

Douglasia



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WASHINGTON NATIVE PLANT SOCIETY

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



President's Message: The View from Here

by Keyna Bugner

Dear WNPS Members,

Spring was a busy time for WNPS and I am so excited to see WNPS hosting in-person events again. The Central Puget Sound and Central Washington chapters hosted Study Weekend in Ellensburg in April and May. The committee had been planning this event since 2020 and was finally able to make it happen this year. It was great to see familiar faces and meet new friends. Botany Washington also returned after a two-year break. The event was held on beautiful Orcas Island and it was great to see some new members attending. We have been fortunate to continue the native plant sales by developing a new online ordering system. This model will be used going forward to incorporate online sales and in-person events. A lot of work went into setting up the online catalog and sales, and this can be how we continue the success of our native plant sales. Chapters are also hosting in-person events and field trips. We know we aren't back to operating like we did in 2019, but it is great to see us bring back these events again.

We also realized a lot has changed since 2019. How do we incorporate what we have learned from the past two years to make our organization stronger? Can we offer in-person events and still provide online content to reach more people?

Our membership has also grown in the past two years, in large part from the expansion of online programs and workshops offered. Now that we are getting back to in-person programs and field trips how do we engage these members to actively volunteer with WNPS?

WNPS is a volunteer-led organization, but we also understand volunteerism has changed. Many people are busy and have multiple demands on their time. WNPS needs to understand these time limitations to provide multiple opportunities



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that fit a variety of needs. The topic of volunteer recruitment and engagement comes up repeatedly among the WNPS leadership. We have yet to find the silver bullet and maybe there isn't one. We have to look at potential volunteers as well as chapter and committee needs and fit the jobs that work for our volunteers. These can be one-time opportunities or ongoing short tasks. Maybe we pair new members with long-time members for training. The model of a few volunteers doing the work and holding the knowledge for the organization is outdated and not sustainable. We need to train new members and distribute the work so it is manageable.

At a Chapter Council meeting in the summer of 2021 we developed a couple of volunteer philosophy statements for WNPS. These statements reflect how we envision volunteers within WNPS.

1. Encourage enthusiasm and engagement with native plants by sharing knowledge in ways big and small.
2. Value and engage people with meaningful volunteer opportunities in the study, education and advocacy of native plants.

How does WNPS fulfill these statements? What volunteer opportunities are we providing that are meaningful for people? We all know that there are numerous roles available to continue the work of WNPS. This could be leading field trips, assisting with communication and newsletter development, participating in restoration projects, leading a chapter program, and so much more. How do YOU get involved to make WNPS a stronger organization? How can you *Be a voice for Native Plants*? No matter what amount of time or experience you have, WNPS needs your voice. Please reach out to Denise Mahnke at wnps@wnps.org or contact your local WNPS chapter chair to learn more about volunteer opportunities: www.wnps.org/directory.

Happy Summer Everyone!



On the cover: Healthy sword ferns (*Polystichum munitum*) and vanillaleaf (*Achlys triphylla*) on the forest floor at Rockport State Park. PHOTO: MARK TURNER

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Ecological Restoration— What Could Possibly Go Wrong?

A Tale from the Kennedy Creek Natural Area Interpretive Site (Mason County)

by Regina Johnson

The Kennedy Creek Natural Area Preserve, along Totten Inlet of Puget Sound between Olympia and Shelton, was established in 1993 to preserve the best remaining examples of three different salt marsh communities in Puget Sound. In addition to salt marsh, the Natural Area includes the tidal reaches of Kennedy and Schneider Creeks, and the adjacent tide flats, uplands, and riparian forests. The salt marsh protected at the preserve is among the highest quality in the Puget Trough Ecoregion. The salt marsh and adjacent mudflats are also important habitat for wintering and migrating shorebirds.

A south-facing flat rock outcrop on the shoreline, overlooking the estuary, had long been used by birders. This site was highly disturbed and dominated by blackberry (*Rubus bifrons*), broom (*Cytisus scoparius*) and weedy nonnative grasses. It was selected as the location for an Interpretive Site due to its good view of the estuary and its road access. While perfect for birding, the Interpretive Site has turned out to be a very difficult place to establish and maintain native plantings.



The newly-opened interpretive site in September 2008. PHOTO: COURTESY OF DNR

It can be hard to know exactly how plantings will respond to the site they're put in. What is the water holding capacity of the soil? The persistence of the weed seed bank? Herbivory pressure from rodents, rabbits, and ungulates? What's the weather going to do during the post-planting establishment phase? Designing a restoration project requires assessing the ecology of the site in question and selecting plants that can establish and grow in that particular habitat at that particular state of disturbance. The planting crew's skill and perseverance levels are critical factors too. It's hard work, the weather is usually nasty, and improperly planted plants won't live long.

Construction and planting of the Interpretive Site were done in 2007, following a plan from a commercial landscape architectural firm. Site preparation involved removing the top couple inches of soil to remove roots of the weedy grasses and digging out the blackberry and broom. Pathways, large logs, and signs were installed, and all disturbed areas were mulched with bark mulch and seeded with blue wildrye (*Elymus glaucus*), standard erosion control practices. But the initial planting consisted of primarily forest understory species that are not likely to survive on a south-facing, sunny, thin-soiled, rocky site—sword fern (*Polystichum munitum*), woods strawberry (*Fragaria vesca*), salal (*Gaultheria shallon*), evergreen huckleberry (*Vaccinium ovatum*), etc. I think this is a reflection of a couple of things—the limited palette of native plants available in the conventional nursery trade, limited experience with native plants and ecosystems among landscape architects, and a lack of understanding of the difference between a natural area, which is left to its own devices, and a residential or commercial landscape, which gets irrigation and regular attention. Landscape architects’ customers tend to want a late-seral forest plant community—salal, evergreen huckleberry, vine maple (*Acer circinatum*). In this exposed setting, forest understory plants couldn’t survive, and mortality was high. And without regular weed control, the weeds re-established themselves thoroughly. Site preparation for restoration of weedy sites generally requires multiple rounds of weed control before replanting, and then repeated weed control post-replanting for years. Restoration funding rarely accounts for this. The gardening dictum, “One year’s seeding makes seven years’ weeding,” is certainly true in ecological restoration.

Rocky balds, of which this site is a small example, feature thin soil on bedrock, and tend to not support conifers very well. Thin, rocky soil dries out fast, even in areas of high rainfall. In our area they often grow madrone (*Arbutus menziesii*) and Garry oak (*Quercus garryana*), along with poison-oak (*Toxicodendron diversilobum*), manzanita (*Arctostaphylos columbiana*), and grasses and wildflowers similar to the South Sound prairies such as Oregon sunshine (*Eriophyllum lanatum*) and early blue

violet (*Viola adunca*). The site was replanted in November 2016 using rocky bald-type vegetation better adapted to the site and known to occur locally. Weedy grasses were sprayed once before planting, and the blackberry and broom were cut and pulled. Then we stood back and waited.

The Big Freeze occurred in January 2017, just two months after planting. Temperatures did not go above freezing for about three weeks in this area, and the soil froze much deeper than the typical inch or two. Typical winter temperatures here don’t stay below freezing for more than a few days. The new plantings’ roots didn’t extend below the freeze line, so most died, whereas this freeze would not have had any effect if it had happened after a year’s growth.

Then the next summer, a small wildfire burned the interior planting area and any surviving plants. The fire was fueled by the tall dry grass that had re-dominated the site since the original planting in 2007 and come back from the seed bank after the single herbicide application in 2016. The rocky bald vegetation planted in 2016 is fire-adapted, but these plants were too new and too stressed to be sufficiently established, so many of the survivors of the freeze did not survive the fire.

We did a third planting in fall 2018. Again, weedy grasses were sprayed once before planting. This time we planted early, to allow the plants more time to establish themselves before winter’s cold weather. But the ash from the wildfire prevented infiltration of what little rain had fallen by planting time, not quite three inches. At the top of the slope, where the fire would have been the hottest, the soil was still bone dry under wet ash when we planted. Ash can be very hydrophilic, preventing water from reaching the soil below, and the heat of fire can make the soil under the ash hydrophobic, preventing infiltration. There was no rain in the forecast and no water source on site, so with a wheelbarrow, multiple five-gallon jugs of water, and a watering can, I hauled water the next day to dribble water on each plant by hand—all 574 of them. On most of our natural area planting sites, even this limited hand-watering would be impossible. Survival in the driest portion of the site still wasn’t good, since even just one night in dry soil is too long for bare-root plantings. Coming back the next day with water is still too late.

But that was not the end of the ordeal! The Heat Dome of June 2021 did a number on the surviving plants in the Interpretive Site. Soil surface temperatures on South Sound prairies regularly reach over 100 degrees Fahrenheit in normal summers, with air temperatures rarely above 85 degrees, so the soil surface temperature on this site would have been well above the official air temperature of 109 degrees. Interestingly, none of the naturally-occurring shrubs were affected, including seedling madrones, with their deep taproots. The herbaceous plants totally dried up and went dormant early, which is to be expected. The few naturally-occurring Douglas-fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*) and Oregon ash (*Fraxinus latifolia*), volunteers from the surrounding forests and already stunted and stressed on this site, were all badly scorched. Most



After a wildfire in August 2018 that killed the plants in the restoration area. PHOTO: REGINA JOHNSON



The interpretive site in March 2022. PHOTO: REGINA JOHNSON

of the planted shrubs, which had been in the ground for 2 or more years, looked stressed but will recover.

The Kennedy Creek Interpretive Site offers excellent views of the estuary with its migrating salmon and overwintering shorebirds, whatever the state of the plantings. The bones of the original landscape design still hold up. Another planting will be done, incorporating what we've learned about this particularly difficult site from previous plantings. We make our best estimates, do the best planting work we can, often with volunteer labor, then we cross our fingers that no extreme events come our way before the new plants can get established.

Regina Johnson is a restoration ecologist with the Natural Areas Program in the WA Department of Natural Resources, based in Olympia. She also spent many years restoring South Puget prairies with the Washington Department of Fish & Wildlife, and has a long history in landscaping and horticulture. She has been a member of WNPS for about 10 years.



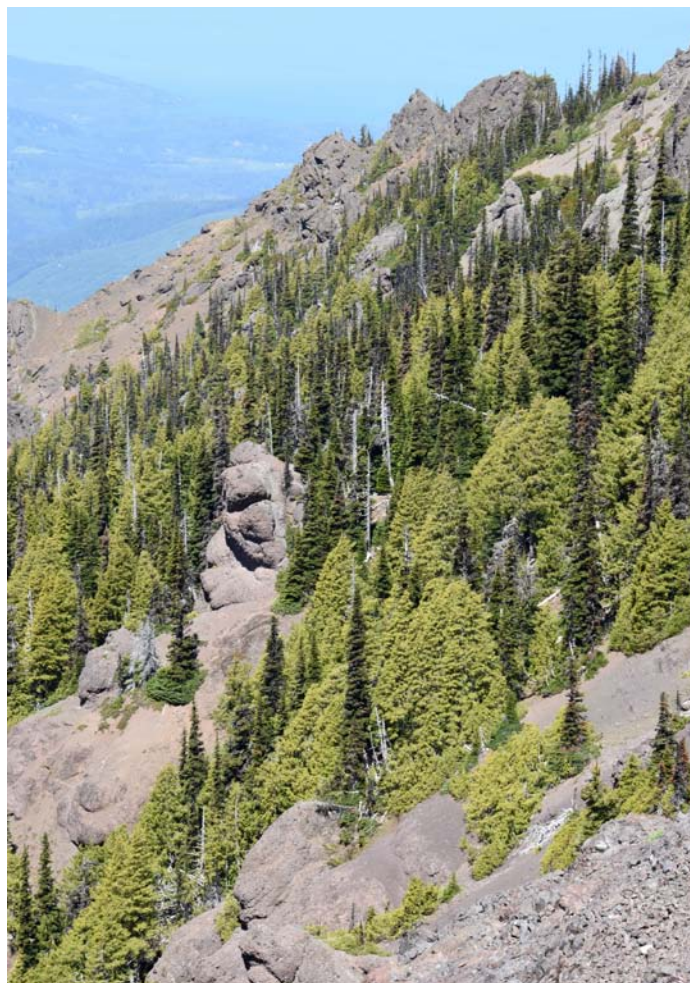
Cedar or Cypress? A Common Confusion Explored

by Katherine Darrow

What is the difference between a cedar and a cypress? There are many answers to this seemingly simple question.

Botanically speaking, 'true' cedars are any species in the genus *Cedrus*, which is in the family Pinaceae. There are four species recognized worldwide, the most famous being the ancient cedars of Lebanon (*Cedrus libani*). These cedars are native to the Mediterranean region and mentioned in the Bible more than 100 times. Atlas cedar (*C. atlantica*) is endemic to northwest Africa; the Hindi 'Tree of the Gods' (*C. deodara*) is native to the western Himalayas. To test your geographic chops and increase the nomenclatural confusion, we also have the Cyprus cedar (*C. brevifolia*), endemic to the island country of Cyprus. All of these species have clusters of thin needle-like leaves, scaled cones, and all are commonly cultivated and used as ornamental trees for landscaping.

The botanical categories for cypress may include any member of the cypress family, Cupressaceae. The family has a global distribution of about 140 species. Seventeen of the about 30 genera are monotypic, with small endemic populations where they persist in the wild. Members of this family *mostly* have overlapping scale-like leaves and round or egg-shaped cones. Giant sequoias (*Sequoiadendron giganteum*), coast redwood (*Sequoia sempervirens*) and more than 60 species of juniper (*Juniperus* spp.) are included in this family.



Nootka cypress (*Callitropsis nootkatensis*) with subalpine fir (*Abies lasiocarpa*) in Olympic National Park. PHOTO: KATHY DARROW

However, the cedar-cypress confusion plagues anyone who encounters the many types of trees and shrubs that are granted both of these common names. As part of my research for this ramble, I queried retail specialists at a fine woodworking shop, an aromatherapy store, and a garden center that sells a broad diversity of conifers. All of these people were unsure how to answer my leading question, or made stuff up, even though they carry numerous products labeled either cypress or cedar. Numerous native plant enthusiasts I queried were equally perplexed. But the problem mostly goes one way, i.e. members of the genus *Cedrus* are never called cypress, but many members of the cypress family are often called cedars.

Alaskan yellow cedar, aka Nootka cypress (*Callitropsis nootkatensis*), is a case in point. This issue first came to my atten-



Nootka cypress foliage with mature cones. PHOTO: KATHY DARROW

tion last fall when a pair of Americorps volunteers fresh from Maine and Oregon began exploring their new territory at Fort Worden State Park in Port Townsend. Using the most convenient tool at their disposal, their cell phones, they set about to identify trees in the Park. Lo and behold, they discovered, or at least the iNaturalist Seek app on their phones declared, that there are mature Port Orford cedars, aka Lawson cypress (*Chamaecyparis lawsoniana*), at Fort Worden, something that had not been documented by anyone before them. This is not too surprising, since they blend in well among the western red cedars (*Thuja plicata*) that are a dominant tree in the forest there, unless you stop to inspect their cones, of which there are very few. However, one of the trees deemed to be a Port Orford cedar had been identified as a Nootka cypress a decade earlier. Which was correct, the cell phone, or the dichotomous key that was probably used by botanists who had collected a specimen of this tree when they inventoried Fort Worden in 2010?

