proper timing is the key to successful collection. The collector needs to wait until the developing seed is viable, yet be wary of ripe seed dispersing or being eaten before they can get to it. When possible, I try to identify the plant populations where I would like to collect early in the season and then watch for cues as they develop. Here are some general cues for checking seed ripeness:

- The seed color changes from white/green to brown/black, and the seed hardens (a ripe seed cannot be easily scratched or crushed with your fingernail).
- Seeds begin dropping from the plant.
- In a fleshy fruit, such as salmonberry (*Rubus spectabilis*), the fruit is ready to be eaten.
- In a dried fruit, such as columbine (*Aquilegia* sp.), the fruit is yellow-brown and brittle, and you can hear seeds rattling inside when you shake it.

- Fruit development and seed ripening often follow flowering by about one month.

Over time, you'll get a general idea of when things ripen, though it's important to note that this doesn't necessarily happen at the exact same time from year to year. For example, in 2017 I collected the seed of many species up to a month later than they were collected in 2016, possibly due to the relatively cold, wet winter compared to the previous year's winter. Keeping thorough notes each season will help you identify the cues to look for in your target species and other species in the vicinity.

All said, for various reasons I do collect seeds from some species before they are ripe. A number of species are extremely attractive to wildlife and can be missed if you wait for full ripeness. An example of this is beaked hazelnut (*Corylus cornuta*): I collect the nuts while still somewhat green and lay them to ripen in trays, out of the sun in a well-ventilated area, where they eventually turn brown and their husk papery. Additionally, plants with dehiscent fruit, such as lupines (*Lupinus* spp.) can drop their seed suddenly, making it difficult to time collection. In our collections for the Oxbow nursery, we've found we can capture viable seeds if we wait for one or two of the pods on an inflorescence to start splitting open, then clip the whole inflorescence to finish ripening in a paper or cloth bag out of direct sunlight. It's important to close up the bag to capture the somewhat "explosive" seeds.



Beaked hazelnuts (*Corylus cornuta*) are a beloved food item for many wildlife species. They can be collected slightly before their green coverings turn brown and left to ripen in a well-ventilated, protected area. PHOTO: BRIDGET MCNASSAR

Collecting Responsibly

Admittedly, I sometimes find myself slipping into a mindless collection state, gathering more than I need. It's easy for the thrill of finding to get the better of us, but collecting in the wild needs to be more thoughtful. It's necessary to leave enough seed for both the natural regeneration of the species and for the wildlife that relies upon seed for food. A general rule of thumb is to only take 1 in 20 seeds from a plant or population of

plants in a location and to never take seed where you see only a few individuals.

Two other important points:

- Collect only when you are certain of your species identification.
- Be sure you have permission to collect on the land where you are looking for seed, whether by asking a private landowner or obtaining permits for public lands.

In Part 2 of this series, we'll discuss cleaning and storage: what to do with your precious seeds after collecting.

Resources

Collection Materials and Methods

Young, J.A., and C.G. Young. 1986. *Collecting, Processing and Germinating Seeds of Wildland Plants*. Chapter 3. Portland, OR: Timber Press.

Seed collecting techniques. Millennium Seed Bank Partnership. www.kew.org/sites/default/files/03-Collecting%20techniques%20web.pdf

Guidelines for Ethical Collecting

Policy on Collection and Sale of Native Plants. Washington Native Plant Society. www.wnps.org/about_wnps/administration/policies/collection_policy.htm

San Juan National Forest Service Guidelines for the Ethical and Sustainable Harvesting of Wild Plants. www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3822046.pdf

Bridget McNassar is the manager of the native plant nursery at Oxbow Farm & Conservation Center (www.oxbow.org) in Carnation, Washington. You can contact her at bridget@oxbow.org.



Some Island Residents beneath the Bridge over Deception Pass, Late March

by J. Dan Paquette

Dark forbidding water squeezes through the gap below—swirling patterns somewhat ovalish, stretching to ellipses. Turbulence on the surface originating with some nemesis of Pythagoras, or perhaps the stirring spoon of an alchemist?

Green arches of the bridge above fade into moist gray. Plants hurry to set seeds and spores on this slope facing the sun. In a month's time, this ground to be baked, the plants destined for wilting, withering.

I stretch out among umbrella-like yellow inflorescences, my nose up against spring gold—now, about five inches tall, the plants many and spread quite evenly. A black bear loping through might only step on one or two.

The rocks around me are lichenized: See the one-inch, bone-colored goblets bordered by moss blankets—moss parents, daughters and above them the grandchildren spored in swollen capsules.

I see the fuzz of early saxifrages and soft yellows of small-flowered woodland stars, My other companions—interrupting, heading to the cars. Quickly note the blue-eyed grass and just beginning to show, the purple camus.

Dan Paquette writes poems that often lean toward aesthetic encounters in the life sciences and natural history. He currently provides input to the Lord Hill Regional Park master plan.



WNPS Grants: Education, Conservation, and Research and Inventory

Solicitation for Grant Proposals

Each year WNPS provides grants for projects that educate the public about native plants, for conservation of native species and habitats, and for research in areas such as the biology of native species or specific plant inventory projects. In 2018 the WNPS State Board of Directors increased the funding to each area—education, conservation, and research and inventory—to increase the opportunities for grant projects around Washington State.

Each grant committee operates with an annual application cycle:

- Education: May 1 and November 1
- Conservation: March 1 and July 1
- Research and inventory: January 1

We encourage interested applicants to find out more on the WNPS website: www.wnps.org

Contributions to the Endowment Fund support the WNPS grants program. To support the Endowment Fund, find more information here: <https://www.wnps.org/support/ways.html>. Thank you WNPS donors for your continued support.

Changes to the State Noxious Weed List for 2018

by Wendy DesCamp

In November 2017, the Washington State Noxious Weed Control Board met in Wenatchee for its annual board meeting and public hearing to determine changes to the noxious weed list. The board voted to add five species to the list for 2018, along with reclassifying a Class A noxious weed and making Class B designation changes. Class B weeds have wider distribution and thus present a greater threat to native communities.

New Noxious Weeds for 2018

Small-flowered jewelweed (*Impatiens parviflora*) is a new Class A noxious weed. As described in the previous issue of *Douglasia* (41(3): 16–17, Fall-Winter 2017), this annual is known to occur at only two locations in Washington, both in King County. As a Class A noxious weed, eradication of *I. parviflora* is required throughout the state.



European coltsfoot (*Tussilago farfara*) in bloom with leaves beginning to emerge from its rhizomes. PHOTO: TRICIA MACLAREN

European coltsfoot (*Tussilago farfara*) is a new Class B noxious weed. As a Class B noxious weed, the state weed board designates *T. farfara* for control in areas where it is limited in distribution, or does not occur, and poses a threat to invade those particular areas. According to WAC 16-750-003, control of noxious weeds means to prevent all seed production and

the dispersal of all propagative parts capable of forming new plants. European coltsfoot, also just called coltsfoot, is designated for control everywhere in Washington except in Grant, Lincoln, Adams, Benton, and Franklin Counties. *Tussilago farfara*, a member of the Asteraceae family, is a rhizomatous perennial that first grows flowering stems in the spring, topped by a single yellow flower head, comprising yellow disk and ray flowers. As seeds develop, larger somewhat rounded to heart-shaped leaves having whitish, woolly undersides develop from the rhizomes. Limited populations have been found in western Washington, with a higher frequency found in King, Pierce, and Snohomish Counties. In July 2016, Julie Combs wrote an article for the WNPS Botanical Rambles blog (www.wnps.org/blog/2016/07/) on the discovery of *T. farfara* in Mount Rainier National Park, and staff has since discovered four other locations of it growing in the park.

Malta starthistle (*Centaurea melitensis*) is a new Class B noxious weed. Also described in the previous issue of *Douglasia*, this annual starthistle is a Class B noxious weed designated for control in all of Washington except in Klickitat, Whitman, Benton, Franklin, Walla Walla, Columbia, Garfield, and Asotin Counties, and a portion of Stevens County. Until more is learned about the distribution of *C. melitensis*, this plant has the same Class B designation as yellow starthistle (*C. solstitialis*), as the two species are similar in appearance. The only recently known population of *C. melitensis* in Washington was on Cypress Island in Skagit County and was controlled after its discovery in 2016.



The stems of two Eurasian watermilfoil hybrids (*Myriophyllum spicatum* × *Myriophyllum sibiricum*) (left) next to the stem of northern watermilfoil (*M. sibiricum*) (right). PHOTO: JENIFER PARSONS

Eurasian watermilfoil hybrid (*Myriophyllum spicatum* × *Myriophyllum sibiricum*) is a new Class C noxious weed. This plant is a hybrid between the Class B noxious weed Eurasian watermilfoil (*M. spicatum*) and the native northern watermil-

foil (*M. sibiricum*). These two species can hybridize when they co-occur in the same water bodies, resulting in a variety of genetic strains, with some being more aggressive than others. Morphological traits of the hybrid overlap with both of the parent species, requiring genetic analysis for hybrid identification. *Myriophyllum spicatum* × *Myriophyllum sibiricum* is usually discovered when typical control methods used on *M. spicatum* are not effective, as some strains of the hybrid are resistant to some herbicides. The state weed board does not require control of Class C noxious weeds, but county noxious weed boards are able to select Class C weeds for local control. At this time, no county has indicated it will require control of *M. spicatum* × *M. sibiricum*, due in part to the difficulty of its identification without genetic analysis.



Spotted jewelweed (*Impatiens capensis*) in bloom, having orange flowers with dark orange to red spots and a recurved spur. Flowers develop narrow capsules that explosively dehisce when mature, propelling seeds a short distance. PHOTO: WHATCOM COUNTY NOXIOUS WEED CONTROL PROGRAM

Spotted jewelweed (*Impatiens capensis*) is a new Class C noxious weed. Another species of *Impatiens* added to the weed list for 2018, this annual is becoming more widespread in western Washington, particularly in shaded areas with moist soils. An additional concern regarding *I. capensis* is its ability to hybridize with a native *Impatiens* species, spurless jewelweed (*I. ecorruta*), resulting in the hybrid *Impatiens* × *pacifica*. While control is not required of Class C noxious weeds at the state

level, check with your county noxious weed board for possible local control requirements.

