

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.



About This Issue

by Andrea Cummins

As I sit at my desk and watch the winter rain fall steadily (and seemingly endlessly), I dream of drier and sunnier weather and the hiking, kayaking, and other outdoor activities it will bring—not to mention the free Vitamin D! Hopefully by the time you are reading this, the gray and dreary weather will have subsided and spring will have made an appearance, at least to some extent.

In this issue, we have a range of stories with broad focus: Bridget McNassar returns to author a story on the new Burke Museum's native landscape—I'm planning a visit just to see the grounds. Kathy Darrow does a terrific piece on artistic expression using herbarium specimens by artist Lou Cabeen, and Regina Johnson's article on the challenges and hurdles of natural area restoration brings new understanding and respect to the often uphill battle to reclaim our natural landscapes.

Bob Carson takes us on a trip to Colonel Bob in the Olympic mountains and Fred Weinmann gives a report on the Chetzemoka Trail outside of Port Townsend, the result of a WNPS Education Grant. We can learn about the basics of seedling identification by Kyra Kaiser (bring your hand lens!), and Walter Fertig's article teaches us things aren't as simple as we might think when it comes to calling something a "weed."

When you are out in the field this spring, make sure you look for anything new or unexpected. According to David Giblin, the flora of the state is ever-changing and new discoveries are being made all the time. In the southwestern part of state, keep an eye out for Walter's lost geranium. And in the central area, Washington's rare and only, but rather eye-catching, ball cactus. Whatever you find, consider signing up for iNaturalist (if not already a member), which is a great platform for sharing observations, identifying unknown species, and working to eliminate the need for your local botanist—just kidding!

Finally, please consider visiting the links that WNPS President Van Bobbit mentions in his opening message. Plant blindness is a real thing, as I think most of us know. It is important for those of us who identify as "plant nerds," "plant geeks," or "plant-lovers" to be vigilant in continuing to educate others on the need and value of conservation of flora world-wide. In the end, plants are the reason we are ALL here.

Happy Spring!



On the cover: Showy Phlox (*Phlox speciosa*) and Carey's Balsamorhiza (*Balsamorhiza careyana*) overlooking Wanapum Reservoir on the Columbia River at Ginkgo Petrified Forest State Park, Vantage, Washington. PHOTO: MARK TURNER

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

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President's Message: The View from Here

by Van Bobbitt

Dear WNPS Members,

Plant blindness is a phrase that I have encountered a lot recently. To be honest, until now I never gave much thought to this concept. I was drawn to plants as a child, studied botany in college, and spent most of my career working in horticultural education. I am always looking at plants, even while cruising down the highway at 60 mph—much to my wife's consternation. But not everyone is fascinated by plants.



So, what is plant blindness? It is “the inability to see or notice the plants in one's own environment, leading to the inability to recognize the importance of plants in the biosphere and in human affairs,” according to James Wandersee of Louisiana State University and Elizabeth Schussler of the Ruth Patrick Science Education Center in South Carolina. They are credited with introducing this term in 1998. (<https://academic.oup.com/bioscience/article/53/10/926/254897>)

Most of us have noticed that people are often more drawn to animals, at least mammals and birds, than to plants. But is this a problem? Well, yes.

The Native Plant Conservation Campaign makes the following points:

- “Conservation laws and policies, as well as the priorities of many environmental organizations, remain focused disproportionately on animals—particularly charismatic mammals.”
- “The federal Endangered Species Act ... provides much weaker protection for listed plants than other species.”
- “Although approximately 60% of the species listed under the federal Endangered Species Act are plants, they receive less than 5% of recovery funding from resource protection agencies.”
- “In many areas, federal wildlife staff outnumber botany staff by as much as 20 to 1.”
- The Recovering America's Wildlife Act, introduced to Congress in 2019 and sponsored by fish and wildlife conservation groups, “would dramatically improve funding for State Wildlife Action Plans (SWAPs).... Although plants can be listed in SWAP ... the primary grants that fund SWAPs may only be used to conserve animal species of greatest conservation need, not plants.”

The extent of plant blindness was on full display in the way the destructive wildfires in Australia were covered this past winter. There were lots of reports about the loss of koalas and many pleas for donations to help Australian wildlife, but little

about the devastation of Australia's native plants. Having visited Australia in 2018, I admire its wildlife, but Australia possesses a fascinating flora too. This continent contains two of the world's 36 biodiversity hotspots (which are defined by their plant life), the Daintree Rainforest (part of the oldest continually surviving tropical rainforest in the world), and the last remaining prehistoric Wollemi “pines”—with less than 200 individuals still existing in the wild.

What can we do to combat the effects of plant blindness?