Down the rabbit hole I went. How marvelous it would be if Port Orford cedars were living in our midst all these years, growing hundreds of miles from their known natural range! Since these trees are considered endemic to the Klamath Mountains of southwest Oregon and northwest California, this would be quite a disjunct, so highly unlikely. That is why, perhaps, botanists using the 1st edition of Hitchcock's *Flora of the Pacific Northwest* (1973) keyed the young tree as the closely related *Chamaecyparis nootkatensis* and the only one of its genus in the *Flora*, since the Klamath Mountains are not included. Flip to page 71 of Hitchcock's 2nd edition (2018) and you'll find that, like so many of the genera we may have learned in our early years of botanizing, this one has been changed to *Callitropsis*, so there are no *Chamaecyparis* listed in the *Flora* or in Washington.

Okay, fine. We all make mistakes in identification, especially if the darn plant isn't even in our key. Further down the rabbit hole, I learned that Nootka cypress has been assigned at least six generic names and another six specific epithets, although *nootkatensis* seems to be the most popular of those. No fewer than nine common names are found in North American literature on these trees, five cedar and four cypress. Not to mention the many names from dozens of Indigenous tribes for

these trees, whose wood, bark and foliage provide all kinds of valuable uses, second only to western red cedar (*Thuja plicata*), another venerated member of the cypress family.

The natural range of Nootka cypress extends from Alaska to northern California, so they could be hanging around in Fort Worden, but it was also not likely. The closest documented groves and forests are high in the Olympic Mountains or scattered throughout the Cascades. Having hiked through forests of these trees in the Olympic Range, I was familiar with their elegant drooping foliage and distinctive fibrous bark. When I was led to the Fort Worden tree, it was immediately clear that this was not a Nootka. The app was correct.



Nootka cypress bark at Olympic National Park. PHOTO: KATHY DARROW



Lawson's cypress bark at Fort Worden State Park. PHOTO: KATHY DARROW

Thus, we were disappointed to realize that *Callitropsis nootkatensis* and *Chamaecyparis lawsonii* are not native or naturalized occurrences at Fort Worden. On the other hand, it turns out that many Nootkas and hundreds of Lawson's cypress are thriving all around Port Townsend. Both species are popular ornamentals. Horticulturists have also developed hundreds of cultivars and hybrids that are distributed widely for landscaping all over the world. Some of the Lawson's cypress in Fort Worden may have been planted during the military reign, between 1898 and the 1950s. Plus, back in the 1970s hundreds of Lawson's cypress were distributed by the local paper mill so that residents could plant them, helping to mitigate the stench that still emanates from the mill's smoke stacks.



Typical cones of Nootka cypress (left), Lawson's cypress (center), and Western red cedar (right). PHOTO: KATHY DARROW

But the question remains: Why are we calling our cypress trees cedars? This goes back to the ‘true’ cedars (*Cedrus* spp.), whose wood is used to make all manner of objects and casings benefitting from its decay-resistant qualities, including coffins. Lebanese cedar and Atlas cedar (*Cedrus atlantica*) are a source of precious oils used for preservatives, medicine, and aromatherapy. The wood and oil have been used for thousands of years and the trees are still cultivated and harvested in their native regions. When European explorers ventured to North America, the aroma of many members of the Cupressaceae found here probably reminded them of the cedars familiar to them from trade closer to home. Curiously though, some scholars suggest that the etymological origins of cedar actually referred to a Greek species of juniper, also known for its pleasant aroma, and was later adopted by people familiar with the equally aromatic cedars of Lebanon.

Sadly, the draping foliage of our Alaskan yellow cedar or Nootka cypress is sometimes called stinking cedar, and said to have ‘an unpleasant, mildewy smell’ (I disagree, but that’s what several descriptions claim). Thus, we might better refer to the etymological origins of cypress, which are thought to be from a Greek legend of a young man named Cyparissus, who accidentally killed his beloved tamed stag, and was so grieved that he turned into a cypress tree. The drooping boughs of cypress are symbolic of his mourning.

But alas, not all cypresses droop and not all cedars smell cedary, and Himalayan cedars do droop! Thus, we are left to sit under the tree in question, enjoy the dappled shade, and scribble in our journals with a pencil that, if cased in wood, was probably made from the wood of some kind of cedar! Or is it a cypress?

If you want to learn more about these magnificent trees, by far the best resource for more detailed information on all coniferous cedars and cypresses is the Gymnosperm Database website at www.conifers.org. For literature cited, visit [/bit.ly/douglasia_46_2](https://bit.ly/douglasia_46_2).

Katherine Darrow is a member of the Olympic Peninsula Chapter of WNPS. She contemplates botanical conundrums from her home in Port Townsend, where she enjoys the company of one member of the Cypress family (*Sequoia giganteum*) and one true cedar (*Cedrus deodara*) who live in her front yard. During one of her incarnations, she was a ceramic artist, and earned first place in a juried show for her sculpture of an Arizona cypress pod (*Cupressus arizonica*). She still uses a flip phone, which has no apps.



14" diameter ceramic sculpture of an Arizona cypress pod by the author. PHOTO: KATHY DARROW

50 Peaks Project: Documenting Alpine Plant Diversity and Distributions in Washington's Cascades Range

by David E. Giblin, Ph.D.

University of Washington Herbarium, Burke Museum

Since arriving at the University of Washington Herbarium in 2002, I have focused my field research on documenting the diversity and distribution of vascular plants in Washington through the collection and archiving of herbarium specimens. That work has taken me to every corner of the state and from sea level to over 8,000 feet in the North Cascades. Those specimens, together with those collected by my predecessors and contemporary colleagues, served as the basis for our publication of *Flora of the Pacific Northwest*, 2nd edition in 2018.

Reflecting on the newly published volume afterwards, it was clear to me that the alpine flora had the least precise distribu-



Slope of western windflower (*Anemone occidentalis*) near Cape Horn. PHOTO: DAVID GIBLIN

tion information and was underrepresented in the Herbarium collections. The latter point is not surprising given the challenges of accessing the alpine zone and the relatively short growing season (July–September). However, because the alpine zone is Washington's most pristine habitat due to minimal human impacts—you seldom see weeds or evidence of roads and structures—it is imperative that we have a comprehensive understanding of its flora.

In 2020 I was invited to submit a funding proposal for a field research project of my choice, and the 50 Peaks Project came immediately to mind. The goals were straightforward: 1) survey 50 peaks over a five-year period in the Cascades Range between the Goat Rocks Wilderness and the Canadian border; 2) improve and expand alpine plant diversity and distribution data for this region; 3) locate previously undocumented rare plant populations; 4) create baseline data for future studies examining climate change impacts on alpine plant communities; and 5) involve University of Washington undergraduate students in the field work.

Unfortunately, my proposal was not selected for funding, but the idea seemed so worthwhile that I decided to pursue it beginning in the summer of 2021. I had spent the previous

winter generating a list of potential peaks to sample based on two criteria: 1) summit access did not require technical gear, and 2) representation of peaks on both sides of the Cascades crest. Thanks to generous donor support, I was able to hire two undergraduate students (Ava Kloss-Schmidt and Leo Linder) to work with me for the summer.

Our field work consisted of three backcountry backpacking trips and several one-day outings. We were fortunate to stay dry during our nights in the backcountry, but we were subjected to



Ava Kloss-Schmidt nearing Green Mountain summit with Glacier Peak in the distance. PHOTO: DAVID GIBLIN

cold nights, mosquito attacks, and disrupted sleep from strong winds battering our tents. Nevertheless, we enjoyed the isolation and physicality of it all. The surveys were a mixture of specimen collecting and checklisting. For the project I want at least one herbarium specimen for each species, subspecies/variety found, along with a specimen for each rare plant population encountered, and a specimen for each notable distribution record (e.g., the southernmost or northernmost location for a species). We also collected specimens for any species that is difficult to identify by sight in the field (e.g., *Carex* (sedge), some grasses, *Potentilla* (cinquefoil), etc.). From each specimen we collected a small piece of leaf tissue and placed it into a small plastic bag containing silica drying crystals for future DNA analyses.

In all we made 273 collections, six of which documented new populations for rare plants in Washington, and one of which extended the known range of *Campanula parryi* var. *ida-hoensis* (Parry's harebell) a couple of hundred kilometers south of the next closest population in Washington (it does not occur in Oregon or California). In between field trips Ava and Leo gained experience with plant identification in the Herbarium by keying out the collections we made with *Flora*, 2nd edition (I checked their identifications and was responsible for all of the grasses and sedges).

It was our intention to either visit peaks in the North Cascades near Mazama or in the Goat Rocks Wilderness south of White Pass. However, both of those areas were inaccessible due to large wildfires last summer. Consequently, our south-



David Giblin and Leo Linder on Cape Horn. PHOTO: AVA KLOSS-SCHMIDT

ernmost destination was Dewey Peak just south of Chinook Pass near Mount Rainier, and our northernmost site was Green Mountain just north of Glacier Peak. Between there we visited peaks in the Wenatchees, Central Cascades, Chiwaukums, and Entiat. Ava and Leo's perseverance, interest, and camaraderie far exceeded my expectations. We covered 94 trail miles, several more miles off-trail, and gained over 32,000 feet over the course of our field work together.

At summer's end we summarized the data and performed preliminary analyses. If you're interested in seeing Ava and Leo's 15-minute presentation on our findings you can find it here: https://www.pnwherbaria.org/wtu/2021_50_peaks_presentation.mp4. One interesting result was that most species occurred on only a small number of peaks (less than three), and that only a few species (about six of the 200 that we collected or observed) occurred on all peaks. This seems counterintuitive because many of us who visit the alpine have our favorite flowers and think that we see them on every peak—not true for most alpine species. However, this pattern matches what I found while doing botanical surveys on small islands in the San Juan Islands—most species occur on only a small number of islands and very few occur on most. Alpine peaks are effectively small islands in a sea of forested terrain.

This past winter I was fortunate to receive a major philanthropic gift to support and expand this research. I am now collaborating with colleagues at the University of New Mexico (Dr. Hannah Marx), Western Washington University (Dr. Eric DeChaine), University of Wyoming (Ben Legler), and in Idaho (Mike Mancuso, Jessica Irwin, Dr. Don Mansfield). Our goal is to replicate the survey effort across western North America and to explore more theoretical questions regarding the processes that form alpine plant communities and how those communities might be impacted by potential future climate change.

I am particularly grateful to everyone who has provided financial, logistical, and field support for this project, and I look forward to sharing the results of this work as we make progress. I have three wonderful University of Washington students join-

ing me this summer, and we are looking forward to a productive field season ahead!

David Giblin is Collections Manager and Research Botanist at the University of Washington Herbarium, Burke Museum, where he leads and collaborates on a number of collections- and field-based research projects.



Research Grant Report

The Nutritive Value of Several Western Washington Glacial Prairie Forbs Used in the Implementation of Conservation Grazing Practices for Cattle

by E. David Heydt

INTRODUCTION

Conservation grazing practices are being implemented to support the biodiversity of grazed prairie ecosystems. Are the native forbs established in conservation grazing practices adequate feed for cattle? This study was undertaken to quantify the nutritive value of these forbs so that ranchers and land managers will have more tools with which to ensure the health of their cattle while stewarding biodiversity. The forbs sea-blush (*Plectritis congesta*), western buttercup (*Ranunculus occidentalis*), and the interplanted complex of small-flowered blue-eyed Mary (*Collinsia parviflora*) and large-flowered blue-eyed Mary (*Collinsia grandiflora*)—hereafter referred to as “*Collinsia* spp.”—were chosen for study due to their high rates of establishment in conservation grazing trials (Bramwell et al. 2020). Additionally, all forbs selected provide important resources for the

federally-listed Taylor’s checkerspot butterfly (Grosboll 2011, Hamilton and Linders 2014).

METHODS

Three sample sites were selected: Colvin Ranch, Fisher Ranch, and Wolf Haven International. All the sites are in the southern Puget Sound area on the ancestral lands of the Nisqually, Cowlitz, Coast Salish, and Chehalis Peoples. Two sites are rotational grazing pastures that had been seeded with native species, and the third is a healthy remnant prairie. Ten vegetative samples each were taken of *P. congesta* and *R. occidentalis*. Nine samples of *Collinsia* spp. were taken. Samples were collected during the first week of May 2021. This is the time cattle are returned to conservation grazing pastures after a short (about two months) exclusion period to facilitate native plant flowering and seed development. Samples were tested after 48 hours of refrigerated storage in plastic.

Samples were run through “Fw-3” feed analysis testing using wet chemistry techniques at Soil Test Labs, a National Forage Testing Association-certified lab located in eastern Washington. After moisture content percentage (MC) was removed, samples were tested for the values of crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), Phosphorus (P), Potassium (K), Calcium (Ca), and Magnesium (Mg) as a percentage of total dry matter (DM). From those results, the lab calculated values of digestible protein (DP), relative feed value (RFV), digestible dry matter (DDM), digestible matter intake as percentage of body weight (DMI), digestible energy (DE), metabolizable energy (ME), net energy lactation (NEL), net energy maintenance (NEM), and net energy gain (NEG).

RESULTS

The full test results for all samples are detailed below (Table 1). The metrics of crude protein content and relative feed value are widely used by ranchers and land managers to make decisions regarding feed (Kene 2009). This report highlights average crude protein content (Figure 1) and average relative feed value (Figure 2). Relative feed value is a unitless scale based on equivalence to the forage forb alfalfa.

The mean crude protein percentages of the sampled forb species (Figure 1) were 7.79% for *P. congesta*, 7.37% for *R. occidentalis*, and 8.85% for *Collinsia* spp with one sample reaching 12%. The mean relative feed values of the sampled forb species (Figure 2) were 214 for *P. congesta*, 127 for *R. occidentalis*, and 189 for *Collinsia* spp. Both *Collinsia* spp and *P. congesta* had individual samples that reached a RFV of 235.