Other Noxious Weed List Changes

Spurge flax (*Thymelaea passerina*) has been reclassified from a Class A to a Class B noxious weed. This annual, which grows to about 2 feet tall, has tiny yellow flowers and spreads readily by seed. It has only been found in Okanogan County, but it may have a wider distribution. Due to local spread and the challenges of finding and controlling this plant, *T. passerina* is now a Class B noxious weed, designated for control in all of eastern Washington except Okanogan County. The Okanogan County Noxious Weed Control Board will develop a plan locally to manage *T. passerina* infestations.

Four Class B designation changes were approved for 2018. These changes are as follows: undesignating shiny geranium (*Geranium lucidum*) and butterfly bush (*Buddleja davidii*) for control in Thurston County, undesignating yellow nutsedge (*Cyperus esculentus*) in Clark County, and designating policeman's helmet (*Impatiens glandulifera*) for control in Clark County. Check your county noxious weed list to learn about the noxious weed control requirements for your area. Contact information for all county noxious weed control boards can be found on our website: www.nwcb.wa.gov.

In-depth information on each new noxious weed species, along with all existing noxious weeds, can be found on our website. Go to the Noxious Weed List heading, and then select which class of weeds to display. Hard copies of the 2018 state noxious weeds are available, which can be requested on our publications page, along with any of our other educational materials.

Wendy DesCamp is the education specialist for the Washington State Noxious Weed Control Board. Contact her with any questions about noxious weeds at wdescamp@agr.wa.gov.



2018 WNPS Annual Backpack

Sheep Lake (Chinook Pass), July 20–22, 2018

This year we'll hike to Sheep Lake north of Chinook Pass on the Pacific Crest National Scenic Trail. This is an easy 1.8-mile hike north of the pass that is popular with hikers, so we plan to leave the large parking lot at Chinook Pass at 8:30 a.m., Friday, July 20, in order to find adequate camp sites for our group. A Forest Service parking pass will be required at the trailhead.

On Saturday we will explore the area of Sourdough Gap, north of Sheep Lake, and beyond for those interested in going farther.

Because this area is not in a wilderness, our group size is not limited. For more information and to sign up, contact Jim Riley at dalife@juno.com or call 360-497-5193.

Miner's Lettuce: Our Tastiest Green

by T. Abe Lloyd, Koma Kulshan Chapter

Miner's lettuce (*Claytonia perfoliata*, Montiaceae family) has one of those utilitarian plant names that doesn't leave much to the imagination. Yes, the plant was eaten by miners, but it deserves a better reputation than simply being a green that kept the "forty-niners" from getting scurvy when their dreams brought them to colonial outposts to scour the placers for gold. In fact, this green is a prized traditional vegetable to Native Americans throughout California.



Basal rosette of miner's lettuce (*Claytonia perfoliata*). PHOTO: T. ABE LLOYD

As American society struggles to find a path of reconciliation with the original stewards of these lands, perhaps adopting some indigenous plant nomenclature, such as the Pomo name Mi-tol, would be a step away from the painful legacy of the state-sponsored genocide of Native Americans on the part of early miners and ranchers, and a step toward respecting the people and plants that came before us.

I herald *C. perfoliata* as my favorite leafy green and love sharing them with family, friends, and guests. If culinary trends continue, I predict that restaurants that pride themselves on exceptional cuisine touted for being both local and sustainable will soon be charging chic urbanites, foodies, and well-to-do hipsters top dollar for salads with these greens, so don't tell them—you can pick them for free!

In our region, we have several species of *Claytonia*, and they aren't all created equal. For example, in the wetter coastal areas of Oregon, Washington, British Columbia, and Alaska, Siberian miner's lettuce (*C. sibirica*) predominates, and the leafy

green of this species usually leaves me with an unpleasant tingle in the back of my throat. I begin my account with *C. perfoliata*, the true miner's lettuce, and tastiest of the group. Several other members of the genus are also edible, a few of which are also delicious (see Related Species in this article for tips on differentiating species and notes on flavor).

Description

Claytonia perfoliata is a winter annual that grows readily from shiny black seeds that germinate when autumn rains saturate the soil. The plants overwinter as a basal rosette of spindly, rather linear to ovate, green leaves. In early spring the rosette expands upward with increasingly broader ranks of leaves, until the temperatures warm enough for the round cauline leaves (leaves on the flowering stalk) to develop in mid-spring. The cauline leaves on *C. perfoliata* are conspicuously round with two broad points. Deep in evolutionary time, the two points actually represented two individual leaves, which eventually fused together.

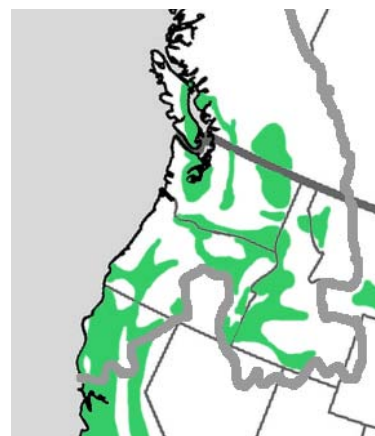


A lineup of miner's lettuce (*Claytonia perfoliata*) rosette leaves (left four) and cauline leaves (right four). PHOTO: T. ABE LLOYD

Flowering stems quickly elongate from the center of the cauline leaves, as if perforated by the stalks (hence the species epithet *perfoliata*). Small clusters of five-petaled, white flowers bloom before deciduous trees have fully leafed-out. As temperatures warm in early summer, seed pods dry to the point of exploding, which disperses the seeds into the drying soil.

Range and Habitat

Claytonia perfoliata has a spotty geographic range throughout western North America. In the Pacific Northwest, it is found from central Vancouver Island southward to California. West of the Cascades, it is found in relatively dry rain shadow forests in the partial shade of Douglas-fir (*Pseudotsuga menziesii*) and occasionally Garry oak (*Quercus garryana*). East of the Cascades it is found on



Distribution map of miner's lettuce (*Claytonia perfoliata*).



Miner's lettuce (*Claytonia perfoliata*) growing in profusion at the base of a Douglas-fir (*Pseudotsuga menziesii*) in Victoria, BC. PHOTO: T. ABE LLOYD

cloud-catching foothills where there is enough moisture to support tree growth. Here again it is often found under *P. menziesii* or occasionally pines (*Pinus* spp.). Further south in southern Oregon and California where the coastal forests are dryer it is found closer to the Pacific Coast, again in association with *P. menziesii*, *Quercus* spp., or bay laurel (*Laurus nobilis*).

Harvest and Preparation

There is no finer leafy green, growing wild or in cultivation. *Claytonia perfoliata* has tender, juicy leaves with an exceptionally soft and juicy texture and a mild, pleasing flavor. Truly a seasonal delicacy, *C. perfoliata* is best harvested in the early to mid-spring when the leaves are larger than a quarter and before the plants begin to yellow and go to seed.

Find a healthy patch of *C. perfoliata* with few weeds and use a pair of sharp scissors to snip the stalks a few inches above the ground with one hand, while grabbing the leaves with the other. This leaves all the dirt behind. Place the leaves in a plastic bag, and then repeat until you have enough for a few meals. The leaves and stalks are equally delicious. *Claytonia perfoliata* is mild enough to eat plain or serve as the base of a mixed salad with stronger flavored greens.

Because it is an annual, be sure to leave plenty of plants to reseed your patch. I have had great success growing *C. perfoliata* from seed in the partial shade of mature *P. menziesii* trees on my property. Much to my delight, the patch continues to spread every year.

Ethnobotany

Raw *C. perfoliata* leaves are traditionally eaten by the Northern Paiute (Park in Fowler 1989), Pomo (Welch 2013), and

Miwok (Barrett and Gifford 1933) and Maidu (Powers 1975) in Northern California. The Maidu had a curious recipe for eating the greens. According to Powers (1975, pg. 155) the Maidu placed large quantities of the fresh leaves near ant mounds and allowed the ants to run through them. He notes that "After the ants have circulated all through [the leaves], they take it up, shake them off, and eat it with relish. They say the ants, in running over it, impart a sour taste to it, and make it as good as if it had vinegar on it."

In addition to eating the fresh greens, the Costanoan (Bocek 1984), Luiseno (Sparkman 1908), Yuki (Chesnut 1902), and Cahuilla (Bean and Saubel 1972) also boiled the leaves as a potherb later in the spring. The Chumash cook the greens and historically ate the seeds as well (Timbrook 2007).

In the Rockies, groups such as the Gosiute (Chamberlin 1911) in Utah and Native Americans in Montana (Blankinship 1905) also ate the raw greens. David Douglas (1914) often noted the plant thriving in soil disturbed by humans near villages and by elk in open woodlands, but he did not record any food use among the Chinookan, Sahaptin, and Salishan groups he traveled among.

Curiously, no ethnographers have recorded food uses for *C. perfoliata* among indigenous groups in coastal areas north of California, and many groups from these areas claim it was not traditionally eaten.

Perhaps there was a stigma against leafy green vegetables. To my knowledge, there are no ethnographic records that suggest raw leafy greens were eaten prior to European contact. Stinging nettle (*Urtica dioica*) and dock (*Rumex* spp.) were both cooked as a potherb in more recent times by a few tribes such as the

Haida (Turner 2005) and Saanich (Turner and Bell 1971). While leafy greens may not have been eaten, shoot vegetables were important (and still are). For example, the shoots of *Rumex* and many other species were enjoyed both raw and cooked by several indigenous groups throughout this same region.

As the name suggests, miner's lettuce was widely eaten by miners during the California Gold Rush, who undoubtedly learned of its edibility from Native Americans.

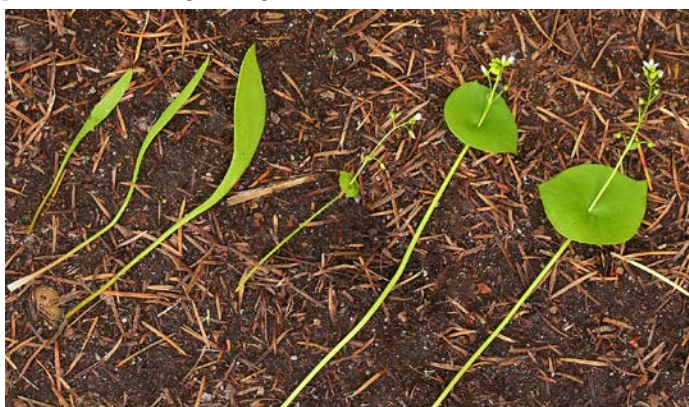
Related Species

Small-flowered and redstem miner's lettuce are so closely related that some taxonomists have lumped them together as the same species. To differentiate, note the differences in the rosette of basal leaves and the flower clusters.



