

Douglasia



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WASHINGTON NATIVE PLANT SOCIETY

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



President's Message: The View from Here

by Keyna Bugner

Dear WNPS Members,

For a long time, April has been a time for WNPS to celebrate the beauty of native plants. It all started with Native Plant Appreciation Week during the last week of April; during this week chapters and partner organizations throughout the state would sponsor presentations, hikes and activities highlighting native plants and their habitats. This one week was later expanded to celebrate the whole month of April as Native Plant Appreciation Month (NPAM). In 2020, many of these presentations were moved online as in-person activities were cancelled. Despite this change, we reached even more people and expanded WNPS membership. In 2021 efforts were made in the US Congress to create a national National Native Plant Appreciation Month in April. This resolution was passed unanimously. Again in 2022, April will mark this occasion.

This year's theme for NPAM is "Exploring the Future of Washington's Trees." The NPAM committee, chapters, and partner organizations have planned some great activities. We are excited to again offer in-person events when safe to do so. Please check out the WNPS webpage Native Plant Appreciation Month (<https://www.wnps.org/wnps-annual-events/npam>) for more information as new activities are added regularly. We will kick off the month with a panel presentation titled "The Challenges Facing Forest Ecosystems in Washington," featuring Chris Earle, Connie Mehmel, and Jacob Betzen. Other activities will include a book discussion on *Witness Tree* by Lynda V. Mapes, as well as presentations on white oak and forest systems in the Northwest. All chapters will also be offering field trips to explore native habitats. The month will conclude with Study Weekend held in Ellensburg, hosted by Central Puget Sound and Central Washington chapters. We are excited to host this event again in-person after a two-year absence, to highlight the beauty of central Washington in the spring.

When I think about what trees mean to me, I remember growing up in eastern Kansas exploring the grasslands and riparian areas of the Flint Hills. I loved being outside and surrounded by the diversity of trees, including oaks, maples, cherries, and even cedar. The change of the seasons was marked by the changing of the trees. Spring brought cherry blossoms and the early songs of birds. As the temperatures warmed up dur-



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

** Deceased

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On the cover: Champion western hemlock (*Tsuga heterophylla*), growing on the banks of the Quinault River at the upper end of Enchanted Valley in Olympic National Park. PHOTO: MARK TURNER

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ing the summer, the trees provided much-needed shade from intense heat. Fall brought the bright reds, oranges, and yellows of the tree leaves scattered around the countryside. As the leaves fell to the ground, we knew winter was coming. The beauty of the snow-covered trees was a welcome sight during the grey winter months. The cycle continued again when the first spring buds appeared on the trees. At home we had a maple tree in the front yard that provided endless enjoyment and fond memories for me and my friends. Just this year that tree fell over during a windstorm. While devastating to lose something so wonderful, I know that a new tree will take its place to provide shelter and enjoyment for a new generation.

When I moved to Washington, I experienced a whole new world of trees. I could get lost in the expansive forests in western Washington with massive cedars, firs, and pines, while the open landscape of eastern Washington with the scattered pines, oaks, and cottonwoods remind me more of my childhood in Kansas. I love living in a place that provides these extremes that I can enjoy within a day's journey.

Although we only celebrate Native Plant Appreciation Month in April, I hope you all get a chance to enjoy the beauty and diversity that Washington provides any time of the year.



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: www.wnps.org/publications/douglasia/douglasia_contributors.html.

Email submissions to Douglasia@wnps.org.

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Native Plant Appreciation Month—April 2022

Exploring the Future of Washington's Trees

Join us for these upcoming events this April! All of these events will take place via Zoom webinar.

Find complete descriptions and more information to register: <https://www.wnps.org/wnps-annual-events/npam>.

The Challenges Facing Forest Ecosystems in Washington

- Saturday, April 2, 1:00-2:30 pm

A panel presentation and discussion with Chris Earle, Connie Mehmel and Jacob Betzen. Topics include native forests in the 21st century, challenges we've created and solutions we can create, whitebark pine, and bigleaf maple decline in western Washington.

Celebrating our Native Trees with Poetry

- Tuesday, April 5, 7:00 pm-8:30 pm

Rena Priest, Washington State Poet Laureate

The Witness Tree: Seasons of Change with a Century-Old Oak

- Thursday, April 14, 7:00 pm-8:30 pm

Lynda Mapes, author of *Witness Tree*

The White Oak of the Northwest: The Story of an Arboreal Shape-shifter

- Monday, April 18, 7:00 pm-8:30 pm

David Peter, US Forest Service

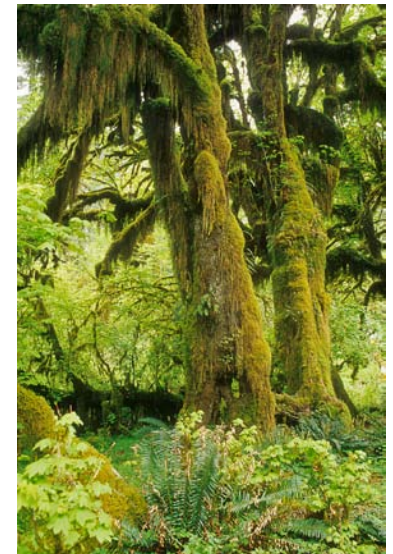
21st Century Challenges in Douglas-Fir Forests: A Conversation with Jerry Franklin

- Thursday, April 21, 7:00 pm-8:30 pm

Jerry Franklin, Professor of Forest Management and author of *Ecological Forest Management*. Interviewed by Clayton Anti-eau, horticulturalist and botanist

An Evening with Commissioner Hilary Franz

- Friday, April 29, 7:00 pm in-person at Study Weekend 2022



Moss-draped bigleaf maples (*Acer macrophyllum*) in the Hall of Mosses, Olympic National Park. PHOTO: MARK TURNER



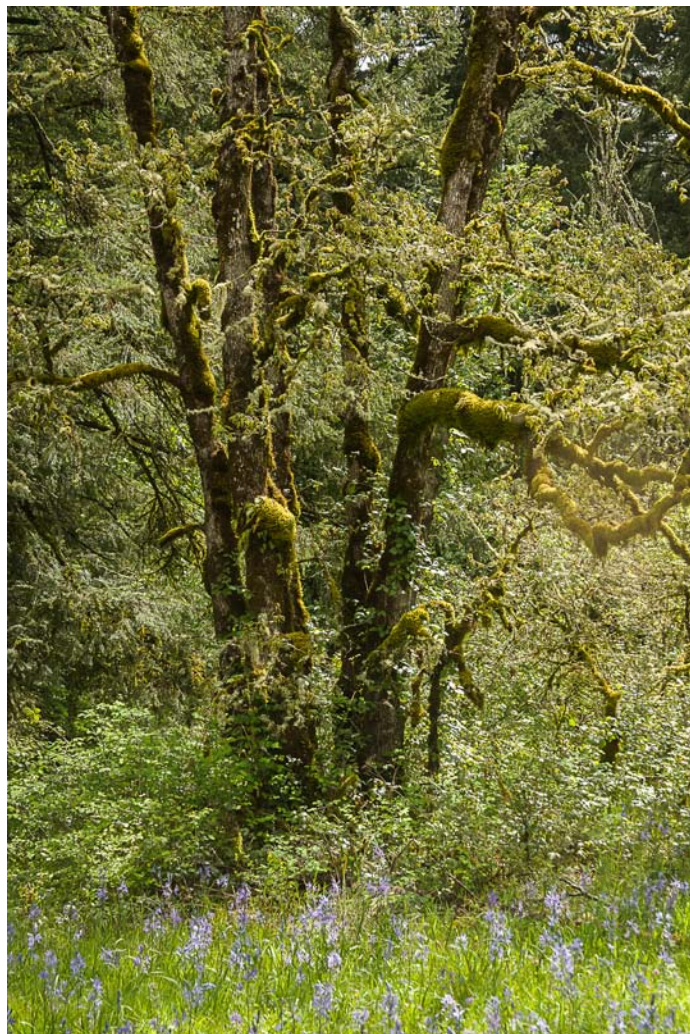
Speaking for the Trees: Garry Oak Woodlands in Washington

by Katherine Darrow

On Wednesday, May 9, 1792, while HMS Discovery was anchored just north of Nodule Point on the east side of Marrowstone Island, just south of Port Townsend in Puget Sound, some of her crew rowed around the south end of the island and noticed a grove of large oak trees. “In consequence of this valuable discovery,” wrote Captain George Vancouver, “the place obtained the name Oak Cove” (Vancouver, 1798).

The name of this secluded cove was changed to Oak Bay in 1847, but it is possible that some of the same trees observed more than 200 years ago are still alive today. If you look to your right just before you cross the bridge from Indian Island to Marrowstone Island, you can see these historic trees spreading their gnarled branches across the sky and over the bay. Jefferson County manages this narrow strip of land, which has been dubbed Indian Island County Park. (The rest of Indian Island is currently occupied by the US Navy.)

Recognizing the rarity of these trees in the region, Marrowstone residents Janet Welch and Willi Smothers* took on the ambitious project of planting oak seedlings along Jefferson County’s Isthmus Trail on the east shore of Oak Bay. In spring of 2020 and 2021, the couple planted more than 180 young Garry oaks (*Quercus garryana*), providing each one with a



Garry oaks (*Quercus garryana*) with camas (*Camassia quamash*) at Lacamas Lake Park in Camas, Washington. PHOTO: MARK TURNER

couple handfuls of mulch, a protective wire cage, a bit of flagging, and a soak of fresh water.

“We were very inspired by the Elwha Dam restoration project in Olympic National Park a few years ago,” explained Willi. He and Janet had spent more than 60 days as volunteers on the Elwha project, both working in the greenhouses to propagate native plants and then helping to plant them out in the old reservoir beds.

“That was mission number one for us,” Janet said with a smile. “Helping to restore Garry oaks is mission number two.”

Before Janet and Willi began fostering oak seedlings, they noticed that there were some saplings growing along the roadsides, but the few that were there had been repeatedly mowed



Janet Welch and Willi Smothers with oak seedling. PHOTO: KATHERINE DARROW

*Willi Smothers passed away suddenly and unexpectedly on January 20, 2022. He is fondly remembered as an ardent native plant enthusiast and steward for many conservation and restoration projects. In 2020, both Willi and Janet were recognized as Conservation Advocates of the Year by the Olympic Peninsula Chapter of WNPS for their work with Garry oaks.

by roadside brush cutters. They carefully transplanted about a dozen of the saplings to safer places where they could grow beneath their parent trees. A couple years later, they noticed hundreds of acorns scattered on the road and hatched the idea to gather some and grow them in pots at home to help restore the grove. Since 2011, North Olympic Salmon Coalition had been planning to restore a channel between Oak Bay and Kilisut Harbor, so another crop of acorns was grown to plant out after the Kilisut Harbor bridge project was completed in October 2020.



Garry oaks (*Quercus garryana*) at Isthmus Beach on Indian Island. PHOTO: KATHERINE DARROW

Garry oak, also known as Oregon white oak, is the only native oak tree found in Washington state. Some live to be more than 500 years old and grow to over 100 feet tall. In 1838, the species was named after Nicholas Garry, who worked for the Hudson Bay Company and was a friend of Pacific Northwest botanist David Douglas. Although it was Archibald Menzies who collected specimens from Oak Bay and other locations during the Vancouver expedition, Douglas and William Hooker, are the botanists who authored the species.

