

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.



2024 WNPS Calendar



2024 Calendar



Washington Native Plant Society

Once again the WNPS Calendar for 2024 is available, featuring the outstanding photography of WNPS members. The calendar photos are complemented with educational content, important holidays, moon cycles and WNPS dates.

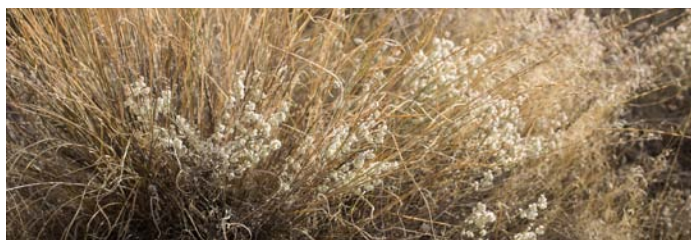
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Information for Contributors

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

Email submissions to Douglasia@wnps.org.



Snow buckwheat (*Eriogonum niveum*) among Bluebunch Wheatgrass (*Pseudoroegneria spicata*) at Frenchman Coulee near Vantage. PHOTO: MARK TURNER

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** Deceased

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On the cover: Mountain hemlocks (*Tsuga mertensiana*) blanketed by deep January snow near the Mt. Baker Ski area in the North Cascades. PHOTO: MARK TURNER

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President's Message: The View from Here

by Gail Sklar

Dear WNPS Members,

I hope that you are enjoying this beautiful autumn. I am honored to serve as President of the WNPS Board of Directors. For those of you who don't know me, I am originally from Philadelphia, PA, where there was no Native Plant Society. When I became a Master Gardener, I learned quite a bit about invasive plants, but not too much about native plants. I did lots of research and planted small niches of natives all over my two acres and pulled English Ivy and other East Coast invasive plants.



When I moved to Washington state, I signed up to take the Master Gardener training again. One of my friends in the class suggested that I sign up to take a thirty-hour Native Plant Steward training. I signed up and began my love affair with the Stewardship program and WNPS.

My instructor was Jim Evans, who is a wonderful teacher and has also become a friend. He took us on a field trip to the prairie. The sight of the camas in bloom has remained a vibrant memory for me. Then, on another Saturday trip we went to China Lake Park on the border of Tacoma and Fircrest. My heart hurt when I saw this park overrun with Himalayan blackberry and English ivy. I decided that it would be the park for me to begin a restoration project. Unfortunately, I didn't know who "managed" the park. I began to work my thirty-hour stewardship commitment at the Tacoma Nature Center, with Cyndy Dillion, a Master Native Plant Steward. It was there I got to know Bill Brookreson, who I decided would be my mentor, and who became my friend.



China Lake. PHOTO: GAIL SKLAR

Over time, I learned that China Lake Park was under the umbrella of MetroParks. I met the gentleman in charge of what they call the Habitat Stewards, and I asked if I could do restoration work at China Lake. He said yes and we arranged to meet a few weeks later. After meeting and being told how MetroParks could help, which was to bring tools and post the work party on their Chip In page, I settled on leading work parties the first Saturday of the month. I began two weeks later.

Cyndy was always kind and brought home-baked cookies and water to her work parties, so I started baking cookies and bringing water. The first year was difficult—it didn't help that I started in November. I often would have only one or two volunteers. Work parties are not predictable. Many times, I would go home sad that it didn't seem like we were accomplishing much. But I kept going. In the warmer and drier weather, more volunteers started attending. A volunteer started a Facebook page, and I began writing monthly updates. Team building is very critical. The first Saturday in August after our work party, I held a potluck barbecue at my house. My goal was to build community and have people become committed to China Lake's restoration.

Perseverance has its rewards. The community is growing, and friendships have evolved. Gravel paths have been added as well as steps to prevent people from falling on wet slabs of concrete that were dumped there some time in the past. We have cleared areas and replanted them. Life circle rings to control ivy have been made around many trees, but more are needed. We continue to fight the good fight against Himalayan blackberries and other invasive plants. To me, all this has been a learning process. I continue to learn how to improve my skills as a Native Plant Steward.

In this season of giving, I encourage you to think about giving your time or financial donation to WNPS. WNPS is expanding the Stewardship program across the state! This is such an exciting time! Collectively and individually, we can make a difference.

Please feel free to contact me at wnpspresident@wnps.org if you have any questions about giving, stewardship, or anything else.



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Influence of Annual Grass Invasion on Biocrusts and Mycorrhizal Fungi in the Palouse Prairie

by Rachel Berner, PhD candidate, School of Biological Sciences, Washington State University

With less than 1% of the original habitat remaining, the Palouse Prairie of eastern Washington and northern Idaho is an endangered ecosystem. As a PhD student at Washington State University working with Dr. Tanya Cheeke, I study the interactions between native fungi, biological soil crusts, and native and invasive plants in the Palouse Prairie. I am investigating how these soil communities may be affected by annual grass invasion and whether we can restore native plant communities after invasion by using inoculations with native symbiotic, or mycorrhizal, fungi.

Background

A Research and Plant Inventory grant from the Washington Native Plant Society in 2021 allowed me to investigate biological soil crusts and soil fungi in relationship with the dominant native bluebunch wheatgrass (*Pseudoroegneria spicata*) and invasive North Africa grass (*Ventenata dubia*) in the Palouse.

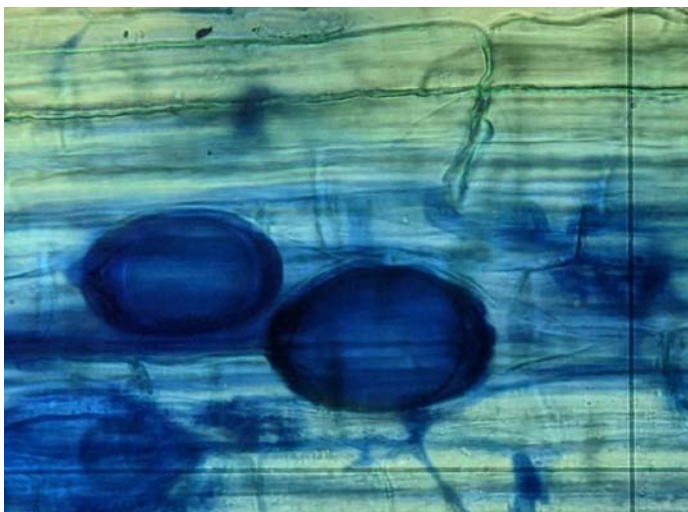
Biocrusts occupy the uppermost layers of the soil and are complex communities of both macroscopic (mosses, lichens) and microscopic organisms (cyanobacteria, algae, fungi, bacteria, archaea). These crusts act as a “living skin” on the soil; they are important for soil stability, especially in areas prone to erosion, such as the rolling hills of the Palouse. Biocrusts can also increase the amount of nutrients and water found in the soil below. Some biocrust members (lichen, cyanobacteria, algae) can fix nitrogen from the air into the soil, and many members fix carbon through photosynthesis. Due to their influence on soil nutrients, the soils below biocrusts tend to have higher mi-

crobial activity in relation to soils without biocrusts, or “bare” soils. Biocrusts are considered *ecosystem engineers* due to their strong influence on soil conditions and nutrient cycling. Given the ecological importance of these organisms, understanding if and how they may be affected by invasive species in the Pacific Northwest could be vital for informing ecological restoration efforts of the Palouse.

Below this layer of living skin of the biocrusts, microbes take up residence. Soil microbes are important parts of ecosystems. They contribute to nutrient cycling, carbon storage, plant growth, and can influence plant biodiversity. Key members of soil microbial communities include fungi. Some fungi are *mycorrhizal* (root fungus), meaning that they form a symbiotic relationship with plant roots and can improve plant growth. Through this symbiosis, plants receive nutrients and water from the fungi in exchange for carbon from photosynthesis. Some plants that are native to the Palouse Prairie have better growth when forming symbiotic associations with mycorrhizal fungi. This is partly due to the extension of the plant root system that is provided by these fungi.

Mycorrhizal fungi have long filamentous cells, called hyphae, that extend into the soil surrounding plant roots to forage for nutrients (e.g., nitrogen, phosphorus) and water. These hyphae increase access to nutrients and water outside of the root zone and in soil pores that are too small for roots to access. The nutrients and water that mycorrhizal fungi provide to plants can be critical for plant growth and survival. The hyphae of mycorrhizal fungi may forage under biocrusts due to the increase in nutrients and water in the soil. However, little is known about how this plant-fungal relationship is affected by the establishment of invasive plant species, especially in endangered grasslands, such as the Palouse Prairie.

Invasive plants tend to spread rapidly, reduce native plant diversity and native plant cover, and have been shown to decrease the cover of biocrusts in some landscapes. Furthermore, invasive plants can impact the microbial community composition in the soil through their leaf and root litter, altering the availability of organic material. Changes in the soil microbial community can also happen through alterations to the plant or biocrust community. Invasive plants can affect soil microbial communities by adding different molecules to the soil from their roots, or by associating with different soil microbes compared to native plants. Some invasive annual grasses that do not associate with mycorrhizal fungi can decrease the abundance of native mycorrhizal fungi—when invasive plants take over, there may be less suitable hosts for mycorrhizal fungi to associate with, thus decreasing their populations. In this case, the invasive plant might make the invaded habitat less suitable for native plants by changing the biotic environment



Plant root under the microscope (40x magnification) with arbuscular mycorrhizal fungal structures inside plant root cells. Fungal structures are stained blue, including hyphae, arbuscules, and vesicles. PHOTO: RACHEL BERNER

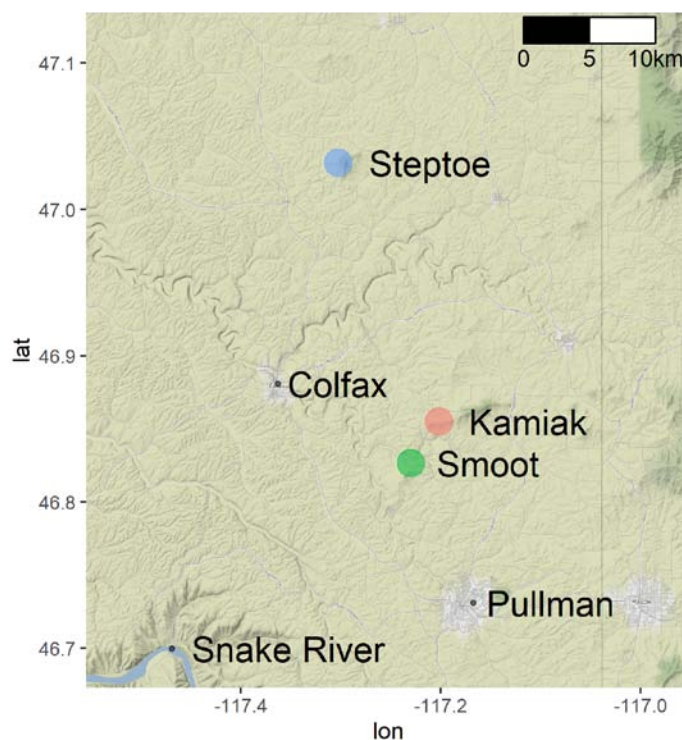
in the soil. Native plants that rely on mycorrhizal fungi may be less resilient in the invaded habitat in comparison to the invasive plants, leading to a feedback loop of decreasing native plant species in invaded habitats. This effect is an example of a plant-soil-feedback.

A new invasive annual grass, *Ventenata dubia*, was first documented near Spokane, Washington in 1952 and has since spread into Palouse Prairie habitats. Areas invaded with *V. dubia* tend to have lower percent cover of biocrusts, including habitats in the Palouse Prairie (Jones et al. 2020). However, prior to our study, we had no information about whether mycorrhizal fungi interact with biocrusts in the Palouse, or how the invasion of *V. dubia* may impact the mycorrhizal fungi in the soil. If the abundance of mycorrhizal fungi is higher under biocrusts compared to bare soil, then mycorrhizal fungi may be foraging for nutrients under biocrusts and increasing resource availability to plants. However, if biocrust cover decreases in areas with higher cover of *V. dubia*, then there may be less nutrients available for mycorrhizal fungi to forage. Thus, changes in the biocrust and mycorrhizal communities after invasion by *V. dubia* could reduce the ability of native plants to survive and recolonize in invaded areas.

In a field survey and glasshouse experiment, we investigated how multi-trophic interactions between biocrusts and mycorrhizal fungi are affected by invasion by *V. dubia*. I hypothesized that 1) percent cover of biocrusts would be lower and the composition of biocrusts would differ between plots with high percent cover of *V. dubia* and between sites, 2) samples collected below biocrusts in native plots would have higher abundance of arbuscular mycorrhizae (AM) fungi compared to bare soil and differ between sites, 3) below-crust samples would show higher AM fungi abundance than bare soil across treatments, and 4) that plots with higher *V. dubia* invasion would show no difference in AM fungi abundance in below-biocrust samples compared to bare soil. Results from this study will help to inform restoration practices for Palouse Prairie plant communities that rely on mycorrhizal fungi for survival.