The linear leaves and clustered flowers of small-flowered miner's lettuce (*C. parviflora*). PHOTO: T. ABE LLOYD

Small-flowered miner's lettuce (*C. parviflora*) has a basal rosette of linear leaves and diffusely clustered flowers that extend much higher above the perfoliate cauline leaves. The plants are found growing on the thin soils of rocky balds in



A lineup of small-flowered miner's lettuce (*C. parviflora*) rosette leaves (three on left) and cauline leaves (three on right). PHOTO: T. ABE LLOYD

partial shade throughout the same range as *C. perfoliata*. Like other members of the genus, *C. parviflora* favors areas with periodic disturbance that exposes fresh soil in the early summer when the seeds are being dispersed.

The leaves and stems are highly edible with a delicate texture and a very mild flavor—slightly stronger than *C. perfoliata*. Harvest in early to mid-spring before the plants go to seed. The species epithet *parviflora* is Latin for “small-flowered.” The plant is also called streambank miner's lettuce. Note that *C. parviflora* has a surprisingly similar sounding species epithet to the discreet species, *Montia parvifolia*. This can be confusing since many *Claytonia* species were once placed in the genus *Montia*.



Basal rosette of leaves and clusters of flowers of redstem miner's lettuce (*Claytonia rubra*). PHOTO: T. ABE LLOYD

Redstem miner's lettuce (*C. rubra*) has a basal rosette of rhombic to deltoid leaves that are often red tinged on the petioles, undersides, or throughout. The cauline leaves are perfoliate (like *C. perfoliata*) but occasionally one side is deeply cleft. Flowering stems usually extend peripherally around the plant and have tight clusters of flowers immediately above the perfoliate cauline leaves.

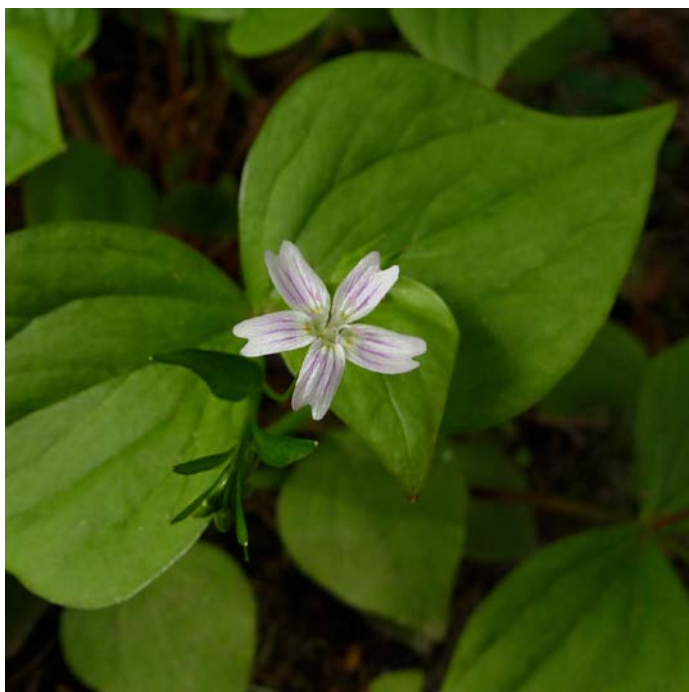
The plants are commonly found growing in sandy soil near sea level west of the Cascades crest, or in open pine forests on the east side. The leaves and plants tend to be much smaller than *C. perfoliata*, but *C. rubra* has the same excellent flavor, thick juicy texture, and a similar habit of growing in extensive patches that making picking a joy. You can't beat the color!

Don't fret if you are struggling to differentiate these species. These three *Claytonia* species have several named varieties and are notorious for hybridizing with each other (Pers. Com., Robin O'Quinn, 2017).



A lineup of redstem miner's lettuce (*Claytonia rubra*) leaves. PHOTO: T. ABE LLOYD

Candyflower or Siberian miner's lettuce (*C. sibirica*) is named for the candy cane appearance of its white and pink flowers; *C. sibirica* is the poorer cousin of the true miner's lettuce. While it is still edible, *C. sibirica* is prone to imparting a burning sensation in the back of the throat, especially if older leaves are eaten.



Siberian miner's lettuce (*Claytonia sibirica*) flower. PHOTO: T. ABE LLOYD

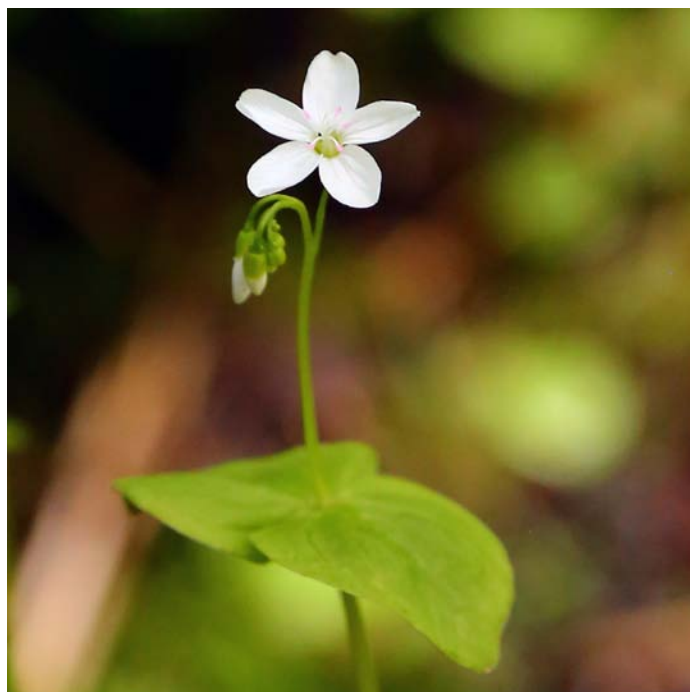
Like *C. perfoliata*, *C. sibirica* also overwinters as a rosette of long-stemmed, egg-shaped leaves. However, *C. sibirica* can easily be differentiated from miner's lettuce by the pair of sessile (lacking a petiole) leaves below the flowers (versus the perfoliate leaves on the flowering stems of *C. perfoliata*). The veins on the leaves of *C. sibirica* are also much more distinct than those of *C. perfoliata*.

More tolerant of the deep shade and moisture that characterize much of our region, *C. sibirica* is found from Southeast Alaska (and Siberia) to Northern California at low to moderate elevations, often in the shade of western hemlock (*Tsuga heterophylla*).



Siberian miner's lettuce (*Claytonia sibirica*) plant. PHOTO: T. ABE LLOYD

The root system of *C. sibirica* is more robust than miner's lettuce, and it will occasionally take on a perennial life history in sites with adequate summertime moisture.



Heartleaf springbeauty (*Claytonia cordifolia*) flower. PHOTO: T. ABE LLOYD

Heartleaf springbeauty (*C. cordifolia*), a montane version of *C. sibirica*, is named for the plant's cordate (heart-shaped) basal and cauline leaves. The flavor is intermediate between *C. perfoliata* and *C. sibirica*. I find the flowering stems have excellent flavor, although they are a little more fibrous than *C. perfoliata*. The leaves are better than *C. sibirica*, but have some of the same burning quality. According to J. W. Blankinship (1905),



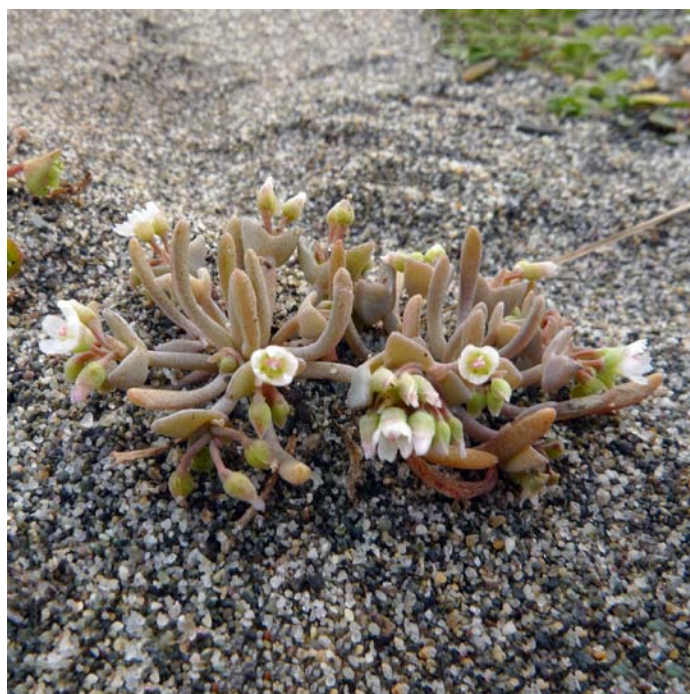
Heartleaf springbeauty (*Claytonia cordifolia*) plant. PHOTO: T. ABE LLOYD

it was eaten raw by Native Americans in Montana, but I am aware of no other references to its use by Native Americans.

In appearance, *C. cordifolia* is very similar to *C. sibirica* in having a pair of broad leaves on the flowering stems. However *C. cordifolia* flowering stalks lack small leaf-like bracts below each individual flowering stalk and have flower petals that are perfectly white (lacking the pink stripes often present on *C. sibirica*).

The plants are found on both sides of the Cascades, in the Olympic and Siskiyou mountains and are common in the Rockies from Southern British Columbia to southern Idaho. Look for them at middle elevations in the mountains along streams and seeps, usually in the partial shade of true firs (*Abies* spp.) and broadleaf riparian trees.

Pale springbeauty (*C. exigua*) has minute succulent leaves and a greyish color. It is another annual species with a thread-like root system. The basal leaves are linear and the cauline leaves are only partially fused. Raw, I find that *C. exigua* provokes the same burning sensation as *C. sibirica*, but it may have been eaten as a potherb by the Cahuilla in Southern California (Bean and Saubel 1972).



Pale springbeauty (*Claytonia exigua*) plant. PHOTO: T. ABE LLOYD

Claytonia exigua is found in very open and dry habitats on rock, silty soil, or sand, from southwestern British Columbia west of the Coast Range, west of the Cascades crest through Washington and Oregon, and west of the Sierras in California.