Throughout their natural range, from northern California to British Columbia, the oak woodlands that existed during Vancouver's voyage have declined to less than 15% of what they were prior to the 1850s. More than 80% of remaining wild Garry oak groves are on private property. Many of the public lands where Garry oak forests persist have inspired restoration and public education programs to encourage protection of what are regarded as some of the most biodiverse terrestrial ecosystems in the Pacific Northwest. Although the tree species is not considered to be threatened or endangered, the conservation status of ecosystems typified by Garry oak rank as "criti-

cally imperiled" (G1S1) under the Natural Heritage Network assessments (Rocchio & Crawford, 2015).

In Washington, you can witness mature Garry oaks in many developed situations. Cemeteries, golf courses, city parks, university campuses, suburban neighborhoods, and rural farmlands often feature magnificent old trees that have been spared the ax. A couple of excellent examples of these oak remnants are on Pacific Lutheran University's campus in Tacoma, Smith Park in Oak Harbor, and the Seward Park Uplands neighborhood in Seattle (where many of the roads have "oak" in their name).

The tricky part to spotting these more urban or sub-rural trees is to not be confused by the presence of English oak (*Q. robur*), pin oak (*Q. palustris*), and red oak (*Q. rubra*), introduced species that have now naturalized in some developed areas. There is also a plethora of other non-native oak species marketed by the horticultural trade.

The best examples of the pre-colonial forests, woodlands, savannas, prairies, and riparian areas that include Garry oak are in some of Washington's Natural Area Preserves (NAP) and State Wildlife Areas (SWA). The Washington Natural Heritage Program recognizes four major ecotypes that include Garry oak, and more than 16 subtypes. (Many other types have been classified in Oregon, California, and British Columbia, including two other shrubby varieties, *Q. garryana* var. *breweri* and *Q. garryana* var. *semota*, both native to California.)

The bosque on Indian Island is an example of the North Pacific Oak Woodland ecotype, which is most common in the Puget Trough, the Willamette Valley, San Juan Islands, and Whidbey Island. These forests may be co-dominant with Douglas-fir (*Pseudotsuga menziesii*), grasses, sedges, and shrubs, and may also include forbs such as blue camas (*Camassia quamash*),



Oak seedlings ready for planting. PHOTO: JANET WELCH

fawn lilies (*Erythronium oregonum*), and chocolate lilies (*Fritillaria affinis*). The 17-acre Oak Patch NAP on south Kitsap Peninsula is one well-preserved remnant of this type.

Two larger remaining oak forests of this type in Washington are the 314-acre Bald Hill NAP south of Tacoma in Thurston County, and the 318-acre Washougal Oaks NAP, about 20 miles east of Vancouver in the Columbia River Gorge. The Washougal NAP is said to have been visited by the Lewis & Clark expedition in the early 1800s, and in late spring also features “vast meadows of blue camas stretching up to the oak covered hillsides,” according to the Washougal Oaks NAP website.

The photo by Mary Ingels on the cover of our 2022 WNPS calendar and Native Plant Appreciation Month poster features a Garry Oak in the Tieton River Canyon, 20 miles west of Yakima. This is part of the Washington Department of Fish and Wildlife’s Oak Creek Wildlife area. Oak woodlands in this region are classified as East Cascades Oak-Ponderosa Pine Forest and Woodlands, and are found in the eastern Cascades foothills and eastern Columbia River Gorge. Douglas-fir may also be co-dominant in these areas, with a shrubby or grassy understory.

The rarest of all the Garry oak ecotypes is the Willamette Valley Upland Prairie and Savanna. What remains after extensive agricultural development is mostly in Thurston and Pierce counties, as well as smaller patches in the San Juan Islands and on Whidbey Island. Some of the best examples of this very rare ecotype are preserved in the Scatter Creek SWA in Thurston County and at Joint Base Lewis-McChord.

Throughout western Washington, at low elevations east and west of the Cascades, oaks are also found in ecotypes classified as North Pacific Lowland Riparian Forest and Shrubland. These habitat types are less rare than the others, but still considered Imperiled (S2).

All of these ecotypes suffer from habitat loss due to urban or agricultural development, cutting for firewood and fenceposts, and heavy cattle grazing. Another primary factor that

added to their demise and degradation is fire suppression, since without frequent fire intervals of 5-30 years, Douglas-fir forest can quickly take over oak and prairie landscapes. Native peoples who once harvested acorns and camas bulbs for food kept the groves healthy for thousands of years by setting fires in the fall, after the harvest and when plants had gone to seed. Many of our NAPs and SWAs are engaged in efforts to restore pre-colonial fire regimes. Savanna/prairie restorationists are also working with regional tribal groups to incorporate and revive local traditional ecological knowledge of management practices for harvesting wild foods.

Although setting fires on Indian Island is not part of their restoration plan, Janet and Willi have continued to foster hundreds of oak seedlings. Genetic diversity was introduced from acorns collected on Jones Island in the San Juan Islands. About 40 of those have been planted around Oak Bay, and 300 planted on several islands in the San Juan archipelago. They hope that their efforts will make a difference to ensure that there will still be oaks along the rocky shores of Indian Island in another hundred years.

If you have room in your yard, you too can make a difference by planting young oak seedlings or saplings. In just a couple of decades, you or your children can relax in their shade. The Oak Harbor Garry Oak Society on Whidbey Island has a complete guide to growing and planting oaks. Learn how at their website: <https://ohgarryoaksociety.org/how-to-plant-oak-trees/>.

Even better, make time to visit one of the many parks and preserves around Washington where Garry oaks have been growing for millennia, so that you can experience these icons of Washington’s native flora in the majesty and diversity of a wild landscape.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

Katherine Darrow is a member of the Olympic Peninsula Chapter of WNPS. An earlier version of this article was first published in The Port Townsend & Jefferson County Leader on April 29, 2020.



If you’d like to learn more about Garry oaks and their role in ecosystems of the Pacific Northwest, be sure to register for the presentation by oak ecologist David Peter of the US Forest Service. Titled “**The White Oak of the NW: The Story of an Arboreal Shape-Shifter**,” this program will be live on Zoom on Monday, April 18, at 7:00 p.m. See the WNPS Events page for more information: <https://www.wnps.org/events>

Green Mountain— Truth in Advertising

by David E. Giblin, Ph.D.

University of Washington Herbarium, Burke Museum

Green Mountain is a name that could describe a lot of peaks in Washington given our terrain and forest cover. I have been to two—one in Kitsap County that is forested to the summit, and one in Snohomish County that reaches above treeline with a smattering of alpine habitat topping its expansive subalpine meadows—but there may be more. The Snohomish County Green Mountain may be the most aptly named peak in Washington.

I was aware of this destination for years, but the trailhead's location up the Suiattle River Road made it inaccessible for over a decade due to major road washouts from a historic October 2003 rainstorm. It took 11 years to bring all the funds, equipment, permits, etc. to reconstruct the road and reopen it in October 2014. It would be another seven years before I finally made it there. In early August 2021 University of Washington students Ava Kloss-Schmidt and Leo Linder and I included it in my 50 Peaks Project (botanical surveys of 50 alpine peaks in Washington's Cascades). It was a truly memorable outing.



Leo Linder at the top of Green Mountain. PHOTO: DAVID GIBLIN

The trail starts out in dense forest with a standard mix of montane forest understory species. We saw candystick (*Allotropa virgata*) and green orchid (*Platanthera stricta*) along the way. A few miles in, the trail emerges onto a southwestern and western-facing slope covered in massive swaths of subalpine flower species—cow parsnip (*Heracleum maximum*), Columbia lily, (*Lilium columbianum*), and western columbine (*Aquilegia formosa*), to name a few. This also marked our first views south to nearby (relatively speaking) Glacier Peak. It was also here that we encountered plague-like quantities of grasshoppers that flew out in front of us like waves as we hiked.

Further up the trail is a very nice set of small ponds that serve as a good rest stop or lunch spot before making the mile-or-so push to the summit that includes about half (1,500 feet) of the total elevation gain of the hike. There are lots of switch-



Looking east from Green Mountain. PHOTO: DAVID GIBLIN

backs and places to catch your breath as you look south to not only Glacier Peak but to an abundance of peaks that include Whitehorse and Three Fingers. The expansive meadows on the north side of the trail are clearly the origin of the mountain's name—it may be one of the largest and greenest subalpine slopes I've seen in Washington. Viewed either from a distance or close up, the meadow is almost carpet-like, with masses of bistort (*Bistorta bistortoides*) rising above the fields of grass that are broken up here and there by a few low rock outcroppings and clusters of trees.

The last quarter mile is steep, but once on top the views east and north are among the best in the Cascades. Green Mountain is set off by itself, so there are no peaks to obscure your views. The vistas into the North Cascades are particularly stunning. No doubt the isolation of the peak made it a good candidate for a lookout, which remains. There are lots of plants to find on top, perhaps none more surprising than maple-leaf currant (*Ribes acerifolium*). Other things we found up there included pale agoseris (*Agoseris glauca*), alpine sandwort (*Cherleria obtusiloba*), golden fleabane (*Erigeron aureus*), sulfur buckwheat (*Eriogonum umbellatum*), mountain-sorrel (*Oxyria digyna*), Davidson's penstemon (*Penstemon davidsonii*), tufted saxifrage (*Saxifraga cespitosa*), and spreading stonecrop (*Sedum divergens*).

There is a plant list for Green Mountain that you can download from the WNPS Plant Lists database (<https://www.wnps.org/plant-lists>) that lists 160 species for the whole trail, so there is plenty to see. Mid-July is probably the earliest that you want to go to make sure it's snow-free at the top, and mid-August would probably be the end of the bloom period (estimates based on typical snow-year and snowmelt rates).

There is a complete description for the hike at the Washington Trails Association website (<https://www.wta.org/go-hiking/hikes/green-mountain>), where they report the roundtrip distance at 8.5 miles with 3,300 feet elevation gain and high point of 6,500 feet. The trailhead is a long way up the Suiattle River Road, with the last six miles on a spur road that is a little rough in places (nothing major). It is well worth the drive, and the rewards of hiking to the top far exceed the effort involved.



Destination—WNPS Conservation Around the State

by Becky Chaney, WNPS Conservation Committee Chair

Every year, WNPS Conservation activities support the restoration and conservation of native plant habitats. As a rule, these places are not gardens. They are environments that will support native species, suited to the site and the wildlife they attract, that are either compromised or worthy of protection. And every year, WNPS offers hikes and excursions that are notable for their unique native plant species and habitats. Through volunteer leaders, webinars, and plant lists, WNPS contributes to our understanding of Washington's flora. Knowledge is shared, acquaintance-to-acquaintance, friend-to-friend, generation-to-generation.

This year, when venturing out for your favorite wildflower viewing, consider including a treasure hunt of 2021 WNPS conservation activity sites. These areas are distributed around the state and your WNPS donations support their success. They are works in progress—restoration can include a step backward now and then, combined with steps forward. All have dedicated individuals working to make the projects successful. All contribute to hope for our future and the native plants we love.