Experiment

In 2021, our research group set up experimental plots at three sites in the Palouse Prairie bioregion near Pullman, WA on Steptoe Butte, Kamiak Butte, and Smoot Hill in the Hud-



Map of study sites in eastern Washington, including Smoot Hill, Kamiak Butte, and Steptoe Butte. Scale bar shows five and ten kilometers.

son Biological Reserve. Each site consisted of a 50 x 50 m area. At each site, we established replicate field plots (4 x 4 m) that were categorized based on the relative percent cover of native plant species and *V. dubia*: 'Native' plots (<5% relative cover of *V. dubia*), 'Transition' plots (10-20% relative cover of *V. dubia*), and 'Invaded' plots (>30% relative cover of *V. dubia*). We surveyed the percent cover of each plant species in each plot.

To determine if biocrusts decrease in percent cover and shift in community composition with *V. dubia* invasion, and if crust cover varies across sites, I surveyed the percent cover of macroscopic biocrust morphological groups within each plot in eight 50 x 20 cm sub-plots (Daubenmire 1942) along four transects per plot. I assigned the biocrusts into seven morphological groups (mosses: long and short; lichen: gelatinous, crustose, squamulose, foliose, and fruticose; Eldridge & Rosentreter 1999; McCune and Rosentreter 2007). I also collected samples of each biocrust lichen and bryophyte species within the plot for identification.

Smoot Hill



Steptoe Butte



Kamiak Butte



Photos of study sites in the summer of 2021 including Smoot Hill, Kamiak Butte, and Steptoe Butte. PHOTO: RACHEL BERNER

To determine if biocrusts were associated with a higher abundance of AM fungi, and if this micro-habitat effect changes with invasion, I collected soil samples from below biocrusts and bare soil. I collected all samples 10 cm away from two focal plant species, the dominant

Native
<5% relative cover
of *V. dubia*

Transition
10-20% relative cover
of *V. dubia*

Invaded
>30% relative cover
of *V. dubia*



Photos of biocrusts in plots with three levels of *V. dubia* invasion: a) shows a biocrust with moss and lichen in a native plot (10x magnification), b) shows a biocrust with moss and lichen in a transition plot, and c) shows a biocrust with moss in an invaded plot. PHOTO: RACHEL BERNER

native perennial bunchgrass, *P. spicata*, and the invasive grass *V. dubia*. These soil samples were used in a mycorrhizal inoculation potential (MIP) assay (Moorman & Reeves 1979), where the overall colonization of plant roots by mycorrhizal fungi could be determined. The MIP assay is designed to assess AM fungi abundance in disturbed compared to undisturbed soils. In these standard assays, corn plants (*Zea mays*) are typically used due to their fast growth rate and strong reliance on mycorrhizal fungi. I grew corn plants in a greenhouse for six weeks in pots containing soil inocula collected from each plot. Once harvested, the roots were stained to visualize AM fungal structures, and I then quantified the percent AM fungal colonization for each sample.

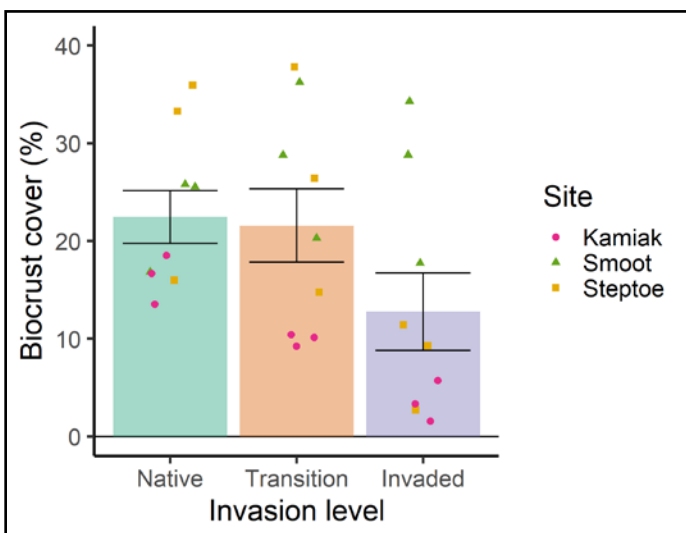
Results & Discussion

In partial support of my first hypothesis, biocrust composition, but not biocrust cover, differed between Native, Transi-

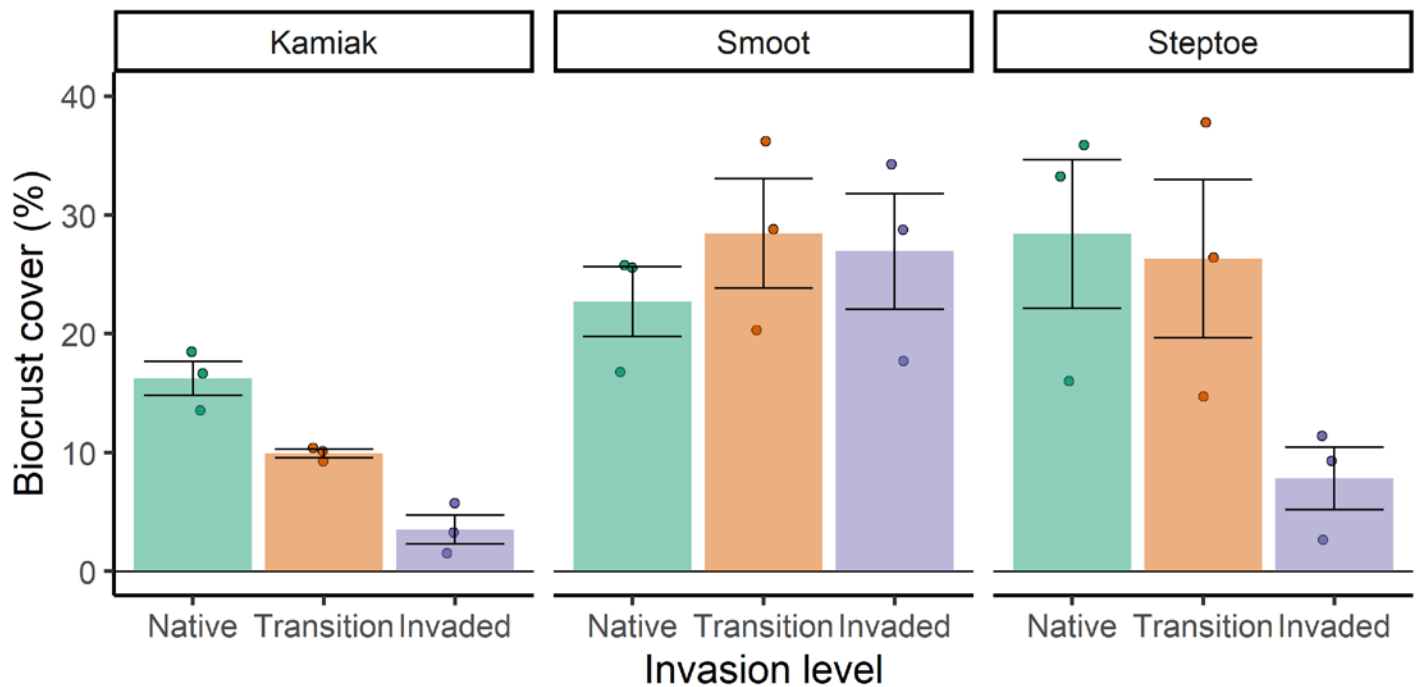
tion, and Invaded plots. I found that the percent cover of biocrusts varied by site and overall biocrust cover was higher at Smoot Hill and Steptoe Butte compared to Kamiak Butte. In support of my second hypothesis, the soil beneath biocrusts in Native plots had a greater abundance of viable mycorrhizal fungal propagules compared to bare soil and varied by site. In support of my third hypothesis, below-crust samples in Native plots had the highest AM fungi abundance compared to all other samples in Transition and Invaded plots. Finally, in contrast to my fourth hypothesis, plots with higher *V. dubia* cover did not have a lower abundance of viable AM fungal propagules.

Results from this study suggest that because AM fungi abundance is higher below biocrusts, biocrusts may alter the soil conditions in ways that are attractive to AM fungi. Biocrusts have been shown to foster distinct soil microbial communities, increase nutrient availability, and increase water availability compared to bare soil to create a unique microhabitat (Bao et al. 2019; Young et al. 2022). This is in part because biocrusts can produce exudates that filter down into the soil below, which further influence microbial communities and nutrients. Thus, our observation of higher AM fungi abundance beneath biocrusts in native plots suggests that biocrusts influence the foraging strategy of AM fungi. The AM fungi may either be attracted to the distinct microbial communities, to the nutrients (e.g., carbon, nitrogen), available water under biocrusts, and/or the cooling effect of moss-dominated biocrusts on underlying soil (Xiao & Bowker 2020).

Our results also suggest that reduction in biocrust cover with *V. dubia* invasion may reduce the microhabitat available for AM fungi foraging. Even though we did not see an overall decrease in biocrust cover with *V. dubia* invasion, as was observed in another study (Jones et al. 2020), we do not know how long *V. dubia* has been present in our invaded plots. Obvious changes in biocrust cover with *V. dubia* invasion may take time, but changes in AM fungi abundance under biocrusts may



Bar plot of total biocrust percent cover with each invasion level (native, transition, invaded). Bars show the average percent cover and error bars show $\pm$ the standard error of the mean. Points show the average biocrust percent cover in each plot. Pink circles show data from Kamiak Butte, green triangles show data from Smoot Hill, and orange squares show data from Steptoe Butte.

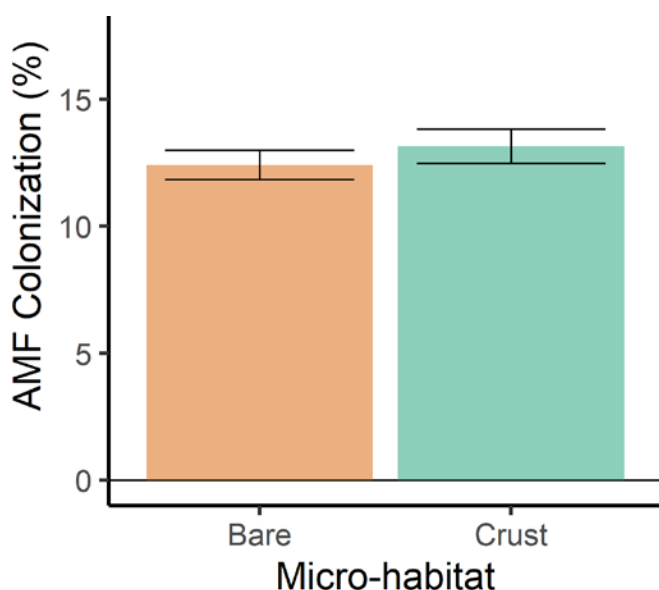


Bar plot of total biocrust percent cover with each invasion level (native, transition, invaded) at each site. Bars show the average percent cover and error bars show $\pm$ the standard error of the mean. Points show the average biocrust percent cover in each plot. Green bars and circles show data from native plots, orange bars and circles show data from transition plots, and purple bars and circles show data from invaded plots.

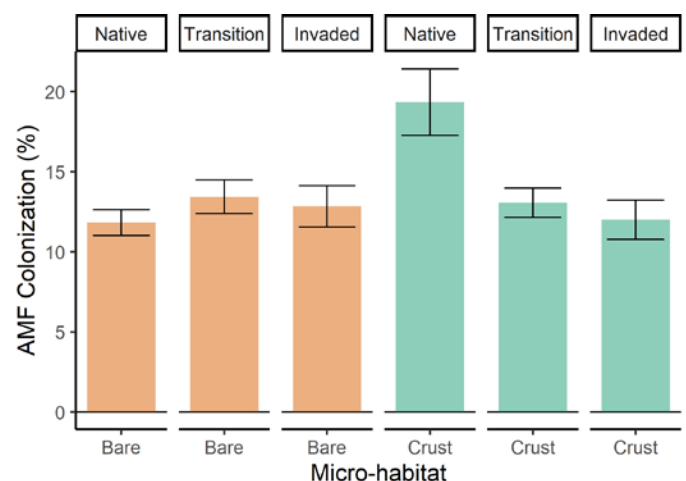
be an early indicator of the effects of *V. dubia* invasion on soil microbial communities in the micro-habitat under biocrusts. In sites that have been invaded by *V. dubia* for a long time, with significant decrease in biocrust cover, re-introduction of native biocrusts may benefit restoration efforts for ecosystem function and native plant diversity. Native plant restoration management practices that prioritize biocrust inoculation following invasion by *V. dubia* may improve native plant establishment, but more research is needed to determine if and how biocrust inoculation may benefit restoration of native plant biodiversity and

ecosystem function. The study presented here is a first step in understanding the potential impact of these practices.