Several perennial rooted *Claytonia* species are found throughout the Pacific Northwest, but I will only briefly mention mountain potato, since—so far as I can tell—the greens of no other species are edible.

Mountain potato (*C. lanceolata*), also sometimes called springbeauty, is easily distinguished by its narrow green leaves, tuberous perennial root, and montane to alpine habitat. Both the raw greens and the cooked tubers are delicious edibles. Unfortunately, the leaves are rather small, so I mostly target the roots and enjoy the leaves as a bonus. Among many Native American groups east of the Cascades and British Columbia Coast Range, *C. lanceolata* is one of the most important traditional mountain root foods. They are eaten by Tsilhqot'in (Mellott 2010), St'át'im (formerly Lillooet; Turner 1992), Secwepemc (formerly Shuswap; Palmer 1975), Nlaka'pamux (formerly Thompson; Turner et al. 1990), Okanagan (Turner et al. 1980), Kalispel (Thoms 1989), Blackfoot (Johnston 1970; McClintock 1909 in Moerman), Sahaptin (Hunn 1990), Nez Perce (Spinden 1908), Shoshone (Lewis and Clark 1905), Ute (Chamberlin 1911), and likely others. Even though they are also found at high elevations west of the Cascades crest, I have found no records of the roots or greens being eaten by Native Americans along the coast. Traditionally, plants with multiple flower stems were targeted, since these have the largest tubers. Because harvesting the tuber destroys the entire plant, only take a small portion of each patch.

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Mountain potato (*Claytonia lanceolata*) harvest. PHOTO: T. ABE LLOYD

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Thorp Mountain Lookout: Early Summer Flowers and Hummingbirds Galore

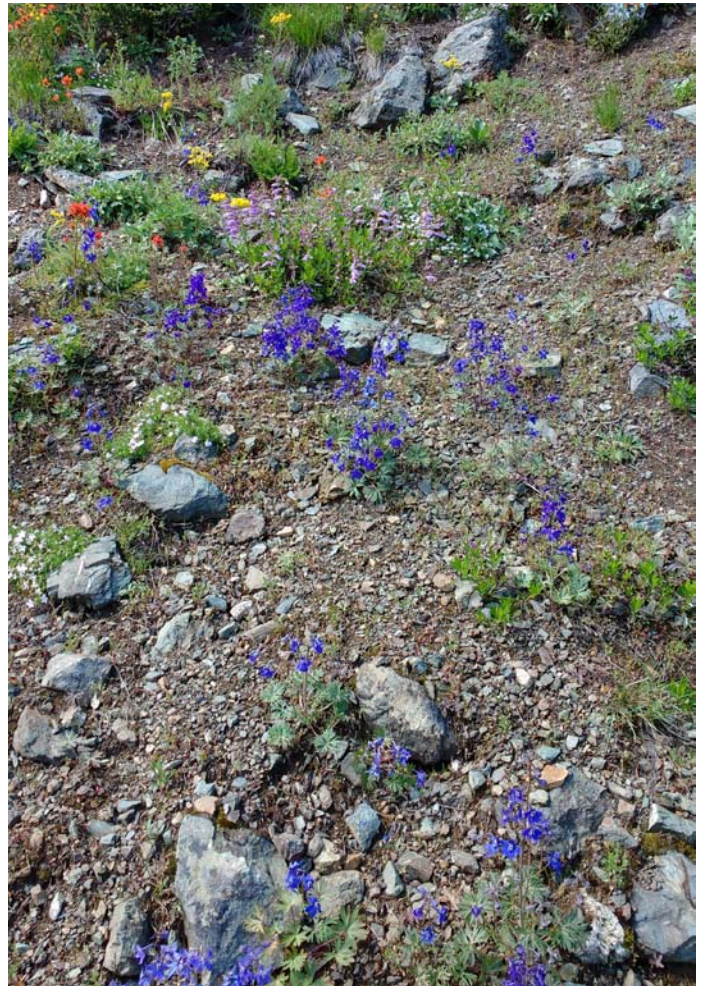
by David Giblin, University of Washington Herbarium,
Burke Museum

I never cease to be amazed by the number of central Cascades wildflower hikes that (1) are relatively easy to access (but see caveat below), (2) are moderate in terms of distance and elevation gain [5 miles round-trip, 1,800 feet], (3) have outstanding views, and (4) I have never done before. Last June I removed the Thorp Mountain Lookout Trail (by way of Knox Creek) from that list.



The lower stretch of the trail with harsh paintbrush (*Castilleja hispida*), Bingen lupine (*Lupinus sulphureus* var. *subsaccatus*), and Lyall's angelica (*Angelica arguta*). PHOTO: DAVID GIBLIN

The Knox Creek trailhead is somewhat obscure. Perhaps the best hint you're there is the small pullout area along the gravel forest service road. Setting out, the initial gentle switchbacks course through a broad avalanche chute choked with plants representing most of the color spectrum: the red and orange of harsh paintbrush (*Castilleja hispida*), the yellow of buttercups (*Ranunculus* sp.), the green-white of white-stem frasera (*Frasera albicaulis*) and the blue of Bingen lupine (*Lupinus sulphureus* var. *subsaccatus*). White is well represented by yarrow (*Achillea millefolium*) and Lyall's angelica (*Angelica arguta*), and gray by the foliage of a wormwood species (*Artemisia* sp.).



Cliff beardtongue (*Penstemon rupicola*) on a rocky outcropping along the trail. PHOTO: DAVID GIBLIN

Toward the top of the chute the vegetation gets lower, the soil gets thinner, and jagged rocky outcroppings appear. The parade of colors continues: Spreading stonecrop (*Sedum divergens*) and cliff beardtongue (*Penstemon rupicola*) cling to bare rock faces, Nuttall's larkspur (*Delphinium nuttallii*) and lambs-tongue ragwort (*Senecio integerrimus*) are plentiful in the open meadows, and large amounts of mountain ash (*Sorbus scopulina*) cluster along a seasonal stream corridor in the gulch below. It was around here that I saw probably the greatest concentration of Anna's hummingbirds (*Calypte anna*) that I have ever seen in the Cascades. Largely in pairs, the hummers zipped back and forth endlessly, mostly visiting the paintbrush.

The trail leads you into fairly dense forest, without, as I recall, having much understory plant diversity. Patches of snow remained in some places on that June day. Once making the ridge the trail heads west and soon emerges into a dry, open meadow with views south that include Mount Rainier. You'll see lots of Rydberg's beardtongue (*Penstemon rydbergii*) along this stretch, and it's a great place for lunch.

Ultimately the trail leads to the foot of a higher ridge that forms Thorp Mountain, upon whose peak a fire lookout was built. Once up there you can understand why. At the base of this ridge is a junction for a trail leading down to Thorp Lake, a beautiful, emerald body of water surrounded by dense, undisturbed forest. You're heading up, somewhat steep in places, but not unreasonably so.

Once on top at the lookout, which is closed to the public, the wildflowers are not terribly abundant. There's actually a lot of krummholz ("bent wood" in German), which provide a quick study on how strong, steady wind can limit forest canopy height and lead to misshapen branches. The lack of wildflowers is okay, because you'll probably spend most of your time marveling at the spectacular views of Mount Daniels, Mount Hinman, the countless peaks of the Alpine Lakes Wilderness, and the Stuart Range.

My wife, Julie, and I did the hike in mid-June of 2016, and you may recall that 2016 was an average snowpack year. In a big snow year you'll probably want to go in late June. I think we passed four people on the way up, and we had the lookout area to ourselves for a good while. Why there weren't more people on a hike like this on a beautiful Saturday in June is a mystery to me, but perhaps not entirely, as explained below.

Located about 5 miles west of the north end of Lake Cle Elum, the trailhead is easy to reach, except for the last two miles. This part of the road is not well maintained, and we had to proceed cautiously in several places with a low-clearance sedan. My advice if you go: don't take a low-clearance sedan. You don't need four-wheel drive, just a little clearance in some places that most modern sedans lack, and the road is narrow in places due to brush.

You can find directions to the trailhead and a trail description in *100 Hikes in Washington's Alpine Lakes* by Vicky Spring, Ira Spring, and Harvey Manning. You can find driving directions and read trip reports on the Washington Trails Association website.

A Northwest Forest Pass or federal lands pass is a good idea to bring, but I don't recall that we needed it. I encourage you to go. The flowers, the pollinators, the views, and likely the solitude make for a nice outing.

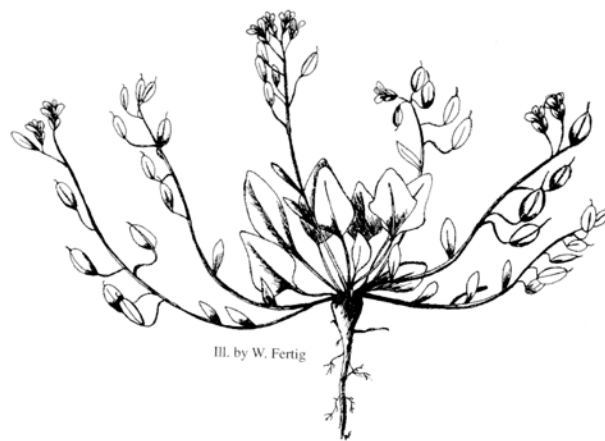
David Giblin manages the University of Washington Herbarium at the Burke Museum, where he studies the vascular plant flora of the Pacific Northwest. He is a regular contributor to Douglasia.



Plant Conservation in Washington: Perspectives from a Transplanted Botanist

by Walter Fertig

They say you never forget your first time discovering a new rare plant population. For me, that time was June 13, 1990. I was in my first week of my Master's thesis studying the flora of the western Wind River Range in Wyoming. Bumping along a dirt road to the Green River Lakes, I crossed a white, milky, stream reeking of sulfur. I did not need to consult my map to know I was at Stinky Spring. It seemed like a good place to stop and see what sorts of plants might be growing on the jagged, barren outcrops of travertine just below the spring. I was too green at the time to appreciate the strong correlation between rare plants and unusual geologic substrates, so my stop was truly serendipitous. But there they were . . . little yellow-flowered mustards with prostrate gray stems and diamond-shaped leaves. I knew Edwin Payson had found his namesake plant, the rare Payson's bladderpod (*Lesquerella paysonii*), somewhere in the general area back in 1922. Maybe he smelled the sulfur too and thought this was a good place to stop and see what was growing.