DISCUSSION

The average crude protein percentage of these forbs (~8%) is at the lower end of the useful range. However, *Collinsia* spp. show the potential to develop a higher (~12%) crude protein percentage. The average RFV of the sampled forbs is comparatively high when measured against those of commonly referenced feeds on the RFV scale. Some commonly referenced feeds on the RFV scale are as follows: pre-bud alfalfa (164),



Sea-blush (*Plectritis congesta*). PHOTO: E. DAVID HEYDT

Lab # F21-	Site	Site Type	Species	DM	MC	CP	ADF	NDF	RFV	TDN	DP	DDM	DMI	DE	ME	NEL	NEM	NEG	Ca	P	K	Mg
01527	Fisher	Ranch	PleCon	14	86	8.5	26.9	31.6	200	70	4.1	68	3.8	3.09	2.67	1.6	2.2	1.43	1.4	0.39	2.21	0.24
01528	Fisher	Ranch	PleCon	14.3	85.7	8.4	24.3	28.7	227	72.7	4	70	4.2	3.21	2.79	1.66	2.3	1.52	1.16	0.36	2.22	0.17
01529	Fisher	Ranch	PleCon	15.2	84.8	7.6	25.9	31.2	205	71	3.2	68.7	3.8	3.13	2.71	1.62	2.24	1.46	1.33	0.38	1.92	0.23
01530	Fisher	Ranch	PleCon	14.8	85.2	6.4	24.8	30.9	209	72.2	2	69.6	3.9	3.18	2.77	1.65	2.28	1.5	1.21	0.35	1.92	0.24
01531	Fisher	Ranch	PleCon	13.8	86.2	6.9	25.6	31.2	205	71.3	2.5	68.9	3.8	3.14	2.73	1.63	2.25	1.47	1.07	0.3	2	0.19
01532	Wolf Haven	Natural	PleCon	14.6	85.4	7.6	24.8	28.6	227	72.1	3.2	69.6	4.2	3.18	2.76	1.65	2.28	1.5	1.19	0.24	1.68	0.24
01533	Wolf Haven	Natural	PleCon	16.3	83.7	9.4	24.3	27.7	235	72.7	5	70	4.3	3.21	2.79	1.66	2.3	1.52	1.15	0.2	1.41	0.22
01534	Wolf Haven	Natural	PleCon	17.8	82.2	8.1	25.4	32.1	200	71.5	3.7	69.1	3.7	3.15	2.73	1.63	2.26	1.48	1.07	0.18	1.21	0.25
01535	Wolf Haven	Natural	PleCon	15.7	84.3	7.7	24.8	30.9	209	72.1	3.3	69.5	3.9	3.18	2.76	1.65	2.28	1.5	1.57	0.28	1.59	0.16
01536	Colvin	Ranch	RanOcc	14.8	85.2	7.3	24.6	29.1	223	72.3	2.9	69.7	4.1	3.19	2.77	1.66	2.29	1.5	1.48	0.38	2.09	0.14
01537	Colvin	Ranch	RanOcc	27.6	72.4	6.6	35.8	46.4	122	60.4	2.2	61.1	2.6	2.66	2.24	1.36	1.82	1.13	0.86	0.26	2.15	0.2
01538	Colvin	Ranch	RanOcc	28.3	71.7	6.5	35.8	46.3	123	60.4	2.1	61	2.6	2.66	2.24	1.36	1.82	1.13	0.89	0.2	2.53	0.21
01539	Colvin	Ranch	RanOcc	27.8	72.2	6.5	34.2	43.7	133	62.1	2.1	62.2	2.7	2.74	2.32	1.4	1.89	1.18	0.95	0.23	2.07	0.26
01540	Colvin	Ranch	RanOcc	28	72	7.4	34.8	43.8	131	61.5	3	61.8	2.7	2.71	2.29	1.39	1.86	1.16	0.97	0.22	1.67	0.25
01541	Colvin	Ranch	RanOcc	28.1	71.9	6.2	37.7	48.9	113	58.3	1.8	59.5	2.5	2.57	2.15	1.31	1.73	1.06	0.87	0.2	1.58	0.19
01542	Wolf Haven	Natural	RanOcc	24.1	75.9	8	37.3	46.5	120	58.8	3.6	59.8	2.6	2.59	2.17	1.32	1.75	1.07	0.82	0.18	1.2	0.23
01543	Wolf Haven	Natural	RanOcc	20.7	79.3	8.5	33.7	42	139	62.6	4.1	62.7	2.9	2.76	2.34	1.42	1.91	1.2	0.88	0.2	1.44	0.23
01544	Wolf Haven	Natural	RanOcc	25.3	74.7	7.8	35.9	44	129	60.3	3.4	60.9	2.7	2.66	2.24	1.36	1.81	1.12	0.86	0.18	1.59	0.19
01545	Wolf Haven	Natural	RanOcc	23.8	76.2	7.6	36	44.2	128	60.2	3.2	60.9	2.7	2.65	2.23	1.36	1.81	1.12	0.78	0.15	1.84	0.19
01546	Wolf Haven	Natural	RanOcc	24.6	75.4	8.6	34.4	43.3	133	61.9	4.2	62.1	2.8	2.73	2.31	1.4	1.88	1.18	0.78	0.14	1.76	0.17
01547	Fisher	Ranch	Colsp	19.5	80.5	9.2	26.5	31	205	70.4	4.8	68.3	3.9	3.1	2.68	1.61	2.21	1.45	1	0.35	2.33	0.22
01548	Fisher	Ranch	Colsp	21.6	78.4	8.9	27.4	32.7	192	69.4	4.5	67.6	3.7	3.06	2.64	1.58	2.17	1.42	0.89	0.39	1.94	0.22
01549	Fisher	Ranch	Colsp	22.7	77.3	9	27.3	34.6	182	69.5	4.6	67.6	3.5	3.06	2.64	1.58	2.18	1.42	0.98	0.38	1.76	0.23
01550	Fisher	Ranch	Colsp	18.1	81.9	12	27.2	30.7	205	69.6	7.6	67.7	3.9	3.07	2.65	1.59	2.18	1.42	1.06	0.44	2.3	0.27
01551	Fisher	Ranch	Colsp	19.4	80.6	10.5	24.9	27.6	235	72	6.1	69.5	4.4	3.17	2.76	1.65	2.28	1.49	1.18	0.4	2.1	0.26
01552	Wolf Haven	Natural	Colapp	25.2	74.8	8.3	30.2	37.1	164	66.4	3.9	65.4	3.2	2.93	2.51	1.51	2.06	1.32	0.88	0.18	1.04	0.31
01553	Wolf Haven	Natural	Colapp	25.6	74.4	7.5	27.2	36.7	172	69.6	3.1	67.7	3.3	3.07	2.65	1.59	2.18	1.42	1.03	0.17	0.91	0.34
01554	Wolf Haven	Natural	Colapp	25.1	74.9	7.3	27.7	34.4	182	69.1	2.9	67.3	3.5	3.05	2.63	1.57	2.16	1.41	0.96	0.13	1.01	0.3
01555	Wolf Haven	Natural	Colapp	25.5	74.5	7	28.6	37.6	165	68	2.6	66.6	3.2	3	2.58	1.55	2.12	1.37	1.26	0.18	0.87	0.42

Table 1. Full test results for all samples...for abbreviations see text.

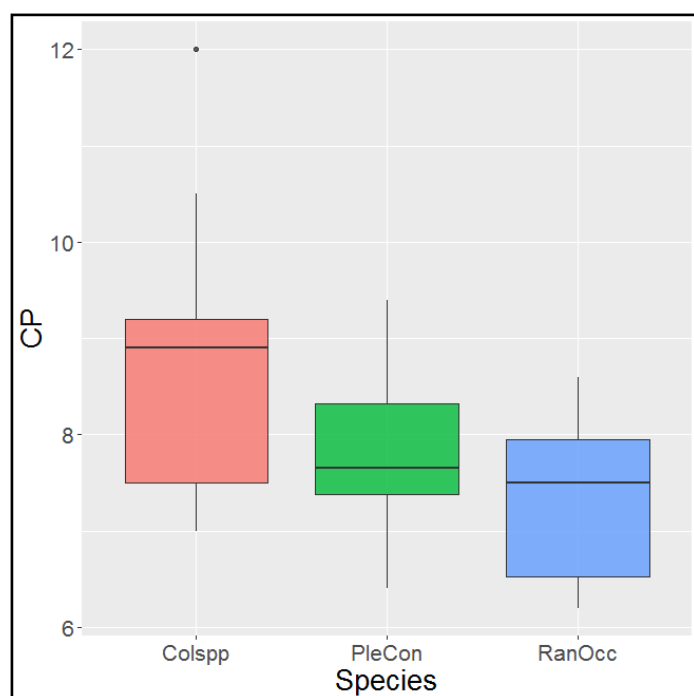


Figure 1. Crude Protein % by Species

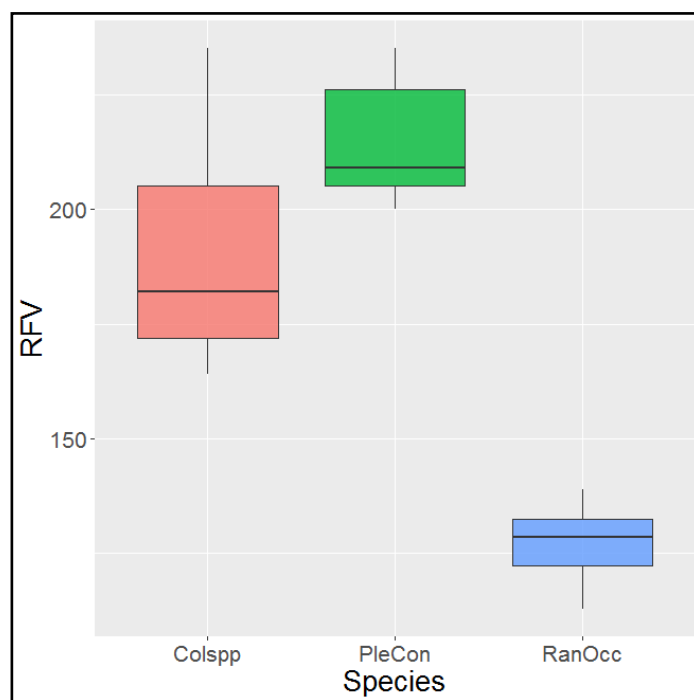


Figure 2. Relative Feed Value by Species

bud alfalfa (152), early bloom alfalfa (138), grassy alfalfa (101), late vegetative brome (91), late bloom brome (58), well-eared corn silage (133), few-eared corn silage (115), and sorghum silage (114) (Jeranyama and Garcia 2004).

While *R. occidentalis* lands in the upper-middle range of RFV when compared to these feeds, *Collinsia* spp.'s and *P. congesta*'s average RFVs are well above that of even the most nutritious commonly referenced feeds on the scale. *Plectritis congesta* shows particular promise as a conservation grazing feed. It has the highest RFV of the sampled forbs, in addition to being an important adult and larval food source in recovery efforts for the Taylor's checkerspot butterfly (Dunwiddie et al. 2016).

CONCLUSION

Due to their RFV and crude protein content, these three forbs make an adequate feed or feed-base for cattle. Alone, these forbs would best be used as feed for non-lactating cows needing around 8% protein content (Rossi 2007). These forbs would make an excellent general feed if supplemented by a higher protein feed. The establishment of these forbs into a pasture would foster the ability of that pasture to support healthy cattle as well as pollinating insects, including the federally listed Taylor's checkerspot butterfly. The implementation of conservation grazing practices using *P. congesta*, *R. occidentalis*, and *Collinsia* spp can support both conservation and food security goals.

Special thanks to Dr. Sarah Hamman, Stephen Bramwell, and Kaity Wickersham. Additional thanks to Colvin Ranch, Fisher Ranch, and Wolf Haven International. This research was funded by a grant from the Washington Native Plant Society. Figures made in R code. For literature cited, visit [/bit.ly/douglasia_46_2](https://bit.ly/douglasia_46_2).

E. David Heydt is a dedicated student of Ecology, Botany, and the natural world. They grow native plants and hope to help others steward the environment.



The Maple Tree Home

by Kaia Morris, age 9

Maple trees hang over the dark silent street.

Creatures lick the maple, to them it's a treat.

Baby birds sleeping, frogs no longer leaping.

These maple trees are home to many, but humans ask
"Are trees home to any?"

When the beautiful sun rises some animals such as chameleons come out of their disguises.

Squirrels come out of the holes in the bark of course
when it's no longer dark.

Nobody will ever understand how many maple trees are
home to animals on land!

The Unfurling Blight

by Dylan Mendenhall

It felt like we were exploring another planet, not conducting a field study in our own backyard of the Pacific Northwest. The understory twilight of the old growth forest was hazy with the smoke of our world burning up, and our voices were muffled by N95s, as much for the wildfires as for the pandemic.

After scrambling up a ladder of roots, our field crew reached a plateau in the heart of the forest, one of the few remaining patches of old growth in the Puget Sound lowlands. Having conducted research in those woods several years prior, I knew that there were plants in that area that were nowhere else for miles around, species such as star-flowered false Solomon's seal (*Maianthemum stellatum*), spreading gooseberry (*Ribes divaricatum*), sweet-scented bedstraw (*Galium triflorum*), and mock orange (*Philadelphus lewisii*). Common enough, regionally perhaps, but to me, it was a blessed place, made all the more immersive by the matrix of sword ferns (*Polystichum munitum*) adorning every surface. For the purposes of our study, it was isolated. And it was old. The perfect place for a control group.

At the end of the day, we sterilized our boots and threw away the surgical gloves that we used for collecting tissue samples. Finally, I cleansed my hands with ethanol.

You could never be too careful. Preliminary research suggested that the pathogen was transmissible. Was it airborne? Was it in the soil? Was it transmitted by an insect? Our meticulous protocols verged on paranoia, but it wasn't for our own safety that we took such precautions.

Unlike COVID-19, this disease only kills sword ferns.



Tip die-back on a symptomatic sword fern. PHOTO: DYLAN MENDENHALL

Anatomy of a Blight

Signs and Symptoms

Sword ferns are withering away at dozens of locations across the Pacific Northwest (Shannon 2020a), including some especially cherished places such as Islandwood, Seward Park,

Tiger Mountain and Kanaskat-Palmer State Park. Most of these declining sword fern populations are clustered around Puget Sound, but they have also been reported in western Oregon.

The sword fern blight is associated with a suite of symptoms that closely resemble the effects of drought stress. Contributing to the ambiguity, the specific set of symptoms and their degree of severity vary from individual to individual. Based on my personal experience, the visual symptoms include any combination of crisped pinnae, a contorted rachis, discoloration, aborted frond development and tip die-back (Mendenhall and Barrera 2021). Sometimes the ferns have a scorched appearance, like kale chips left in the oven for too long. Other times, it looks as though the fiddleheads stopped unfurling halfway through the process. Most of the time, the fronds look “crinkly.”

Although sudden mortality events have certainly been observed, the blight is also associated with a slower and more subtle demise, marked by a gradual decrease in frond production over time. Normally, a healthy sword fern can retain its fronds for multiple years, having as many as three distinct sets of fronds at any given time, with each set having a similar number of fronds. In contrast, symptomatic ferns tend to have a lower ratio of young fronds to old fronds, resulting in them looking increasingly shabby and sparse. Once their fronds have withered away completely, most ferns do not recover.