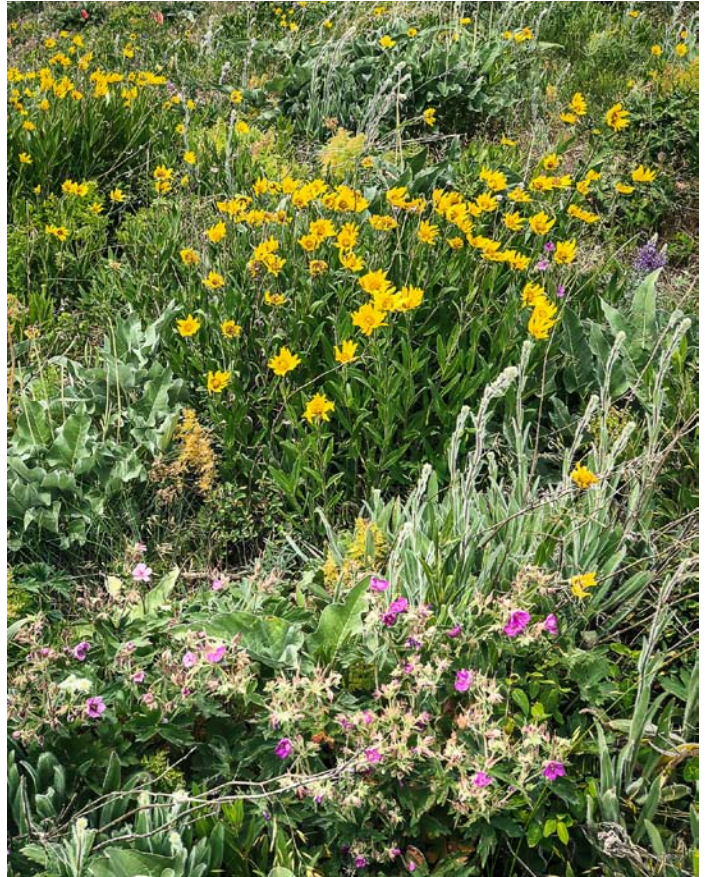
Clark County: Ridgefield National Wildlife Refuge, established in 1965 as wintering habitat for the dusky subspecies of Canada Goose, is working to restore native habitat. Friends of Ridgefield are using supplies funded by WNPS for on-site cutting and seed propagation of native plants for refuge restoration sites. On Bell's Mountain, in the Rock Creek Watershed, Clark Public Utilities District used WNPS grant funds to plant a layered Garry oak (*Quercus garryana*) habitat on a quarter-acre site formerly dominated by blackberry.

Jefferson County: Dabob Bay Natural Resources Conservation Area/Natural Area Preserve (NRCA/NAP) protects rare examples of intact salt marsh and sand spit plant communities within one of Washington's highest functioning coastal spit and tidal wetland systems. WNPS supported a proposed Department of Natural Resources (DNR) land transfer of an additional 826 acres of forestland into the DNR-managed Dabob Bay NRCA/NAP, while protecting the remainder of rare forest occurring on the Toandos Peninsula.

King County: Juanita Bay Park is on the shore of Lake Washington. Green Kirkland Partnership is attempting to establish native prairie plants common to prairie and oak savanna habitats here and is working to educate the public about these rare habitats. Conservation grant funding covered native groundcover seeds.

Thurston County: Lay Wildrose Preserve, at Rosedale Creek, retains one of the last thickets of native rose after which the town of Rosedale was named. Great Peninsula Conservancy used conservation funding, and in addition plants donated by

the South Sound Chapter, to restore a healthy, resilient plant community along the shoreline. This property is reserved for wildlife, so please don't disturb.



Palouse prairie remnant wildflowers at Whelan Cemetery near Pullman. PHOTO: MARK TURNER

Whitman County: Conservation Park, a former landfill, includes remnants of native Palouse Prairie. The Phoenix Conservancy is partnering with the City of Pullman to expand the presence of native species and to educate community members about their value. Whelan Cemetery, just north of Pullman, features pioneer gravestones surrounded by prairie species and is maintained by the Palouse Prairie Foundation. WNPS grants funded invasive species removal at both these sites.

These 2020-2021 projects, completed during the pandemic, are efforts of true dedication. Despite a wide variety of obstacles, the individual and organization awardees carried through their commitment to Washington's native plants and completed their projects. Cheers to all of them! More on these places and projects can be found online. Can you find them? If you go, I'd love to know. And if you or a friend have a need for future restoration funds consider applying for a WNPS Conservation Grant. Information can be found year-round on the WNPS website: <https://www.wnps.org/conservation-grants>.

Becky 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.



Bigleaf Maple Decline tied to Changing Climate

by Jim Kling

Bigleaf maple (*Acer macrophyllum*) is a woodland staple in the Pacific Northwest. It grows best where there is a lot of soil moisture, such as river terraces, floodplains, seepage sites, and of course temperate rainforests. Their stumps often resprout after logging to form thick, new stands. Bigleaf maple is one of the few trees that can support epiphytes within urban and suburban forests. It provides habitat for wildlife and is an important cultural species.

But like some other native trees, the bigleaf maple is declining. Reports in 2011 detailed deformed and wilted leaves, crown dieback, and tree mortality. Initially, researchers suspected changes in nutrient cycling, introduction of toxins, or shifts in the climate beyond the tree's ability to adapt. Other reports had suggested that these stressors lead to reduced growth in forests overall and for several individual species.

To better understand what is happening to bigleaf maples, researchers at the University of Washington, the US Forest Service, and the Washington Department of Natural Resources examined their distribution in space and over time in urban, suburban, and wildland forests in western Washington (Betzen et al. 2021). They collected samples from the soil and foliage to determine the levels of specific elements and to identify pathogens. They extracted stem cores to determine spatial and temporal patterns of healthy and declining trees.

The researchers found no associations between decline and tree age or size, plant pathogens, or insects, suggesting that the cause of the decline was not biologic. Instead, greater decline occurred in regions with higher mean and maximum temperatures. Previous studies had shown that heightened temperatures are linked to declines in other tree species (Allen et al 2010, and van Mantgem et al, 2009).

There was also more decline among trees near paved surfaces and development, and in the presence of the metal chromium (Cr) in the soil and arsenic (As) in the trees' foliage. Both elements are linked to industry. Though the researchers couldn't tie these toxins directly to tree growth, they did find higher levels of the element silicon in stems that didn't show signs of decline. Silicon has long been known to benefit plants under drought and high-salinity conditions, though the specific mechanism isn't known. It is even being considered as an additive to improve the yield in crops under stress (Zargar et al. 2019).

Tree core samples showed high levels of growth variation in bigleaf maples since 2011. Where it was growing alongside Douglas-fir (*Pseudotsuga menziesii*), bigleaf maple grew at lower rates. Growth rates were also lowest in years with the hotter, dryer summers.



Bigleaf maple in flower with its namesake leaves unfolding from their buds. Many Bigleaf maples flower and leaf out normally in spring but show crown dieback in summer, evidence of advancing decline.

PHOTO: ELLEN KUHLMANN

"We provide evidence that warm temperatures and local site conditions, particularly hotter urban sites that are associated with high concentrations of Cr and As, are predisposing *A. macrophyllum* to decline, even in the absence of a detectable biotic agent. Given the lack of detected biotic agents, abiotic factors could be directly causing mortality to *A. macrophyllum*, and could also sufficiently weaken trees, making them vulnerable to opportunistic biotic agents that might otherwise not cause mortality," Betzen et al. (2021) wrote.

The new study conflicts with earlier work that simulated future climate conditions and predicted that bigleaf maple's adaptivity would counter warming temperatures (Case et al 2015). The authors of that study suggested that bigleaf maple may adapt to changes more easily because it can reproduce quickly after disturbances, and because its seeds can travel long distances. However, other studies have shown that bigleaf maple is declining in other parts of its range. The new work implies that the vulnerability of bigleaf maples to heightened temperatures and drought conditions may have been underestimated.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

Jim Kling is a science and medical writer based in Bellingham, Washington. Jim is a member of the Koma Kulshan chapter and is the editor of the chapter newsletter.



Species Profile: Coronis Fritillary, Observations Through the Seasons

by Melanie Weiss

Reprinted with permission from G'Num, the Washington Butterfly Association's newsletter (November 2021, Volume 22, No 4)

In visiting a new shrub-steppe site this spring, I found a bountiful array of early blooming flowers, including several buckwheats (*Eriogonum* spp.) and the sagebrush violet (*Viola trinervata*). The latter is a host plant for the Coronis Fritillary (*Argynnis coronis*). I made a mental note of this for later reference.



Sagebrush violets (*Viola trinervata*) on the L.T. Murray Wildlife Area Whiskey Dick Unit. PHOTO: MARK TURNER

The Coronis is one of Washington's first fritillaries to emerge in the spring after overwintering as first instar larvae in the shrub-steppe and lower canyons. In areas that I frequent in central Washington, they burst onto the scene with fresh orange coloring and high energy in early May. Their appearance is celebrated by many in our Washington Butterfly Association (WBA) community. I've marveled at

their arrival each spring and their remarkable journey as the season progresses.

After emergence, Coronis begin a migration to higher elevations where nectar is more plentiful as the shrub-steppe soon becomes hot and dry. During the summer they may be seen in high mountain meadows surrounding the Columbia Basin and beyond. Some years they are seen in the subalpine meadows of Mount Rainier National Park. In late summer the species returns to the shrub-steppe for egg laying. Their seasonal migration has been documented by David James and Jon Pelham (*The Journal of the Lepidopterists' Society*, 2011).

The appearance of Coronis once again at lower, now dry, locations is a sign to me that the season is drawing to a close. Rabbitbrush (*Ericameria nauseosa*) is the primary nectar source remaining and is a butterfly magnet at this time. Coronis and other late season species may be seen in large numbers on the plant. Nectar is critical to sustain Coronis for the last and most important job of egg laying. Their abundance this past September was a marvel to observe.

When I reported to Jon Pelham the large number of Coronis I was seeing this fall, he nudged me to search for egg laying activity. The mental flag I planted in the spring when observing the sagebrush violets started waving.

On returning to the "new" shrub-steppe site, the dry bushes and desiccated plants presented a very different landscape than what I had seen earlier in the season. The sagebrush violet, critical for Coronis larvae, had senesced by this time with only pale, dry leaves remaining. But I was amazed to see Coronis flying in the area. Fueled with nectar from nearby rabbitbrush, individuals were on the wing as I walked out to the site and at the location itself where, within an hour, I detected 10 female Coronis exhibiting egg laying behavior. (Additional individuals were seen after the first hour.)

Females flew several feet above the ground, periodically dropping to the substrate composed of dirt, dry plants,



Coronis Fritillaries nectaring on gray rabbitbrush (*Ericameria nauseosa*). PHOTO: MELANIE WEISS

twigs, rocks, dried grasses and the senesced violets. After a brief amount of time at one site, another location would be visited a short distance away. It was fairly easy to follow these females from site to site for observation and photos. Through their own means they located the desiccated violet plants that would provide fresh spring growth for larvae after leaving diapause in the spring. David James suggests, "It must be volatiles given off by the dead and drying violets... it couldn't be a visual thing." Although I didn't see each individual ovipositing, I observed a few doing so. I'm confident that either egg laying or surveying for a potential site is what was occurring. The behavior of the females was enthralling, and I let them lead me around the area as they went about the important task of laying this season's eggs.