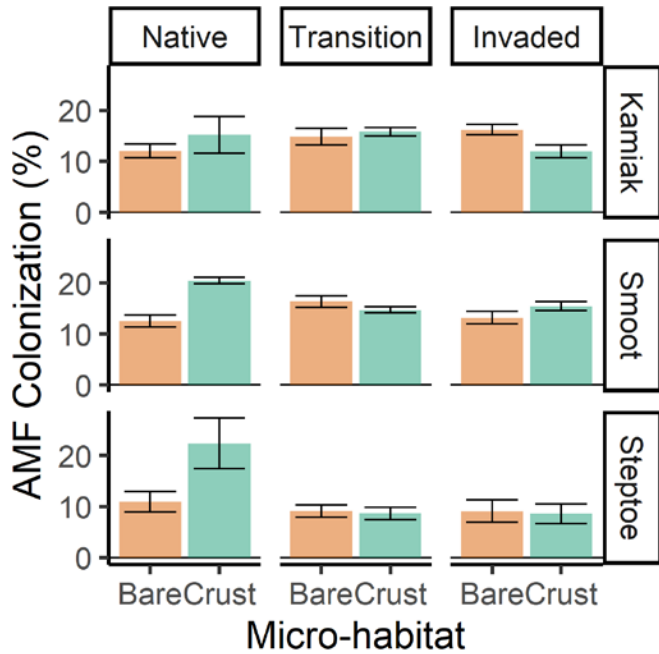
This research helps us better understand the inter-kingdom interactions between biocrusts, AM fungi, and plants in an endangered grassland. Biocrusts and AM fungi have critical impacts on soil conditions and nutrient cycling which is why they are considered *ecosystem engineers*. Uncovering how each key member (e.g. biocrusts) influences other key members (e.g., AM fungi, plants) will help us determine which organisms are most critical for restoring ecosystem function and plant diversity after species invasions, such as those observed with *V. dubia*. Rare endemic plants in the Palouse Prairie include



Bar plot of total percent colonization of arbuscular mycorrhizal fungi in samples from below biocrusts, shown in green, and from bare soil, shown in orange. Bars show the average percent colonization and error bars show $\pm$ the standard error of the mean.



Bar plot of total percent colonization of arbuscular mycorrhizal fungi in samples from below biocrusts, shown in green, and from bare soil, shown in orange. Data are separated by invasion level (native, transition, invaded). Bars show the average percent colonization and error bars show $\pm$ the standard error of the mean.



Bar plot of total percent colonization of arbuscular mycorrhizal fungi in samples from below biocrusts, shown in green, and from bare soil, shown in orange. Data are separated by invasion level (native, transition, invaded) and by site (Smoot Hill, Kamiak Butte, and Steptoe Butte). Bars show the average percent colonization and error bars show $\pm$ the standard error of the mean.

Silene spaldingii (G2, federally Threatened), *Pyrrocoma liatrisformis* (G2), *Symphotrichum jessicae* (G2), *Astragalus arrectus* (G2), and *Calochortus nitidus* (G3) (Washington Department of Natural Resources, fieldguide.mt.gov/wa/), and may benefit from restoration practices that consider belowground organisms in the restoration management plan. A better understanding of the interactions among native plants, biocrusts, and AM fungi will be important for mitigating the impacts of invasive species and for informing restoration practices in the endangered Palouse Prairie and other semiarid grasslands.

I would like to thank my PhD advisor, Dr. Tanya Cheeke and my collaborators, Alexis Sullivan MSc., and Dr. V. Bala Chaudhary. I would also like to thank current and former Cheeke lab members who assisted with this project, including Madeline Lueck, Gunnar Wickenhagen, Rey A. Huachambé, L. McKinley Nevins, Emily Arredondo, Michael Nunnlee, Geselle Sotelo, and Christian Perez-Diaz. I would also like to thank research assistant Allison Winward. Finally, I would like to thank land managers who consulted with us and allowed us to conduct research on their land, including Dr. Erica Crespi, Lewis Payne, Ian Clark, Joan Folwell, Jacie Jensen (Thorn Creek Native Seeds), and Chris Duke (Phoenix Conservancy).

Rachel Berner is a PhD candidate at Washington State University in Dr. Tanya Cheeke's soil microbial ecology lab. They study arbuscular mycorrhizae and biocrusts in the Palouse Prairie. Understanding the interactions between plants, mycorrhizae, and soil microbial communities is important for restoring native habitat biodiversity and function, especially in prairies that have been in-

vaded by non-native grasses (e.g., *Ventenata dubia*). Rachel is also interested in how mycorrhizal fungi and soil microbial communities influence plant community composition, water availability, and nutrient cycling. Before starting a PhD, they graduated from University of Oregon with a BS in Biology in 2017, then worked as a lab manager at University of Florida in Dr. Sarah Strauss' soil microbial ecology lab. Rachel is a member of the Columbia Basin WNPS chapter and can be reached at rachel.berner@wsu.edu.



Conservation Corner

Washington's Outstanding Resource Waters and their Native Plants

by Becky Chaney, WNPS Conservation Committee Chair

Across the country, water resources designated 'outstanding' may be given extra protection under the Clean Water Act (1972). This protection limits water quality degradation thereby ensuring that pristine or unique ecologic systems, including their associated native plant habitat, retain their intrinsic value.

The Washington Department of Ecology states: "Outstanding resource waters (ORW) are identified as having exceptional water quality, ecological or recreational values, or unique attributes. An ORW has the highest level of protection assigned to a water body under the Tier III antidegradation rule in the federal water quality standards."

Are there any designated waters in Washington? Not yet, but they may be coming soon. Urged on by WNPS and other environmental organizations, the Confederated Tribes of the Colville Reservation, and conservationists across the state, the Washington Department of Ecology has proposed four water bodies as outstanding resource waters. Three exceptionally pristine river systems are recommended for Tier III(A) designation:



The Cascade River. PHOTO: THOMAS O'KEEFE

the Cascade (Skagit County), Napeequa (Chelan County), and Green (Skamania and Lewis counties). In addition, one unique and culturally significant lake, Soap Lake (Grant County), the southernmost of the Sun Lakes chain of lakes, is recommended for Tier III(B) designation. Tier III(A) designation requires that waters are protected from all permanent degradation. Tier III(B) designation places extra requirements on new or expanded point source discharges ensuring pollution from wastewater is kept to a minimum.

If approved, these four nominated waters will be the first ORWs in the state of Washington. In support of these designations, the Conservation Committee turned to WNPS plant lists collected and maintained over the years by volunteers and the University of Washington Herbarium at the Burke Museum.

The Cascade Pass plant list is a true team effort on a trail bordering the Cascade River. Originally compiled in 1968 during a field trip led by Molly Berger, the list was updated in 1999, then again in 2002 during a University of Washington Herbarium collecting foray, and most recently in 2018 during a Koma Kulshan Chapter field trip. Documentation of the presence of 172 plant species—168 native and four introduced—is excellent data for the WNPS support letter.

Although the Napeequa Valley is notoriously difficult to access, a plant list exists. The solo work of dedicated volunteer Julia Bent, the list confirms the presence of 98 plant species, all natives. The Cascade Pass and Napeequa Valley lists include the native plants expected in the undisturbed regions of the Washington Cascades. WNPS plant lists indicate that these are intact ecosystems with only a very few invasive species present, supporting the assertion that these are pristine environments, largely free from human sources of degradation.

No plant lists exist for the Green River. Without one, we turned to committee member Susan Saul, our advocate for all things Mount St. Helens, for research confirming designation criteria. Documentation from Washington's Natural Heritage program—another stellar go-to resource—was a key part of her supported findings.

Next, we found the WNPS Sun Lake plant list documenting the unique biodiversity of this chain of lakes, the most southern (and saltiest) of which is Soap Lake. In 2004, Dana Visalli, Peter Morrison and Hans Smith recorded the existence of a whopping 402 species at Sun Lakes State Park—330 native and 72 introduced. Not pristine, but certainly unique and culturally relevant, and thereby meeting designation criteria. Additionally, the lake's mineralized waters support unique bacteria, and peat bogs are said to be along the shores. Perhaps the Soap Lake public shoreline is an excellent candidate for a new WNPS plant list? Soap Lake's purported healing waters may benefit future WNPS botanizers wanting to recuperate after a day in the field.

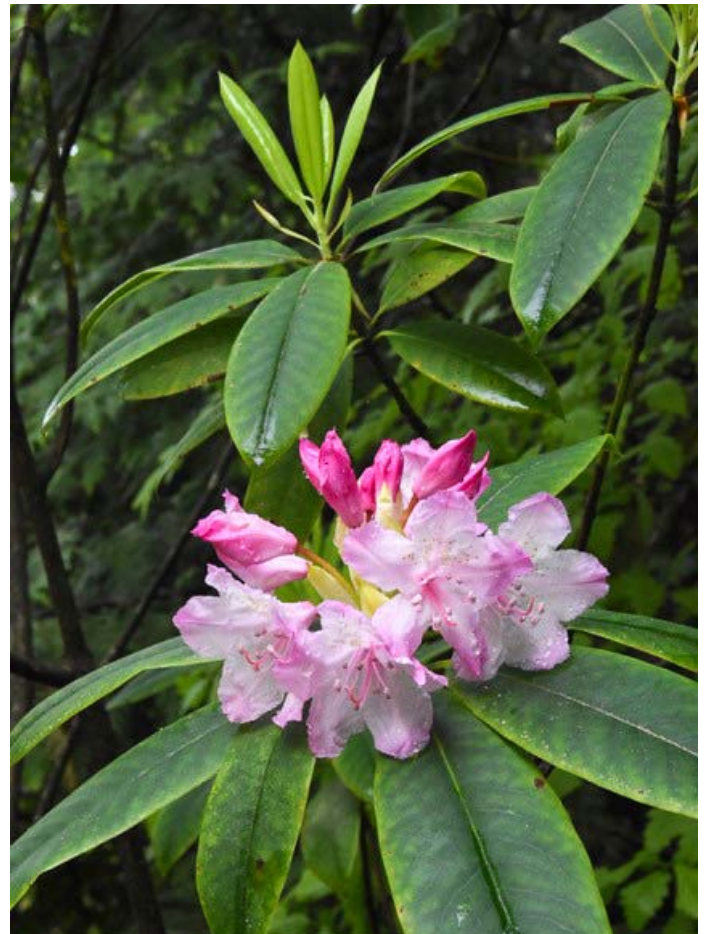
Accolades for WNPS plant list botanizers! Your observations support WNPS conservation activities. Cheers to all botanizers who have traversed Washington trails assembling WNPS's plant

lists. And cheers to current botanizers continuing the work by updating past lists and creating new ones. Heartfelt thanks to all WNPS members who observe and share knowledge of Washington's native plant habitats and their associated ecosystems. Your documentation informs the work of the WNPS Conservation Committee.

Becky Chaney can be reached via e-mail at conservation@wnps.org. She is always happy to hear your conservation interests, concerns, and comments. Ideas for conservation-oriented webinars are also welcome.



Olympic Peninsula Chapter to Host 2024 Study Weekend June 14-16



Pacific Rhododendron (*Rhododendron macrophyllum*).

Mark your calendars to attend next year's WNPS Study Weekend events, which will be based at the beautiful 7 Cedars Hotel, owned and managed by the Jamestown S'Klallam tribe in Sequim, June 14-16, 2024. The Olympic Peninsula Chapter will be our hosts, offering hikes and workshops from coastal strands along the Salish Sea to alpine ridges of the Olympic Mountains. Mid-June is also peak season for our State wildflower, the Pacific rhododendron (*Rhododendron macrophyl-*



Cut-leaf kittentails (*Veronica dissecta* ssp. *lanuginosa*) on Mt. Townsend.

lum)! This is also a good time of year to see some of the alpine endemics of the Olympics in bloom, including cut-leaf kittentails (*Veronica dissecta* ssp. *lanuginosa*), and Flett's violet (*Viola flettii*). Plus, there will be many opportunities to bask in lush coniferous forests, featuring western red cedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*).



Beach peavine (*Lathyrus littoralis*) on coastal strand at Fort Worden State Park.

Registration for the event will be announced in mid-February 2024. Lodging and camping for the event will be separate from WNPS registration. Rooms at 7 Cedars will be available at a discounted rate of \$149/night when you register. Many other accommodations are available in nearby Sequim. Among those is Sequim Bay State Park, less than two miles west of 7 Cedars, with sites ranging from \$12-\$50 per night. If you'd like to plan to camp at Sequim Bay that weekend, reservations can be made up to nine months ahead of time. Read more about the State Park and make reservations on their website at <https://www.parks.wa.gov/582/Sequim-Bay>.

We look forward to botanizing with you in June 2024!

—Olympic Peninsula Chapter 2024 Study Weekend Committee, olympic@wnps.org



Marion Ownbey Herbarium Shines Light on Plant Specimens

by Maddy Lucas

On a cheery fall day, sunlight pours through the fourth-floor windows of the Owen Science and Engineering Library on the Washington State University campus in Pullman. Tucked away on the north half of the floor is the Marion Ownbey Herbarium, the university's collection of about 400,000 vascular and nonvascular plants and lichen specimens.

Started officially in 1897, the herbarium is named after Francis Marion Ownbey, a botanist who taught at Washington State University beginning in 1939 and was director of the herbarium. The initial collection was formed using several individual collections that dated from the early 1890s, and was first directed by Charles V. Piper. Focus on the collection of Palouse native species for the herbarium really began in the early 1900s by Rolla Beattie, the director of the herbarium at the time.

I find myself here on an autumn day joined by Eric Roalson, current director of the herbarium, and Walter Fertig, collections manager. The topic I am most excited to bring up at first? Those windows I previously mentioned.

Why? Before the herbarium's current location in the library, the herbarium was housed on the ground level of another nearby building on campus. Here, windows were nonexistent and the light of day never reached the inside of the facility.

"This is really like the nicest herbarium I have ever been in with all of this space," Fertig said. "And, it is really bright."