Author's illustration of Payson's bladderpod (*Lesquerella paysonii*) from the 1994 *Wyoming Rare Plant Field Guide* (Fertig, Refsdal, and Whipple).

Searching for rare plants got into my blood, and I was lucky to parlay my hobby into a career, first as the state botanist for the Wyoming Natural Heritage Program, and later with my own botanical consulting business in Utah and Arizona. I have had the great fortune of traveling over a lot of the west hunting rare plants and to spend a lot of time thinking about strategies to conserve our native flora. This past September I was hired as the state botanist for the Washington Natural Heritage Program. Although I am new to the Evergreen State, I hope I can apply my past experience to conservation botany issues in Washington.

It is unfortunate that plants do not receive the same amount of conservation attention as animals or showy scenery. The Center for Plant Conservation has estimated that 20 to 33 percent of the 20,000 vascular plant species native to the United States are vulnerable to extirpation. Fifty-seven percent of all species listed as threatened or endangered in the United States under the Endangered Species Act are plants. As human population pressure intensifies and threats from exotic weeds, wildfire, climate change, and habitat loss increase, the number of rare plant species is only likely to grow.

Numerous strategies exist for conserving rare plants, including legal protection, nature reserves, economic incentives to conserve habitat, seed banks, and captive propagation or reintroduction programs. Unfortunately, the available resources to conserve rare plant species are not keeping pace with the need. The US Fish and Wildlife Service spent nearly \$48 million on projects for 947 listed plant species in 2015 (but that represents just 3.4 cents for every dollar spent on listed animals). While this may seem like a lot of money, it is less than the cost of constructing 5 miles of urban interstate highway. Even more limiting than funding is time. For many species, there is not enough time to act before population numbers or habitat conditions fall below a crucial threshold for survival.

Faced with these realities, it is imperative that practitioners of conservation botany develop sound practices for prioritizing which species, habitats, or sites are most in need of conservation attention. To set effective priorities, it is critical to understand the various factors that contribute to rarity, determine which species are most vulnerable, identify where rare species occur, and document which species and habitat types are not being adequately protected. For the past two decades I have been working on these issues in the Rocky Mountains and Colorado Plateau. Now I hope to apply some of the same prioritization efforts in Washington.

Determining Rarity

As recently as the late 1970s, ecologists often equated rarity with substandard genes or poor competitive ability. An important breakthrough came with the publication of Deborah Rabinowitz's paper "The Seven Forms of Rarity" in 1981. Rabinowitz argued that rarity was largely a consequence of limited geographic range, small population size, and high habitat specialization. Species with varying combinations of these factors were more likely to be rare than species with large populations, wide geographic ranges, and a broad ecological amplitude. Rabinowitz's simple but elegant classification scheme inspired many other ranking systems, such as the Natural Heritage system, and helped to destigmatize rarity as a pitiable case of inferiority.

Geographic range is an especially robust predictor of rarity. Simply put, species with small ranges, such as a single mountain, valley, or water body, are more vulnerable to extinction from chance events, disease, predation, or habitat loss than similar species occurring over large geographic extents. Species with



Author in the Grand Canyon. The plant is sweetbrush (*Bebbia juncea*).
PHOTO: LAURA FERTIG

narrow ranges (what are often referred to as local endemics) also tend to have few occurrences, high intrinsic rarity (such as reproductive bottlenecks), or a high degree of habitat specialization, which make them further vulnerable to extirpation.

In Washington, local endemics include some of our rarest species, such as showy stickseed (*Hackelia venusta*), Umtanum wild buckwheat (*Eriogonum codium*), and Knoke's desert-parsley (*Lomatium knokei*), all known from just one or two occurrences in the entire world. Only slightly less rare are "regional endemics" that are restricted to Washington or one to two neighboring states or provinces. These species may have more populations or somewhat higher numbers of individuals than local endemics, but are still highly vulnerable to extinction due to their relatively small global range. Examples of regionally endemic plants include golden paintbrush (*Castilleja levisecta*), restricted to the Puget Trough and Willamette Valley from British Columbia to northern Oregon, and Spalding's catchfly (*Silene spaldingii*), known from remnant Palouse Prairie grasslands and scablands from eastern Washington and Oregon to western Montana. While both of these species are listed under the Endangered Species Act, the majority of regional endemics are not afforded any formal protection.

Many species may be widespread globally but extremely rare within Washington. Species found at the very edge of their contiguous range in the state are classified as "Peripheral." In other cases, the state population may be widely separated from other populations out of state. Such "disjunct" occurrences are of keen interest because the populations are likely to be reproductively isolated and thus capable of speciation. Peripheral and disjunct species often earn the Natural Heritage Program rank of G5/S1 for their abundance globally (G5) but their rarity at the state level (S1). Slender lipfern (*Myriopteris feei*) is widespread globally but extremely uncommon in Washington where it is at the northern extreme of its range. Red poverty-weed (*Micromonolepis pusilla*) is widely distributed in the Great Basin but is disjunct (and very rare) in desert areas of central Washington. Both of these species are tracked by the state natural

heritage program, though neither is likely to become extinct over its entire range.

The number of individuals of a species is often a good indicator of overall rarity and risk of extinction. Small populations are more susceptible to natural or human-induced threats and more vulnerable to genetic bottlenecks. Likewise, plant species known from one or a few separate occurrences are in greater danger of extirpation from large-scale habitat disturbance, predation, or over-harvest. Rarity also tends to be strongly correlated with over-specialization. Species are more vulnerable if they are restricted to a specific rock or soil type, plant community, pollinator, or seed vector. Finally, once common species may become rare due to over-harvest, habitat destruction, disease, or other threats that cause mortality to greatly exceed reproduction. Such species can be recognized by sustained downward trends in population size or extent.

Ranking Species by Conservation Priority

Because there are so many potential causes of rarity, the number of rare species in a given area may be relatively high. Recognizing too many rare species, however, can overwhelm our limited capacity for conservation action. Fortunately, not all species are equally rare. Species can be prioritized based on the number and severity of factors contributing to their overall rarity.

In Wyoming, I developed a ranking system that assessed geographic range, number of occurrences, abundance, habitat specificity, intrinsic rarity, degree and imminence of threats, and population trends to determine the conservation priority of all native species in the state flora. Species were scored using a simple, binary, qualitative process. If a particular factor made a species highly vulnerable to extinction, it was scored a “1” and if it had only a moderate effect or no impact it was scored as a “0”. If a score could not be assigned based on the available information, it was given a “U” (for unknown). A maximum and minimum score was then derived by summing each of the individual scores. For the maximum or “worst case” score, any factor assigned a U was treated as if the score were actually 1, while a minimum score was derived by giving each U a value of 0. The maximum and minimum scores were then averaged (with the sum rounded down) to assign a conservation priority score, ranging from extremely high (a score of 7 or 8 out of 8) to low (a score of 0 to 3 out of 8).

Note: Local endemics were weighted slightly higher than other “rare” geographic range categories and given a score of 2, accounting for the total number of possible points being 8.

Of the 2,483 native vascular plant taxa in Wyoming that I assessed with this ranking scheme, less than 2 percent (46 taxa) scored in the two highest categories: extremely high priority (13 taxa with scores of 7 or 8) or high priority (33 taxa with a score of 6). These species were all local or regional endemics with few extant populations, low numbers of individuals, high habitat specificity, high intrinsic rarity, high threats, and a downward population trend. More than 80 percent were already listed as

Threatened or Endangered under the Endangered Species Act, or classified as Sensitive by the US Forest Service or Bureau of Land Management.

A much larger group of rare species had intermediate scores of 4 or 5. Species that scored 5 out of 8 points accounted for 3.5 percent of the Wyoming flora and were assigned to a state watch list. In general, these were species with limited geographic ranges, relatively few populations, and high habitat specificity, but were often locally abundant or had low threats and stable trends. Such species bear watching, because they are particularly vulnerable to large scale changes in habitat condition that could drive down their numbers, increase threats, or alter population trends (and thereby shift them to one of the higher priority categories). Species scoring 4 out of 8 possible points were considered a medium priority for conservation and represented 17 percent of the state flora. Medium priority species tend to be widespread globally but peripheral or disjunct in Wyoming and were quite uncommon in the state, but lacked intrinsic rarity or high habitat specificity. Individually, these species do not warrant the same attention as higher priority taxa, but when they are found in clusters they can be useful for identifying rare or unusual habitats that might be of conservation value.

About 60 species (2.5 percent of the state flora) lacked sufficient information to be ranked using this system. Rather than being shunted aside, these “Need Data” species could be highlighted as needing survey attention or additional research. Over half of the plants in this group were recently described as new to science and had not yet been adequately surveyed. Many will likely prove to be exceedingly rare once better data are available and may end up in one of the high priority categories.

My ranking system was also applied in Utah to develop a rare plant list for the state native plant society. We assembled a panel of experts to help rank the entire native flora and then held annual meetings to revise the rankings based on new data. Our Utah team was able to winnow an unwieldy group of 858 potentially rare species down to a more manageable 150 extremely high and high priority species. The list was well received by the botanical community, because several influential people participated and the ranking process was transparent. I used a slightly modified version of the protocol to rank the 200 rare plant species reported for Zion National Park and was able to pare down the list to 12 high-priority species and 10 taxa in need of additional survey data. This allowed the park to better focus its limited resources on the species with the greatest need for management attention.

Gap Analysis: What Species are Missing from the Protected Area Network?

An important strategy for conserving representative examples of the entire native flora is to have a network of preserves that encompass the diversity of habitats and environmental conditions across the state. Washington is fortunate in having a system of over 90 Natural Area Preserves and Natural Resource

Conservation Areas managed by the state Department of Natural Resources. This is augmented by dozens of nature preserves operated by land trusts, such as the Nature Conservancy or Columbia Land Trust, and by federally managed protected areas, including national parks and monuments, designated wilderness areas, research natural areas, and national wildlife refuges.

While this network covers more than 10 percent of the state, not all vegetation types or species are presently represented. This is especially true in low elevation riparian, forest, desert, or prairie habitats that have been converted to dams, commercial timberlands, agriculture, or urban centers. Gap analysis is a tool for identifying species or plant community types that are missing or inadequately represented in the protected area network. By knowing the identity and distribution of missing components, conservation planners can target specific sites or vegetation types to fill holes (or gaps) in the protected area network.