Shrub-steppe in fall. PHOTO: MELANIE WEISS

I visited the area on two additional dates and observed the same behavior, but with fewer and more worn individuals present. The eggs hatch soon after being laid, and the first instar seeks a place of safety for diapause during the cold season ahead. Needless to say, I was excited to be able to observe this final act of the adult *Coronis* which also marks the beginning of next year's brood!

Butterfly abundance in the warmer months is celebrated and enjoyed by many of us. Seeing the rabbitbrush in full bloom and alive with activity every fall is a marker for me that the season is once again changing. Although mostly out



Ovipositing *Coronis* among desiccated vegetation. PHOTO: MELANIE WEISS

of sight, the fall season's quieting for the next stage of metamorphosis is also remarkable. A wealth of life rests in the detritus of steppe and forest, under rocks, in tree bark, and other concealed locations during the cold season. The rabbitbrush party is a great way to celebrate this annual transition. And for *Coronis*, egg laying seals the deal for the emergence of a new generation next spring.

As always, I am grateful to our experts who so generously share their wealth of knowledge. And also, thanks to Vicki and Mike Elledge who excitedly directed me to the shrub-steppe site above.



Worn, end of season *Coronis*. PHOTO: MELANIE WEISS

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

Melanie Weiss lives and works in Bellevue, WA. She has spent ten years as a citizen scientist for the Cascade Butterfly Project, participated in butterfly counts, led field trips and currently serves on the Board of the Washington Butterfly Association. An appreciation of native plants has grown out of her study of butterflies and enjoyment of butterfly photography.



Unique Habitats of Lake Chelan: Rare Plants Occupying an Equally Rare Geologic Niche

by Josh Wozniak

Lake Chelan is spectacular: At 50 miles long, it is a narrow, glacially-carved trench that extends 450 feet below sea level from a lake surface at 1,100 feet (Tabor and Haugerud 1999). Extending from the montane heart of the North Cascades to the rolling foothills and shrub-steppe that surround the town of Chelan, the lake is an aquatic thread that connects a variety of

(Alverson and Arnett 1986). The areas surrounding the lake also contain a number of rare plant species, including some that occur nowhere else in Washington. One of these species is *Pellaea brachtyptera* (Sierra cliffbrake), identified as a priority for study by land managers in North Cascades National Park and Okanogan-Wenatchee National Forest. Its only known occurrence in Washington is along the north side of the lake, in a handful of populations identified during plant surveys in 1986 (Alverson and Arnett 1986). Otherwise, it occurs primarily in the Sierra Mountains of California, extending north along the Cascades Range to central Oregon (Camp and Gamon 2011, Hitchcock and Cronquist 2018, Oregon Flora 2021, Hickman 1993).



Sierra cliffbrake (*Pellaea brachtyptera*). PHOTO: KATIE MESSICK

wet, dry, and rocky landscapes. The lake provides a fresh water resource to wildlife, has been a transportation corridor for millennia (NPS History 2021), and creates unique climatic effects on the landscape. It can form a thermal buffer to temperature extremes of day and night, summer and winter, and confers humidity and seasonal retention of low clouds. It can also funnel howling winds from the mountains or the arid east, parch the landscape, and fan huge wildfires.

These climatic effects result in a variety of habitat niches and a resultant flora that is robust and diverse. Species typical of both the east and west flanks of the Cascades Range are well-represented, often in unique mixed associations that rarely co-occur

Pellaea brachtyptera is a member of the family Pteridaceae, the maiden-hair fern family (Hitchcock and Cronquist 2018). In addition to its common namesake, *Adiantum*, the family also includes several rock-loving ferns in Washington: *Aspidotis densa* (Oregon cliffbrake), three species in the genus *Cryptogramma* (parsley-fern), two *Myriopteris* (lace-lip fern) species, and *Pentagramma triangularis* (gold-back fern). Four species of *Pellaea* occur in Washington, all with very limited distribution.

Pellaea brachtyptera's habitat preferences are loose rocky slopes associated with cliffs and rocky outcroppings with sparse forb and shrub growth. Exposures tend to be southerly. Combined with extremely well-drained coarse soils, these

sites are xeric to aridic. The sites are located within a spectacular complex of dry meadows, open forests, and dense shrub thickets. These habitats are very prone to impacts from fire, forest encroachment from fire suppression, and invasive species. They occur near cliffs and talus fields, further adding to the vulnerability of the populations to rockfall, landslides and other physical disturbances. Based on these criteria, agency botanists prioritized surveys for this species and worked with the University of Washington Rare Care program to begin comprehensive surveys for this species in 2016.

Rare Care volunteers Katie and Steve Messick were given the assignment in 2017; their reconnaissance efforts determined that the optimal season for comprehensive surveys, based on phenology and seasonal desiccation, would be late spring. Survey work that year also cultivated an intense appreciation for the diverse rock fern community and rugged, exposed terrain in which the populations occur. That work also suggested there could be a systematic error in the spatial data (i.e., latitude/longitude values) associated with the historical data (datum shift, or other offset) that required further investigation and a follow-up survey.

Katie and Steve returned in May 2018, joined by Julia Munger, Shelby Petro, George Ritchotte, and myself. Survey work began near Rainbow Falls, and the population distribution did indeed support the hypothesis that the archived mapping was consistently about 1,500 feet horizontally and 200-300 feet vertically offset from the actual population locations. This certainly contributed to the difficulty previous surveyors experienced in attempting to relocate these populations. The survey crew in 2018 relocated all the populations in the vicinity of Rainbow Falls and identified a number of new populations in similar adjacent habitats. This crew returned in 2019 and completed surveys of all the previously identified populations within the valley upstream of Stehekin, and those within a day's walk down lake. They confirmed the persistence of all but one population, located in an area that experienced a large fire in 2010 and was now dominated by a robust, neck-deep stand of *Ceanothus velutinus*. It is unknown whether the *Pellaea* is persisting in the understory of the *Ceanothus* and downed logs, but if so, they escaped our detection.

In 2019 a number of new populations were mapped, and suitable habitat throughout the valley was searched to ensure the survey was comprehensive and not biased only towards previously mapped populations. I returned in 2020 (Covid and appendectomies kept the crew to a member of one) to complete the surveys near Stehekin, survey as far down lake as practical for one day, and survey other suitable habitat upvalley. Katie Messick and I returned in May 2021 to complete the surveys of the remaining populations located downlake from Stehekin. Dropped off by the boat at Moore Point, surveys extended 12 miles eastward to the end of the trail at Prince Creek. A new population was found near Moore Point, and as we walked down the trail the number and size of the populations began to increase, culminating at the south end of the



Sierra cliffbrake (*Pellaea brachtyptera*). PHOTO: KATIE MESSICK

trail where hundreds of populations occur in a fascinating and unique landscape co-dominated by another locally rare plant with a primary range in the California Sierra, *Arctostaphalos patula* (green-leaf manzanita).

Throughout its distribution at Lake Chelan, *P. brachtyptera* grew in loose rocky soil, often near rock outcroppings and warm exposures, with a preference for sites with fine views of the lake. Except for at its southernmost extent, the species occurred in a narrow elevation band, about 1,000 feet above the valley or lake surface, in areas with sparse vegetation adapted for harsh, dry conditions. *Arctostaphalos nevadensis* (pinemat manzanita), *Woodsia oregana* (Oregon cliff-fern) and *W. scopulina* (cliff-fern), *A. densa* (Oregon cliffbrake), and *Toxicoscordion venuosum* (death camas) were common associates. Thorough searches of large areas dominated by those species and similar geographic conditions in this valley, adjacent valleys and similar habitats in the eastern Cascades found no additional populations. This led to questions about why this spot and not others, and how it came to be here. Geology was considered as a quality that could render a site unique for plant community development (Kruckeberg 2002). However, both geologic mapping and analyzed samples from the sites concluded the geology (orthogneiss derived primarily from tonalite) is quite average and typical in widespread areas throughout the Cascades Range. One geologic mentor went further to suggest: “Nothing distinctive about the bedrock geology at these locations. I’d think the chemistry of these rocks would be pretty vanilla and not at all chemically unusual like serpentine. For commonalities, I’d be looking at aspect, topography, and climatology.”

This wisdom led me to more thoroughly research the sites compared to other similar habitats, and I came across a fairly substantial characteristic unique to this valley that results from the lake. The deep chasm that cradles the lake has also provided a repository for vast amounts of sediments eroded from the surrounding mountains, and that lie hundreds of feet deep at the bottom of the lake (Tabor and Haugerud 1999). In adjacent valleys and most valleys of the eastern Cascades, those sediments fill the valley floors to around 2,000 feet where they start to merge with the foothills, burying the potential habitat



Sierra cliffbrake (*Pellaea brachtyptera*). PHOTO: KATIE MESSICK

for the species. The lake may well confer other climatic features that allow or encourage *P. brachtyptera*'s persistence.

Soils with limited competition from vascular plants, mosses, and lichens (typically disturbed soils, or those naturally colonized by the gametophytic (haploid) life stage of ferns (Parish et al 1996, American Fern Society 2021). This might help explain the diverse and robust fern community that we observed. It is interesting to consider that the gametophytes of many ferns occupy a broader geographic range or different ecological niche than the sporophyte (diploid) life stage and that the gametophytes of even rare ferns could be quite widespread.

We reflected on the possible sources and trajectories of these unique populations. Were they a relic left behind from long-lost landscapes, slowly fading under our watch? Were those landscapes, the more distant ones, of ice and rock, or a more recent landscape of natural fire regimes and management by native tribes? Was this species brought here with propagules attached to humans, livestock, or wildlife? Or were the spores blown here in a mighty wind or volcanism (Mazama), finding just the right substrate and conditions over the last few thousand years to take root? How many climate changes have these populations weathered? Are they expanding in the sudden warmth we have created? I look forward to re-visiting these areas throughout my life to watch and learn from their patient teachings.

Special thanks and acknowledgment to the plant survey and review team named above and the geologic mentorship and inspiration provided by Dr. Jeff Parsons and Art Campbell.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

Josh Wozniak is a professional wetland scientist and botany enthusiast who conducts plant surveys as a volunteer for the UW Rare Care program and other non-profits, as a private consultant, and as a personal undertaking. He has compiled numerous published and unpublished floristic inventories of favorite places. He leads the environmental sciences group at Parametrix and is president of the Pacific Northwest Chapter of the Society of Wetland Scientists.



Aphyllon franciscanum (Orobanchaceae), The Most Recent “Cryptic” Species Added to Washington’s Flora

by David E. Giblin, Ph.D.

University of Washington Herbarium, Burke Museum

The term “cryptic species” is typically applied when two or more species are hidden under a single species name. The cause for this situation is the lack of easily recognizable morphological differences that we humans can use to distinguish Species A from Species B (and possibly Species C as described below). In most instances, species have morphological differences that allow us to distinguish them (e.g., flower size and color, leaf shape and size, hairiness, habitat, height, etc.).