In addition to the natural light, the herbarium has more room to breathe in its new location. Space had become limited in its former location but being housed in the library building improved the situation.

"We were getting a little tight on space and now everything is a little more spread out. There is plenty of room to add stuff," Fertig said, also mentioning that they were also able to optimize the new space better than the last location.

The herbarium's upgrade is recent, with the daunting move beginning in January of 2023. Assistance was provided by student workers and a moving company was hired to help



The compactor system in the Ownbey Herbarium which was moved from the old herbarium location and rebuilt. PHOTO: MADDY LUCAS

move the massive amount of material the herbarium houses. They finished the relocation during the summer.

“We were basically up and functional by mid-July but we still had lots of piles of stuff and we were really trying to kind of work through things,” Roalson said.

With hundreds of thousands of specimens, tons of furniture, textbooks, and all of the other paraphernalia that makes up an herbarium, there was much to keep track of. Fertig and Roalson state there were around three thousand boxes of specimens and whatnot to move. If it sounds like a meticulous job, you would be right.

“We had to be very organized for this move. Boxes numbered, everything kept in the same order and unpacked the same way. I think we only maybe messed up one thing,” said Fertig. And, miraculously, nothing was lost in the move, as far as Fertig and Roalson are aware.

If this is not impressive enough, the herbarium is also currently in the process of digitizing its entire collection, which was a project being worked on during the relocation. “We have imaged about 15,000 [specimens],” Fertig stated, then after a pause, added, “out of our 400,000.”



A box of lichen specimens housed in the Ownbey Herbarium. PHOTO: MADDY LUCAS



A mounted specimen of *Suksdorfia violacea*. This was the 400,000th specimen accessioned in the Ownbey Herbarium. PHOTO: WALTER FERTIG

We all laughed. But Roalson pointed out that most of these 15,000 were just completed over the past year, which was when the bulk of packing and moving was happening.

“That’s a lot of progress when we were also moving the herbarium and doing a lot of other stuff,” Roalson said.

Specimens in the collections are not just from the Pacific Northwest or even North America. They come from around the world, some quite old, too. Fertig points out the date on a specimen he pulled to show me—the year is 1902. The label is written in something other than English, maybe Czech.

The herbarium also houses many different type specimens, which are stored separate from the rest of the collection.

“There are different kinds of types but the holotypes are most important because that is the one specimen that the name is based on,” Fertig said.

Both the move and digitization of the herbarium have provided staff with the opportunity to accomplish a few other projects, like decluttering, annotating specimens that have been reclassified, and attending to backlogged specimens.

Visits to the herbarium for those interested in browsing the collection and learning more about flora are encouraged. The herbarium is open on weekdays from 8:00 am to 5:00 pm and is free to the public. If you are planning to visit, herbarium staff recommends coordinating in advance by calling 509-335-8358 or emailing cas.herbarium@wsu.edu.

Maddy Lucas is a native plant enthusiast based in Pullman, WA who enjoys the diversity of Eastern Washington flora.



Botany Washington April 26–28, 2024

Botany Washington 2024 will be held in the Columbia River Gorge from April 26–28. The center of operations will be the Rockford Grange, near Hood River, Oregon.

One of the evening speakers will be Sebastian Mortimer, a graduate student at Oregon State University who studies the genetics of Pacific Northwest wild strawberries (*Fragaria*). Further information about programming, field trips, lodging suggestions, and registration will be shared in January.



Common cryptantha (*Cryptantha intermedia*). PHOTO: DAVID GIBLIN



Silver Star Vision Plan Guides the Future of a Special Area

WNPS Collaborates in Planning Process

by Susan Saul, WNPS Conservation Committee

In 1902, the Yacolt Burn blackened 238,000 acres in Washington's South Cascades and killed 35 people before fall rains snuffed it out. That wildfire paved the way for today's wildflower-carpeted meadows on Silver Star Mountain in the southwest corner of the Gifford Pinchot National Forest.

Forests quickly grew back at lower elevations, but the thin soils on the mountaintop and exposure to high winds through the Columbia River Gorge have created an alpine-like microclimate and slowed the advance of new forests up the slopes.



Wildflowers border the Silver Star Trail. Bloom peaks in early July, including *Ligusticum grayi*, *Hedysarum occidentale*, *Lupinus latifolius*, *Castilleja miniata*, *Bistorta bistortoides*, *Aquilegia formosa*, *Delphinium nuttallianum* and the invasive *Hypochaeris radicata*. PHOTO: SUSAN SAUL

Today, wildflower lovers revel in miles of ridge-top meadows and expansive views. At 4,390 feet, Silver Star is the highest point between Mount St. Helens and the Columbia River. It dominates Vancouver's eastern skyline.

On a clear day, the view includes the high Cascades from Mount Rainier south to the North Sister, east through the Gorge to the wheat fields of eastern Oregon, west to Saddle Mountain in Oregon's Coast Range, and down below to the silver ribbon of the Columbia River.

Most of these trails are former roads, constructed in the 1930s to provide fire control access. Repeated fires in the Yacolt Burn between 1902 and 1929 made Silver Star the focus of a lot of fire prevention and conservation work.

The Forest Service closed the Silver Star area to motorized use in 1989 to protect the unique and fragile meadows from increasing vehicle damage. In 1990, the Forest Service designated the 10,350-acre Silver Star Scenic Area and a 1993 decision converted approximately 8.5 miles of old roads to trails.

The temptation of old roads and the difficulty of enforcing the motorized closure have resulted in substantial unauthorized motorized use over the years. All Forest Service efforts to block access have been thwarted; signs are destroyed, barricades are winched away, steel cables are cut. Joyriders in jeeps and perched on quads are not content to stick to the old roads. They leave tracks across the slopes, cut cookies in the meadows, crush wildflowers and damage archaeological sites. The abuse has become more flagrant in the last few years as Forest Service budgets and enforcement personnel numbers have shrunk.

Silver Star Mountain and nearby ridges and valleys are important to protect because they feature outstanding scenic, botanical and cultural resources. Native plants include rare and sensitive species, including Clackamas corydalis (*Corydalis aquae-gelidae*) and western sweetvetch (*Hedysarum occidentale*). My plant list includes over 200 species. The natural landscape is also a living part of the cultural identity of indigenous people who have inhabited the lower Columbia watershed since time immemorial.

A Vision for Silver Star

For years, the Silver Star trail system has been part of the Washington Trails Association's (WTA) advocacy efforts to improve recreation opportunities in the area. The most recent of those efforts has spanned three years, and the result is a brand-new collaborative vision plan that will guide management here for years to come.

In 2021, WTA pulled together a diverse set of stakeholders, including land managers, the Cowlitz Tribe, and other outdoor recreation groups, to make this happen. I represented the Washington Native Plant Society (WNPS) to speak for the interests of native plants and hikers who like to botanize. WNPS and its sister organization, the Native Plant Society of Oregon, used to lead field trips at Silver Star until about 10 years ago when road access became too difficult due to lack of maintenance.

The vision plan is a broad, guiding document for the area. It doesn't outline specific projects—that work will come later.

Frequently Asked Questions

WTA pulled together some frequently asked questions to help explain what a vision plan is, as well as more details on the hopes for the future of the area

WHAT IS A VISION PLAN?

A vision plan describes an ideal future and sets the direction for planning and management of an area based on recommendations with broad support. Vision plans are not legally binding and do not have specific timelines, but they are an expression of the collective voice of the collaborative partners who wrote them.

WHY IS THIS IMPORTANT? WHY NOW?

As the number of visitors to this unique area has grown, the organizations involved in the planning effort recognized a

need to build a shared understanding of how to protect the area while fostering recreation opportunities that are in harmony with the values we wish to share with future generations.

WHO IS INVOLVED IN THIS PROJECT?

The planning team formed in December 2021 included representatives from Backcountry Horsemen of Washington, Backcountry Hunters and Anglers, Chinook Trail Association, Cougar Area Trail Seekers, Cowlitz Indian Tribe, Evergreen Mountain Bike Alliance, Friends of Road 4109, Gifford Pinchot National Forest, Washington State Department of Natural Resources (DNR), WNPS, and WTA.

IF SILVER STAR IS ON LANDS MANAGED BY THE FOREST SERVICE, WHY IS DNR INVOLVED?

The Silver Star Special Interest Scenic Area shares a border with the Yacolt Burn State Forest, managed by the Washington DNR, and several trails connect across the border between DNR and Forest Service lands. An increasing number of people are visiting the area and using these trails. A holistic and integrated approach to managing recreation across both land management agencies will be the most efficient way to provide a high-quality trail system while protecting unique and sensitive natural, cultural and scenic resources.



Another view of wildflowers along the Silver Star Trail. Bloom peaks in early July, including *Ligusticum grayi*, *Hedysarum occidentale*, *Lupinus latifolius*, *Castilleja miniata*, *Bistorta bistortoides*, *Aquilegia formosa*, *Delphinium nuttallianum* and the invasive *Hypochaeris radicata*. PHOTO: SUSAN SAUL

WILL THERE BE NEW TRAILS?

This is not a trails plan. Although the document contains recommendations to show potential new trail concepts, any new project idea will need to be further studied to follow applicable federal and state requirements for environmental analysis and public comment. This vision plan does not set a timeline for those additional, detailed planning efforts. This plan does recommend where new trails could be considered to improve the overall trail system to reduce future congestion and negative impacts to cultural, scenic and natural resources.

WILL THIS PLAN REDUCE TIMBER HARVESTS IN THE AREA?

No. Washington state trust lands are sustainably managed to produce wood products to support school construction and local services. The trust obligation contained in the state Constitution directs how DNR trust lands are managed, while this plan only includes recommendations for recreation management.

WHAT COMES NEXT?

Planning team members have already started to collaborate, pooling their resources to accomplish some of the high-priority recommendations from the planning process. For example, WTA and the Chinook Trail Association (CTA) led volunteer trail work parties this past spring to restore existing trails. Friends of Road 4109 plans to continue its road maintenance work, and the Forest Service has contributed money through a grant that volunteers with CTA and Friends of Road 4109 will implement to install new boulders to help keep off-road vehicles out of sensitive meadows.

With the vision document as evidence of broad support, members of the planning team can work together to seek grant funding for priority projects to come in future years. By working together this year to complete deferred maintenance, we are demonstrating how a fellowship of organizations pulling in the same direction can accomplish more than a lone actor.

Read the full Silver Star Vision Plan: www.wta.org/our-work/trails-rebooted/silver-star-report.pdf.

Susan Saul is a member-at-large on the Suksdorfia Chapter Board and she also represents Southwest Washington on the WNPS Conservation Committee. She is a Rare Care volunteer and has monitored rare plants on Silver Star Mountain. When not out hiking to enjoy native plants and wildlife, she lives in Vancouver, WA.



Native Plant Appreciation Month
April 2024

PRAIRIE PRESERVATION

Watch for updates at
wnps.org/wnps-annual-events/npam

A History of Rare Plants and the Endangered Species Act

by Walter Fertig

In June 1883, William Marriott Canby was on an expedition across the Washington Territory surveying potential routes for the Northern Pacific Railway. Canby (of *Lomatium canbyi* fame) was a wealthy banker, businessman, philanthropist, and a capable amateur botanist (he was considered an expert on the flora of Delaware). Somewhere in the “Walla Walla area” he and his colleague T.S. Brandegee collected a prickly, loosely matted, white-flowered member of the pea family named *Astragalus kentrophyta* on “sandy banks.” Canby’s specimen ended up in the herbarium of the New York Botanical Garden, where nearly 80 years later it was examined by legume expert Rupert Barneby while he was working on a monograph of the *Astragalus* of North America. Barneby recognized that Canby’s collection was an undescribed variety, which he named var. *douglasii* after the intrepid northwestern botanist David Douglas. In the early 1830s Douglas made the only other collection of his namesake milkvetch while exploring the “Great Bend of the Columbia River.”

By the time *Astragalus kentrophyta* var. *douglasii* was named it was probably already extinct. Starting with construction of

the Rock Island Dam in 1932, nearly 20 major dams transformed the free-flowing Columbia and its tributaries into a succession of large reservoirs. It is likely that the sandy shoreline habitat of *Astragalus kentrophyta* var. *douglasii* was completely inundated. The only reminder that thistle milkvetch ever lived are three yellowing herbarium specimens collected by Douglas, Canby, and Brandegee.

Thistle milkvetch was not the only species to be extirpated by humans. Across North America, more than 650 plant and animal species have become extinct since the 1600s. In just 400 years most of the continent was transformed through the clearing of forests, plowing of meadows and grasslands, taming of rivers with dams, and introduction of livestock and commercial crop plants. Vast herds of buffalo, elk, and antelope, and flocks of waterfowl were decimated by the twin impacts of market hunting and habitat destruction. Species that were rare to begin with, or restricted to specialized habitats (such as the Labrador duck and whooping crane), were especially hard-hit. Unknown numbers of invertebrate and plant species may have been lost before they were even documented by science.