First, learn more about this concept. A good place to start is the Native Plant Conservation Campaign's website: <https://plantsocieties.cnps.org/index.php/about-main/plant-blindness>. It also offers several links if you want to delve deeper into the subject.

Second, support legislation and policies that promote the conservation of native plants and give them equal protection to animals. The Native Plant Conservation Campaign points out that “plants are second class conservation citizens, receiving only a fraction of the legal protection and conservation funding that is provided for animals.” Your WNPS Conservation Committee takes a lead on these issues for all of us, but you can take individual action as well.

Third, be a plant mentor. Provide informal botanical education to your friends and acquaintances. This can be especially important with children. Professor Wandersee says “Our research has shown that having a plant mentor in one's life makes a pivotal difference in whether one notices, appreciates, seeks to understand, and cultivates plants.”



Pacific bleeding heart (*Dicentra formosa*) blossoms are a harbinger of spring in western Washington lowlands. PHOTO: MARK TURNER

***Pediocactus nigrispinus* — Washington's Only Ball Cactus**

by Ron Bockelman

Because cacti in the US are so commonly associated with deserts of the southwest, many people are surprised to learn that three species occur in Washington. Two are prickly pears in the genus *Opuntia* (*O. columbiana* and *O. fragilis*), and they are readily distinguished from the third species by their jointed-stem growth form. By default, that makes *Pediocactus nigrispinus* (snowball cactus) easy to identify—if you can find this small, round pincushion cactus. But that can be challenging most of the year because it is inconspicuous when not flowering and its distribution is limited.

Snowball cactus—hedgehog and dark-spined ball cactus are other common names—is a regional endemic found on the Columbia Plateau of central Washington, in central and northeastern Oregon, and in adjacent areas of western Idaho. It occurs in shallow, rocky soils (lithosols) derived from basalt bedrock at elevations ranging from 600 to 4000 feet (200 to 1200 meters). In Washington it has been reported in Chelan, Douglas, Grant, Kittitas, and Yakima counties.

Habitats that support stiff sage (*Artemisia rigida*), thymeleaf buckwheat (*Eriogonum thymoides*), hairy balsamroot (*Balsamorhiza hookeri*), and Sandberg bluegrass (*Poa secunda*) are good places to look for this cactus. There are some indications that it tends to be more abundant in areas where winter snowdrifts provide extended moisture in spring.

The dark reddish-black spines on *P. nigrispinus* are modified leaves that do not photosynthesize, which is also true for all cactus spines. Instead, photosynthesis occurs on the surface of the cactus body, which is a modified stem, where chloroplasts produce a greenish color. Cacti have evolved a special type of photosynthesis named Crassulacean Acid Metabolism (CAM) that reduces water loss by shifting photosynthetic gas exchange to nighttime.

As suggested above, this cactus is easiest to spot when flowering, which tends to occur near the end of April at lower elevations and during the first half of May at higher elevations. Multiple, conspicuous, pinkish-red flowers occur on the top of mature plants, which may have a single stem or be multi-stemmed clumps. Single-stemmed plants usually are about the size of a baseball, but they can grow twice as large and become barrel-shaped under ideal conditions. Clumps can have over 40 stems and be wider than a dinner plate, but are typically smaller. These cacti swell and shrink as they first take up and store water in spring and then use it during the drier months of the year. They are at or near their maximum size when flowering, making them even more conspicuous.

Snowball cactus flowers are pollinated by insects, especially by small sweat bees that often disappear among the multitude of stamens while foraging for pollen. Berrylike fruits develop



Snowball cacti are easiest to find when they are blooming, which tends to occur within a week of Mother's Day at Wild Horse Wind Farm east of Ellensburg. PHOTO: RON BOCKELMAN

over the next four to six weeks, eventually turning from green to red before they split vertically to release small black seeds. The dried flower remains attached to the top of the fruit. Ants often harvest the seeds and carry them to their nests. This not only disperses the seeds, but also saves them from rodents searching the ground for food.

Washington Natural Heritage Program lists *P. nigrispinus* as a species of special concern. It has a state ranking of S2, meaning it is considered imperiled and at high risk of extirpation (local extinction). Because of its restricted range and habitat requirements, any population losses are a concern. One threat to this species is collecting by and for cactus enthusiasts. This ill-advised activity is especially disturbing because plants removed from their native habitats almost always die within a year or two of being transplanted elsewhere.

It is important to avoid damaging these cacti when you are looking for or photographing them. Extra care is needed to avoid accidentally stepping on a small non-flowering plant while admiring a spectacular flowering one nearby. Organized field trips or hikes led by someone familiar with snowball cactus are recommended. Puget Sound Energy offers wildflower walks each spring at their Wild Horse Wind & Solar Facility east of Ellensburg. Field trips can also be arranged through WNPS. Either would be a great way to add *Pediocactus nigrispinus* to your plant life list, such as described by Walter Fertig in the Summer 2019 issue of *Douglasia*.