Nevertheless, morphological differences between species can be subtle, so unless you are a specialist in a particular genus any two species can “look alike” to the eye. Grasses and sedges (*Carex*) are a good example. This is why specialists in specific taxonomic groups are so important. My colleagues here in the Pacific Northwest, Mark Darrach (*Lomatium*—biscuitroots), Mark Egger (*Castilleja*—paintbrushes), Dr. Barbara Ertter (*Potentilla*—cinquefoil), Dr. Barbara Wilson (*Festuca*, *Carex* and *Sedum*—fescue, sedges, stonecrops), and Peter Zika (*Carex* and *Sedum*—sedges and stonecrops) have devoted their careers to extensive and intensive studies of particular plant genera. Consequently, they have discovered and described new species in their respective groups studying morphological differences. Increasingly, DNA-based analyses are being used to complement morphology-based studies to discover new species. With this as context, I recently learned of a new cryptic species for Washington’s flora *Aphyllon franciscanum* (Franciscan broomrape).

The genus *Aphyllon* (broomrape) is itself cryptic. For nearly two centuries it was called *Orobanche* (broomrape) here in North America. However, as a graduate student at the University of California-Berkeley, Dr. Adam Schneider used DNA-



Figure 1. *Aphyllon fasciculatum* (clustered broomrape). PHOTO: TIM SEIPEL (CREATIVE COMMONS ATTRIBUTION-SHARE Alike 2.0 GENERIC LICENSE)



Figure 2. *Aphyllon franciscanum* (Franciscan broomrape). PHOTO: BEN LEGLER

based analyses to determine that *Orobanche* is a primarily European genus that has an evolutionary history distinct from the species here in North America (Schneider et al. 2016). The earliest name used for the North American species is *Aphyllon*, and that is the name now used. No *Aphyllon* species occur in Europe, and only one *Orobanche* species occurs in North America (*O. minor*—hellroot).

Adam recently turned his attention to a species broadly distributed in North America that occurs in Washington—*Aphyllon fasciculatum* (clustered broomrape; Figure 1). Through a combination of detailed morphological and DNA-based analyses of herbarium specimens, and examination of iNaturalist photos, he discovered a new, distinct species. *A. franciscanum* (Figure 2) was “hiding” within what was thought to be just morphological variation of *A. fasciculatum* (Schneider and Benton 2021). Adam not only found clear morphological markers to distinguish the species (corolla color, shape of the petal lobes, inflorescence architecture), but also host differences. *Aphyllon* species are parasitic because they lack photosynthetic leaves or stems. *Aphyllon fasciculatum* exclusively parasitizes sagebrush/wormwood species (*Artemisia* spp.), while *A. franciscanum* parasitizes a much broader range of species but no species of *Artemisia*.

This discovery is exciting news for us biodiversity scientists who track Washington’s flora. It underscores that despite centuries of trying to catalog each species that occurs here in Washington there remain undescribed elements of our flora. To fully conserve our flora we need to have a full accounting of what occurs here.

Interestingly, the newly described *A. franciscanum* is not rare—it is rather broadly distributed in Washington, and its range overlaps that of *A. fasciculatum*. I am deeply indebted to Adam for taking the time to look at all of the images in the Plants of Washington Image Gallery (<https://biology.burke.washington.edu/herbarium/imagecollection.php>) to decipher the two species. Also, assistants in the Herbarium imaged all of our *A. fasciculatum* specimens so that Adam could determine which were true *A. fasciculatum* and which were the new *A. franciscanum*. By doing so he helped us get an accurate understanding of the distribution of these two species here in Washington. To see the results of Adam’s work you can visit the pages for these two species in the Plants of Washington Image Gallery or search for them on the Consortium of Pacific Northwest Herbaria online database (<https://www.pnwherbaria.org/data/search.php>).

This is not the only recent example of “cryptic species” being added to Washington’s flora. A few years ago, Jason Alexander, Wayne Whaley, and Natalie Blain took a close look at what was called *Lomatium grayi* (Gray’s biscuitroot) here in the Pacific Northwest. They discovered that what we were calling *L. grayi* in Washington was actually two undescribed species, *L. papilioniferum* (butterfly bearing biscuit-root) and *L. klickitatense* (Klickitat biscuitroot), the latter of which is endemic to the Columbia River Gorge area of Klickitat County. Interestingly, they found that true *L. grayi* does not occur here in Washington—the closest populations are in southeast Idaho!

It will be interesting to see what additional species turn up in Washington in the coming years. Like the examples above, it is likely we already have specimens and images of these species in hand.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

David Giblin, Ph.D, is Collections Manager and Research Botanist at the University of Washington Herbarium of the Burke Museum of Natural History. His research focus is the distribution and diversity of the Pacific Northwest vascular plant flora.



Department of Corrections:

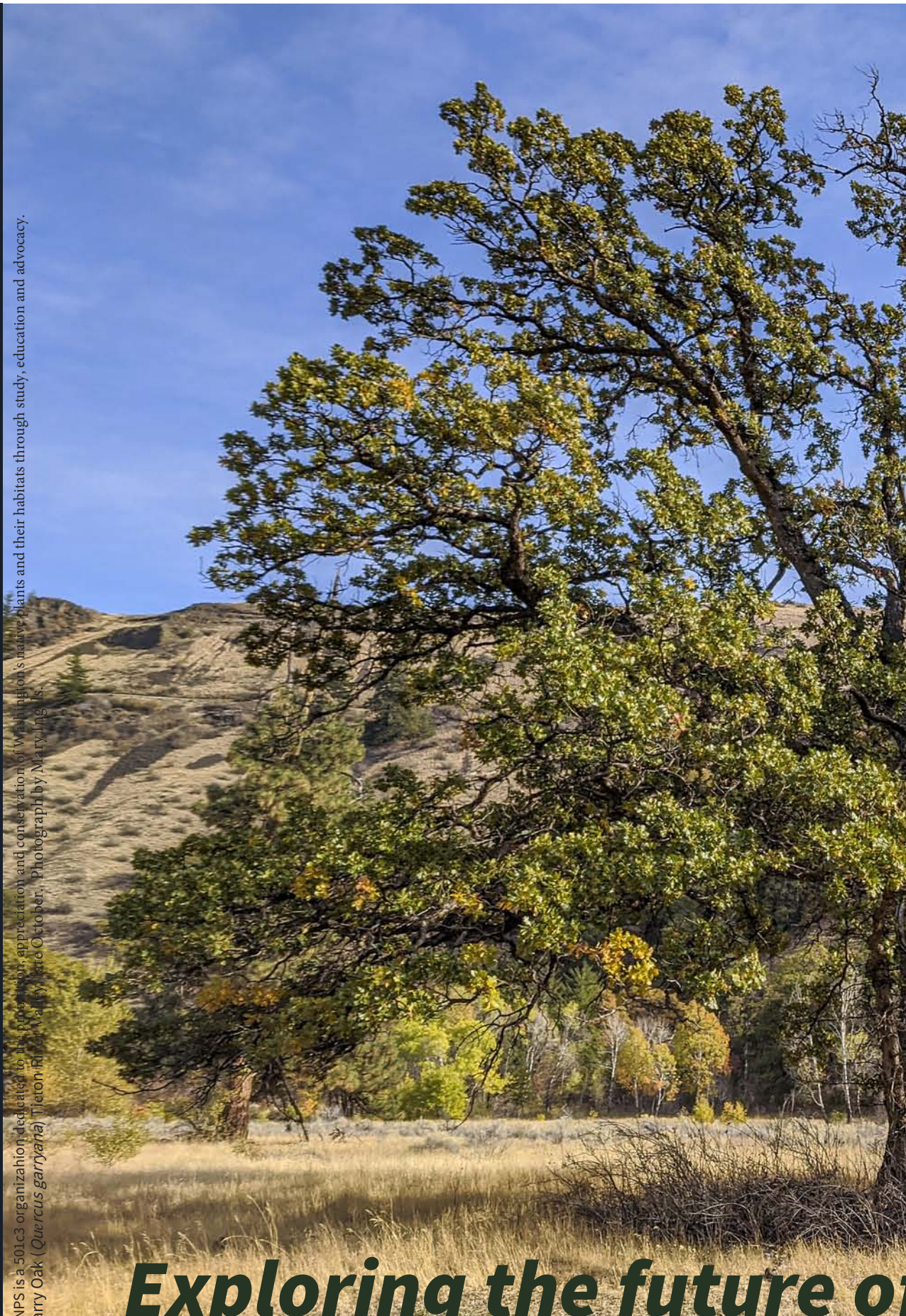
In the Spring 2021 article on Taylor’s draba, I mistakenly gave credit to Washington botanist Ron Taylor as the namesake of this species. Actually, it was named for the late Canadian botanist Roy Taylor, an expert on the flora of Haida Gwaii and formerly director of the University of British Columbia Botanical Garden, Chicago Botanic Garden, and Rancho Santa Ana Botanic Garden.

In the review of the second volume of the *Oregon Flora* in the Fall/Winter 2021 issue, the beautiful balsamroot on the book’s dust jacket was incorrectly attributed to Tanya Harvey (the book’s layout editor) rather than the actual artist, Bonnie Hall.—Walter Fertig, *Douglasia* Editorial Chair

Washington Native Plant Society

Native Plant Appreciation Month - April 2022

WNPS is a 501c3 organization dedicated to the preservation, appreciation and conservation of Washington's native plants and their habitats through study, education and advocacy.
Garry Oak (*Quercus garryana*) Tieton River Valley, late October. Photograph by Mary Ingels.



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How to Eat a Horsetail (*Equisetum* spp.)

by T. Abe Lloyd, Koma Kulshan Chapter

Spring has arrived. The cheerful song of the robin wakes me each morning, there is enough daylight for late afternoon frivolities, and the chorus frogs are calling so jubilantly into the night that they would lull me to sleep if I wasn't so excited to hear them. I open the window and cock my ear to the side to take in the sound. In the woods the bigleaf maple flowers are popping out of their over-sized buds and the birches have given their last drops of sweet water. Like the leggy frogs that leap enthusiastically in the warm air after a winter burrowed in frigid mud, the plants, too seem to be springing from the ground. Nettles grow visibly between my every-other day harvests and an often-overlooked edible—giant horsetail (*Equisetum telmateia*)—claims its place in the front of the seasonal lineup of tasty shoot vegetables.



Equisetum telmateia shoot. PHOTO: T. ABE LLOYD

In the Pacific Northwest we have several species of horsetail. At least four are edible and most are useful as sandpaper. Many people are aware of the scabrous, silica-rich qualities of this genus, and call them “scouring-rushes.” While there are no hard and fast rules to common names, the species with branches are often called “horsetails” and those without branches, “scouring-rushes.” I will use the name “horsetail” as a general term to cover one or more plants from both groups (i.e. the genus *Equisetum*, or a member thereof).

This article focuses on the edible attributes of horsetails, with a species focus on the esoteric edible tubers. I will start with descriptions of the edible species and provide details proportional to their importance, omitting the species not known to be edible.