In response to these dramatic environmental changes, a conservation ethic took hold in the late 19th and early 20th centuries. Initial efforts focused on laws to regulate market hunting for meat, hides, and feathers. This was followed by legislation to establish public lands and manage these for their long-term benefits to society (often with an emphasis on water management, sustainable timber harvest, mining, and grazing). At about the same time, the first national parks were designated for the preservation of scenic and natural values and refuges created to conserve wildlife habitat. Collectively, these actions helped arrest the precipitous decline of many iconic species, such as buffalo, snowy egrets, and trumpeter swans, but unfortunately were too late to prevent the extinction of the passenger pigeon, Carolina parakeet, thistle milkvetch, and hundreds of other obscure plant and animal species.

As the 20th century progressed, new threats emerged to impact wildlife and plants. Herbicides, urbanization, competition from introduced species, and industrial-scale resource extraction brought a new cohort of native species dangerously close to extinction. Many of these were non-game species which often did not directly benefit from efforts to conserve more economically valuable (i.e. huntable) animals, or did not occur in protected areas. Saving these species would require more direct management. Although some state and federal laws had been passed previously to protect individual species (such as the bald eagle), no comprehensive legislation had ever been enacted to conserve vulnerable species as a group.

Things began to change in 1966, when Congress passed the Endangered Species Conservation Act. This law charged the US Fish and Wildlife Service (USFWS) with preparing and maintaining a national list of “endangered” species, defined as those in “danger of extinction within the foreseeable future throughout all or a significant portion of their range.” The first list included 83 species of mammals, birds, and fish—but no



Astragalus kentrophyta var. *douglasii* (top specimen on the sheet), Canby specimen, New York Botanical Garden

reptiles, amphibians, invertebrates, or plants. The 1966 law had no enforcement powers to prevent direct harm to listed animals or their habitat and provided little funding. In 1969, Congress updated the law to allow the listing of herptiles, mollusks, and crustaceans (but still no plants or insects!) and directed USFWS to develop a companion list of foreign animals at risk of extirpation. The latter effort gave rise to the Convention on International Trade in Endangered Species (CITES), a treaty ratified in 1973.

Recognizing that the earlier laws conferred little real protection, Congress passed the much more expansive Endangered Species Act (ESA), which was signed into law by President Nixon on December 28, 1973. The ESA passed the Senate and House by a combined vote of 482 to 12 and generated little debate or controversy at the time.

Among the important new provisions of the ESA were:

- Any native species or subspecies/variety of animal (including invertebrates) or plant native to the United States could be listed, as well as unique “population segments” of animal species, where such species were only vulnerable across a portion of their range.
- Species of plants and animals from foreign countries could be listed.
- A second category, “Threatened,” was added to recognize species “likely to become Endangered within the foreseeable future” over all or most of its range. Protections under the act were comparable for both Endangered and Threatened species (at least within their respective taxonomic classes).
- The decision to list species was to be based solely on the best available scientific information, without regard to economic considerations.
- The ESA allowed extensive public participation in the listing process. Agencies, organizations, or individuals could petition the Service to propose new species for consideration as listing candidates. USFWS was also required to publish proposals for listing (and de-listing) species in the *Federal Register* and to solicit public comment.
- Section 7 of the Act required all federal agencies to conserve listed species and to consult with USFWS to avoid actions on federal lands that would be detrimental to the species and its “critical habitat.” Critical habitat was defined as lands and environmental conditions that were crucial for the continued survival of the listed species.
- Section 9 regulated the “take” of listed species, defined as the harassment, harm, killing or collecting of listed species on public (all species) or private lands (just listed animals).
- Section 4 formalized the criteria by which species would be assessed for possible listing. The five listing factors included: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes;

(3) disease or predation; (4) inadequacy of existing regulatory mechanisms; (5) other natural or manmade factors affecting its continued existence.

- USFWS was directed to develop formal recovery plans for listed species that identified specific actions needed to restore populations and habitat or reduce threats so that species might eventually be changed from Endangered to Threatened or de-listed entirely due to recovery.
- ESA established grant mechanisms to share management costs with state agencies.

The ESA was a truly revolutionary change in the legal contract between humans and other species. For the first time, the federal government asserted management priority for endangered species over other activities on federal, state, and private lands through the Section 7 consultation process, designation of critical habitat, and protection from take. While there was a long legal precedent (dating to Roman times) for management of valuable game animals by the government (first through the monarchy, and then federal or state governments), extension of the ESA to invertebrates and plants was a significant change. Traditionally, invertebrates had been ignored, other than as agricultural products or pests. Likewise, plants were historically treated as personal property of a landowner, akin to rocks or soil. The notion that the ESA might prevent large scale projects (like dams and highways) or impact use of private lands quickly led to controversy, legal challenges, and amendments to soften the impacts of the law. USFWS implemented a variety of tools to reduce landowner conflicts (such as habitat management plans, safe harbor agreements, and species conservation plans) and began working actively with other government agencies to develop conservation agreements to reduce the need for official listing.

Protecting Plants Under the Endangered Species Act

The first endangered species list under the ESA in 1973 contained 109 vertebrate species and no plants. This oversight would be corrected over the next several years. An obscure provision of the 1973 law mandated the Secretary of the Smithsonian Institution to develop a comprehensive list of potential Endangered, Threatened, and Extinct plant species in the United States—the first ever produced. The Smithsonian Institution set up a series of regional workshops to coordinate data sharing among state experts and to compile a nationwide report, submitted to Congress in 1975. The Smithsonian list contained 3,187 plant species and varieties (nearly 1/3 of which were from Hawaii) identified as Endangered (1,400 taxa), Threatened (1,432) or Extinct (355). These species represented approximately 10% of the native flora of the continental United States and 50% of the flora of Hawaii.

The Smithsonian report was accepted as a petition for formal listing under the ESA in a *Federal Register* notice on July 1, 1975. This proposal was modified the following year to include just 1,700 species based on revised information. Concurrently, several proposals for listing individual plant species were mov-

ing through the USFWS assessment process. In 1977, the first four plant species were officially added to the Endangered Species list—all endemic to the Channel Islands of California. By 1979, 16 more plant species were added.

Amendments to the ESA in 1978 formalized the listing procedure by having species go through a more rigorous vetting process (the candidate stage) with only those meeting the five listing criteria being eligible for listing. As a result, USFWS withdrew the massive 1976 listing petition in 1980. The more systematic approach resulted in a steady increase in the number of listed plant species, especially through the late 1980s and early 1990s. By 1994, plant species outnumbered animal taxa on the list. As of October 2023, 941 of the 1,690 species on the Endangered Species list were plants (55.7%), of which 766 were classified as Endangered and 175 as Threatened. (Animals maintain a healthy majority however among taxa on the list of foreign endangered species protected from trade under the ESA.)

One of the side benefits of the ESA was the development of the Natural Heritage Program network by The Nature Conservancy in the mid-1970s. Each state (and later each Canadian province and many countries in Latin America) created a list of rare plants and animals using standardized ranking criteria (a 1-5 scale from most imperiled to most secure) and an accompanying database of occurrence records, including locality, habitat, and management information. Heritage data have been invaluable in identifying species that may warrant federal listing under the ESA or protection by federal or state land management agencies, such as the US Forest Service (USFS) and Bureau of Land Management (BLM). Locality data kept by heritage programs can also be used to identify important sites for conservation or to inform resource extraction or development projects in the planning stages, so that conflicts can be reduced or avoided early on.

The first list of potential rare vascular plants in Washington State was developed by Arthur Kruckeberg and C. Leo Hitchcock in 1974 in conjunction with the nationwide effort spearheaded by the Smithsonian Institution. That list consisted

of 86 species (including *Astragalus kentrophyta* var. *douglasii*, then considered Endangered, rather than extinct). Only three of these original species were ultimately listed under the ESA (showy stickseed, *Hackelia venusta*, Wenatchee Mountain checkermallow, *Sidalcea oregana* var. *calva*, and Spalding's catchfly, *Silene spaldingii*). In 1977, the state list was revisited by a working group of experts, led by Melinda Denton, Art Kruckeberg, and Bonnie Tucker from the University of Washington, Ronald Taylor from Western Washington University, and Amy Jean Gilmartin and Joy Mastrogriuseppe of Washington State University. The updated list eliminated a dozen species of dubious taxonomic status but added another 206 taxa, bringing the total number of rare plants of Washington to 280. The Washington Natural Heritage Program (WNHP) was established by the legislature in 1977 and adopted this list as the first official state rare plant list.

Over the past 45 years the WNHP has evaluated over 640 vascular plant species as potential species of conservation concern. Nearly 40% of these species have been dropped from consideration as a result of field surveys or assessments finding them to be more widespread, abundant, or less threatened than initially thought. As of 2021, 371 vascular plant taxa are tracked by the heritage program as state Endangered, Threatened, or Sensitive. WNHP also tracks 60 lichen and bryophyte species. These latter lists are currently being revised with input from the Northwest Lichenologists and bryophyte specialists and the number of tracked species will likely increase.

It is important to note, however, that Washington does not have a state Endangered Species law for plants that is comparable to the federal ESA. Being on the state list does not confer any legal protection or fines for harming listed plants or their habitat. State-listed plant species can inform wetland ratings from the Department of Ecology and are used by some counties in land use planning. State agencies are also supposed to consider potential impacts to listed species when planning resource management activities.

Not that plants receive a lot of protection if listed under the federal ESA either. Unlike animals, plants are protected from “take” only on federal lands, such as those managed by the USFS, BLM, Department of Defense, or National Park Service. Private landowners are not forbidden from harming listed plants or their habitat unless they are otherwise being subsidized by the US government. Plants are protected from harm by people who trespass on private lands. ESA protections do not apply to candidates for listing.

Several federal land management agencies have developed Sensitive species programs to reduce the likelihood that the agency's own actions will contribute to the decline of these species and hasten their listing under the ESA. In Washington, the USFS and BLM currently recognize 236 vascular species as Sensitive. These tend to be taxa that are state or regional endemics or otherwise uncommon rangewide, rather than being rare just within Washington (due to the arbitrariness of state lines). Sensitive species also have to occur on Forest Service



Sidalcea oregana var. *calva* (Wenatchee Mountains checkermallow).
PHOTO: WALTER FERTIG



Castilleja levisecta (golden paintbrush), Fort Casey, Whidbey Island.
PHOTO: WALTER FERTIG

or BLM lands. Other federal land management or regulatory agencies may not maintain their own sensitive lists but will take listed or candidate species into account as part of their legal mandates. Examples include the Federal Energy Regulatory Commission (FERC) requiring monitoring and management of listed and candidate species in reissuing dam licenses, or the Environmental Protection Agency (EPA) regulating herbicides that might impact listed plants.

In the 50 years since it was passed into law, only 13 Washington plant species have been listed as Threatened or Endangered under the ESA. The state's first two listed species were swamp sandwort (*Arenaria paludicola*) and Nelson's checkermallow (*Sidalcea nelsoniana*), both making the Endangered Species list in 1993. Swamp sandwort was last reliably documented in Washington in 1896 in the Tacoma area and is now thought to be extinct in the state (though a few populations still occur in coastal California). The most recent addition was whitebark pine (*Pinus albicaulis*) in 2022. Whitebark pine has declined by more than 50% across its range in the Rocky Mountains and Cascades in the past two decades due to impacts from blister rust and mountain pine beetles. Presently

just nine plant species remain on the ESA list from Washington with the recent decision by USFWS to delist four species: Bradshaw's lomatium (*Lomatium bradshawii*) and water howellia (*Howellia aquatilis*) in 2021, and golden paintbrush (*Castilleja levisecta*), and Nelson's checkermallow this year. Tall beard-tongue (*Penstemon hesperius*) is currently the only candidate from Washington awaiting a listing decision.

Positive Outcomes of the ESA

Over the past 50 years the ESA has had an enormous positive impact on the conservation of plant species in Washington State and across the country. Before the act, the biology and distribution of rare plants was poorly known and ill-defined. As recently as 1980, a major review paper on the topic of rarity in plants postulated that most rare species were maladapted or evolutionary dead-ends. The classic conservation paper *Seven Forms of Rarity* by Deborah Rabinowitz debunked this myth in 1981 when she persuasively demonstrated that plant species were rare because of their high habitat specificity, small geographic ranges, and low population numbers, rather than biologic or genetic inferiority. Rabinowitz's work influenced the nascent natural heritage program network in quantifying the rarity of species at state and global scales, recognizing the significance of threats and trends, and standardizing how species populations were defined. Heritage data provided critical information on the distribution of rare species that influenced where conservation sites were established or how development projects might be revised or mitigated to reduce impacts.

The ESA provided an important impetus for field surveys to better document the distribution of potential candidates for listing. Many of the species identified in the 1975 Smithsonian Institution report were later found to be more widespread or common than initially suspected once botanists began to search for them. After 1973, federal agencies, such as the National Park Service and US Forest Service began to more systematically inventory their lands to better document the flora, resulting in the discovery of new rare plant populations and more complete species lists. Taxonomists have also been busy discovering and describing new species, many of which are from specialized habitats or limited geographic areas (and by definition, fairly rare). In Washington alone, at least 32 newly described plant species have been added to the state rare list since the first version came out in 1977.