To put it simply, the ferns look...bad. They look really bad. And the badness is contagious.



Crispate pinnae on a symptomatic sword fern. PHOTO: DYLAN MENDENHALL

An Invisible Wave

What could be responsible for such destruction? Previous research has explored a wide range of hypotheses, including studies on soil compaction, nutrient limitations, herbivory by mountain beavers, and known plant pathogens such as *Phytophthora* (Kildisheva and Aghai 2018). One of the more prominent conjectures has been that drought stress is to blame, an intuitive explanation given that most of the symptoms look, well, exactly like drought stress. Beyond those similari-

ties with drought, however, little evidence has actually been put forward to support the hypothesis.

Anecdotal observations conflict with this idea. For example, we might expect abiotic site conditions, such as water availability, to affect other plants in the vicinity. Yet the sword fern blight appears to leave co-occurring species unaffected. Dwarf Oregon grape (*Mahonia nervosa*), osoberry (*Oemleria cerasiformis*), elderberry (*Sambucus racemosa*), fringe cup (*Tellima grandiflora*), and red huckleberry (*Vaccinium parvifolium*) are all examples of native species that persist in the wake of the blight.

Furthermore, sword ferns are among our more drought-tolerant species, capable of fully recovering after periods of severe drought (Baer et al. 2016). It seems unlikely that sword ferns would perish from drought stress when their more sensitive companions remain unscathed.

Another problem with the drought hypothesis is that it doesn't explain the apparent transmission of the disease. In Seward Park, where an initial die-off was first observed in 2013, the blight continues to move through the forest like an invisible wave, spreading outwards year upon year. I am unaware of an abiotic process that could facilitate such travel.

Recent Findings

Transmission

Our first major breakthrough happened during a greenhouse experiment at the Center for Urban Horticulture through a collaboration with Marianne Elliot, a plant pathologist at Washington State University, and Paul Shannon, a senior software engineer at the Institute for Systems Biology. Under the assumption that the blight was caused by a pathogen, we hypothesized that exposure to diseased tissue would cause healthy ferns to develop symptoms similar to those observed in the field.

We tested that hypothesis by placing fronds from healthy ferns in containers of water shared with either diseased tissue or healthy tissue. After 12 days of exposure, the fronds exposed to the diseased tissue had almost completely withered away, resulting in significantly lower foliar moisture content compared to the fronds in the control group (Mendenhall et al. 2019). Personally, I found the speed and severity of the effects to be, quite frankly, horrifying.

These findings were soon followed up by an elegant field study in which Paul Shannon planted healthy nursery-grown ferns in what appeared to be the path of the blight (Shannon 2020). Eventually, the invisible wave overtook the young ferns. After two years of exposure, they had significantly fewer fronds compared to the ferns planted nearby in a control group.

We had confirmed our suspicion. The blight was transmissible.



Results from a transmission experiment, comparing a frond exposed to healthy tissue (left) with a frond exposed to diseased tissue (right).
PHOTO: DYLAN MENDENHALL

Chlorophyll Fluorescence

Despite having strong evidence for transmission, the diversity of symptoms was endlessly vexing. How could we even define the phenomenon if we couldn't describe a single consistent symptom? I also wondered if the old shabby look of the ferns might be the result of them simply being old shabby ferns. It was the parsimonious explanation. To answer these questions, I turned to a commonly used metric for evaluating plant stress: chlorophyll fluorescence.

Of the many quirks involved with photosynthesis, my favorite is the capacity of chlorophyll molecules to shed their excess energy by re-emitting photons of light, a process called fluorescence. One way to measure chlorophyll fluorescence is to compare the variable fluorescence (F_v) with maximum fluorescence (F_m). In healthy plants of almost any species, the dark-adapted F_v/F_m values generally hover around 0.8 or higher, while lower values are often interpreted as an indicator of plant stress (Maxwell and Johnson 2000).

To my surprise, I found that in healthy sword ferns, the young fronds and old fronds both have F_v/F_m values around 0.8, which suggests that older fronds are able to efficiently pho-

tosynthesize even into their second or third year. In contrast, the chlorophyll fluorescence values of symptomatic ferns were significantly lower, with F_v/F_m values as low as 0.45.

In the world of plant physiology, numbers like that mean pain.

Mother Trees and Nurse Logs

At the die-off site in Seward Park, Paul Shannon noticed a pattern. The handful of ferns that survived appeared to be located near trees and logs. Could big trees and decaying wood provide some form of protection to the ferns?

To explore this question, Paul and I conducted a study in which we carefully mapped the locations of over 200 ferns and used vector algebra to determine their distances to the nearest trees and logs. We found a weak but statistically significant relationship between their likelihood of survival and their proximity to trees and coarse woody debris (Shannon 2019). There also appeared to be thresholds for the minimum and maximum distances associated with greater survival. For example, none of the sword ferns survived if they were more than 15 feet from a tree or log.

The mechanisms that could give rise to this pattern are unclear to me. If I was to wildly speculate, however, I imagine that the trees and logs may relieve some sort of compounding stress that the sword ferns experience, perhaps by increasing soil moisture in their vicinity through the hydraulic redistribution of water stored deeper underground. In the case of logs, I imagine there could be a similar effect from the passive release of water from their decaying wood.

Social Distancing

When people are crowded together in a room, it's easier for an airborne pathogen to be transmitted from person to person. A similar pattern occurs with plants in a phenomenon known as density-dependent mortality. Higher densities of a host species increase the chances that pathogens will spread to its neighbors, for example, through root grafts, branch wounds or



Discolored fronds on a symptomatic sword fern. PHOTO: DYLAN MENDENHALL

insect vectors. If a pathogen was responsible for the sword fern blight, I expected to see a similar density-dependent pattern.

After comparing estimates of historical fern densities with our current observations in Seward Park, I found the mortality rates to be significantly correlated with the historical densities. Based on a linear regression model, areas with nearly continuous sword fern cover are predicted to have over 90% mortality. In contrast, areas with only 20% sword fern cover are predicted to have a mortality rate closer to 50%. If this pattern holds true, I fear that sword ferns will become a minor component of the plant communities in the areas affected by the blight.

Our study

In 2020, I participated in a research project through a collaboration between Friends of Seward Park, MPG Ranch, and my business, Haven Ecology and Research LLC. After collecting tissue samples, soil samples and observations on the site conditions at Seward Park, we explored two competing hypotheses. Is it drought stress or a pathogen?

Mediterranean Summers

In the Pacific Northwest, we are blessed with a so-called Mediterranean climate, characterized by mild winters and parched summers. If the sword fern die-off was caused by drought conditions, perhaps exacerbated by climate change, one might expect the symptoms to be especially pronounced during our yearly summer drought season. One might also expect the blight-stricken ferns to have more severe symptoms in areas where the soil tends to be drier.

During the late summer, we compared the foliar moisture content and soil moisture content at sites containing predominantly healthy ferns or symptomatic ferns. Similar to our greenhouse results, we found symptomatic ferns to have significantly lower foliar moisture content compared with healthy ferns (Mendenhall and Barrera 2021). The soil moisture content, however, was similar between these two groups. There was no correlation. The symptomatic ferns were drying up, but it was not for lack of water.

Next Generation Sequencing

To explore the pathogen hypothesis, we focused on the fungal kingdom as a likely taxonomic hiding place. After extracting DNA from the rhizomes of both symptomatic ferns and healthy ferns, we sequenced the fungal DNA using a technique called metabarcoding. The challenge was in sorting through millions of DNA sequences, looking for something that may not even be there. Toward that end, I applied a permutational method called indicator species analysis, which essentially determines how well each DNA sequence correlates with the experimental groups—symptomatic ferns or healthy ferns. If a fungal pathogen was present, this powerful statistical test should find it.

However, instead of finding a pathogen in the symptomatic ferns, the algorithm identified a single sequence that was significantly correlated with healthy sword ferns, but largely absent in the symptomatic ferns. If this was a smoking gun, it was pointed in the wrong direction.

Based on similarities to known fungal species, the DNA sequence was identified as an unclassified species in *Cron-*



A sudden mortality event in a stand of sword ferns. PHOTO: DYLAN MENDENHALL

artiaceae, a family of pathogenic rust fungi. Readers with a background in plant pathology will recognize this as the same family that contains *Cronartium ribicola*, also known as white pine blister rust.

In any case, what was a rust doing in the rhizomes of healthy sword ferns, and why was it missing in the symptomatic ferns? I suspect that under normal circumstances, sword ferns are one of the alternate hosts for this pathogen, which perhaps infects other plant species during the other parts of its life cycle, much like white pine blister rust. It is difficult to explain why the pathogen would be missing in symptomatic ferns though. When plants are under stress, they tend to be more susceptible to pathogens, not less so.

If I was to wildly speculate once again, I imagine that the pathogen responsible for the sword fern blight somehow modifies the conditions within its host to such an extreme that it becomes an inhospitable place for the other microbial denizens. It outcompetes the other plagues.

Conclusion

Applications and Future Research

Although we have yet to identify the pathogen responsible for the sword fern blight, our existing knowledge of the phenomenon has applications for natural resource management. Based on the results of the proximity study, for example, we now have a sense of the minimum and maximum distances to trees or coarse woody debris that are associated with greater survival rates. By extension, land managers can modify the densities of trees or coarse woody debris to facilitate greater survival, or prioritize the planting of sword ferns within those proximity thresholds where they are more likely to survive. The density-dependent mortality pattern is another useful finding, allowing us to estimate the total area of groundcover that will eventually be lost in areas affected by the blight. For the restoration of these areas, this pattern can also be used to predict the sword fern planting densities that will encourage greater survival.

Future research should build on our progress by using DNA sequencing to target other sword fern tissues, such as the roots or foliage, or by focusing on other taxonomic groups known to harbor plant pathogens, such as bacteria or oomycetes. There is also a need to better understand how the pathogen is transmitted. Our greenhouse study suggests that the causal agent is at least capable of being transmitted through water. However, in the natural environment, it is plausible that an insect or some other vector facilitates its transmission.

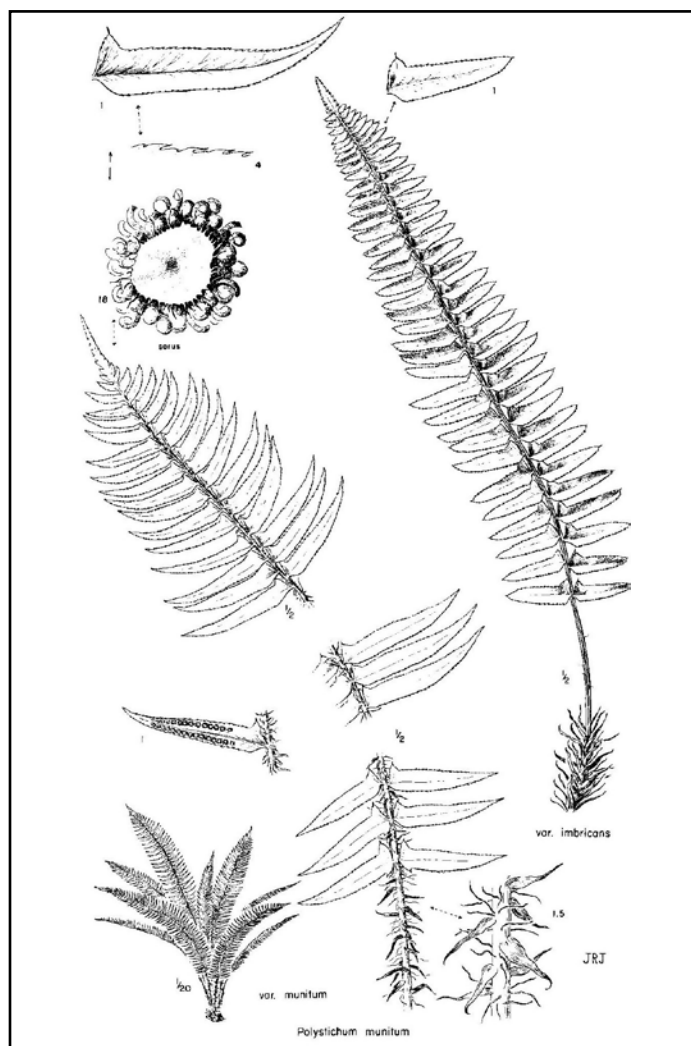
Lastly, research is needed to evaluate the susceptibility of other *Polystichum* species that are native to the Pacific Northwest, such as *P. andersonii*, *P. californicum* or *P. imbricans*. If not for the purpose of their own conservation, such research could potentially identify a resistant species that could be used for habitat restoration. It may be the twilight of *Polystichum munitum* at some locations in Washington, but there is hope that we

can restore the structure of these forests, normally awash by a perennial sea of fronds.

How to Get Involved

One way that folks can contribute to the research is by reporting suspected sword fern die-offs through the iNaturalist project, *Western Sword Fern Decline in the Pacific Northwest*, managed by Paul Shannon. This community-based monitoring effort helps us better understand the geospatial extent of the phenomenon and provides researchers with potential locations for future experiments. As good stewards of the earth, I also plead that we avoid moving soil, plants or woody debris from areas affected by the blight, and that we wash our boots after travelling to such places. Lastly, readers can advocate for greater participation from state and federal land managers. Most of the research mentioned here was funded by a small group of thoughtful committed citizens, devoted to the celebration, preservation and restoration of Seward Park. For literature cited, visit [/bit.ly/douglasia_46_2](https://bit.ly/douglasia_46_2).

Dylan Mendenhall is the owner and principal ecologist of Haven Ecology and Research LLC. He lives in Bremerton, Washington.



Sword fern (*Polystichum munitum*) as illustrated by Jeanne R. Janish in *Vascular Plants of the Pacific Northwest*.