The strongly branched dimorphic species

Giant horsetail (*E. telmateia*) is an herbaceous clonal species. New shoots emerge from an underground network of rhi-

zomes and tubers beginning in early to mid-March. The plants produce two types of shoots, with the fertile or spore-bearing shoots appearing a week ahead of the vegetative shoots. Fertile shoots are $\frac{1}{2}$ – $\frac{3}{4}$ " wide and 1–2' tall. The stems elongate between nodes which are covered with papery brown leaf sheaths. At the top of each fertile shoot is a cone-like structure (technically called a strobilus) that changes from green to white and eventually matures to brown when it begins releasing spores. The vegetative shoots are slightly narrower and taller at $\frac{3}{16}$ – $\frac{3}{4}$ " wide and 1½–4' tall. The nodes of the vegetative shoots are also surrounded by brown papery leaf sheaths, but they are smaller, giving room for the whorls of needle-like branches that give the plant its namesake appearance. The features that most easily distinguish giant horsetail require some cutting. A cross-section of the vegetative shoots shows a large hollow center that is much wider than twice the thickness of the walls, and a cross section of the branches shows that they are rounded.



Equisetum telmateia fertile and vegetative shoots. PHOTO: T. ABE LLOYD

Giant horsetails grow at low elevations in loose, damp soil. They are found from Bella Coola and Haida Gwaii in British Columbia southward along the coast to southern California. Their eastward range is mostly limited by the Coast Range in BC, and the Cascades in Washington and Oregon, except for a few isolated inland populations in the upper, wetter reaches

of the Columbia River watershed. This pattern continues into California where they flourish along the Coast Range but have only limited distribution in the Sierra foothills.

The name “horsetail” aptly reflects the similarity in appearance of the vegetative shoots to a horse’s tail. This resemblance is also captured in the genus name which means “horse bristle” in Latin. The species epithet comes from the Greek word *telmat* which means “wetland,” where the plants are often found. A geographically distinct subspecies of giant horsetail is found in Europe, Western Asia, and North Africa and retains the subspecies name *telmateia* whereas our western North American taxon goes by the subspecies name *braunii* (in honor of the German botanist Alexander Carl Heinrich Braun, 1805-1877, who specialized in spore-producing plants).

Common horsetails (*E. arvense*) are widespread throughout North America and the globe. From a distance, they can be distinguished from giant horsetail by their smaller size, more kinked branches, and longer innermost branch segments on each branch. This first segment is much longer than the sheath covering the main stem node in common horsetail, whereas in giant horsetail the first segment is shorter than the node sheaths. In cross-section, the needle-like branches are angled so strongly that they appear winged, and the void in the middle of

the main stem is equal to or less than twice the wall thickness. The fastidious botanist will also find that giant horsetails have 20-40 ridges around the stem while common horsetails have 10-15 ridges. At harvest time, the shoot thickness and wall to central void ratio are the most discernible differences.

The vegetative shoots of meadow horsetail (*E. pratense*) look very similar to common horsetail, but the reproductive shoots are greener and sprout branches after the spores are released. In the Pacific Northwest, they are only found in the Canadian Rockies, Northern British Columbia, and Alaska.

The weakly branched monomorphic species

River horsetail (*E. fluviatile*) and marsh horsetail (*E. palustre*) have patchy distributions throughout North America and the Northern Hemisphere and are likely frequently overlooked by botanists. Both usually grow out of standing water. Unlike the strongly branched dimorphic species described above, these only have one type of shoot, which has vegetative branches and a terminal reproductive cone. The needle-like branches are also more sparse and occasionally absent. A cross-section of the stem shows that river horsetail has a completely hollow stem and marsh horsetail has a stem with a honeycomb pattern. The keen-eyed will also notice that river horsetail has whorls with more numerous and finer branches than marsh horsetail, and sheaths covering each node that have shorter, finer, and more numerous teeth (usually more than 11 in river horsetail, and less than 11 in marsh horsetail).



Equisetum arvense fertile and vegetative shoots. PHOTO: T. ABE LLOYD



Equisetum fluviatile (left) and *E. palustre* (right). PHOTOS: T. ABE LLOYD

The unbranched monomorphic species

Both scouring rush (*E. hyemale*) and smooth rush (*E. laevigatum*) are *usually* branchless and have just have one type of shoot that is hollow in cross-section. Like the name suggests, scouring rush has very scabrous stems that make excellent sandpaper when dry. They are common on levees and other wet, sandy places. Stems are very stout and last for multiple years. Smooth rush is best distinguished by its annual, smooth stems that die back each fall, and its more limited distribution east of the Cascade Crest.



Equisetum hyemale (left) and *E. laevigatum* (right). PHOTOS: T. ABE LLOYD

Edibility

The fertile shoots of giant horsetails are best picked between March 15 and April 15 when they are 4–8" tall and the cones are still whitish. Harvested too early, they are hard to see and too small to be worth the effort; harvest too late and they become stringy and unpalatable. You'll know it is too late if the cones are brown. Pluck shoots at or below ground level and carefully peel off the coarse sheath that surrounds each node. These sheaths are filled with silicates that will sand away at your teeth. Once you have peeled the shoots, discard the cones, rinse off any dirt, and enjoy them fresh. Their mild flavor and juiciness are similar to celery, but they lack the annoying fibers. I didn't learn to eat giant horsetails until I was a Fairhaven College student and my friend Trent stuffed one in his mouth at the Outback Farm. Even though I ate many wild foods at the time, I looked on in disbelief thinking he would choke on the silicates or be poisoned by thiamin inhibitors, but when he showed up for class the next week, I tried one myself. They have been among my favorite wild shoot vegetables ever since. If you are feeling dubious, reserve judgement until after you read the ethnobotany section.

Note: Silicates and thiaminase are real concerns in mature horsetails, and only properly peeled young shoots should be eaten (Turner and Szczawinski 1991). Harvesters should also be careful to avoid collecting from roadsides, stormwater treatment ponds, and other potentially polluted areas as horsetails can assimilate heavy metals such as mercury (Matanzas et al. 2017).



Equisetum telmateia lineup. PHOTO: T. ABE LLOYD

The vegetative shoots of giant horsetail are also edible, but much more work for a product that is not as tasty. You must pick them before branches have started to extend horizontally. Remove both the sheaths (as above) *and* the branches since the leaves contain the same silicate grazing defense as the sheaths.

Fertile shoots of common horsetail can be peeled and eaten in the same manner as giant horsetail. They are more work for less volume, and, in my opinion, don't taste as good. The young vegetative shoots may well be edible like those of giant horsetail, but I can't see how they would be worth the trouble when the fertile shoots are available. The species epithet *arvense* comes from the Latin adjective "in the field," an apt name for this common agricultural "weed."

Ethnobotany

Closely-related species often are used in very similar ways. When I skimmed through Daniel Moerman's *Native American Ethnobotany* (1998) I quickly realized that Indigenous societies across the continent traditionally use seven species of *Equisetum* for similar things such as skin poultices, tonics for internal organs, and sandpaper. This account focuses on edible portions of species found in the Pacific Northwest.

The fertile shoots of giant horsetail (*E. telmateia*) are traditionally peeled and eaten by the Yurok in California (Baker 1981), Chinook (Harrison 1989), Saanich (Turner and Hebda 2012), Squamish (Turner and Bouchard 1976), Sechelt (Turner 1995), Upper Skagit (Theodoratus 1989), and Haida (Turner 2010).



Equisetum hyemale sandpaper. PHOTO: T ABE LLOYD

The Clallam (Gunther 1927) and Nuu-cha-nulth (Turner et al. 1983) eat both the fertile and vegetative shoots. The latter note that they are best harvested in April and early May, and that only the lower three quarters of the vegetative shoots are palatable. The Coast Salish (Turner and Bell 1971), Upper Stó:lō (Galloway 1982), and Nuu-cha-nulth (Turner et al. 1983) also eat the young strobilus atop the reproductive shoots. The Makah (Gill 1983) boil this cone for 10 minutes before consuming it. Only the vegetative shoots of giant horsetail are eaten by the Hesquiaht (Turner and Efrat 1982).



Equisetum telmateia fertile and vegetative shoots peeled. PHOTO: T. ABE LLOYD

The reproductive shoots of common horsetail (*E. arvense*) are eaten by the Squamish (Turner and Bouchard 1979) and the vegetative shoots, by the Hesquiaht (Turner and Efrat 1982). John Scouler (1905) observed the Lower Chinook eating the young shoots of common horsetail on April 15, 1825, but David Douglas (1914), who was traveling with him at this time, described it merely as a species of *Equisetum*. He did note that “the male stems are eaten by the natives in a raw state and sometimes boiled.” The young shoots of an unidentified horsetail are also traditionally eaten by the Coos, Lower Umpqua, and Siuslaw (Phillips 2016), which is probably *E. telmateia*, *E. arvense*, or both.

The Cowlitz pulverize the dried cones of scouring rush (*E. hyemale*) to mix with salmon eggs (Gunther 1973) and the Syilx and Sinixt eat the young cones of smooth rush (*E. laevigatum*; Turner and Bouchard 1980).

Many horsetail species produce starchy tubers on their rhizomes. In our region, tuber-producing species including giant horsetail, common horsetail, and river horsetail (*E. fluviatile*; Abrams 1940), and possibly a few other species covered in this account. The pioneering botanist John Lindley (1856) notes that the tubers of scouring rush (*E. hyemale*) are a “food in times of famine” and the tubers of river horsetail are said by Haller to be “the food eaten by the Romans under the name of *Equisetum*.” Theo Holm (1893) carefully dissected “pear shaped tubers” from giant horsetail and described their location “in clusters of two or three at a node of the rhizome.” As if Holm were directly addressing their edibility, he remarks that “a transverse section shows a very thin cuticle which has no incrustation of silica, and a starch-bearing parenchyma just inside the epidermis,”—in essence, no grit and lots of calories!

In our region, a few accounts of consuming these horsetail tubers are difficult to attribute to species. There are several understandable reasons for this. To begin, many early explorers were either encountering species for the first time or had little botanical training. Secondly, some cultural groups also used the same name for multiple horsetail species (see Turner and Efrat 1982; Galloway 1982). Additionally, settler colonial practices such as moving Indigenous Peoples onto reservations, limiting access to traditional foods, interrupting the transmission of knowledge between generations, and outlawing cultural practices greatly eroded food knowledge (Joseph and Turner 2020). Ambiguous and confusing nomenclature in many plant accounts are the result. Members of the Equisetaceae are variously called “horsetail,” “scouring rush,” “sand rush,” or worst of all, simply “rush.” The term “rush” is also used to describe edible roots from the bulrushes in the Cyperaceae and cattails in the Typhaceae. For example, James Swan (1857) described “the root of a species of rush, found on the sea-shore, of the size of a walnut, is eaten either raw or baked; its taste raw is similar to the Jerusalem artichokes, and baked resembles a mealy potato.” This large, good-tasting root may either be a species of bulrush (*Bolboschoenus*) or *Equisetum*. With those ample

caveats, I have done my best to clarify species or be clear when that isn't possible.

The tubers of various *Equisetum* species were once eaten by Indigenous Peoples from the Oregon Coast to Alaska but are likely not eaten any longer. One of the most detailed accounts comes from Lewis and Clark during their stay with the Tillamook while they overwintered on the Pacific. Lewis writes on January 23, 1806:

The root of the rush used by the natives is a solid bulb about one inch in length and usually as thick as a man's thumb, of an ovate form depressed on two or more sides, covered with a thin smooth black rind. the pulp is white brittle and easily masticated either raw or roasted the latter is the way in which it is most usually prepared for use. this root is rather insipid in point of flavour, it grows in greatest abundance along the sea coast in the sandy grounds and is most used by the Killamucks and those inhabiting the coast (University of Nebraska Press 2005).