In the early 1980s USFWS adopted a three-tier candidate system to more systematically assess and prioritize species for inclusion on the Endangered Species list. A relatively small number of species that were already well-studied and clearly in need of protection were assigned to Category 1 and eligible for proposing as endangered or threatened. Many more species appeared to be rare based on incomplete information and were placed on the Category 2 (C2) list. These species were frequently the subject of targeted field surveys to better elucidate their actual abundance, distribution, threats, and management needs. New information was critical in determining whether these C2 candidates were truly rare or had just been under-

collected or over-looked. Species that were evaluated but no longer warranted consideration for listing (or were found to be taxonomically invalid) were relegated to the Category 3 list. This system resulted in a lot of field work that made listing decisions more robust and kept the Service from expending its limited protection dollars on species that did not require legal protection.

As a direct result of the ESA, many state and federal agencies and private land trusts (such as The Nature Conservancy) began to identify and protect specific areas for the benefit of rare species. In Washington, the Department of Natural Resources employed heritage program data to identify important lands for conservation through the state Natural Areas Program. Preserves such as Rocky Prairie, Upper Dry Gulch, Camas Meadows, and Lacamas Prairie were established to conserve critically rare plant species, like golden paintbrush, Colocymum milkvetch (*Astragalus sinuatus*), Wenatchee Mountain checkermallow, Wenatchee larkspur (*Delphinium viridescens*), and Bradshaw's lomatium. The USFS, BLM, and USFWS also created new Research Natural Areas, Special Botanical Areas, National Wildlife Refuges, or National Monuments to protect rare plant species. Local conservation groups, like the Chelan-Douglas Land Trust and Columbia Land Trust, continue to purchase lands or part-

ner with private landowners to establish conservation easements for rare plants. Often these areas also conserve other plant and animal species (both common and uncommon) that are poorly protected elsewhere.

Those species fortunate enough to be listed have benefited from conservation actions undertaken by USFWS and its partners. For example, USFWS funded more than a decade of research and experimentation on out-planting plugs and seed of golden paintbrush to establish dozens of new populations in Oregon and Washington. New occurrences have also been established for Nelson's checkermallow, White Bluffs bladderpod (*Physaria douglasii* var. *tuplashensis*), Spalding's catchfly, showy stickseed, and Kincaid's lupine (*Lupinus oreganus* var. *kincaidii*) within their historical ranges. Surveys mandated for ESA compliance have resulted in the discovery of new locations of Ute ladies'-tresses orchid (*Spiranthes diluvialis*) and other rare plants.

Challenges and Controversies

Implementation of the ESA has evolved over the last 50 years in response to a series of controversies. The first major test was the Tellico Dam dispute of the late 1970s that pitted a costly federally funded construction project against a tiny fish, the snail darter (*Percina tanasi*). The darter was listed under the ESA in 1975, shortly after being named as a new species. At the time, its entire known range was the Little Tennessee River, which was soon to be converted into a large reservoir by the Tellico Dam. Proponents of the dam were incensed that a "worthless minnow" could derail a project that was nearing completion. Congress intervened by amending the ESA in 1978 to create the "God Committee" (made up of several high-ranking cabinet officers) to decide the fate of projects like Tellico Dam. Ironically, the God Committee ruled in favor of the wee fish (as did the Supreme Court), prompting Congress to then pass a bill specifically exempting the Tellico project from the ESA. The dam was completed, though fortunately snail darters were introduced or discovered in additional waterways and decades of active conservation work improved its survival prospects such that it was delisted (as recovered) in 2022.

A conflict like the Tellico Dam affair was inevitable once government agencies and developers realized the magnitude of the Section 7 consultation provision of the ESA. In addition to prompting amendments to the Act (like the God Committee, which has been rarely used since), the immediate fallout from Tellico was a significant drop in the number of species added to the Endangered Species list over the next 10 years, as well as increased scrutiny over new species that might create management conflicts. Congress also learned that it could interfere with the Act by introducing short-term listing moratoria (as in 1995 as part of an unrelated defense authorization bill) or forbidding listing of specific creatures (like the 2023 bill to remove ESA protection for the lesser prairie-chicken in the Midwest).

Other controversies followed, such as the conflict between the spotted owl (*Strix occidentalis*) and harvest of remnant



Lupinus oreganus var. *kincaidii* (Kincaid's lupine). Boistfort Prairie, WA.
PHOTO: Mark Turner



Physaria douglasii var. *tuplashensis* (White Bluffs bladderpod). PHOTO: WALTER FERTIG

old growth conifer stands in the Pacific Northwest in the late 1980s, and the introduction of gray wolves (*Canis lupus*) in Yellowstone National Park in the early 1990s. One of the bigger challenges to the ESA came from the property rights movement of the 1990s which asserted that the ESA represented a “taking” of private property, so landowners should be either monetarily compensated or exempted from the Act. The Clinton administration ultimately defused this crisis by employing several novel programs under the ESA to reduce the burden of listed species for private landowners and developers. These included Safe Harbor Agreements and Habitat Conservation Plans which provided assurances to private landowners that they would not be liable under the ESA if they agreed to management measurements to help conserve the habitat of listed species. The Service also began to encourage development of Conservation Agreements and Conservation Strategies between county, state, and federal government agencies, landowners and developers, and USFWS to provide some habitat protection for affected species, without actual listing under the ESA.

An unfortunate casualty of the ESA wars of the 1990s was the candidate vetting process and the Category 2 list. Critics had long misrepresented the candidate list as being equivalent to the official roster of Threatened and Endangered species maintained under the ESA. In reality, the candidate list was more analogous to the minor leagues where many species were systematically evaluated for potential protection, but most were ultimately dropped because they did not meet the Service’s listing criteria. The candidate program was eliminated in 1996, as was the biennial list of Category 2 candidates published in the *Federal Register*. Environmental advocacy groups responded with a barrage of multi-species listing petitions and lawsuits, which ended up diverting a lot of USFWS’s attention from proactive conservation.

Funding for ESA protection has never been adequate to the monumental task of conserving hundreds of rare species. Plants in particular are short-changed; the Service spends 3.4 cents on plants for every dollar it devotes to animals, even though

the majority of listed species are plants. One consequence of inadequate base funding is USFWS’s inability to add some species to the endangered list that are “warranted but precluded” because of higher conservation priorities (i.e., there is not enough money in the budget to pay for both). Congress ultimately controls the amount of money allocated to USFWS and the public needs to pressure Congress to improve funding levels if it agrees that endangered species are worth saving (polling consistently shows public support for the ESA to be in the 80–90% range, slightly lower than motherhood, but higher than apple pie). Legislation such as the Recovering America’s Wildlife Act (RAWA), which narrowly missed being passed in the last session of Congress, would address the budget shortfall with a significant infusion of cash for state and federal conservation efforts.

Over the years the most controversial ESA cases have revolved around animals, but occasionally plants can elicit pushback too. One example is Graham’s penstemon (*Penstemon grahamii*), a narrow endemic of the Uinta Basin of Utah and Colorado. This species has the unfortunate habit of growing in barren, mineral-rich oil shales coveted by the energy industry. Due to its low numbers and limited range, Graham’s penstemon has been a potential candidate for listing under the ESA



Lomatium bradshawii (Bradshaw’s desert-parsley). Lacamas Prairie Natural Area, Camas, WA. PHOTO: MARK TURNER

off and on since 1975. When the first oil shale boom fizzled in the 1980s the push to list Graham's penstemon lost steam due to a perceived lack of threats. After the industry revived at the turn of the 21st century, listing became too contentious. USFWS was sued in 2006 and 2014 to list the species, losing both times and being directed by the Court to proceed with listing. Both times USFWS initiated the public review process to list the species, but then reversed course and developed a Conservation Agreement with affected local, state, and federal government agencies and developers instead (though not with the environmental groups who were the plaintiffs). The Agreement



Artemisia campestris var. *wormskioldii*: Wormskiold's northern wormwood, Beverly, WA in flower. PHOTO: WALTER FERTIG

imposed modest (and temporary) restrictions on development to protect some penstemon habitat and prevent ESA listing.

Closer to home, USFWS ruled against ESA protection for one of Washington's rarest plant species, Wormskiold's northern wormwood (*Artemisia campestris* var. *wormskioldii*) when it was a candidate for listing in 2016. At the time of the decision, this species was known from just two surviving native populations on small islands and sandy shores of the Columbia River in Washington (it was considered extinct in Oregon) with about 2,500 individuals. Wormskiold's wormwood is characterized by few, relatively large flower heads and blooms and sets seed in the spring before floodwaters historically inundated its sandbar and cobblestone habitat. Now that river flows are regulated by dams, water levels are more uniform or kept higher in the spring to generate electricity during peak summer demand, creating habitat conditions more favorable to weedy species or its close cousin, Scouler's wormwood (*A. campestris* var. *scouleriana*), a species adapted to flowering later in the summer when water levels are lower. The Service acknowledged that var. *wormskioldii* was uncommon, but dismissed the seriousness of its threats in deciding that listing was unwarranted. The year after the decision, both native populations crashed to about 20 individuals and have numbered only 20–40 each year since. Ironically, FERC requires conservation measures to be taken for the relicensing of dams along the Columbia River, so this taxon still receives management attention from public utility districts (who have been real champions for the species), with support from USFWS, as if it were listed anyway.

Quiet changes to the ESA de-listing process were implemented by former Interior Secretary Ryan Zinke during the Trump presidency. De-listing now emphasizes whether a species is still impacted by the original five listing factors of ESA, and not if the objectives from the species' recovery plan are being fully met. Thus, it has become much easier to claim that a species is now adequately protected (because of a Conservation Agreement or voluntary measures) or threats have been mitigated so that it can be de-listed. More than 100 species have been de-listed based on recovery, or reclassified from Endangered to Threatened, in the last 20 years. This is cited as evidence that the ESA works. But there has also been pressure from higher levels of government to reduce the total number of listed species and avoid controversial new listings. Some critics have argued that USFWS has "internalized opposition to the ESA" (Kunzig 2023).

Making the ESA Work Better

The academic conservation biology literature was rich with articles during the 1990s and early 2000s about how the ESA failed to protect ecosystems, or was employed too late to protect species already on the brink of extinction, or was a failure because more species were added than deleted due to recovery, or should only focus on keystone species, etc. After 50 years the ESA has had its share of successes, such as the recovery of the American alligator and bald eagle, and a few failures, such as the 23 species recently de-listed due to extinction. As with any

long-term enterprise, there are always tweaks that could make the Act work better. Here are a few recommendations:

1. Resurrect the Category 2 candidate program. The C2 list was a valuable tool for identifying species that appeared to be at risk of extinction but needed more study. Usually this entailed field work to revisit known sites to determine their current status and condition and to locate new populations in suitable habitat. The C2 list also brought attention to taxonomic issues that might be resolved by genetic studies in the lab or herbarium. Most importantly, the C2 list made it easier to secure funding to do these studies. For relatively little cost, USFWS could ascertain whether these candidates were more common than was originally thought (and could be dropped from the candidate pool) or in worse shape and elevated to category 1 status. The real value was having a way to systematically assess species. Without this program, newly described taxa (which almost by definition appear to be exceptionally rare at first) tend to get ignored, or listing becomes driven by lawsuits or petitions, often promoting species that are not immediately at risk, or serve other agendas.

2. Increase the number of candidate and listed plant species. In Washington alone, more than 50 plant species are ranked by the natural heritage program as globally rare (G1, G2, T1, or T2). Many of these taxa are sufficiently threatened by habitat loss, competition with introduced species, or impacts from climate change (such as prolonged drought or heat spikes during the spring or summer breeding season) to be designated as candidates for listing (see Counting Down Washington's 50 Rarest Plants, coming in the spring 2024 issue). Others need additional study to verify their status. At least a dozen are sufficiently well documented that they could be proposed for listing under the ESA right now if they were already in the candidate pipeline.

3. USFWS needs to hire more botany staff. This has improved in recent years, but more could be done. Too many times wildlife biologists are tasked with leading conservation efforts for listed or candidate plant species. This is not to question their integrity or dedication (all the field level USFWS staff I have worked with have always been top notch), but botanists should be in charge of plant species. Can anyone imagine a botanist being put in charge of a grizzly bear recovery team? No one would stand for it.

4. Incentivize conservation of listed and candidate plant species, especially on private lands. Compared to animals, plants receive very little real protection on private lands. Most members of the public don't realize this and may take adverse actions (plowing up fields, cutting down forests) in a misguided effort to keep listed species off of their property. As a society, we need to switch the narrative and make possession of listed plants an asset for landowners, rather than a perceived liability. Programs like Safe Harbor offer some regulatory relief, but more positive outcomes could come from monetary incentives. Tax breaks or direct compensation for maintaining habitat and populations of listed plants would provide a "carrot" to go along with the

legal "stick". The federal government routinely subsidizes farmers to grow particular crops or keep highly erosive areas out of production because this serves the national interest. So would paying a relatively small amount to promote conservation of endangered plants and animals on private lands.

5. Reconsider the emphasis on de-listing, especially for management-dependent species. About 1 percent of the species that have been listed under the ESA have become extinct in the last 50 years. Studies suggest that several hundred species are still extant because of the protections and management attention they received through the ESA. That sounds like a very successful program to me. Species that turned out to be more common than initially thought (thanks in part to surveys prompted by ESA listing) should be de-listed, especially if they draw our limited attention and funds away from species at much greater risk of extinction. The bald eagle, American alligator, even the snail darter, are all in much better condition today than they were before being protected under the ESA and should be de-listed. But some species are going to need extra management attention for decades, even if they seem to be doing better now. This includes a suite of prairie endemic plants of the Puget Trough and Willamette Valley that have been recently de-listed, such as golden paintbrush and Nelson's checkermallow. Threats are increasing for these species, from decline of pollinators and habitat fragmentation to long-term drought, springtime heat domes, and competition from annual weeds and forest encroachment. All of these factors require expensive, hands-on management for extended periods of time—perhaps even perpetuity. ESA protection allows the funds to keep coming for these management actions and keeps everybody honest and incentivized to do the hard work.