Study Weekend and Botany Washington 2022



Study Weekend 2022: Building a new plant list at Giant Ripples with Clay Antieau. PHOTO: JANKA HOBBS



Study Weekend 2022: Jeff Walker assists plant ID at Giant Ripples. PHOTO: JANKA HOBBS



Dwarf hesperochiron (*Hesperochiron pumilus*) at Camas Meadows Natural Area Preserve near Peshastin. PHOTO: MARK TURNER



Botany Washington 2022: The tale of the banana slug with Steven Clark. PHOTO: REGINA JOHNSON



Study Weekend 2022: Summit of Baldy Mountain with Joe Arnett. PHOTO: JANKA HOBBS



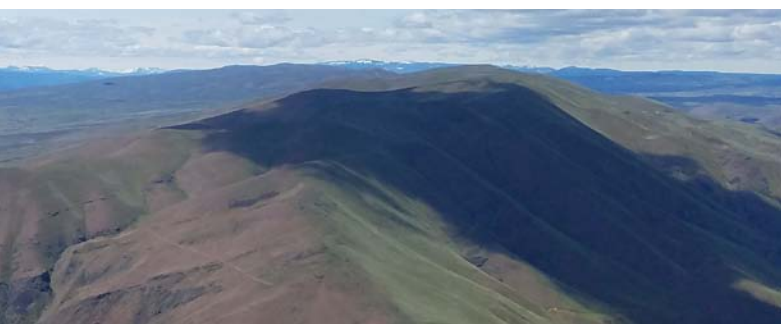
Study Weekend: Quaking Aspen (*Populus tremuloides*) border a wet meadow at



Showy townsendia (*Townsendia florifer*), Rocky Coulee on Ginkgo Petrified Forest State Park near Vantage. PHOTO: MARK TURNER



Botany Washington 2022: After a day in the field, happy hour on Orcas Island. PHOTO: DAVID GIBLIN



HOBBS



Botany Washington 2022: Field trip to Turtleback Mountain with Jason Ontjes. PHOTO: REGINA JOHNSON



Camas Meadows Natural Area Preserve near Peshastin. PHOTO: MARK TURNER



Botany Washington 2022: Rare plant hunting with Walter Fertig at Iceberg Point, Lopez Island. PHOTO: JANKA HOBBS



Botany WA 2022: Rare plant hunting with Walter Fertig at Iceberg Point, Lopez Island. PHOTO: REGINA JOHNSON

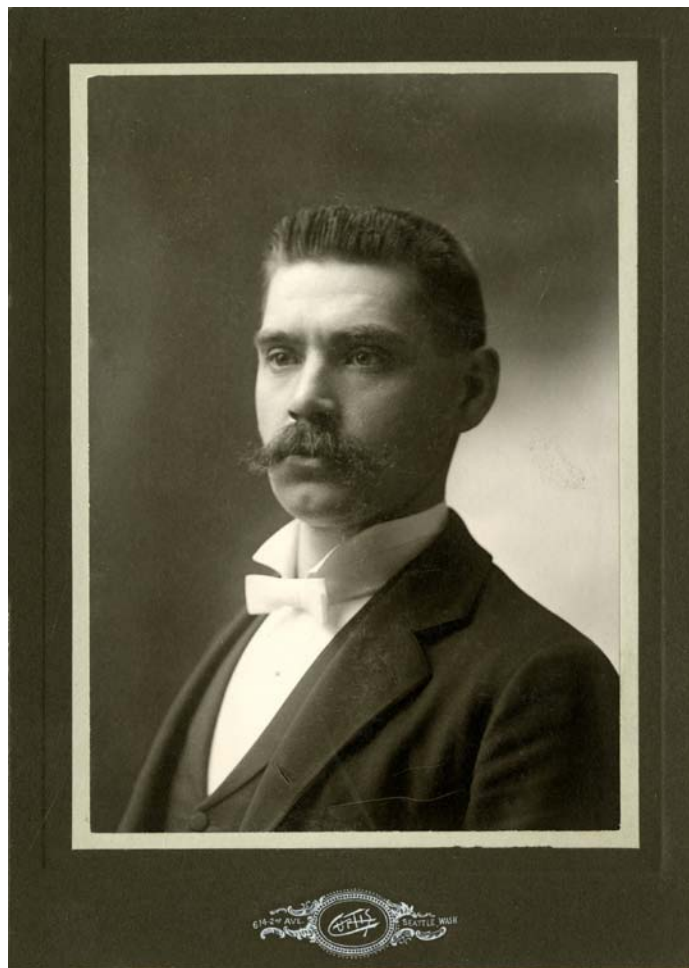
Four Days in Paradise: C. V. Piper and the Muir Expedition of 1888

by Donovan Tracy

Midday August 12, 1888 John Muir came upon a meadow and experienced his first close encounter with The Mountain. He later recounted the moment: “Out of the forest at last there stood the mountain, wholly unveiled, awful in bulk and majesty, filling all the view like a separate, newborn world, yet withal so fine and so beautiful it might well fire the dullest observer to desperate enthusiasm. Long we gazed in silent admiration, buried in tall daisies and anemones by the side of a snowbank.”¹ He had arrived at Camp of the Clouds, east of a small hill now known as Alta Vista, on the southern flank of Mount Rainier.

Fifty-year-old Muir was in the Northwest to gather materials for his latest book *Picturesque California, the Rocky Mountains and the Pacific Slope*. He had settled into retirement on his California ranch and his days of inspired writing had ceased. However, he plunged enthusiastically into this new project, returning to the wilderness world he loved. While he hadn’t planned on climbing Rainier, he was a man who had known mountain fever before, and given the opportunity he wouldn’t resist a summit attempt.²

Fortuitously, a local mountaineer had organized a party to attempt an ascent from the mountain’s south side. Having failed twice to summit in 1886 and 1887 via the northeast slope, Edward Sturgis Ingraham was determined to make it to the top, and much to his delight John Muir agreed to join his party.³ He liked to be addressed as Major Ingraham in deference to his rank in the Washington Territorial National Guard. Ingraham was an established figure in Seattle where he was the first Superintendent of Seattle Public Schools (Ingraham High School is named for him). Because Muir’s book focused heavily on artistic images, he needed a photographer and the job went to Arthur Churchill Warner, who would receive notoriety as the first to capture a photograph from the summit of Mount Rainier. Also included in the party was a young botanist, Charles Vancouver (C. V.) Piper.



This formal portrait of Piper was taken by the renowned Seattle photographer Edward Curtis in his studio on Second Ave. It’s believed the date is Sept. 15, 1897, the day he married Laura Maude Hungate; Charles was age 30, Maude was 26. PHOTO: EDWARD HUNGATE COLLECTION OF C. V. PIPER MATERIALS, WASHINGTON STATE UNIVERSITY LIBRARIES



View of the mountain from the Alta Vista trail slightly to the west of the site of Camp of the Clouds. Shown here are *Castilleja parviflora* var. *oreopola* (magenta paintbrush) which was collected by Piper in the vicinity on August 13, 1888. PHOTO: DONOVAN TRACY, AUGUST, 2018

It is not entirely clear how, or why, the 21-year-old Piper and his friend Norman Booth were invited to join the party. Perhaps Piper’s active involvement in the Young Naturalists’ Society (YNS)⁴ caught the fancy of the major. Young Charles had been studying botany since age ten and would occasionally agitate his large family (he was one of nine children) by bringing home specimens of skunk cabbage and other odoriferous plants. Like all early members of the YNS, he began his involvement in the organization as a teenager and was very enthusiastic about studying natural history and collecting the flora and fauna of the Puget Sound area. Piper was the dominant collector of plants in the group and hundreds of his mounted specimens from that period are held in herbaria today (over 275 were collected prior to the expedition).⁵ In 1885, Piper received his Bachelor of Science degree from the Territorial University of Washington. He must have been excited by the prospect of extending his collecting range to the high country and experiencing the wonders of alpine plants as he boarded the train on August 8 headed for Yelm.

The party was outfitted in Yelm with supplies and pack ponies. The expedition was off to a good start, for it was here that they had the good fortune to meet Philemon Beecher Van

Trump. Van Trump had previously summited Rainier in August of 1870 and 1883 (again in 1891 and 1892). No better guide could be had. Ingraham was heartened, for surely this improved his chances this time to reach the top. He exclaimed, "Before night the microbes that bring on the mountain fever had taken such hold of Van Trump that he expressed a desire to join our party, so when the pack train started from his store the next morning, Van, with his blankets strapped on his black pony, was with us."⁶ Piper began his collecting, which would continue throughout the expedition. He left Yelm with specimens including 20 species of plants.

After four days of arduous travel, where much of the party was in a sickly state, most likely from rancid butter, they reached their base camp at Camp of the Clouds. This lovely meadow above what is now called Paradise was in full summer bloom. Warner lamented in not having the power to describe it but summarized, "At my feet was a bed of flowers such as I never thought could bloom, there were all colors."⁷ Muir's reaction to Rainier's remarkable

wildflower display is etched in the granite steps leading from the present-day visitor center toward the mountain: "... the most luxuriant and the most extravagantly beautiful of all the alpine gardens I ever beheld in all my mountain-top wanderings." If this was the reaction of a man who had spent years rambling in amazing alpine environments, imagine the excitement of the young botanist; it's called Paradise for a reason!⁸

On the morning of the 13th, the party began preparations to leave camp and head toward the snow-covered slopes. Warner set up his camera and photographed the group resting in the meadow. Some of the other members of the party, who weren't there to climb, included H. Loomis, Muir's publisher; Indian Henry, a guide; and William Keith, Muir's artist. Dan Bass, an associate of Warner's, who would summit, is not shown. Most notably, however, is the absence of Piper, who was off in this 'Garden of Eden' botanizing. He collected specimens encompassing 45 species before they left camp at 2:00 p.m. About five and a half hours later, they reached a site that Muir felt would provide some protection from the wind since there was undisturbed layer of pumice on the ground. They were at 10,100 ft. elevation, a place Ingraham would name Camp Muir.

At 4:30 a.m., they set out for the summit. Warner, claiming to be the only one who was not "sea sick" at Camp Muir, packed his 50 pounds of equipment up the rocky slope and across a narrow ledge of the great rock Ingraham would later name Gibraltar. The summit was reached by 11:45 a.m. with Ingraham determined to be first. Warner, anxious to get the first photo on the summit, set up his camera and framed the group photo. Five are shown with Ingraham raising his hat in triumph. With Warner behind the camera, it meant one member of the party was absent. Again, Piper missed the opportunity to be in an historic image. Exhausted, he lagged behind by about an hour. Van Trump expressed his feelings for him: "I was much pleased by Muir's kindly sympathy for the lad, and with his cheering and encouraging words as he urged the wearied climber to push on to the goal, he meanwhile waiting for him."⁹ Due to Muir's concern about the potential for bad weather, they stayed just two hours, thereby concluding only the third known complete ascent of Mount Rainier.

Descents from mountaintops are often more perilous than their ascents, which was clearly the case for Piper. According to Warner, John Muir was last in the descending party with Piper just ahead.¹⁰ Van Trump had lost the spikes in his



Camp of The Clouds, August 13th. 1888 From left to right Indian Henry. (John Muir.) H. Loomis. P.B. Van Trump. E.S. Ingraham. Wm. Keith. N.O. Booth.

A. C. Warner took this photograph before the party left Camp of the Clouds for their summit attempt. Piper, too busy collecting in the meadows nearby, is unfortunately absent in the historic image. PHOTO: JOHN MUIR PAPERS, HOLT-ATHERTON SPECIAL COLLECTIONS AND ARCHIVES, UNIVERSITY OF THE PACIFIC LIBRARY, ©1984 MUIR-HANNA TRUST



Where's Piper? He lagged behind by about an hour and missed the opportunity to be in another historic image. Warner, anxious to take the first photo from the summit, went ahead without him. Waving his hat in triumph is Ingraham, Muir is seated in the snow and Van Trump is holding his alpenstock. Bass and Booth stand nearby. PHOTO: UNIVERSITY OF WASHINGTON LIBRARIES, SPECIAL COLLECTIONS, WARNER 712E

shoes and slid down the slope with his alpenstock, performing what is now referred to as a “self-arrest,” just before reaching a crevasse. Then, Warner exclaims, “We had all crossed [presumably the ice bridge] save two when another cry made the very blood in our veins turn cold. This time it was Piper.”¹¹ Piper recounts the narrow escape in an article in a 1915 edition of *The Mountaineer*: “When we came to the ice bridge over which the party had crossed the crevasse we were decidedly suspicious of its strength, and after consulting a moment over the matter I decided to put my alpenstock part way on the bridge and jump so as to clear the crevasse. The attempt was perfectly successful so far as I was concerned, but my alpenstock and the whole ice bridge fell into the crevasse. I have often wondered what would have happened if I had attempted to go across the bridge in the ordinary way, as the man who had crossed it shortly before I reached it told me afterwards that he felt the bridge crack under him. It is possible of course that if I had gone across the bridge carefully it would have held all right, and that the breaking was due to the suddenness of the weight put upon it.”¹² The young botanist would live to collect another day.

Ingraham claimed he returned to Camp of the Clouds four hours after leaving the summit; all were in by 7:00. Muir summarized the return: “We were rather weak from want of nourishment, and some suffered from sunburn, notwithstanding the partial protection of glasses and veils; otherwise, all were unscathed and well. The view we enjoyed from the summit could hardly be surpassed in sublimity and grandeur; but one feels far from home so high in the sky, so much so that one is inclined to guess that, apart from the acquisition of knowledge and exhilaration of climbing, more pleasure is to be found at the foot of the mountains than on their tops.”¹³ Surely this was Piper’s sentiment. Remarkably, prior to the end of a hard day, he had added 11 species to his collection.

The next day they moved the camp to a lower elevation, most likely to Paradise Valley, for better protection for the weary climbers. The mission of the expedition was accomplished, but Piper continued to roam the slopes looking for prime specimens to round out his collection. Not since the British doctor William Fraser Tolmie had there been such a concerted effort to collect plants in the shadow of the majestic mountain. The 20-year-old Tolmie was employed by the Hudson Bay Company and stationed at Fort Nisqually near Tacoma. His short trip in the late summer of 1833 into the northwest corner of what is now the national park took him to Mount Pleasant, where he collected with a focus on medicinal uses. He gathered specimens representing 42 species of plants; many had yet to be identified or named. Perhaps the most well-known is *Micranthes tolmiei* (aka *Saxifraga tolmiei*, or Tolmie’s saxifrage).¹⁴

Like most early field botanists, Piper probably used a vasculum to store and to transport his collections. A vasculum is a flattened cylindrical metal (most likely tin) container with a lengthwise hinged opening and a leather carrying strap. Based on the quality of the specimens that are preserved in herbaria today, it is apparent he was a diligent collector and was careful about protecting his specimens. He may have used wet leaves to help separate and preserve his plants in the vasculum. It’s not clear whether he knew the extent of his endeavors during the four days in paradise as he couldn’t have been familiar with all these plants (several had just recently been found by other field botanists, particularly Howell, Suksdorf, Cusick, and Henderson). His vasculum was brimming with a wide assortment of alpine plants he had collected at Camp of the Clouds, with specimens representing 58 species. He possessed asters (*Symphyotrichum*) and daisies (*Erigeron*), louseworts (*Pedicularis*) and penstemons (*Penstemon*), pussytoes (*Antennaria*) and pussypaws (*Cistanthe*), bistorts (*Bistorta*) and paintbrushes (*Castilleja*),