As part of my dissertation at the University of Wyoming, I conducted a gap analysis of the entire flora of Wyoming. This entailed using more than 200,000 digital distribution records from the Rocky Mountain Herbarium, digital data from the state natural heritage program, and species checklists from selected national parks, monuments, and wildlife refuges.

I discovered that 82 percent of the 2,875 native and introduced plant taxa of Wyoming were found in at least one protected area in the state. Of the remaining unprotected species, nearly one-half had been identified as priority species for conservation. Nearly one-third of the unprotected species were from the Great Plains or desert areas of the state, while less than 1 percent of alpine species were not protected. Overall, rare species were more than twice as likely to be missing or under-represented in the protected area network compared to common and widespread taxa. These results indicated that the greatest number of under-represented species could be protected by focusing conservation efforts on the least-protected habitats and regions of the state, especially low elevation wetlands, prairies, deserts, and patches of eastern deciduous forest in the Black Hills.

What Can be Done?

Unfortunately, not all parcels of land can be formally protected. But informal conservation practices can still be implemented that reduce unintentional harm. The key is to disseminate information on what species are rare, where they occur, and what management practices are compatible with their survival. Natural heritage programs can play a key role in providing this kind of reliable data. In my experience, more damage occurs to rare species and their habitat when people act out of ignorance, not malice.

There are also many ways for plant enthusiasts in Washington to help with conservation efforts. Programs like Rare Care from the University of Washington provide training and opportunities for citizen scientists to revisit known populations of rare species and collect valuable information on population size, trend, and habitat condition. Thousands of occurrences

of rare plants have been revisited by volunteers over the past 20 years and the information has been entered into the natural heritage database.

Citizen scientists are also needed to document the flora of many of the state's protected areas, which will help local land managers know what species they have and aid in identifying protection gaps elsewhere in the state. There are many other opportunities to volunteer at state parks or natural areas with monitoring, reintroducing rare plants, pulling weeds, or other labor-intensive activities that otherwise might not happen.

My biggest hope is that we can eventually change the prevailing narrative that having rare plants on one's property or job site is a disaster. Unfortunately, current laws and regulations tend to perpetuate this stereotype. In my experience working with rare plants on private lands I have found that landowners who still have these species tend to be doing a good job of stewardship, (though they often do not realize it) compared to their neighbors who lost their plant habitat years earlier due to poor management. We need to create positive incentives that recognize or reward such good behavior. This might be a tax credit for managing rare species habitat or something as simple as the state of Washington's volunteer registry program where landowners get formal recognition for their conservation efforts. The trick is to make rare plants be an asset for private landowners rather than a perceived liability.

Washington has over 2,650 native plant species, giving it the 15th largest flora in the country (despite being 20th in total area). There is still a lot to be learned, though, as new species continue to be named or discovered every year. I am excited to be here and hope to make some interesting discoveries of my own. And I hope to see you on the trail, making discoveries of your own, as well.

Walter Fertig was state botanist for the Wyoming Natural Diversity Database from 1992 to 2001 and has been state botanist with the Washington Natural Heritage Program since September 2017. He was formerly the editor of the Wyoming Native Plant Society newsletter (Castilleja) and the Utah Native Plant Society newsletter (Sego Lily). Walter can be contacted at walter.fertig@dnr.wa.gov.

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***Idahoa scapigera*:** **An Overlooked and (Very) Early** **Flowering Herb of the** **Shrub-Steppe**

by David Giblin, *Central Puget Sound Chapter*

Spring generally arrives earlier west of the Cascades crest than it does east of it. The primary driver of this difference is the relative warming effect of the Puget Sound and Pacific Ocean on lowland western Washington. While Indian plum (*Oemleria cerasiformis*), red-flowering currant (*Ribes sanguineum*), and springbeauty (*Claytonia sibirica*) are often flowering in mid-March west of the crest, the ground can still be frozen in central and eastern Washington.



Flatpod (*Idahoa scapigera*) plant with basal rosette of small leaves and leafless inflorescence stalk bearing immature fruits. PHOTO: G. D. CARR

Flatpod (*Idahoa scapigera*) is among the earliest of the flowering herbs east of the Cascades crest. The combination of its diminutive size (a maximum inflorescence height of about 6 inches) and early flowering period explains why this native

annual is not more familiar to wildflower enthusiasts. But, really, who goes looking for wildflowers in the first week of March in sagebrush country? Consulting the Consortium of Pacific Northwest Herbaria online database (www.pnwherbaria.org/data/search.php) shows that this species has been collected 25 times in Washington in the month of March, with a couple of collections as early as March 4.

The genus *Idahoa* belongs to the Brassicaceae (mustard family), with *I. scapigera* being the only species in the entire genus. We describe a genus with only one species as “monotypic.” *Idahoa scapigera* is broadly distributed, ranging from southern British Columbia to California and eastward to Montana, Idaho, and Nevada. It was first described as a new species in William J. Hooker’s 1830 publication *Flora Boreali-Americana*, under the name *Platyspermum scapigerum*, so it did not go unnoticed by western North America’s early plant collectors. The accompanying notes for the description say, “This highly interesting plant cannot be compared with any genus with which I am acquainted . . . the single-flowered scapes are, as far as I know, an anomaly among Cruciferous plants.” *Idahoa scapigera* typically



Closeup of flatpod (*Idahoa scapigera*) fruit (silicle) showing the round, flattened shape and splotching on the surface. PHOTO: G. D. CARR

is found on seasonally moist open slopes, scablands, meadows, and sagebrush plains. Surprisingly, it is also found west of the Cascades crest at low elevations on southern Vancouver Island and in the Gulf Islands (think pronounced rain shadow effect), where it is tracked as rare.

Like most members of the Brassicaceae, *I. scapigera* flowers have four petals, in this case white. The leaves are basal and small (to about 1-inch long and about half as wide). *Idaho scapigera* is easily confused with the non-native, abundant, annual spring whitlow grass (*Draba verna*), also a member of the Brassicaceae. Close examination of the flowers makes it easy to distinguish these species: *D. verna* has deeply bilobed petals that often appear as totaling eight in number (visit the Plants of Washington Image Gallery to see this feature: biology.burke.washington.edu/herbarium/imagecollection.php), while *I. scapigera* has unlobed petals.

Perhaps the most striking features of *I. scapigera* are the flattened, splotched, nearly rounded fruits (silicles). To me they are among the most striking of any of our native mustard fruits. The shape and coloration are also an easy way to distinguish this species from *D. verna*, which lacks coloration in its much more slender fruits.

You don't have to go out in early March to see *I. scapigera*, though it is a good reason to make a late winter or early spring trip to see the sagebrush-steppe after a long winter. *Idaho scapigera* spans an elevation gradient from the Columbia Basin to about 2,500 feet, so it can be found in April and May as well (we collected it as late as May 9 outside Ellensburg). Good places to look for *I. scapigera* near the Cascades are the publicly accessible lands outside of Wenatchee, Ellensburg, and Yakima. In eastern Washington *I. scapigera* is known from areas around Spokane and Pullman.

I hope you come across *I. scapigera* in your travels this spring. Like me, I'm sure you'll be struck by the uniqueness of the fruits and will keep an eye out for it wherever your sagebrush adventures take you in the future.

David Giblin manages the University of Washington Herbarium at the Burke Museum, where he studies the vascular plant flora of the Pacific Northwest. He is a regular contributor to Douglasia.



Sagebrush violets (*Viola trinervata*) among spring whitlow-grass (*Draba verna*), Cowiche Canyon Uplands, Yakima. PHOTO: MARK TURNER

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Making a gift through your estate is a powerful way to express your values, care for the earth, and ensure a lasting impact. "One generation plants the trees, another gets the shade."—Chinese Proverb

Here are examples of how to make a planned gift:

- Name the Washington Native Plant Society in your will.
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- Name the Washington Native Plant Society as the beneficiary of a charitable remainder trust.

There are many other ways you can make a charitable gift through estate planning—consult your lawyer or financial planner. For more information, call the WNPS office 206-527-3210.

Conservation through the WNPS Grant Program

by Becky Chaney

Every year WNPS supports Washington's native plants and habitats through grants that fund conservation activities. With the start of the year, the Conservation Committee accepts applications for conservation projects from around the state. The committee chooses projects that will best restore, improve, or support on-the-ground functioning native plant ecosystems. Whether rural or urban, forest or prairie, on private or public land, winning projects are site-appropriate and further the WNPS mission.



Volunteers and park staff transport the plants from the nursery to the prepared site. PHOTO: BONNIE MILLER

In 1997 a grant from the Seattle mayor's office began the forest restoration of four acres of natural area located in the Burke-Gilman Playground Park. Since then, local agencies, neighborhood volunteers (including WNPS Native Plant Stewards), and University of Washington students have replaced the streamside invasive species: Himalayan blackberry (*Rubus bifrons*) and English holly (*Ilex aquifolium*). Cooling conifers and a varied understory, complete with sedges (*Carex* spp.) and western skunk cabbage (*Lysichiton americanus*), now benefit native wildlife and delight park visitors.

Work on this restoration project continued in 2017 with the help of a \$500 WNPS Conservation Grant to purchase native plants. Member Bonnie Miller took the lead in applying for the grant and documenting the event. Bonnie reports, "When notified that the WNPS grant was awarded, the volunteers determinedly cleared the invasive non-native vegetation and spread more than 40 yards of high-quality wood chips." Plants were ordered, delivered to the site, organized, tagged, and moved to their planting places ahead of the event. On planting day trained WNPS Native Plant Stewards working with enthusiastic volunteers planted the 145 shrubs within the targeted half-



A perfect planting mix: a cool autumn morning, trained WNPS Native Plant Stewards, and eager neighborhood volunteers. PHOTO: BONNIE MILLER

acre of park. The new plantings should result in native thickets that will benefit the park's wildlife. They will also improve the experience of youngsters exploring the creek by introducing them to native habitats.

Seattle, like WNPS, recognizes that the ecosystem services that green spaces provide benefit cities and our state. Beyond habitat connectivity and species biodiversity, these benefits include trapping and slowing rain water, energy conservation, carbon sequestration, moderation of heat island effects, improvements to air and water quality, and human well-being. You can find more on this topic in the publication *Seattle's Forest Ecosystems*, available online at www.seattle.gov/trees/ecoservices.htm. For a broader overview of urban forest benefits, download "Benefits of Restoring Ecosystem Services in Urban Areas" by T. Elmquest et al., available as a PDF online at www.sciencedirect.com. This paper includes an extensive list of references and recommended reading for those wanting to delve deep into the science of urban forestry.