He goes on to describe the vegetative characters in enough detail to confirm he is talking about the giant horsetail (*E. telmateia*).

Other early reports cannot be attributed to species. In the 1870s, the Makah considered "*Equisetum*" tubers to be one of their principal root foods. They were collected in the winter and early spring and eaten raw (Swan 1870). Early Missionary Myron Eells includes the roots of an "*Equisetum*" in a list of foods eaten by the Twana, Chemakum, and Klallam in the 1870s (Eells 1985). The Haida also ate the roots of an *Equisetum* species according to Charles Newcombe (in Turner 1995), who travelled to Haida Gwaii in the late 19th and early 20th centuries. The early naturalist and ethnographer George Gibbs provides a name for "horsetail roots" in Clallam and Lummi (1863) and translates the Nisqually and Skykomish names as "ground grape, the tuber of a species of *Equisetum*" (Gibbs 1877), which suggests their food use among these groups.

More recent ethnobotanical accounts provide more clarity on the species but fewer specifics about the tubers. Giant horsetail tubers were traditionally eaten raw by the Cowlitz, Swinomish, and Quinault (Gunther 1973). The tubers were boiled or pit roasted and served with grease by the Makah, Clallam, Quinault, Cowlitz, Lower Chinook, and Quinault (Gunther 1973; Fleisher 1980). The Cowlitz, Quileute, and Quinault all have names specifically for the roots (Gunther 1973), which suggests their cultural importance, although Gunther notes that the Quileute did not eat them. The Clallam harvested them adventitiously by waiting for storms to wash the tubers from the soil (Fleisher 1980).

Other species of *Equisetum* were possibly eaten in western Washington. According to Albert Reagan (1934), the Hoh and Quileute ate the roots of both smooth rush (*E. laevigatum*) and scouring rush (*E. hyemale*) and "consider[ed] them a great delicacy." They gathered the tubers for use in "medicine ceremonies" as well as dried them for future use. Reagan tasted them himself and said they have a "sweetish" flavor. Reagan's inclu-

sion of smooth rush is problematic because it is known mainly from east of the Cascades Crest. While his description for the plant is consistent with smooth rush, the Indigenous terms he recorded are cognates with Makah and Quinault terms reported by Gunther (1973) for giant horsetail. The University of Washington botanist George Neville Jones points out that Reagan's identification is erroneous because smooth rush doesn't grow in western Washington (1936 in Gunther 1973). However, an observation of smooth rush by Casey Lunzman (iNat-12559539) near Seaside, OR, and a collection by William Brandt (OSC-V-000481) near Astoria, OR, may suggest Reagan was correct. It is also worth noting the existence of shared uses between the Makah/Quinault and more distant Indigenous Peoples. The Pueblo ground smooth rush to make mush and the Hopi dried and ground smooth rush with cornmeal to make "ceremonial bread" (Castetter 1935).

Further north, the Inland and Iliamna Dena'ina (Russell 2012) still eat common horsetail tubers. These raw tubers are reportedly "sweet and juicy" and considered to be the "first fruit of the season" in the local taxonomy with names in the various dialects that translate to "underwater berry" and "bank berry." The small tubers are black on the outside and white inside and are collected after the spring floods expose them on sandy banks.

Among the Eskimo, the small tubers of common horsetail (Agar and Agar 1980), meadow horsetail (*E. pratense*), and possibly other species (Jones 1983) are collected. Meadow horsetail tubers are "white, crisp and sweet inside the black skin." They are eaten raw or with seal oil by the Inupiat and because they are so small "people chew them hull and all" (Jones 1983). These tubers were also eaten by the Anishinaabe (Reagan 1928).

The few accounts of harvesting horsetail tubers suggest that they are "much too tedious" to dig (Jones 1983) and were therefore harvested opportunistically by raiding rodent caches (Ager and Ager 1980; Jones 1983) or by looking for them in places where flowing water eroded them free of the soil (Russell 2012, Fleisher 1980).



Equisetum telmateia perfect stage. PHOTO: T. ABE LLOYD

Conclusions

What horsetails lack in botanical bling they make up for in practical versatility. Most species can be used to scour a soot-encrusted campfire kettle, giant and common horsetail produce tasty spring shoots, a few have edible cones, and giant, common, meadow horsetail—and possibly smooth and scouring rush—all have edible tubers. I believe the reportedly neutral to sweet flavor of the tubers, their ability to be eaten fresh or dried for later use, and their moderate size (at least for a few species) make them valuable additions to the cornucopia of Indigenous root foods in our region, and worthy of cultural revitalization efforts.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

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Postscript: Missing Plants Rediscovered in Washington

by Walter Fertig, Douglasia editorial chair

In the Spring 2021 issue of *Douglasia*, I wrote about efforts to relocate Washington's historical and extirpated plant species (see "What ever happened to Taylor's Draba? *Douglasia* 45(1): 7-13). I included a list of 104 missing native species that had not been relocated in the state since at least 1981 and invited readers to take up the search themselves. I even promised a "shout out" for "every reader who successfully rediscovers an historical or extirpated plant species."

Within days of that issue hitting people's mailboxes, I received an email from Paul Slichter noting that he had photos of three species from the historical list posted on the Flora & Fauna Northwest website (<http://science.halleyhosting.com/nature/pnwmenu.htm>). Sure enough, Paul had beautiful close-up images of alpine knotweed (*Aconogonon phytolaccifolium*) and Paddo (Mount Adams) rockcress (*Boechera paddoensis*) from Mount Adams, taken from 2002 to 2020. He also shared photos of naked (or torrent) sedge (*Carex nudata*) from the banks of the Klickitat River taken in 2012.

Shortly thereafter, Jack Nisbet, biographer of David Douglas and botany aficionado from eastern Washington, sent me a photo he took of ballhead gilia (*Ipomopsis congesta* var. *congesta*) from Stevens County, which was the first report of that species in the state since 1937. Alex Wright, graduate student at Washington State University, also contacted me with photographic evidence of a population of small-leaved brickellbush (*Brickellia microphylla*) that he relocated in Asotin County, last seen in 1948.

Over the course of the spring and summer, several additional reports of relocated species came across my desk. "ekohner," a 7th grade teacher from Vancouver, WA, posted an unlabeled flower photo from Klickitat County on iNaturalist that was eventually confirmed as varied-leaf miterwort (*Ozomeles diversifolia*) by Alex Wright—the first report of this species in the state since 1974. Laurie Heimbigner posted a mystery *Delphinium* on iNaturalist from Spokane County that was subsequently determined as Sutherland's larkspur (*D. sutherlandii*) by Jason Headley, a self-described bat enthusiast. The image clearly showed the white, nearly entire petals distinctive of this species (last collected in Washington in 1958).

Two new reports of formerly historical species came from the Burke Herbarium Image Collection website (<https://biology.burke.washington.edu/herbarium/imagecollection.php>). Unbeknownst to me, Robert Carr had rediscovered delicate spikerush (*Eleocharis bella*) in Stevens County in 2012 when he took a series of close-up photographs, posted on the Burke site. Carr took additional photos from a second site in Lincoln County in 2016. Patrick Loafman took some photos of low starwort (*Stellaria humifusa*) from a salt marsh in Clallam County in 2018 for the Burke webpage, the first report of this species since 1978. Subsequently, it was documented by Susan McDougall, Tynan Ramm-Granberg, and Patricia Johnson at four coastal wetland sites in Jefferson, Grays Harbor, and Pacific counties in 2021.

One other species was dropped from the historical list in 2021, though in this case it was because of a past misidentification. David Giblin, collections manager of the University of Washington Herbarium, was inspecting images on the Consortium of Pacific Northwest Herbaria website (<https://www.pnwherbaria.org/>) when he noticed a collection of soldier rockcress (*Boechera drepanoloba*) that looked amiss. The specimen (Lesher 74 WWB) from Tomyhoi Peak actually represented Lyall's rockcress (*B. lyallii*), a common alpine species in western and northern Washington. As this collection was the only known report from the state, it was removed from the historical roster and the WA Natural Heritage Program Review List.

All told, at least 10 species from the state historical list were relocated as a result of being highlighted in my article or through field work by intrepid botanists. But as we win some, we lose some. Three new species have joined the ranks of historical plants this year. Fringed stoneseed (*Lithospermum incisum*), a member of the borage family with large, bright yellow flowers with crimped petal lobes, had been reported several times in recent years, but each record was based on misidentifications of its cousin, the drab, greenish-yellow flowered western gromwell (*L. ruderale*). The only authenticated report of fringed stoneseed in Washington is a historical collection from Okanogan County made in 1926. Lemmon's alkali grass (*Puccinellia lemmonii*) and red glasswort (*Salicornia rubra*), both found on saline shores of small lakes in Okanogan County, have not been observed since Joy Mastrogriuseppe collected both in 1982. At

40 years old, these reports are now eligible for the state historical list.

How long will these species stay on the list? And what other historical or extirpated species will be relocated this year? Stay tuned for a future postscript!

Walter Fertig is the state botanist for the Washington Natural Heritage Program and interested in historical and extirpated native plants from a conservation perspective. If you observe any of the species on the historical list, let him know at walter.fertig@dnr.wa.gov to earn your place in the pantheon of plant rediscoverers.



Book Review

Golden Trees of the Mountain West

by Stephen F. Arno. Self-published, 148 pp. 2021.

Review by Christopher J. Earle

Steve Arno is one of the leaders in the field of forest ecology in the American West. He started studying forest ecology in 1961, and his education included a stint fighting fires with the Washington Department of Natural Resources, ranger work in Sequoia-Kings Canyon National Park, and a very long career with the US Forest Service in Missoula, during which time he became one of the most respected fire ecologists in the field. Along the way, he has written a long string of publications, including both scholarly works and well-loved popular books such as *Northwest Trees*. He wrote his dissertation on the ecology of alpine larch, and the resulting publication (Arno and Habeck 1972) is still the definitive work on the subject. So I was excited to learn that after half a century of work, Arno has decided to return to the larch forests with *Golden Trees of the Mountain West*, a new look at two of our most memorable trees, the alpine larch (*Larix lyallii*) and western larch (*L. occidentalis*).

You probably know these trees already. Their fall displays of color, spectacularly displayed on the east side of the Cascades, seasonally attract hordes of visitors. I went up to Rainy Pass on the first October weekend of 2021 and was astonished to find literally thousands of cars disgorging hikers into the larch forests. Every parking area was full and cars were parked for miles

along the side of the highway, and all to see the golden larches. But apart from their fall beauty, what do you really know about the larches? *Golden Trees of the Mountain West* is here to explain. The book mainly consists of two guides; the first describes the biology and ecology of the trees, and the second presents the best places to visit them.