Piper Collections: Camp of the Clouds and Paradise Valley, August 13–16, 1888

<i>Anemone occidentalis</i>	<i>Gentiana calycosa</i>	<i>Oreostemma alpigenum</i>	<i>Ranunculus eschscholtzii</i>
<i>Antennaria lanata</i>	<i>Heuchera glabra</i>	<i>Oxyria digyna</i>	<i>Rhododendron albiflorum</i>
<i>Athyrium distentifolium</i>	<i>Juniperus communis</i>	<i>Pedicularis bracteosa</i>	<i>Ribes acerifolium</i>
<i>Bistorta bistortoides</i>	<i>Leptarrhena pyrolifolia</i>	<i>Pedicularis contorta</i>	<i>Rorippa palustris</i>
<i>Caltha leptosepala</i>	<i>Luetkea pectinata</i>	<i>Pedicularis ornithorhynchos</i>	<i>Saxifraga austromontana</i>
<i>Calyptridium umbellatum</i>	<i>Luina hypoleucea</i>	<i>Pedicularis racemosa</i>	<i>Smelowskia ovalis</i>
<i>Cassiope mertensiana</i>	<i>Lupinus lyallii</i>	<i>Penstemon procerus</i>	<i>Sorbus sitchensis</i>
<i>Castilleja miniata</i>	<i>Lupinus latifolius v. subalpinus</i>	<i>Penstemon rupicola</i>	<i>Spiraea splendens</i>
<i>Castilleja parviflora</i>	<i>Lupinus sericeus</i>	<i>Phlox diffusa</i>	<i>Triantha occidentalis</i>
<i>Erigeron acris</i>	<i>Micranthes ferruginea</i>	<i>Phyllodoce empetriformis</i>	<i>Valeriana sitchensis</i>
<i>Erigeron glacialis</i>	<i>Micranthes nelsoniana</i>	<i>Phyllodoce glanduliflora</i>	<i>Veratrum viride</i>
<i>Erythranthe caespitosa</i>	<i>Micranthes tolmiei</i>	<i>Polemonium californicum</i>	<i>Veronica cusickii</i>
<i>Erythranthe lewisii</i>	<i>Mitella breweri</i>	<i>Potentilla flabellifolia</i>	<i>Xerophyllum tenax</i>
<i>Erythronium montanum</i>	<i>Monotropa hypopitys</i>	<i>Primula jeffreyi</i>	
<i>Eucephalus ledophyllus</i>	<i>Nothocalais alpestris</i>	<i>Pyrola picta</i>	

shooting stars (*Primula*) and monkey-flower (*Erythranthe*), gentian (*Gentiana*) and lupine (*Lupinus*), and even the larger hellebore (*Veratrum*) and beargrass (*Xerophyllum*), all in all from 23 plant families. While today none of these would be thought of as rare or unusual for a Mount Rainier meadow (most can be found in today's wildflower guidebooks¹⁵), he must have been pleased with the extent of the collection and the opportunity it afforded to expand his knowledge of the flora of the northwest.

Tucked away in his vasculum were two plants that had never been collected, and were not only unknown to him, but also to the scientific community. These 'type' specimens become the basis for the identification of new species and the publishing of new scientific names. His 'discoveries' were *Erythranthe caespitosa* (formerly *Mimulus caespitosus*/*Mimulus tilingii* var. *caespitosus*), the large mountain monkey-flower, and *Penstemon rupicola* (formerly *Penstemon newberryi* var. *rupicola*), rock penstemon. Piper was not only expanding his knowledge but contributing to the knowledge base of alpine plants.

Later he would mount four of his *Anemone occidentalis* (western pasqueflower) specimens on two herbarium sheets—a pair in flower and a pair in seed (shown here). In his *Flora of Mount Rainier*, written years later, he expands upon the basic description of the plant: "The curious seed head of the mountain anemone always excites attention, their plumed heads reminding one irresistibly of the caps worn by grenadiers." Today they still excite attention, but the 'mopheads' remind us more of something Dr. Seuss might have dreamed up.

The morning of the 16th, apparently satisfied he had met his responsibilities as expedition leader, Ingraham and his two young companions Piper and Booth set out to return via a much different route. Ingraham, in a short piece in the 1915 *The Mountaineer* entitled "Then and Now" somewhat causally lays it out, "After resting a couple of days at Camp of the Clouds, I decided to return via the east and north slopes. I induced Charles Piper and Norman Booth to accompany me. The first day we swung around to a beautiful park on the east slope, which I called Summerland. The second day we crossed the Emmons, Winthrop, and Carbon glaciers, making camp just after crossing the Carbon. The end of the third day found us in a camp on Meadow Creek about two miles below the meadows. It required another day and a half to reach Seattle."¹⁶ This was an ambitious undertaking requiring able mountaineering, but due to Ingraham's two prior attempts to climb the mountain from the northeast he was likely familiar enough with the terrain to take it on.^{17, 18} His companions probably not quite so much.

Piper may have had some reservations about 'going around the mountain.' He would have been wearied from his harrowing descent two days prior, had a vasculum full of specimens he would have to take in tow, and he probably would have liked to have spent more time with the great naturalist John Muir. They would be without pack horses and the critical supplies they carried. Furthermore, he would have to traverse more glaciers and face the potential of more narrow escapes. All things considered



Piper's herbarium sheet of the *Anemone occidentalis* (western pasqueflower) in seed he collected August 13, 1888. The preprinted label reads "Herbarium, University of Washington, Collection by C. V. Piper, Presented by Young Naturalists' Society." IMAGE COURTESY OF UNIVERSITY OF WASHINGTON HERBARIUM, BURKE MUSEUM

it represented an opportunity to continue collecting and in new terrain.

As the major marched his small troop off to the east he couldn't have imagined that in a few short years the first glacier they crossed would be named for him. The beautiful Ingraham Glacier on the southeast slope was named by I. C. Russell in 1896. Russell was a Professor of Geology at the University of Michigan and performed the early geologic surveys of Rainier's glaciers.¹⁹

On their second day, August 17, Piper collected specimens of nine species found at Summerland including the elegant *Parnassia fimbriata* (fringed grass-of-Parnassus).²⁰ While not rare, it is uncommon enough to be a pleasant surprise; its five white petals are delicately fringed, giving it a lacy look, and its stems have a single clasping heart-shaped leaf-like bract. The lovely plant was first collected by Archibald Menzies in the late 1780s, probably in the lowlands of present-day Washington state. Its addition expanded his collection as the only species from the Celastraceae family.

The record provides only one additional collection, *Erysimum arenicola* (sand-dwelling wallflower) on August 18, the day they crossed the north side glaciers. They were safely in Seattle before the main party had reached Yelm. The demanding 14-day excursion with the indefatigable Edward Ingraham was at its end. Back home, Piper would begin the meticulous tasks of cataloging and mounting his specimens. His herbarium sheets have preserved 101 species of plants collected on the expedition. All but three sheets are held at the University of Washington Herbarium.

Piper returned to Mount Rainier in August of 1889, but elected to stay off the glaciers. While collecting with the Rev. E. C. Smith, a trained botanist, and who incidentally summited with Ingraham while there, Piper managed to discover some exquisite new plants of the alpine zone, notably *Castilleja rupicola* (cliff paintbrush) and *Polemonium elegans* (elegant Jacob's ladder). Returning again in 1895 and 1919, his collection of vascular plants from Mount Rainier preserved in herbaria today total 852.²¹

Piper received his Master of Sciences degree from the University of Washington in 1892 and soon after became a Professor of Botany and Zoology at the Washington Agricultural College, now Washington State University.²² After ten years in Pullman, he took a position with the U.S. Department of Agriculture and was recognized internationally for his work as an agronomist²³. Ingraham became one of the leaders to establish Mount Rainier National Park. He stood atop the big mountain six more times.

FOOTNOTES:

¹Muir, John. *Steep Trails, Chapter XX. An Ascent of Mount Rainier*, Houghton Mifflin Company, 1918

²Haines, Aubrey L. *Mountain Fever, Historic Conquests of Rainier*, University of Washington Press, 1962.

³Ingraham, E. S. *Then and Now*, The Mountaineer, Volume Eight, December 1915, The Mountaineers, Seattle (Issue dedicated to Mount Rainier National Park included a brief description by Ingraham of the Muir expedition).

⁴Benson, Keith R. *The Young Naturalists' Society and Natural History in the Northwest*, American Zoology, 1986.

The Young Naturalists' Society was conceived in 1879 by four young men, including Edmond S. Meany (a university classmate of Piper's and later a UW professor), who were completely untrained in the sciences. Over its 25-year history it steadily grew into a bona fide scientific institution by collecting a large number of specimens, organizing expeditions and providing educational opportunities for the public. It developed strong ties with the University of Washington and eventually its functions were absorbed by the University and the newly-formed Washington State Museum (lately named the Burke Museum). On its website the Burke traces its roots "from teenage club to world-class museum."

⁵The database of the Consortium of Pacific Northwest Herbaria and the image collection of the University of Washington Herbarium were used throughout the article in regards to species collection, collectors, dates and locations (Giblin and Legler 2003+).. Piper's earliest recorded collection goes back to 1880

when he was thirteen years old and two of his herbarium sheets of that year can be found in the UW Herbarium. Piper's sheets used a pre-printed label with the title "Herbarium, University of Washington, Collection by C. V. Piper, Presented by Young Naturalists' Society." It is not clear when these came into use as part of the mounting process vs. added later to previously mounted specimens.

⁶Ibid. Ingraham.

⁷Warner, A. C. *John Muir's Ascent of Mt. Rainier*, The Mountaineer, Vol. 50, Dec. 28, 1956. Warner's account was in the form of a letter to his father written shortly after the trip. It remained unpublished for 67 years until it appeared unedited in The Mountaineer. Aubrey Haines provided an introduction and presumably the footnotes to the letter. Five Warner photographs are included.

⁸Ibid, Haines. The coining of the name 'Paradise' is attributed to Mrs. James Longmire who, with a guest, Mrs. Jameson of Olympia, were brought by her husband to an alpine meadow above the Nisqually Glacier in 1885. She exclaimed "O, what a paradise!" in which Mrs. Jameson replied "Yes, a real paradise." As a place name it's not clear whether the area we now know as Paradise was the meadow they visited or whether 'paradise' was a spontaneous remark referring to the grandeur of Rainier's subalpine meadows. Our group, camped at Camp of the Clouds, may have thought they were in paradise but not necessary at Paradise.

⁹Ibid, Haines

¹⁰There is some confusion about who was with Piper. Haines says that it was Van Trump who was behind Piper (which makes sense since he wanted to stay longer) and Warner who claims it was Muir (his account has Van Trump ahead and falling on the slope before Piper's event). Muir, in his account in *Steep Trails*, doesn't totally resolve this, for he says, "The descent was accomplished without disaster, though several of the party had narrow escapes. One slipped and fell, and as he shot past me seemed to be going to certain death . . . he threw himself on his face and digging his alpenstock into the ice . . ." (apparently referring to Van Trump's self-arrest). Further, "Another broke through a slim bridge over a crevasse, but his momentum at the time carried him against the lower edge . . ." He doesn't clarify his position in the descent during these events. Piper, however, affirms it was Muir: "On the return of our party from the summit Mr. John Muir and I had for some reason lingered behind." (see *Narrow Escape*). Therefore, it was Muir, not Van Trump, who had to vault over the exposed crevasse.

¹¹Ibid, Warner

¹²Piper, C. V. *A Narrow Escape*, The Mountaineer, Volume Eight, December 1915, The Mountaineers, Seattle

¹³Ibid, Muir

¹⁴Peterson, Arnie. *A Brief History of Plant Collections from Mount Rainier National Park*, Douglasia, Vol. 45, No. 3, Washington Native Plant Society, Seattle, 2021.

¹⁵Tracy, Donovan and D.E. Giblin. *Alpine Flowers of Mount Rainier*, Burke Museum, Seattle. Of the fifty-three flowering vascular plants forty-eight are found in this guide.

¹⁶Ibid. Ingraham.

¹⁷Molenaar, Dee. *The Challenge of Rainier*, 4th Edition, The Mountaineers, Seattle, 2011. In reviewing early ascents of the Emmons-Winthrop Glaciers Molenaar states "All subsequent pre-1900 ascents of this side of the peak were made by a circuitous

approach from the coal-mining communities of Wilkeson and Carbonado in the foothills northwest of the present park.”

¹⁸Meany, Edmond S. edited by. *Mount Rainier A Record of Exploration*, New York, The Macmillan Company 1916. During his 1887 attempt Ingraham is credited with naming St. Elmo Pass, a high mountain pass on the ridge between the Winthrop and Inter Glaciers (p. 319). He may have used this up and over route of the pass in his traverse in 1887 (as opposed to going around what is now Camp Schurman) and perhaps used again in 1888.

¹⁹Ibid. Meany. Ingraham describes his encounter with Russell in his section of Meany’s book: “One time when I was on the mountain encamped at the Camp of the Clouds, Professor I. C. Russell and another man in their shirt sleeves, came tottering into my camp at the early morning. They had been caught upon the summit and had spent a shivering night in the crater. I treated them the best I knew how and they departed. When their maps came out I found that a beautiful glacier had been named for me – Ingraham Glacier.” In 1909 The Mountaineers named a glacier on the mountain’s northwest slope for Russell.

²⁰Other species collected at Summerland include: *Collomia larsenii*, *Dasiphora fruticosea* *Delphinium glaucum*, *Erigeron brandegei*, *Erigeron compositus*, *Mertensia paniculata*, *Monardella odoratissima*, and *Phacelia hastata*.

²¹Ibid, Peterson

²²He attended summer school at Harvard in 1900 and earned a second M. S. degree. In 1921 the Kansas Agricultural College conferred upon him an honorary D.Sc. degree.

²³An expert in the science of soil management and crop production.

Endnote: Both men died in 1929; Ingraham at 74, Piper at a much-too-young 59. They are buried in Lakeview Cemetery near Volunteer Park in Seattle.

For literature cited, visit [/bit.ly/douglasia_46_2](https://bit.ly/douglasia_46_2).

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Book Review

After the Blast: The Ecological Recovery of Mount St. Helens by Eric Wagner (2020)

by Katherine Darrow

If you search the title *After the Blast* on Amazon, at least seven books will come up, including one play, a poetry collection, a memoir from the Iraq/Afghanistan war, and several science fiction novels. But only one of them covers the ecology of Mount St. Helens, as skillfully told by science writer and freelance journalist Eric Wagner. This is his third book-length publication other than his Ph.D. thesis on Magellanic penguins, which was also the subject of his second book. He has written dozens of magazine articles, including an update of

the proposed Spirit Lake diversion tunnel maintenance project (High Country News, May 1, 2020), which should be of interest to all our members. WNPS signed on as a plaintiff to contest the proposal in March 2021. (This case is still pending.)