Plants for the restoration in the Burke-Gilman Playground Park were selected using the plant list for a conifer deciduous mixed forest from the "Forest Stewardship Field Guide" provided by the Green Seattle Partnership.

Quantity	Common Name	Scientific Name
10	Pacific crab apple	<i>Malus fusca</i>
10	Serviceberry	<i>Amelanchier alnifolia</i>
20	Mock orange	<i>Philadelphus lewisii</i>
20	Oceanspray	<i>Holodiscus discolor</i>
20	Flowering red currant	<i>Ribes sanguineum</i>
20	Pacific ninebark	<i>Physocarpus capitatus</i>
20	Nootka rose	<i>Rosa nutkana</i>
20	Sword fern	<i>Polystichum munitum</i>

Becky Chaney, the WNPS Conservation Committee chair, can be reached via email at becky@chaney.org. She is always happy to hear your conservation interests and concerns. Please include "WNPS Conservation" in the subject line.



Boundary Layer: Exploring the Genius between Worlds

Kem Luther
Oregon State University Press
Paperback, 240 pages

Reviewed by Fred Rhoades

"Pursuit of the [boundary layer] metaphor brings us, in the end, to three boundary layers of a different type: the conceptual ones that lie between species and ecosystems, nature and culture, and science and the humanities."

This quote from the Preface to *Boundary Layer* by Kem Luther points us to the broad range of topics covered in his fascinating book. This book is at once a natural history of organisms and their environments, brief biographies of some biologists who study them, and musings on the historical and philosophical backdrops to these realms. Throughout, Luther uses the term "boundary layer" as a metaphor for many of his descriptions of what many might consider marginal organisms and their relationships with other things. As Luther explains, "Boundary layers . . . develop their own set of rules. When viewed from the more stable spheres that give rise to the boundary, these rules can seem confused. Inside the boundary layer, however, the rules come to have plain, widely accepted interpretations."

The natural history parts include an appreciation for several groups of "cryptogamic" (spore-producing, plant-like) and "higher" organisms, and for the ecological positions of these organisms. Luther introduces the unusual (and I'm not sure useful) term "stegnon" to refer to the smaller organisms that occupy the spaces between the larger plants and animals and their terrestrial environments. Trevor Goward, the Canadian lichenologist featured in the chapter on lichens, coined this term. The organisms of the stegnon that are dealt with in-depth include the mosses, mushroom-forming fungi, and lichens. One chapter discusses the shore dune landscape and the plants that occupy this boundary between sea and land. Several chapters deal with broader concepts, including the nature of ecosystems and wilderness preservation in parks.

In order to introduce the various topics, the book is constructed as a series of encounters with biologists in British Columbia. In most of the chapters, we learn something about the varied—but all fascinating—backgrounds of these Canadian biologists. Where did they grow up and study? What led them to be experts in their fields? What insights about their worlds can they give us? I found these biographic backgrounds about our northern neighbors interesting and informative.

Throughout the book Luther often turns his attention to philosophical musings about the topics, using his overall boundary layer metaphor to link ideas that otherwise might seem quite disparate. Luther originally studied the philosophy

of science, and this interest is never far away from his discussions.

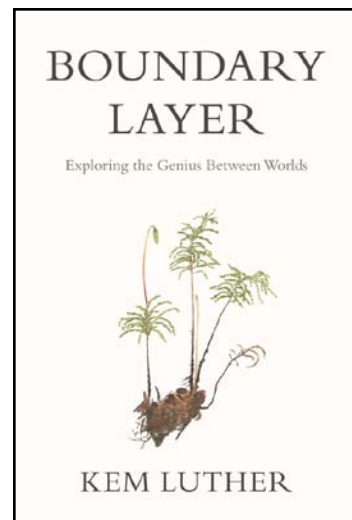
Chapter 5 features the forest ecologist Andy MacKinnon and a review of the classic ecological arguments about how the organisms in ecosystems arrange themselves: in replicable units that are given phytosociological names or as individual organisms that arrange themselves along environmental gradients and just happen to group with others that relate to the same gradients. This is a valuable review of an epic battle of ecologists in the late twentieth century.

This book is well worth perusing if you want to learn about a few of the organisms of the stegnon. The biology is introduced in a manner that reduces the heavy load of specialist terminology that comes with each group. The biological details are accurate, although in some cases I wish they went a bit further. The discussion of moss sexuality and the history of understanding this detail about bryophytes is particularly good. However it would have been useful to extend the description by comparing such life cycles to the similar life histories of the higher plants. And there may be good ecological arguments regarding this life cycle and how the higher plants moved away from the "boundary layer" during evolution.

For his discussion of fungal biology, Luther focuses on the mycorrhizal mushrooms. This is a good introduction to this ubiquitous relationship between fungi and plants. As an ecological mycologist, I wish Luther had spent a little more time discussing the important role of fungi in plant decomposition. The boundary layer in which the various fungi function may be the most unfathomable of all discussed in the book and deserves more detail. With regard to lichens, Luther defers to the views of Trevor Goward, whose ideas have helped biologists expand their concepts of how complex symbiotic relationships can be. Since lichens are not so much organisms as unique fungal ways of life and ecosystems in their own right, Goward's somewhat unorthodox views are a perfect introduction to this unique life form.

This is a book to savor in bits and pieces. Luther is largely arguing for a different way to look at nature that includes closely examining all organisms where they live, no matter how small. And he provides particular insights into looking at the boundaries that crop up when looking at larger forms of life.

Fred Rhoades is a retired mycologist and cryptogamic botanist, who taught at Western Washington University. He has been a member of the Washington Native Plant Society since the late 1970s.



WNPS 2017 Annual Backpack: Trip Report

by Terri Knoke, Columbia Basin Chapter

For last year's backpack trip (July 14–16, 2017), we hiked to Badger Lake, a large pond on the Boundary Trail in the Gifford Pinchot National Forest. Nearby, overlooking Badger Lake, was Badger Peak, the site of a former fire lookout.

Our starting place: the Mosquito Meadows trailhead, located south of Randle in Lewis County. Jim Riley met us there and handed out our plant list booklets. Along the trail, there were numerous flowers in bloom: little prince's-pine (*Chimaphila umbellata*), queen's cup (*Clintonia uniflora*), tiger lily (*Lilium columbianum*), side-flowered miterwort (*Ozomelis stauropetala*), Brewer's miterwort (*Pectiantia breweri*), foamflower (*Tiarella trifoliata* var. *unifoliata*), and two violets (*Viola glabella* and *V. orbiculata*). There was ample evidence of the bloom to come, but many of the more common wildflowers that we expected to see were just beginning to put out this year's growth.

As we made the gradual ascent from Mosquito Meadows into the Badger Lake basin, it became evident that the deep winter of 2016 was still in the process of bidding farewell to the landscape as the understory of the forest was carpeted with white avalanche lilies (*Erythronium montanum*). Its presence foretold the conditions at camp: snow fields, a seasonal stream of snow melt, and the wet sponge of the high mountain meadow studded with shoots of green pushing through the dead remnants of last year's plants. As we approached camp, hundreds of white marsh marigold (*Caltha leptosepala*) greeted us, blooming profusely under the water and along the banks of the melting snow.

We camped as best we could, searching for dry footprints for the tents in the spongy meadow and the wet, black duff of the forest floor. The meadow was ringed with a plethora of tree species, including silver fir (*Abies amabilis*), subalpine fir (*A. lasiocarpa*), noble fir (*A. procera*), Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), Engelmann spruce (*Picea engelmannii*), western white pine (*Pinus monticola*), western hemlock (*Tsuga heterophylla*), mountain hemlock (*T. mertensiana*), western red cedar (*Thuja plicata*), and Alaskan yellow cedar (*Callitropsis nootkatensis*), all knee deep in snow. Bob Tokach explained that he and others had planted several of these species of trees in this area over 30 years ago.



Nuttall's linanthus (*Leptosiphon nuttallii*).

PHOTO: LINDA SWARTZ

The following morning, we made a quick ascent of Badger Peak, carefully route-finding through large patches of snow in the forest. At the peak we were rewarded with a 360-degree view. We stood at the center of a host of snow-covered volcanoes: Mount St.



(Left to right) Linda Swartz, Jim Duemmel, Mary Prichard, Sheryl Fortney, Jim Prichard, and Bob Tokach. In front, Killer the dog. PHOTO: TERRI KNOKE

Helens, Mount Adams, Mount Rainer, and Mount Hood in the distance. As Jim Duemmel scrambled the steep cliffs to the east in search of other species, we stood and admired the colorful array of blooms on the peak: Cascade desert-parsley (*Lomatium martindalei*), northern buckwheat (*Eriogonum compositum*), cliff paintbrush (*Castilleja rupicola*), spreading phlox (*Phlox diffusa* var. *longistylis*), and broadleaf lupine (*Lupinus latifolius* var. *latifolius*). Dropping back down into camp, we found two plants of interest: Nuttall's linanthus (*Leptosiphon nuttallii*) and long-stalked clover (*Trifolium longipes*).

Upon returning to camp, everyone packed and departed for home, leaving me alone in the meadow to wait for new recruits to arrive. Alex Wright and a fellow student did arrive, and the three of us proceeded up the Boundary Trail to investigate the ridge to the west. We were rewarded with new species: subalpine mariposa lily (*Calochortus subalpinus*), cliff beardtongue (*Pentstemon rupicola*), an odd form of silky lupine (*Lupinus sericeus*), Hall's goldenweed (*Columbiadorea hallii*), which was sterile and had to be confirmed in the herbarium, and a cold rocks suite with buttercup suksdorfia (*Hemieva ranunculifolia*), holly fern (*Polystichum lonchitis*), *Saxifraga vespertina*, and alpine lily (*Lloydia serotina*). According to David Giblin, manager of the University of Washington Herbarium at the Burke Museum, the *L. serotina* is the southernmost reported population in Washington, though not the southernmost population for the species.

Deep snow and felled trees prevented further exploration, so we returned to Badger Lake only to find Stu Knoke making camp. The next day we broke camp and returned whence we came, stopping to talk with Brad Kreikhaus, the new Gifford Pinchot Forest botanist who we met along the way.