Unfortunately, the ESA came along too late to help the thistle milkvetch. Or pale bugseed (*Corispermum pallidum*), a central Washington sand dune endemic last seen alive in 1953. And perhaps it is too late to save Wormskiold's northern wormwood. But then again, maybe not. Thanks to the ESA, researchers have learned how to grow this species from seed and reintroduce it to the wild. Several new sites have been established on river cobble and sandy sites where populations can be easily accessed for weed control and supplemental watering, if needed. Things look dire, but the plant is still alive and fighting. Without the law and the list, none of this would be happening. Northern wormwood would have already gone the way of thistle milkvetch—dying with no one noticing or caring, the only evidence of its time on Earth a few yellowed herbarium sheets.

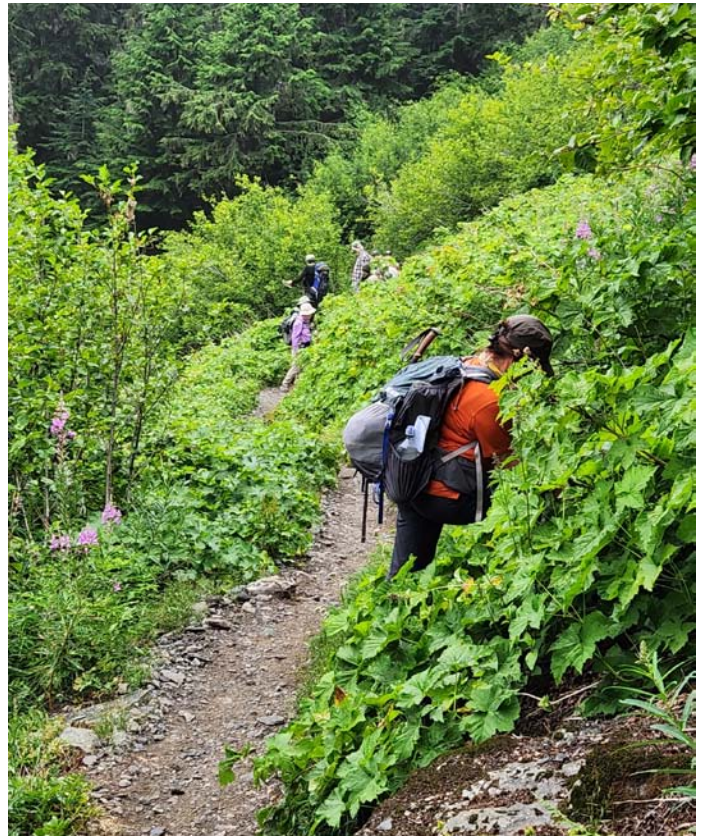
Walter Fertig was formerly the rare plant botanist for the Washington Natural Heritage Program and the Wyoming Natural Diversity Database and has been surveying and monitoring endangered and candidate plant species across the west since 1988.



Scenes from the 2023 WNPS Study Weekend in the North Cascades



Photo field trip participants on the Chain Lakes trail with their instructor, Mark Turner (red shirt). PHOTO: REGINA JOHNSON



Those who hiked up the Welcome Pass trail got a serious physical workout, along with a good selection of the “usual suspects” of North Cascades flora. The trail is one of the steepest in the Mt. Baker area.

PHOTO: JANKA HOBBS



Athyrium distentifolium (alpine lady fern) with *Tsuga mertensiana* (mountain hemlock) soft-focus in the background along the Chain Lakes Trail. PHOTO: Mark Turner



At the Yellow Aster Butte trailhead, we vowed to hike to the top as fast as possible, and Not Botanize till we got there. This promise lasted until - well, someone stopped at the outhouse, and we didn't want to leave without them. We didn't get to the top. But we got far enough to see the view! —Janka Hobbs, Central Puget Sound Chapter Chair. PHOTO: JANKA HOBBS



I was lucky to have had the best group of botanists at the WNPS Study Weekend 2023 on my Damfino Lakes to Excelsior Pass hike. The five of us were very engaged to find as many native plants as we could fit in a one-day-hike. It turned out the pace was much slower than I had planned and we had to stop for lunch before we made it out of the woods, the beautiful meadows were still ahead of us. After lunch I forced the speed a bit because I was determined to make it to Excelsior Pass. Finally, we found ourselves in the meadows and we were impressed how the leatherleaf saxifrages (*Leptarrhena pyrolifolia*), the slender bog orchids (*Platanthera stricta*), the elephant's head louseworts (*Pedicularis groenlandica*) and the small-flowered paintbrushes (*Castilleja parviflora*) assembled to a beautiful display. What family do the louseworts belong to again? Franja got her "Pojar" out and found it under Figworts. I was consulting the Burke Washington Wildflowers app and found it under the Broomrape Family. Go figure, changes happen! —Fritz Ulrich, trip leader



The ridge at the top of the Welcome Pass trail is part of the High Divide. Go west to Excelsior Peak and ramble east to the tarns below Yellow Aster Butte. Soon after snowmelt this spot is carpeted with glacier lilies, but at the end of July it just made a great lunch spot.

PHOTO: JANKA HOBBS



Table Mountain provides grand vistas of Mt. Shuksan (in the background) and Mt. Baker, as well as botanical delights. PHOTO: JANKA HOBBS

Two Spring Sagebrush Hikes: One Flat, One Not

by David E. Giblin

With winter closing in and plants dormant for the next several months, it's fun to think about where to go when spring makes its inevitable return. The first places to see early season wildflowers in Washington typically have some combination of these factors: 1) southern part of the state (e.g., Klickitat and Skamania counties); 2) low elevation; 3) south-facing slopes. As someone who lives in Seattle, getting south involves more time than is possible for a day trip. This leaves me low elevation destinations with some south-facing aspects. Like so many other native plant enthusiasts, I find myself heading east in early spring to either the Yakima Canyon area or the Columbia River near Vantage. Anyone who lives within a couple of hours drive of either location should be sure to include Baldy Mountain in Yakima Canyon and an unnamed area of Ginkgo Petrified Forest State Park near Vantage on their list of places to visit.



View of Yakima River Canyon from Baldy Mountain Trail. PHOTO: DAVID GIBLIN

The trailhead for Baldy Mountain is right along the main highway (Canyon Road) that goes through the Yakima River between Ellensburg and Yakima. It lies just opposite the Big Pines Campground (river side of road) and is largely unmarked. There is ample parking at a pullout adjacent to the campground. There is an old gate to walk through with a well-worn path that heads directly north to the base of Baldy Mountain. Don't follow this path unless you want to gain about 800 feet elevation in half a mile! Instead, once through the gate head left along a fainter path that initially heads west towards the river and then takes a very gentle bend to the right to get onto the ridge that leads to the summit.

The lower part of the hike is pretty weedy, though you will find Columbia prickly-pear (*Opuntia columbiana*) very near the trailhead. About a half-mile or so in when you start up the

ridge you should encounter a nice stand of rock lupine (*Lupinus saxosus*). From there it is just all of the sagebrush wildflowers that you can imagine, with a particularly heavy dose of desert-parsleys (*Lomatium spp.*) with both yellow- and white-flowered species represented: Canby's (*L. canbyi*), northern (*L. farinosum*), butterfly-bearing (*L. papilioniferum*), Gorman's (*L. gormanii*), Geyer's (*L. geyeri*), and if you make it all the way to the top an extensive stand of Umptanum's (*L. quintuplex*). There is also arrow-leaf balsamroot (*Balsamorhiza sagittata*), sagebrush buttercup (*Ranunculus glaberrimus*) along the way, and again, if you make it to the top, snowball cactus (*Pediocactus nigrispinus*).

Be aware that the last half-mile below the summit (3,212 feet) is a bit steep, but totally doable and worth the views from the top, which include Mount Rainier. The round-trip distance is five miles with 1,972 feet elevation gain. I went in late April in 2023, and it was wonderful timing in terms of the bloom. There is probably plenty to see until mid-May, when things start to dry out due to the mostly south and southwestern exposure of the ridge and slope (though you can drop onto the north side of the ridge in places and probably find things still in bloom then).

A flatter option, and one with a whole lot more sagebrush, can be found in an unmarked and easily overlooked part of Ginkgo Petrified Forest State Park along the Old Vantage Highway (Highway 10). Many people are familiar with the Petrified Log Trail on the north side of the road. Due to countless wildfires the sagebrush plants are gone, and the trail winds through a south-facing slope awash in cheatgrass (*Bromus tectorum*), an invasive annual grass. Seeing petrified logs in steel cages surrounded by cheatgrass might leave some a little flat (it does me). However, if you cross the highway from that parking area (look both ways—it is a state highway after all), you'll find a large gap between the guardrails formed by an old dirt road that heads upslope and to the east.

The short slope is north-facing, has never been burnt, and is full of spring wildflowers, including tons of Hood's phlox



Expanse of high-quality sagebrush in Ginkgo State Park across from petrified logs trail in early May. PHOTO: DAVID GIBLIN



Bushy growth form of showy phlox (*Phlox speciosa*). PHOTO: DAVID GIBLIN

(*Phlox hoodii*) and bush-like showy phlox (*P. speciosa*). The dirt road leads up onto a massive plateau of sagebrush that you are likely to have all to yourself just like my wife Julie and our dog Cedar did on a weekend in early May. We walked south for maybe half a mile (you start getting close to I-90), and then backtracked and followed another old dirt road south towards the Columbia River. We probably walked for about a mile in that direction over largely flat terrain before turning around. My guess is that we probably could have made it to the Ginkgo Petrified Forest State Park Visitor Center had we continued onward.

The plateau is a truly remarkable area with large, ancient big sagebrush (*Artemisia tridentata*) plants, and smatterings of sagebrush violet (*Viola trinervata*), desert yellow daisy (*Erigeron linearis*), some yellowbells (*Fritillaria pudica*), Nuttall's larkspur (*Delphinium nuttallianum*), and several annual wildflower species. And it was quiet, except for the birds. And there was nobody else there. Total elevation gain for our hike was probably 200 feet. If you go, you'll need a Discover Pass to park at the trailhead for the petrified log walk.

Both hikes are real gems that could be visited more than once during the period between mid- to late April and mid-May to see a different suite of species, or one could visit both to get different perspectives on the sagebrush habitat.

David Giblin is Collections Manager and Research Botanist at the University of Washington Herbarium, Burke Museum, where he conducts field- and collections-based research on Washington's vascular plant flora.



WNPS Will Award \$24K in Grants for 2024

WNPS is opening the 2024 Grant Cycle with a request for applications by March 1, 2024, for Grant awards for projects in Conservation, Education, and Research and Plant Inventory. Each committee will award \$8,000 in 2024, for grant projects that promote native plants and their habitats within the State of Washington. Grant awards of \$500–\$2,000 are available.

WNPS Grant funding is provided by generous donations made to the WNPS Endowment Fund and additionally supported by the WNPS Board designation of general fundraising campaign funds each year.

Successful project applications must follow the criteria for the specific committee and provide public benefit with support of the WNPS mission to promote the appreciation and conservation of Washington's native plants and their habitats through study, education, and advocacy.

Please review each committee's grant requirements to find the right fit for your project:

- Conservation: wnps.org/conservation-grants
- Education: wnps.org/education-grants
- Research and Plant Inventory: wnps.org/research

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wnps.org/wnps-annual-events

Native Plant Collaboration at Spokane Conservation District Quarry

by Kris Moberg-Hendron, Spokane County Master Gardener Volunteer

Thanks to a collaboration with Thurman Johnson, recipient of a WNPS grant, the Spokane County Master Gardeners have a new Native Plant Demonstration Garden at the Spokane Conservation District (SCD) to provide native plant education to Spokane residents.



Project volunteers work together to install native plants. PHOTO: THURMAN JOHNSON

The WNPS grant allowed Thurman, a Weed Board employee and Eastern Washington University (EWU) graduate student at the time, to design, plan, and install appropriate native plants for this new inspiring educational garden. A collaboration of Master Gardeners, SCD, and Weed Board personnel worked through the spring and summer months to plan and prepare the garden site. SCD staff created the infrastructure for the garden, including gravel paths, rock/timber placements, and a deep layer of arborist chips. On September 1, 2023, a group of Master Gardeners (several of whom are WNPS members), Certified Naturalists, EWU students, Weed Board staff, and Conservation District staff joined together to plant over 300 native plants on the prepared site. The opportunity to work together to create this garden could not have happened without the funding for the native plants.

On September 1, the Spokane County Noxious Weed Control Board received its order of assorted native plants from Plants of The Wild. The plants were installed at the demonstration garden site on the Spokane Conservation District's campus with the help of over 20 volunteers from the Washington Master Naturalist Program, the Washington State University Master Gardeners, the SCD, and local members of the community. Everyone who participated in the project, from planning to planting, was told that the plants purchased for the project were

funded by the WNPS. With this, the funded portion of this project is complete.