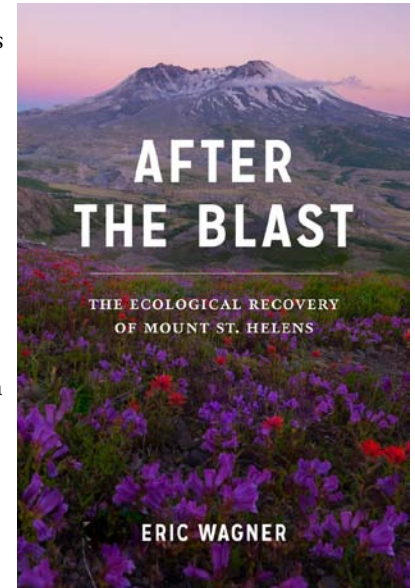
To dive into writing a book about Mount St. Helens is a daunting project. Not only are there at least 20 other books about the famous May 1980 eruption that horrified people living in the Pacific Northwest at the time, there are hundreds of scientific papers and agency management plans to peruse and absorb into a unique tale of one’s own. Wagner was up for the task and deftly weaves together the findings of dozens of researchers, who pounced on the opportunity to set up long-term monitoring projects that focused on the return of vegetation and wildlife to the scorched, flooded, and buried landscape.

Wagner’s book was planned for release just before the 40th anniversary of the blast. He could not have predicted that this timing would coincide with the announcement of the Covid-19 pandemic, which resulted in everyone wearing face masks, as did tens of thousands of people who were living in the vicinity of the volcano during the early 1980s in order to not inhale ash.

I first read *After the Blast* after a five-day backpack circumnavigating Mount St. Helens on the Loowit Trail in October 2020. This was my first encounter with this volcano, other than views from other distant summits. Our trip began with a 14-mile trek past Spirit Lake and across the Pumice Plain, two areas that are the focus of much of the research, since these areas had suffered some of the starkest impacts. Witnessing the diversity of plant species (398, including 64 introduced) and thriving wildlife, plus an abundance of fungi that have helped reclaim the ruined landscape, validated my understanding of the stunning resiliency of life. And the moss! Bright green mosses formed a soft carpet over much of the Pumice Plain and forest understory.

Thus, I was at first disappointed that Wagner’s book hardly mentioned mosses, fungi, or the mountain goats that mesmerized me on our trip. Or the magnificent old growth forest on the opposite side of mountain from the blast zone. Or the hill-sides covered with bear grass (*Xerophyllum tenax*). Or the lush vegetation at multiple waterfalls all around the mountain.

But on my second reading this spring for our local book club, I was most impressed with Wagner’s ability to synthesize a mountain range of information published in science journals,



including the 850-page collection of U.S. Geological Survey papers known as Twelve Fifty, while also spending time in the field with dozens of scientists who continue to monitor wildlife populations and square meter plots at Mount St. Helens.

Seminal to all the studies are ideas about plant succession and the notion of ‘climax vegetation’ generated in the late 1800s. One of the best parts of the book is how Wagner sets the stage for how research on Mount St. Helens has upended a century of thinking about those concepts. He has written an excellent primer on the history of plant ecological theories, briefly summarizing the work of Cowles, Clements, Gleason and Tansley, who were the most influential minds to help establish paradigms about how we understand plant communities. The analysis of data accumulated by careful documentation of everything, from seed dispersal in elk scat to algal blooms on logs in Spirit Lake, has led to discarding many of those paradigms.

Wagner engages readers not only with elegant prose and a fine collection of historic photos, but with a steady report of mind-boggling factoids: Fireweed growing out of the ash only weeks after the blast; 600 truckloads of logs salvaged per day from the blast zone for several months in 1980; 18 million tree seedlings planted over 45,000 acres to restore valuable timber land; 2,000 fungal spores in one ounce of gopher-processed soil; 23 tons of organic matter drifting onto the Pumice Plain over a period of 100 days (a significant amount of that being spiders that fried on contact with hot rock!).

Of special interest to native plant enthusiasts is the story of how ecologists studying at Mount St. Helens, including several members of WNPS, were leaders in crafting a proposal and following through with the establishment of the area as a National Monument in 1982 during the Reagan administration. This changed the way Mount St. Helens is managed, and set guidelines regarded as being granted in perpetuity to many whose careers are tied to this landscape, including to ‘permit the full use of the Monument for scientific study and research.’

While the book does mostly focus on what happened post-eruption, an excellent presentation delivered by Wagner for WNPS in November 2021 describes some of what happened before and during the May 1980 event. The Zoom recording available on the WNPS website is well worth your time to view and listen to in tandem with reading *After the Blast*, which deserves five stars for science writing in my view.

Katherine Darrow is a member of the Olympic Peninsula Chapter of WNPS. She contemplates botanical conundrums from her home in Port Townsend,



The Conundrum of Common Names

by Walter Fertig

Canada thistle is a spiny weed of agricultural fields and riparian areas across much of North America. By any name, it is the nemesis of gardeners and nature enthusiasts. But Canada thistle is a misnomer—the plant is not from Canada at all, but is native to Japan. Yet no one calls it Japanese thistle!



Canada thistle (*Cirsium arvense*). PHOTO: MARK TURNER

To facilitate communication across geographic and language barriers, botanists employ standardized scientific or Latin names. Unfortunately, scientific names can be confusing too. Most people are no longer conversant in Latin or are otherwise averse to polysyllabic words. Multiple names may also exist for the same species. Canada thistle is usually known as *Cirsium arvense*, but its original name (given by Linnaeus, no less) was *Serratula arvensis*. No fewer than eight Latin names have been applied to Canada thistle over the past 250 years. Most have been rejected because of technicalities or changes in taxonomic philosophy or concepts. *Cirsium arvense* and *Breia arvensis* are two valid names that still remain. *Cirsium* is available for taxonomic lumpers and *Breia* for splitters.

Despite the seeming chaos of synonymy, scientific names follow specific rules laid down and revised periodically by an international committee on taxonomic nomenclature. Any given species may still have two or more names (depending on whether specialists treat a taxon as a full species or a variety/subspecies, or treat genera broadly or narrowly), but to be accepted a name has to follow official guidelines and be the oldest, validly published name. New names may be proposed, but if they don't follow the rules they may be officially rejected.

By contrast, there are no formal rules for applying common names to plants. Authors of field guides, floras, and checklists are free to compile common names from whatever sources are available. In the case of some common or widespread species, a bona fide vernacular name may already exist, such as Douglas-fir for *Pseudotsuga menziesii*, bluebunch wheatgrass for *Pseudoroegneria spicata*, or Kentucky bluegrass for *Poa pratensis* (of course, Kentucky bluegrass may not be native to Kentucky, either).

But for the majority of plant species there is no single, accepted common name. Thus authors resort to creating names, usually by translating Latin or Greek genus names and specific epithets. Ordinarily, the translations are pretty straightforward, such as Garry oak for *Quercus garryana*, California buttercup (*Ranunculus californicus*), or golden fleabane (*Erigeron aureus*). Sometimes the translation hardly seems necessary, as in Canby's angelica (*Angelica canbyi*) or Davidson's penstemon (*Penstemon davidsonii*).

Unfortunately, these translations are often not that informative about a species and its appearance, distribution, habitat, or other useful characteristics. For example, Garry oak commemorates Nicholas Garry, the deputy governor of the Hudson's Bay Company and friend of David Douglas in the early 1800s. Alternative names, such as Oregon oak or Oregon white oak have been used for *Quercus garryana* and confer more information about its range and relationships with other oaks in subgenus *Leucobalanus* (white oaks). Likewise, Canby's angelica provides little useful information to distinguish this species from its close relatives. A better common name might be "Cascades angelica," as *A. canbyi* primarily occurs in the Cascade Range of Washington and Oregon. Or "Narrow-winged scabrous angelica" for its unique fruit characters, though this name would be quite a mouthful!

There are also instances where useful information gets lost in the translation of Latin names. *Koenigia islandica* is a tiny, reddish annual of arctic and alpine wet gravel habitats across the northern hemisphere (and disjunct in southern South America) in the buckwheat family (Polygonaceae). The genus name honors 18th Century Danish botanist J.G. König, a pupil of Linnaeus. "Islandica" is a Latinized name for Iceland, one of the places where this species occurs. Unfortunately, this has been incorrectly translated as "island koenigia" in many floras and databases (though, technically, Iceland is an island!).

Some common names perpetuate harmful stereotypes, or honor individuals who seem less honorable with the passage of time. Birders have been at the forefront of removing offensive



Oregon white oak, aka Garry oak (*Quercus garryana*) acorn. PHOTO: MARK TURNER

terms from the accepted names of avian species, which has resulted in the replacement of old-squaw with long-tailed duck, and McCown's longspur with thick-billed longspur. The new names are also more descriptive. Botanists have been shying away from some older common names with similar problems, such as "squawbush" (better referred to as skunkbush sumac or three-leaf sumac for *Rhus trilobata*) or Indian paintbrush (just paintbrush is fine, for our many colorful species of *Castilleja*).

The late William Weber, coauthor of the *Colorado Flora*, did not mince words in his annoyance with ill-conceived common names. Weber took particular offense at names that conferred little meaning. Who can tell what a fairy slipper is? (Answer: *Calypso bulbosa*, a native orchid named for the Greek sea nymph in Homer's *Odyssey*.) Or "love in a mist" (*Nigella damascena*), "virgin's-bower" (*Clematis* spp.), or "old man of the mountain" (*Hymenoxys grandiflora*)? And so many native plants have the unfortunate name "weed" added to their common name, making it difficult for lay people to differentiate these from introduced species that may have harmful ecological impacts. Examples include locoweed (*Oxytropis*, *Astragalus*), pondweed (*Potamogeton*), pickleweed (*Salicornia*), and milkweed (*Asclepias*).

Where common names can really get confusing is when the same term is applied to multiple (and often unrelated) species or genera. Such is the case with the word “cedar” which is applied to a number of trees and shrubs with aromatic wood or scale-like foliage. Dozens of species in the cypress family (Cupressaceae) are called cedars, including eastern red cedar (*Juniperus virginiana*), western red cedar (*Thuja occidentalis*), Alaska yellow cedar (*Callitropsis nootkatensis*), and incense cedar (*Calocedrus decurrens*). None of these are “true cedars” in the genus *Cedrus* (like the famed Cedar of Lebanon) in the pine family (Pinaceae). Then there are other species that are not even gymnosperms, like “salt cedar” (a.k.a. *Tamarix*) and “ground cedar” (*Diphasiastrum* or *Lycopodium complanatum*, a fern-ally). Confusing things even more are the cedars used in cedar chests and closets, which are tropical trees in the mahogany family (Meliaceae). “Thistle” can be just as confusing, with just about any spiny-leaved herbaceous species getting that common name, whether they are in the aster family (Asteraceae), like *Cirsium*, *Carduus*, *Onopordum*, and *Silybum*, or unrelated families and genera, like Russian thistle (*Salsola* in Amaranthaceae), and coyote-thistle (*Eryngium* in Apiaceae).

Part of the appeal of common names is their presumed stability. Genus and species names may change with some regularity based on better understanding of their genetics and evolutionary relationships (such as the various wheatgrasses and relatives, once in the genus *Agropyron*, but now scattered among *Elymus*, *Psathyrostachys*, *Pseudoroegneria*, and *Thinopyrum*), but in theory, common names remain the same. In recent years, however, species databases have started to change common names to be in sync with generic changes. For example, species long known as “asters” in the genus *Aster* become “northern asters” (*Canadanthus*), “hoary asters” (*Dieteria* or *Machaeranthera*), or “American asters” (*Symphyotrichum*) when transferred to new genera. Keeping the old common names is fine, as long as people recognize that they may not reflect current concepts of evolution. For readers of *Douglasia*, this is good, because the latest genetic research suggests that our namesake genus is nested within *Androsace* (rock-jasmines) and new species names are required. (We won’t be changing the name of our publication to *Androsace* anytime soon.)

Then there is the problem of multiple common names for the same species depending on geography, language, or culture. In some parts of the country, species of *Amelanchier* are called shadbush (because they bloom when shad, a migratory fish, return to spawn), or serviceberry (because they flower when the ground thaws in the spring and funeral services can finally take place again), or Saskatoon (a Cree term for their edible berries, and a city in central Saskatchewan). Other local English names include juneberry, pigeonberry, comier, Indian pear, sugar pear, grape pear, sugar plum, and mountain pear. French speakers just call it amelanchier. The species was widely used by native Americans as a food source and had numerous names, including tushnets (Hul’q’umi’num’), s-cheech-sun (Straits Salish), Gaan xaw’ laa (Skidegate Haida), mis-ask-a-tomina (Sawket-akix or Blackfoot), mis-ask-quah-toomina (Naskapi or Cree),

and wipazuka (Dakota). All of these are perfectly legitimate names, but create a communication problem when people try to refer to the same plant.



Serviceberry (*Amelanchier alnifolia*) among Ponderosa pines (*Pinus ponderosa*). PHOTO: MARK TURNER

Several attempts have been made to standardize common names over the past century. Most of these efforts have been led by government agencies or professionals in the gardening and nursery trades. Modern versions of such lists include the US Department of Agriculture’s PLANTS database (www.plants.usda.gov), NatureServe Explorer (www.nature-serve.org), and the Integrated Taxonomic Information System (ITIS) managed by the Smithsonian Institution (www.itis.gov). These and other websites compile useful information on the taxonomy, distribution, and status of native and introduced plants, but none have been successful at imposing a single, uniform system of common names analogous to the list of accepted bird names maintained by the American Ornithological Union (AOU). Given the large number of plant species (especially compared to birds) and the independent streak of plant taxonomists, the realization of an AOU-like standard for plant names will probably remain an unfulfilled goal.

The best solution to the conundrum of common names may be to train people to use scientific names. After all, these names follow formal rules and are applied universally. With practice, scientific names are no more difficult to pronounce than many commonly used words. Indeed, Latin names like *Chrysanthemum*, *Rhododendron*, *Geranium*, *Yucca*, and *Asparagus* are regularly used by gardeners and plant lovers with little notice. If children can regularly master tongue-twisting names of dinosaurs, then adults really have no excuse.

So stand up for science—and impress your friends—by forsaking common names for the REAL names of plants! No more bad translations of Latin and Greek! Now if we can all just agree on what constitutes a different species and whether genera should be split or lumped, everything will be fine!

Walter Fertig, botanist from McCleary and chair of the Douglasia editorial committee, regularly uses Latin names in his conversations because he can’t remember all the common names.