Biology and ecology are described in four chapters that introduce the species, discuss their geographic distribution and site preferences, examine some relationships with wildlife, and trace their relationship to humans from aboriginal times to the present. This section concludes with a chapter that looks at what the future may hold, and finds that the future depends quite a bit on how humans choose to use their ability to manage the fire regime. In particular, Arno finds that larch is generally in decline due to a history of fire suppression that has brought us to an age of giant, severe fires, where fuel loads are so high that suppression strategies don't work anymore. The subject of climate change is glossed over, merely dismissed as "inevitable;" this is unfortunate, as this species is a good candidate for climate change adaptation via assisted migration (see Williams and Dumroese [2013] for more on that topic).

Personally, I think I will find this book most useful for the "hiking guide" section. This includes a short "Visitor's Guide to Northwestern Larch" that cites some of the best places to see larches within their US and Canadian ranges. I've been to nearly all of these sites and can say with confidence that Arno has chosen well, though I certainly would have added the southern Wallowa Mountains. He then offers a detailed "Hiking Guide to Larch in the Bitterroot," which is his own backyard. I've only done a couple of these trails, but again, he seems to have chosen well and I'll be sure to bring this book along on my next visit to that area.

A few final points: One, the book briefly discusses other members of the larch genus, with some emphasis on the tamarack (*Larix laricina*), which enters the Pacific Northwest in the Canadian Rockies. Two, the book is self-published, which means there are more than the usual number of editing flaws and typos, but this is at worst a cosmetic problem, detracting only slightly from the book's value and appeal. Three, there is a useful bibliography for those who want to know more about these trees. Since this is a self-published book, there are few outlets for purchase, but it is carried by Amazon.com (although not by Amazon.ca). All in all, Dr. Arno has produced a useful and engaging introduction to two of our more attractive and interesting native trees.

For Literature Cited, visit: bit.ly/Douglasia_46_1 (link is case-sensitive).

Dr. Earle is a consulting ecologist, manager of the Gymnosperm Database at www.conifers.org, and has been a WNPS member since 1987. He lives near Olympia and is active in the South Sound chapter.



Supporting Youth Ecology Education Through Restoration

An Interview with Jim Falconer

by Sarah Gage and Don Schaechtel

Washington Native Plant Society members Jim and Birte Falconer are providing core funding for WNPS's Youth Ecology Education Through Restoration (YEER) program. Because of their vital and big-hearted support, YEER was able to kick off in 2021 with a pilot program in five Washington middle schools. The response to the YEER program from students, teachers, volunteers, and communities has been enthusiastic. The Falconers have agreed to extend their generous support to fund a second year of the pilot. In the 2022–23 school year the YEER program will continue at its five current schools and expand to two more.

Sarah Gage and Don Schaechtel sat down (virtually) with Jim Falconer in November 2021 to discuss his and Birte's interest in YEER, native plants, restoration, and philanthropy.



Janneke Petersen and Jim and Birte Falconer meet at Rose Hill Restoration. PHOTO: DENISE MAHNKE

Q: What got you interested in nature?

I grew up in Michigan, near Detroit, but I used to spend my summers in a very small cabin on the other side of the state, where I could run about in the woods. And in the Detroit suburb where I lived there was an undeveloped half square mile of woods nearby. I would go there and sit and watch things, sometimes with my dog and other times by myself. By the time I finished high school they had built houses where the woods were.

I look back now and think how lucky I was to have had those experiences, and about how much I learned about myself and about nature just by going out listening and exploring. Those were formative years. I wish young people today could have those experiences. I don't mean the same as I had, but at least just to be able to be out in nature and feel comfortable.

I wander around our place on Lopez when it is getting dark or when it is rainy and windy. But I am comfortable because I know my way around. I love it. I hear things I don't hear during the daytime. That is a luxury, being able to go out into the woods and not only not be afraid, but being able to say, "I like this."



Birte and Jim Falconer.

Q: How did you get interested in native plants?

J: Birte and I had never seriously considered a second home. But when we were older, the kids were grown and we had fewer responsibilities, we considered finding a place that we could enjoy, then ultimately donate to an organization such as The Nature Conservancy. We looked for a while without success. Then we found ourselves on Lopez Island for a weekend and asked a realtor to give us a tour.

We stumbled on a special 32-acre parcel that was about to be subdivided. Cutting the parcel up for large homes would fragment the beautiful vegetation, would destroy some beautiful views, and disrupt the whole watershed. So, we bought it the next day! A rash decision for people like us—but we could not let that subdivision happen.

We have acquired about 50 acres on Lopez Island over the last 12 years. We have been working on restoring it with native plants. Part of the effort is to remove debris and invasives. Another part of it is replanting disturbed areas. The last, and most exciting part, is to diversify the flora with native plants that will thrive there.

The area is quite dry. It has shoreland, wetlands and uplands. But most significantly, it has challenging soil conditions. It is dry, rocky, and "clay-ey". That challenge is what I enjoy: planting something and realizing, ah, I got one that really likes being here.

Q: What have been some of your native plant successes?

Our "successes" have been a result of learning what plants can survive the dry conditions of the San Juans. We have plant-

ed over 3,000 plants over the last 12 years. We have successfully introduced natives such as paper birch (*Betula papyrifera*), Oregon ash (*Fraxinus latifolia*) and Sitka spruce (*Picea sitchensis*). The most rewarding have been flowers such as paintbrush (*Castilleja miniata*) and pink fawn lily (*Erythronium revolutum*). The most satisfying (and the most interesting) is how we grew hundreds of new madrones (*Arbutus menziesii*).

This is the tip of the iceberg! I could spend hours talking about what we have done, how we have done it, and our successes and failures.



Rose Hill students at work, restoration day #2. PHOTO: DENISE MAHNKE

Q: Tell us what attracted you to the Youth Ecology Education Through Restoration (YEER) pilot project.

J: Birte and I are interested in funding projects. Projects are exciting and I like to find ones that I can relate to. In addition, if I am involved in a specific project, I get to meet people at the grass roots level who are motivated.

I could relate when I heard Janneke Peterson tell her story about the idea for YEER germinating for her when she was teaching at a local private school. She said, in effect, “I want tie the Next Generation Science Standards for students together with ecology in the classroom and restoration in the field, but I am not quite getting this mission out where I want it to be. How do I get there?”

I love it when I hear people who feel that excited about a good idea and who try to find an outlet.

Q: Was involving young people important to you?

J: Both Birte and I are concerned about passing the environmental mission on to the next generation. If I look at the membership of WNPS or Audubon, they all look like Birte and me—same age and often similar backgrounds. To save the environment, we need to shift this effort to the next generation, and in a more diverse way. We need young people of various backgrounds involved!

That is one of the things I like about the YEER project. It is taking place in different parts of the state and in different types of communities. That is great.

Q: We understand that science careers are important to you too.

J: On every project we support, we ask, “How can we involve young people, especially young people from diverse backgrounds?” For example, we are underwriting some research that Susan Waters of the Institute for Applied Ecology is doing, about pollination at restoration sites in Oregon and Washington. One of the requirements we had was to hire young people, in this case young college graduates who want to work in science. If they get out of science for a job or whatever, they are hard to bring back. How do we hire them on a year-round basis so they can financially sustain themselves? So, we funded the work enough so they could be employed all year long.

Q: Volunteers have also been involved with YEER.

J: I have been so impressed with the volunteers of the WNPS. They are crucial to this YEER project. It is so inspiring to see all of the volunteers who are involved with it. It would not work without them.

At one time (going way back!) I taught middle school and found that students need role models and exposure to being outdoors. I never thought that was going to be a big issue, to just get kids outside and not afraid of getting their hands dirty. The volunteers can be both role models and guides to the outdoors.



Rose Hill student prepares a plant for planting. PHOTO: DENISE MAHNKE



YEER East Planting Day. PHOTO: GRETCHEN GRABER

Q: How important is the restoration component of YEER?

J: My view on restoration, and I think a lot about this, is that we can't just preserve, we have to restore. Preserving is no longer enough because we have messed up enough of the earth that we have to go back and reclaim it now. Getting people to think about restoration as a natural part of environmental protection is necessary.

I have this concept that I call "one square." Just imagine every person took care of one square of something: Some people can take care of one square mile; others can take care of one square meter.

If everyone takes care of their one square, and gets possessive about it and protective of it, like what the kids are doing, if it becomes part of their school, and part of their identity, they will say, "You can't dump your garbage here! This is a place we care about."

I am a real believer in this idea of getting people involved in local restoration because it is easy to say, "Let's go save 100,000 acres in Alaska!" While that is necessary, it is not sufficient. We



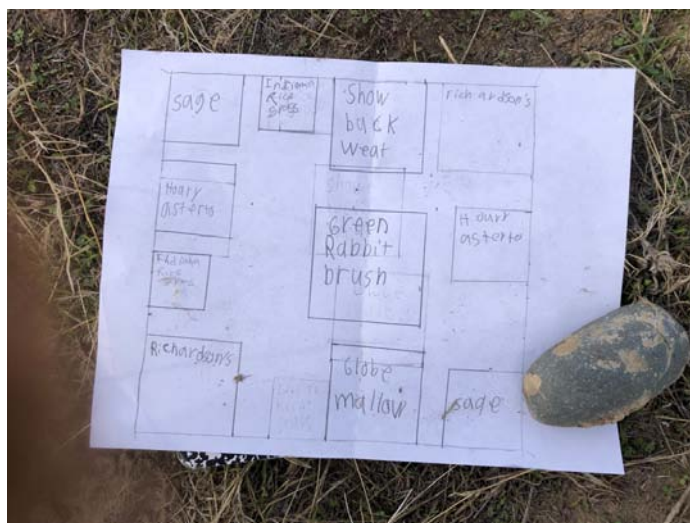
YEER East Student Planting on school grounds. PHOTO: GRETCHEN GRABER

need to do restoration locally, where we can see it, feel it, love it.

Q: Not everyone has such a passion for restoration, how did it become important to you?

J: My dad grew up as a farm kid. When he moved away from the farm, he was dismayed that kids weren't as hardy as he was when he was that age. So, when I was growing up, I had to do lots of yard work, and I came to dread it, especially the lawn. We had a small lawnmower and a big lawn. In fact, if the grass got away from me it was hard to catch up—it was a horrible job.

I spent most of my life saying, "I will never mow a lawn again!" And I have succeeded! But I did get some skills out of all that yard work. I learned how to plant and transplant and when and how to water. That experience did not lead me to be a gardener, but it gave me some basic skills.



YEER East student's planting plan. PHOTO: GRETCHEN GRABER

Q. What encouragement can you give to people who would like to make a difference with their donations?

J: I have noticed that many people with the means to give just don't know where to start. So, I would recommend a few things. First, find a cause that you are passionate about. Second, seek out people whom you can trust. Finally, jump in and make some gifts, even if they are small. But get started.

The rewards of donating go beyond doing something good in the world. For example, the fun comments from the YEER student participants make my day. They are so spontaneous and candid, they give me hope.



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

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

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

Here are examples of how to make a planned gift:

- Name the Washington Native Plant Society in your will.
- Make the Washington Native Plant Society a beneficiary to your IRA or life insurance policy.
- Name the Washington Native Plant Society as the beneficiary of a charitable remainder trust.

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

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Giant horsetail (*Equisetum telmateia*) vegetative stems emerging among Pacific bleeding hearts (*Dicentra formosa*) in moist woodlands on the edge of Bellingham. PHOTO: MARK TURNER