Plants were installed over a much larger area than the originally anticipated 750 ft², approximately triple this figure, resulting in a much more immersive site complete with a meandering walking path and large natural elements including stones and logs. Three zones were defined across the site and planted to three floristic assemblages representing sagebrush steppe, ponderosa pine woodland, and Palouse prairie with the zones gently gradating into one another. A total of 31 native species were planted for the demonstration garden.

As a result of frequent project planning meetings stretching back to early Spring 2023, the demonstration garden installation was a resounding success. Site prep began in May 2023 with light weeding, followed by the deposition of locally sourced mulch throughout the site and, subsequently, gravel and natural elements. Additional weed control was necessary up to and during the planting event. The plants were irrigated immediately after they were installed and will receive weekly irrigation until regular precipitation begins.

The satellite garden, a small length of landscape bedding located at the Spokane County Extension Office, was seeded



A volunteer tucks a plant into its new home in the demonstration garden. PHOTO: THURMAN JOHNSON



A volunteer poses with a native plant while installing it in the Spokane Native Plant Demonstration Garden. PHOTO: THURMAN JOHNSON

with an assortment of native grasses and both perennial and annual forbs using wild-collected seed. Narrowleaf milkweed (*Asclepias fascicularis*) seedlings, donated by a project volunteer, will eventually be planted along with white sagebrush (*Artemisia ludoviciana*) and nettle-leaf horsemint (*Agastache urticifolia*) plants grown by Spokane County Noxious Weed Control Board staff from wild-collected seed.

Signage for the SCD's campus is in the early planning and design phases. Once the SCD develops a site-wide signage plan with a corresponding web design layout, the demonstration garden will have signs, including QR codes, installed. All project partners will be using the site for educational purposes as the site develops. The WSU Master Gardeners, who will primarily be the ones maintaining the garden site, held a training event a week before the planting date to discuss weed identification. Another round of plant ID training was conducted alongside the plant installation.

For many years into the future, the Native Plant Demonstration Garden will provide a site that can be used for educational presentations, Master Gardener research, native plant appreciation by garden visitors, and improved biodiversity and environmental health of the Quarry as restoration efforts continue.



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

Here are examples of how to make a planned gift:

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

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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.

Assessing Floristic Change on Small Islands in the Southern San Juan Archipelago

by R. Adam Martin

The funding provided by WNPS that I received through their Research and Plant Inventory grant allowed for several days of boat travel time to visit 13 small islands on the southern end of Lopez Island with a disproportionate number of rare and unique plant species. The 13 islands all had vascular plant inventories done 10 to 15 years prior, which allowed for assessing how classical biogeographic factors like island size interact with stochastic events such as wildfires, species invasions, and weather events, such as the unprecedented heat dome of 2022, to influence plant species persistence, colonization, and extirpation.

The research done using the grant money informed two chapters of my thesis work, which I successfully submitted in June 2022. I also led a field trip in May 2022 as part of Botany Washington to Iceberg Point, where I shared initial findings as part of the field trip. Then, in March 2023, I presented my WNPS-funded research at the annual Botanical Symposium. Both [my thesis](#) and [symposium presentation](#) are publicly available through ResearchGate. Finally, my thesis chapters are in the process of submittal to Diversity & Distributions (Chapter 2) and Ecology (Chapter 1).

Summary of Main Findings: As expected, regionally rare native species that were also rare on an island were more likely

to become extirpated. Ten of the 21 regionally rare or disjunct plant species had smaller populations on fewer islands, and one species *Oxytropis campestris* var. *spicata*, a WANHP Sensitive Species, is now down to two known populations in the islands, with the population found on Swirl Rocks no longer present, likely due to the impacts of Canada geese grazing.

Across the small islands, the islands that continued to have higher native plant diversity and uniqueness had island traits that inhibited geese or deer presence. For example, Castle Island has cliffs on nearly all sides, has the fewest native plant extirpations, and remains the least invaded by annual grasses compared to the other islands. In contrast, Goose Rock, which is low elevation, small, and close to Cattle Point on San Juan Island, lost nearly half of its native flora, likely due to a wildfire in 2015, in conjunction with both geese, deer, and nesting seabirds and is now primarily comprised of short-stature annual grasses.

These small islands represent a microcosm chronosequence of how the rare coastal meadow communities in the islands are changing due to the influence of invasive species, increased herbivory, and stochastic human-caused impacts. The least invaded and disturbed islands have high cover and diversity of native annual forbs and perennial forbs and grasses with high diversity in vegetation structure. When geese and deer increase their presence on an island, they facilitate alien species establishment by directly bringing them into the site (geese) or through the selective foraging of native species. These two synergistic effects then dramatically change the structure of island flora. The synergistic impacts of herbivores and species invasions likely lead to the disproportionate loss of rare species—regionally and locally. The remaining native taxa are more likely to be plants with traits facilitating persistence through time, such as woodiness, bulbs, and clonal reproduction. While overall, the



A chronosequence of floristic change. Native intact coastal meadow islands have high forb diversity of many functional groups and varied vegetation structure. Deer and goose browse removes most of the vertical structure in a meadow community and over time selects for invasive annual grasses and more common perennial taxa that are less palatable and have high persistence traits. The resulting meadow has dramatically lower forb cover and is highly simplified. PHOTOS: R. ADAM MARTIN

effect on any individual species is moderate to small, cumulatively, island floras are becoming more simplified compared to the past. Annual grasses dominate this new simplified flora in conjunction with species not preferred by geese or deer. In particular, annual grasses may be successful in these islands because they are a functional group new to the Pacific Northwest flora, which has very few native annual grasses. Surprisingly, while individual islands are generally simplifying, the diversity between islands persists because each island is simplifying uniquely, dependent upon the original flora of the island.

Finally, the most troubling thing about these findings is that these islands have some of the strongest conservation protections. But despite these protections, the continued loss of native species highlights that sometimes conservation needs to mean active stewardship. Doing nothing and doing no harm are not the same thing.



Book Review

***The Pacific Northwest Native Plant Primer: 225 Plants for an Earth-Friendly Garden* by Kristin Currin & Andrew Merritt**

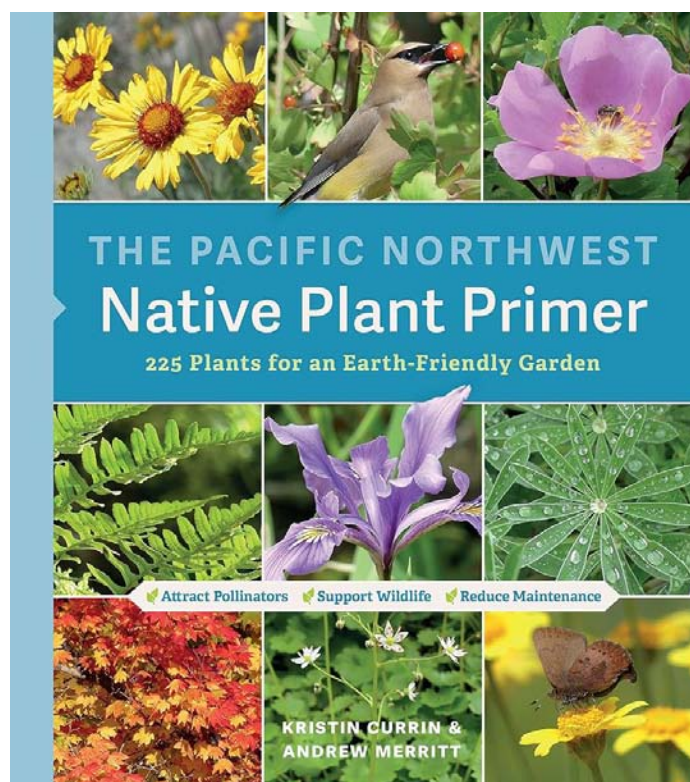
Reviewed by Sue Kusch, Suksdorfia Chapter

As an avid grower of vegetables, fruits, herbs, and native plants, I have an ample supply of gardening books. In my experience, an introductory gardening book includes just enough information to inspire and motivate and then focuses on the plants and how to grow them.

This new book, authored by the owners of Humble Roots Native Plant Nursery in Mosier, OR, is the perfect book for the gardener who is new to native plant landscaping. (But experienced native plant gardeners will be inspired to add some new plants to their gardens.) The first 57 pages include an introduction, an explanation of the benefits of native plants in the home landscape, a descriptive section on Pacific Northwest habitats, and a chapter on plant selection and cultivating and cultivation. Unlike most home landscaping books, the authors include an introductory section of how biodiversity and its inherent relationships can quickly develop in a home landscape.

Most ornamental gardening books focus on plants and design ideas. What sets this book apart is its commitment to supporting biodiversity in the garden. Native plants are a necessary component of a healthy and functioning habitat and the authors remind us that:

“Native plants are defined as occurring naturally in the geographical region in which they evolved, thus shaping the landscape as much as they are shaped by it. They have co-



evolved with local insects, birds, mammals and soil biota and have the ability to support the diversity of life that gives the natural world its beauty and its function.” (p.10)

Recent research has acknowledged that significant declines in native insects and birds are partly attributed to habitat loss. Entomologist and author Doug Tallamy has been at the forefront of this call to action: Plant more native plants to support other species and maintain healthy habitats.

The bulk of the book offers succinct profiles and beautiful photos of easy-to-grow PNW wildflowers, grasses (and grass-like plants), ferns, shrubs, and trees. Each plant profile includes information on preferred habitat/range, seasonal interest, wildlife value, and cultivation, and ends with a short paragraph featuring some details about each plants’ physical appearance. The authors include a quick reference habitat guide of plants for specific purposes, giving the home gardener an easy starting point for designing a native plant garden based on the garden’s natural conditions.

Sue Kusch is the former chair and newsletter editor of the Suksdorfia Chapter. An avid gardener, she is currently planting a hedgerow that includes berry-producing native plants, wildflowers, and medicinal herbs.



Whitebark Pine and White Pine Blister Rust

by Art Zack

White pine blister rust (*Cronartium ribicola*) is a fungal disease of five-needled pines, originally from east Asia, but introduced through Europe into western North America around 1910. This pathogen has a complicated life cycle involving five different spore types on two different host species. Two of the spore stages are on a five-needled pine and three spore stages are on an alternate host—most commonly a *Ribes* shrub (currants or gooseberries). The disease can NOT be passed directly from one tree to another. The tree can only be infected by a blister rust spore type coming from the alternate host.



A whitebark pine with a swollen small branch infected with blister rust through the needles on that branch. Blister rust spores germinate on the needles, grow into the needle stomata, and then grow down into the branch, eventually killing the branch, or girdling the stem of the tree if the rust reaches that far. PHOTO: ART ZACK

Whitebark pine (*Pinus albicaulis*), a five-needled pine species, is infected in the late summer or early fall when a windborne blister rust spore from the alternate host lands on a needle. Under moist conditions the spore germinates on the needle and the fungal mycelium enters the needle through the stomata and grows down the needle into the branch. The mycelial network continues to develop in the branch both lengthwise and laterally in a spindle-shaped pattern to produce a swollen branch canker. Eventually the canker girdles (i.e., destroys the vascular tissue around the circumference of the stem) and kills the branch. If the blister rust canker reaches the stem of the tree it results in a stem canker that can girdle the tree and kill all of the tree above that point. Blister rust cankers low on the stem will kill the whole tree. A blister rust canker higher on the stem will kill the tree top above that point, weakening the tree and greatly reducing cone and seed production.

Because whitebark pine grow in harsh conditions, they grow slowly. Here, blister rust cankers may also grow slowly, taking years to kill a mature tree. However, there is some indication that weakening from blister rust infections may make white-

bark pine less capable of resisting bark beetle attack. Often bark beetle outbreaks in blister rust weakened whitebark pine stands result in extremely high whitebark pine mortality.

Art Zack has worked as a Forest Ecologist and Forest Silviculturist for the Idaho Panhandle National Forest (IPNF). He has also worked as a Research Natural Area, Botany, & Invasive Plants Program Manager for the IPNF. He has been a member of the Whitebark Pine Ecosystem Foundation since 2002.



WNPS Arthur R. Kruckeberg Fellow Award: Call for Nominations

The highest honor given to a member of our Society is to be named a WNPS Arthur R. Kruckeberg Fellow. Nominations are now being accepted for the award, which is given every three years.

A list of previous recipients may be found in the inside cover of each issue of *Douglasia* and at www.wnps.org/history/wnps-fellows.

To be considered for recognition as a Fellow, an individual must be a current or past member of WNPS and be recognized for one or more of the following criteria:

- Through the actions of this member, a significant and lasting change in the organization has been realized
- An extraordinary contribution of volunteer time dedicated to WNPS
- An outstanding act or driving force in terms of conservation, education, research, or advocacy of Washington's native flora
- Longevity of contribution at the state or chapter level

One to four individuals will be selected for this honor, which will be presented at the 2024 Study Weekend.

How to make a nomination

Nominations may be made by writing a letter to the WNPS Nominations and Governance Committee that explains the nominee's accomplishments regarding the above criteria. Committee members will review the nominations and recommend names to the WNPS Board of Directors, who will vote on the recommendations at the Spring 2024 Board meeting.

Please submit nominations to vicepresident@wnps.org. Nominations must be received by March 1, 2024.

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PHOTO: MARK TURNER