WNPS Awards 2022

by Van Bobbitt

WNPS Outstanding Partner Award

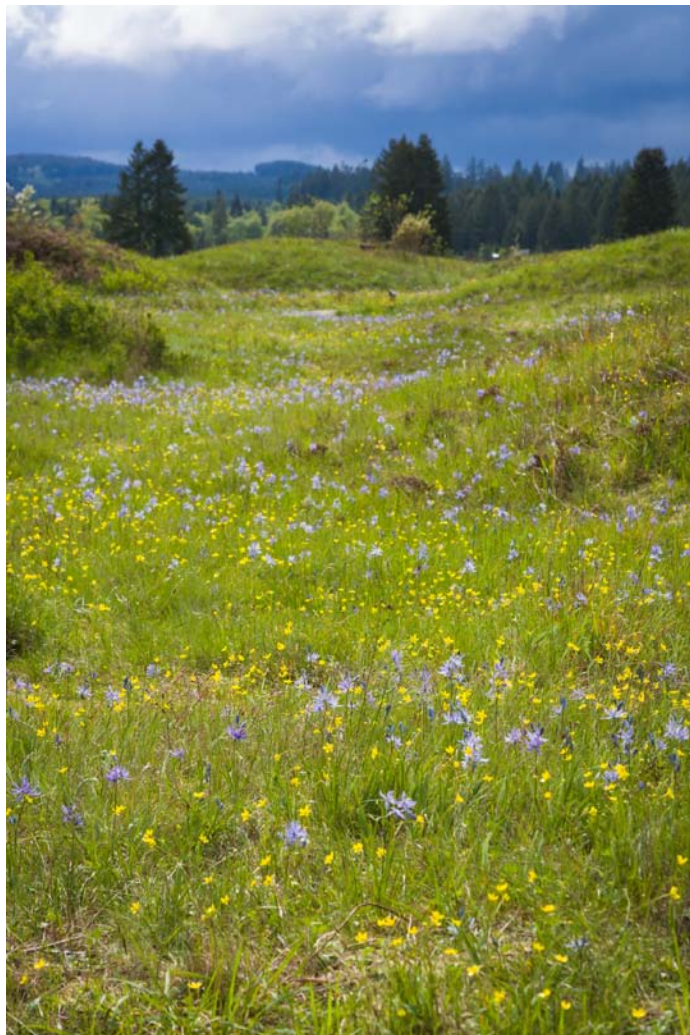
This award is presented annually to an agency, organization, or individual which has made significant contributions to native plant conservation, research, or education in Washington.

Natural Areas Program of the Washington State Department of Natural Resources

Natural Areas Program of the Washington State Department of Natural Resources (DNR) is the winner of the 2022 Outstanding Partner Award.

DNR manages two different types of natural areas: (1) Natural Area Preserves and (2) Natural Resource Conservation Areas.

The Natural Area Preserves “protect the best remaining examples of many ecological communities including rare plant and animal habitat,” according to DNR. “The preserve system presently includes more than 40,816 acres in 58 sites throughout the state.”



Camas (*Camassia quamash*) and western buttercups (*Ranunculus occidentalis*) on mounded prairie at Mima Mounds Natural Area Preserve. PHOTO: MARK TURNER

The Natural Resource Conservation Areas “protect outstanding examples of native ecosystems, habitat for endangered, threatened and sensitive plants and animals, and scenic landscapes... More than 125,577 acres are conserved in 39 Washington State NRCAs.” (<https://www.dnr.wa.gov/managed-lands/natural-areas>)

“These areas provide minimally disturbed locations for long-term ecological research and serve as reference areas to compare with more heavily managed landscapes,” says Walter Fertig, state botanist, WA Natural Heritage Program. Some Natural Area Preserves “have trails and educational exhibits, but most are strictly protected and actively managed to conserve rare species and the integrity of the vegetation,” according to Fertig, while the “Natural Resource Conservation Areas...allow compatible, low-impact, public use.”

The Natural Areas Program obviously complements WNPS’s mission—“To promote the appreciation and conservation of Washington’s native plants and their habitats”—but there is another reason the Natural Areas Program is dear to WNPS. Dr. Arthur R. Kruckeberg, one of the founders and a long-time leader of WNPS, played a key role in promoting the creation of Washington’s Natural Areas Program.

WNPS Mentzelia Award

This award is presented annually to WNPS members who have made a significant contribution to native plant conservation, research, or education in Washington. The 2022 Mentzelia Award winners are Denise Mahnke, Gerald Stanley, and Gail Sklar and the Native Plant Appreciation Month Committee.

Denise Mahnke



Denise Mahnke (left) with friends and WNPS board members Casey Leigh and Don Schaechtel.

It is unusual to present the Mentzelia Award to WNPS staff, but Denise Mahnke is a special case. The last two years brought tremendous changes and challenges to WNPS. Yet, Denise’s dedication and amazing work ethic have carried us through.

“We would not be emerging from this pandemic with as strong a foundation and an expanded membership base without all of Denise’s outstanding work,” states Deborah Naslund, Chair of the South Sound Chapter. “In 2020, as the world shut down to in-person meetings, Denise quickly pivoted and created a way for us to continue our work and stay in touch with each other through Zoom. Denise’s behind the scenes work setting up and shepherding the Zoom webinars allowed us to hold our meetings, host interesting speakers, and keep our membership engaged during a very isolating time.”

Gerald Stanley



Gerald Stanley

Gerald Stanley was nominated for improving the WNPS Native Plant Directory at <https://www.wnps.org/native-plant-directory>. He volunteered to help with the directory in 2020. At that time, there were about 300 very simple entries. Two years later, he updated almost all the existing entries and added 300 more. Sarah Verlinde-Azofeifa, WNPS Volunteer Webmaster, says this work is challenging for many volunteers due to its solitary nature. “It’s been hard to keep volunteers motivated (I’ve had about 15 volunteers in the last 2 years); however, Gerald has been able to keep working along and doesn’t falter.”

Since January 2021, Gerald has logged over 400 hours of meticulous work to improve the Native Plant Directory. As Verlinde-Azofeifa notes, “Projects like this build infrastructure for the organization and are not always properly acknowledged. Let’s not miss a chance to thank someone who has dedicated his time to WNPS and contributed to a wonderful resource, making botany more accessible to the public.”

Gail Sklar and the Native Plant Appreciation Month Committee

WNPS started celebrating Native Plant Appreciation Week in 2004. In 2019, Gail Sklar, the relatively new chair of the Native Plant Appreciation Week Committee, suggested that we change it into a month-long activity. In 2020, Governor Inslee proclaimed the first Native Plant Appreciation Month (NPAM) in Washington.



Gail Sklar

Under Gail’s leadership, the NPAM committee—Cici Asplund, Van Bobbitt, Denise Mahnke, and Julie O’Donald—have continued to adapt and improve NPAM. When the pandemic arrived, the committee quickly pivoted from in-person events to a series of virtual webinars. In 2021, nationally known author and conservationist Doug Tallamy was recruited to kick off NPAM. And in 2022, the committee introduced a poetry contest for youth to extend the reach of NPAM to the next generation. Winning poems are on pages 9, 29, and the back cover.

“The success of NPAM has been immense,” states Deborah Naslund, chair, South Sound Chapter. “I have personally spoken to several new chapter members who credit NPAM for sparking their interest in native plants and in joining WNPS.”

Van Bobbitt is the WNPS Awards Committee Chair and past President of WNPS.



Unlocking Phenology Data

By Melissa Islam, Ph.D.

Changes in plant phenology, the timing of a plant’s growth or reproductive life event, is one of the best indicators for observing the biological impacts of climate change. Finding long-term or systematic data tracking these changes is not always easy. Researchers have scoured diaries, herbarium specimens, and citizen scientists’ observations. With over 80,000 plant images, the Burke Herbarium Image Collection holds a potentially untapped mine of phenological data. These images capture over 3,000 species of plants exhibiting a life event, such as flowering or fruiting, tied to a date and location. Until recently, these phenological attributes were locked away, except for about 5,000 images, and not easily accessible to researchers and educators. Hence, the full potential for the herbarium’s plant images was not fully realized.

To remedy this situation and release this data, over the last year and a half a small but intrepid team of volunteers started scoring the phenology captured in these images. Once the image receives the same score from three individuals, the phenology is added to the image’s metadata and is searchable on the Image Collection. Some images are easy to score, and others are not. On average, four scores are needed for each image to reach consensus. To date, volunteers have added over 160,000 scores. A few volunteers have scored tens of thousands of images (one volunteer nearly 60,000!) and others a few thousand. Collectively, these scores translate into over 36,000 images with phenology or 51% of the collection when adding the 5,000 images

WNPS Grant Awards for 2022

The grant cycle for 2022 is complete with each committee supporting the following grant projects. Additional details on each project can be found on the Grant pages of the website as listed.

Conservation – <https://www.wnps.org/conservation-grants>

- Post-Fire Shrub-steppe Restoration: \$2,000 to Susan Ballinger, Chelan-Douglas Land Trust
- Comparing Establishment Success of Direct Seeding and Plug Planting Following Solarization: \$1200 to Sarah Hill, Phoenix Conservancy, Pullman
- Seed Germination and Banking of Species Native to the Washington Coast: \$1,232 to Dr. Gabriel Campbell, Rae Selling Berry Seed Bank at Portland State University
- Sound to Olympics Trail, Sakai Pond Connector Assisted Natural Revegetation: \$2,000 to Douglas Crist, Bainbridge Island Parks Foundation
- Extending the Bareroot Planting Window: \$1,100 to John Knox, Washington Association of Conservation Districts Plant Materials Center

Education – <https://www.wnps.org/education-grants>

- Community Native Plant Garden: \$500 to Amy Larson, Waterville Main Street Parks Dept.
- Enhancing Biodiversity of the Saddle Rock Natural Area Award: \$1,373.82 to Elizabeth Jackson, Cascadia Conservation District, Wenatchee
- Development of a Native Plant Teaching Garden: \$1,000 to Courtney Tomlinson, The Gardner School of Arts and Science, Vancouver
- Campus Prairie Scape, A living laboratory: \$800 to Barbara Blackie, Peninsula College, Port Angeles
- Provide a purchase a set of 24 of *Flora of the Pacific Northwest* second edition by Cronquist and Hitchcock: \$1,582.00 to Kristen Harrison, Tacoma Community College
- Native Plant Kiosk education at University Place Community Garden: \$1172 to University Place Community Garden
- Seattle University Demonstration Rain Garden: \$946 to Shannon Britton, Seattle University

Research and Plant Inventory – <https://www.wnps.org/research>

- The immensity of minutiae: Using bryophytes to detect an ice age refugium in the North Cascades: \$2,000 to Miles Berkey, Western Washington University for work at Barlow Pass, North Cascades
- Washington's lichen taxa of conservation concern: Verification and annotation of herbarium specimens: \$2,000 to Jeanne Ponzetti for herbarium samples from Burke Museum, Western Washington Univ., Oregon State Univ.

Find photos in the Burke Herbarium Image Gallery which have been scored for phenology under the Photos tab, then select Search Photos.

previously scored. Use of the Image Collection continues to be at an all-time high. Daily usage (about 900 unique users) is 20% higher than the same period last year likely in part to the ease in accessing and searching images based on their phenology. All thanks to the hard work and dedication of volunteers!



Search results for *Trillium ovatum* in fruit.

Even as gardens and wild areas beckon for their attention, these volunteers continue to score. Yet researchers and educators are accessing the collection today. To keep up the momentum and hasten our progress, we are asking for more volunteers. This is science you can do from home—observing and recording without the need for a mosquito net or lab coat. Instead, you observe beautiful close-up pictures of flowers and fruits or the occasional grand landscape with a llama or three. Training is quick. The scoring tool is super easy. And, unlike other volunteer commitments, you can spend a little or a lot of time. Just be warned, looking at beautiful plant images is addictive. If you are interested, please contact David Giblin, Burke Herbarium Collections Manager at dgiblin@uw.edu.

Melissa Islam, Ph.D., is a Research Associate at the Burke Museum of Natural History and Culture. She assists in managing data curation projects related to the Burke Herbarium Image Collection to improve the known distribution of plant species and their phenology.



- Influence of deciduous tree representation on understory plant community composition and diversity: \$2,000 to Danielle Holt, Washington State University for work at Wind River Valley, southwest Washington
- Genetic diversity in a rare Buttercup, *Ranunculus tritermatus*: \$2,000 to Ryan Garcia, Central Washington University for work in the Columbia River Gorge

WNPS Grants are provided by the generous contributions made to the WNPS Endowment Fund, and funds designated by the WNPS Board of Directors.



Cliff paintbrush (*Castilleja rupicola*) with moss caption (*Silene acaulis*).
PHOTO: MARK TURNER

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The Washington Native Plant Society depends on your support to deliver the mission of the society. Your help can make the difference and sustain the impact of WNPS into the future.

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Join our community of plant lovers and be the first to learn about the programs in your area. Contact the office or go online at www.wnps.org/store-membership/membership.

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You may donate any amount online through our secure website at www.wnps.org/donation/make-a-donation.

Donate through Your Workplace

- Workplace giving is an easy way to support WNPS.
- Benevity Giving Portal – If your employer is registered with Benevity, your gifts to WNPS could be matched by your employer.
- Federal Employees may donate through the Combined Federal Campaign—CFC # 69374. The CFC is now a giving option for retired Federal workers.
- Washington State Employees may donate through the Combined Fund Drive—CFD # 0315051.
- King County Employee giving—WNPS agency code #9600.
- Workplace matching gifts: Your employer may offer to match your charitable donations—and help your gift do more. contact your workplace's charitable giving contact. Let us know by email or phone to register with your giving portal as a charitable organization.

WNPS Endowment Fund Giving

Endowment gifts are kept as permanently restricted funds as designated by the donors. This fund provides annual distributions that support the WNPS Grant programs in Research and Plant Inventory, Conservation and Education. Donations may be made in the following ways:

- Online at www.wnps.org/donation/endowment (and review our Endowment Policy www.wnps.org/bylaws-and-policies/state).
- By mail: Please make checks payable to WNPS Endowment Fund.

Make A Planned Gift

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.
- Make the Washington Native Plant Society a beneficiary to your IRA or life insurance policy.
- 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.

Make a Contribution with Stock

WNPS can now support a transfer with a brokerage account. Contact the WNPS office for our FAQ sheet that provides information to share with your broker.

Learn all the ways you can support WNPS at www.wnps.org/donate. For more information on giving options, call the WNPS office 206-527-3319, or email wnps@wnps.org.

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Allison Bachner
Ashley Shattuck
Gail Sklar
Ted Crovello
Denise Mahnke

* Denotes a voting position

** Ad hoc committees are formed to address society business and are not defined by WNPS bylaws, as are standing committees.

Native Trees Poem

by Grace Tucker

Age 10, Fourth Grade, Jefferson Elementary, Fircrest, WA

Arrays of trees across the land,
From tops of mountains to the beaches sand.
Through my window I can see
My own forest of Douglas fir trees
Swaying in the wind so flexible and tall
If there weren't any trees I would not hear the birds sing and call

Douglasia
c/o Washington Native Plant Society
6310 NE 74th Street, Suite 215E
Seattle, WA 98115

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Washington Trees

by Aukse Frei Elvikis
8 yrs old, third grade in Wenatchee

All trees are together in all sorts of
weather.

Western red cedar is fine
So is Ponderosa pine.

Cancer drug is from Pacific yew.
Red alder is gray, not blue.

Sitka spruce is used for paper.
All trees let out water vapor.

I love these: Washington trees.

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Alaska Yellow-cedars
(*Callitropsis nootkatensis*)
with oval-leaf
huckleberries (*Vaccinium
ovalifolium*) along the
Ridley Creek Trail in the
Mount Baker Wilderness.

PHOTO: MARK TURNER