Terri Knoke is a botanical artist and illustrator. Her work focuses on native plants and insects of the Pacific Northwest. She joined the WNPS in 2011 and has been a regular participant in the annual WNPS backpack.



Smartphone Wildflower Photography

by Mark Turner, Koma Kulshan Chapter

What camera do you carry with you nearly all the time? There's a good chance it's the one built into your smartphone. Many of us pull our phones from our pockets and take pictures of nearly everything, including wildflowers.

That camera phone in your pocket is quick, convenient, and easy to use. With a little bit of care it's also capable of making very good photos. My iPhone 6, released in 2014, has an 8-megapixel camera (3264 × 2448 pixels), and there are newer models that have even higher resolution. That's more pixels than my first digital single-lens reflex (DSLR) camera, which I used for most of the photos in my book, *Wildflowers of the Pacific Northwest*.

The automatic features of your smartphone camera—exposure, focus, and color balance—work surprisingly well. Point your camera at a subject, press the shutter button, and you're going to get a reasonably well-exposed photo that's big enough to make an 11×14 print or publish in a magazine.

What the camera won't do for you is tell you where to hold it and what to include in the frame. While phone cameras are quite capable, they do have limitations.



Bringing the camera close to this clump of Davidson's penstemon (*Penstemon davidsonii*) helps to add depth to this photo from the alpine edge of Mount Baker. PHOTO: MARK TURNER



Fresh, perfect red-flowering currant (*Ribes sanguineum*) blossoms on a branch well-separated from the rest of the flowers on the bush allowed the background to go soft. A bright overcast sky flatters the flowers with gentle light. PHOTO: MARK TURNER

Understand the Limitations

Phone cameras have a fixed focal length, wide-angle lens. If there's a zoom, it's digital and not optical. That means you're just cropping your photo when you zoom in. The wide-angle lens means you can't do justice to distant subjects, like wildlife or mountain summits. You're also limited to a fixed aperture, so you have no control over depth of field. It's challenging to separate a subject from the background by having the subject in sharp focus and the background soft. On the other hand, nearly everything in your photo will be acceptably sharp.

Given that your phone camera has some limitations, how can you work with it to create wonderful wildflower photos? Here are some tips, most of which also apply to photographing flowers with a DSLR or other bigger and more versatile cameras.

Know Your Subject

Think about which characteristics of the wildflower you need to show. Unless you're creating a piece of art, in which case nearly anything goes, knowing what's important to reveal in a specimen photo will help you get better images. What's the shape of the flower? How are the leaves arranged? What's the habitat? You don't necessarily have to show everything in detail, but if you want to tell the plant's story or you're going to ask someone to help you ID a flower from your photo you will want to include most of the important elements.

Select a "Hero"

Think like a bee or butterfly and choose a specimen that is fresh, with blossoms that have recently opened, with leaves that have minimal insect damage, and that is characteristic of the species. Does your specimen have the right number of petals? Are the blossoms loaded with fresh pollen? In commercial product photography, the perfect subject is the "hero." Find your flower hero first and don't waste time on subpar subjects.

Find Relationships

Look for ways to show how your subject relates to the surrounding environment. Think in layers: foreground, middle, and background. Usually your main subject will be in the foreground, but it doesn't have to be. Sometimes it's nice to use something closer to the camera to frame your subject. You can create a bit of mystery by partially hiding your subject with a foreground object, even creating a frame around your subject within your overall composition.

When shooting landscapes, a strong foreground element can help anchor the viewer and give a stronger feeling of depth. The wide-angle lens on your phone camera works well for this.

Get Eye to Eye with Your Subject

Most subjects look better when photographed from their eye level. When photographing flowers, that means getting your camera at about the same height as the flower. This isn't a hard and fast rule, and sometimes you'll want to shoot down at your subject, or get below it and look up. The point is to figure out the best vantage point for the story you're telling. For flowers, standing above the subject and shooting from your eye height, the way we see things every day, usually isn't the best choice. Bring more interest and drama to your photos by changing your vantage point.

See the Light

While my favorite light for photographing wildflowers is a bright overcast sky, with soft shadows, I'm not always lucky enough to get those conditions. You may have learned that you're supposed to put the sun over your shoulder so it's shin-

ing into the face of your subject. That's front light, and sometimes it's okay. But I like to work with light that's falling on my subject from the side or coming through foliage from behind. Plants with large leaves, like devil's club (*Oplopanax horridus*), take on an entirely different look when backlit. Pay attention to light direction and bring drama to your photos that you can't achieve by using front light.



These trillium (*Trillium ovatum*) blossoms fill the frame, with just enough space around the edges that they don't feel crowded. There's nothing sticking into the edge to distract from the subject.

PHOTO: MARK TURNER

Fill the Frame

Decide what you want to show in your photo. It could be a blossom detail, a plant portrait, or an environmental photo showing your primary subject in the landscape. Whatever it is, keep everything important in the frame and crop out everything that's not. That means moving your camera closer or farther from your subject. While you want to fill the frame, you also want to give your subject a little breathing room. Avoid having things touch, or be very close to, the edge of the frame. That creates visual tension that can distract a viewer from what you want them to see.

Look for Contrasts

Most people think of contrast in photography only in terms of light and shadow. That's important, but also consider color and sharpness contrasts. Color contrasts are pretty easy with flower photography because there's usually lots of green foliage. Sharpness contrast is harder with a phone camera because of the wide-angle lens, but if you can put enough distance between your subject and the background it's not impossible. Be careful with brightness contrast because a bright flower against a very dark background can look unnatural. It's a style that some people like, but it isn't easy to do well.

Clean up the Frame

Once you've settled on a composition, look carefully at everything in the frame. Are there distracting elements, like dry grass stems? Is something barely sticking into the photo



Backlight makes this detail of a sword fern (*Polystichum munitum*) frond pop. The photo was finished in the Camera+ app to enhance color contrast and add the border. PHOTO: MARK TURNER

or touching the edge of the frame? All of these are distracting elements. The general rule of thumb is, “if it doesn’t enhance the photo, get rid of it.” However, don’t go pulling things up willy-nilly. While dead stuff and known weeds like cheatgrass (*Bromus tectorum*) are almost always fair game to remove, be careful not to over-clean. Perhaps last year’s spent flower stalks help tell the story that the plant you’re photographing is a perennial. Use your good judgment about how much cleaning is right for each photo.

Tap the Screen to Focus

While all phone cameras will automatically focus, they may not focus on what you think is most important. Touch the screen at the point you want the camera to focus. The camera will generally set the exposure for that point, too.

Use an App for Manual Focus

Sometimes it’s nearly impossible to get your camera to focus where you want it to. The problem is that the autofocus system is looking for contrast (like sharp edges), and if there’s more detail in the background than in your main subject, the camera will focus on the background. There are third-party apps that let you override autofocus and focus manually. The one I use is Camera+ (for iOS only). For Android folks, Camera FV-5 gives you manual control of your camera.

Adjust Exposure

Auto exposure works well most of the time, but occasionally you’ll want your photo to be brighter or darker. In the iPhone camera app, when you touch the screen to focus you’ll see a little sun appear to the right of the focus box. Drag your finger up (to brighten) or down (to darken) your photo.

Hold Your Camera Steady

How you hold your camera matters. I always use two hands, or rest my camera on something solid like the ground, a rock, or a tree trunk. I use a tripod for my big DSLR, but one of the beauties of a phone camera is its convenience and a tripod is not convenient

so I handhold my phone camera. Holding your camera steady reduces blur when the shutter speed is slow, but also lets you look carefully, refine your composition, and clean up the frame.

Enhance Your Photos with Postproduction

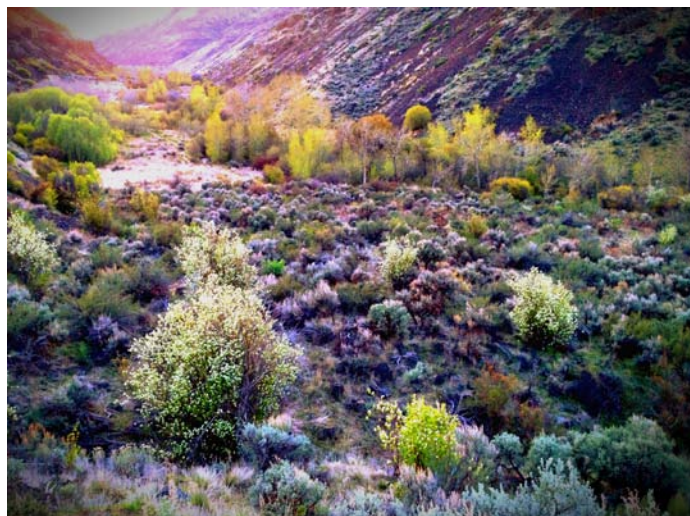
You’ve done everything you can to get the best possible photo at the moment you press the shutter, but most photos benefit from a little finishing work later. While you can transfer your phone photos to your computer and use a program like Photoshop, there are good options on your smartphone as well. The app I use most is Snapseed, available free for both iOS and Android.

I almost always adjust highlight and shadow values, enhance perceived sharpness (but it won’t fix an out-of-focus photo), and add a subtle vignette to my photos. Sometimes I’ll adjust the cropping and make other adjustments as well. Don’t count on post-production to make a good photo from a bad one. What you can, and should, do is make your good photos even better and more impactful.

Conclusion

Your smartphone camera is a powerful, capable, always-ready tool. While it won’t completely replace bigger and more complex cameras for wildflower photography, you can do a great deal with it. Pay close attention to where you hold the camera, which determines what is in or outside the frame. Watch the light and consider how you might use sidelight or backlight to add drama or interest. Look for distracting elements and either adjust your composition to hide them or physically remove them before you press the shutter. Seek contrast to set your subject apart from the background. And don’t forget to breathe deeply and enjoy the experience (and maybe the fragrance) of the flowers around you.

Mark Turner is the photographer of Wildflowers of the Pacific Northwest, Trees & Shrubs of the Pacific Northwest, and Bellingham Impressions. He shoots gardens and native plants for national publications and runs a Bellingham portrait studio.



Postproduction editing can change a photo dramatically. On the left, Umtanum Canyon with serviceberries (*Amelanchier alnifolia*) in bloom at twilight is dull and lifeless. On the right, the same image after increasing contrast and saturation with an app. PHOTO: MARK TURNER

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iPhone photo of skunk cabbage (*Lysichiton americanus*), Bellingham. PHOTO: MARK TURNER