Ron Bockelman is a Central Puget Sound Chapter member who is studying *P. nigrispinus* at Wild Horse as a retirement project. A WNPS grant, the South Sound and Wenatchee Valley chapters, and Puget Sound Energy are partially supporting his studies.



Washington's Natural Area Preserves and Natural Resource Conservation Areas

by Regina Johnson

The Natural Areas Program in the Washington Department of Natural Resources (DNR) protects outstanding examples of the state's biodiversity, representing the finest natural, relatively undisturbed ecosystems in state ownership, and protecting rare or vulnerable plant and animal species. The program has two types of natural areas: Natural Area Preserves and Natural Resource Conservation Areas. Natural Area Preserves (NAPs) protect the best remaining examples of ecological communities including rare plant and animal habitat; while Natural Resource Conservation Areas (NRCAs) protect native ecosystems, habitat for endangered, threatened, and sensitive plants and animals, and scenic landscapes. Natural areas range in size from 17 acres of oak woodland at Oak Patch NAP to over 37,800 acres in the North Cascades at Morning Star NRCA. The Natural Area Program mission statement instructs DNR to restore degraded ecosystems to promote landscape-level ecological functions and protect the conservation goals of each natural area.



Dabob Bay Natural Area, pasture to forest restoration, newly planted in 2011. Note the introduced snags and logs. PHOTO: DEBORAH NEMENS

Most NAPs, such as Dabob Bay, are highly sensitive and access is limited to guided tours, educational use, and approved scientific research; however, a handful have parking and interpretive trails that are open to the public. Most NRCAs are open to low-impact activities such as hiking and bird watching, and camping is allowed at a few NRCAs. A Discover Pass is required to visit these state lands. WNPS hosts field trips for members to some of our natural areas.

The Dabob Bay Natural Area was visited by the Olympic Chapter of WNPS in July of 2019, accompanied by me (the natural areas assistant ecologist for the west side) and DNR's rare plant botanist, Walter Fertig. Dabob Bay consists of both NAP and NRCA lands, and is one of the largest, high-quality

salt marsh estuary and sand spit complexes in Puget Sound. Originally the site was established to protect the delicate sand spits and salt marshes with their distinctive plant communities, but has been expanded over the years to better protect the shoreline through upland forest/riparian protection and restoration, and feeder bluff/beach preservation. We visited one of the spits and three restoration sites: the first restoration work done at Dabob on an abandoned pasture (in 2009), a just-planted former home site, and a stream where a culvert was replaced with a bridge.

In the creation or expansion of a natural area, privately owned land can be purchased from a willing seller. Often, these properties contain intact examples of the features the site was established for (rare species, high quality ecosystems). Others are more degraded and are purchased as a buffer or to increase protection of ecological processes. Sellers might be private timber companies, land trusts, or individuals. Timber land can range from recently-harvested and planted clear-cuts to century-old, naturally regenerated forest from an early-settlement logging operation. Residential properties range from small clearings just large enough for a camping trailer or one-room vacation cabin, to pastures and orchards, to homes with outbuildings.

Once acquired, some properties need restoration. Restoration planning synchronizes a multitude of steps to move a parcel from residential development to a natural ecosystem. All the "improvements" are removed: buildings and pavement, drainage systems, utilities, trash, abandoned vehicles, etc. Any terracing, shoreline armoring, or stream channelization are re-engineered. The building site and driveways were compacted for construction, and now are mechanically ripped to allow the soil to recover. The disturbed soil is mulched with tree chips. Logs may be brought in and placed on the ground, or installed upright to act as snags, replacing snags and downed logs that were removed when the original forest was cleared. Weed control occurs whenever appropriate, and upland planting season (in western Washington) is in winter.



Pasture to forest restoration, Woodard Bay. New plants in foreground, 5-year old plantings in rear. PHOTO: REGINA JOHNSON



Beachfront home at Stavis NRCA, 2009. PHOTO: DNR STAFF

There may be very little restoration required on timber land; or we may need to do forest thinning, planting for diversity, weed control, road abandonment, and culvert removal. Tree spacing in commercial timber is unnaturally close, to encourage trees to grow tall and straight with no knots. And, on the westside at least, commercial timber is usually all Douglas-fir (*Pseudotsuga menziesii*) and all the same size. This is not a natural phenomenon, so we plant for diversity by interplanting with tree and shrub species that would have naturally occurred in the area in the absence of timber management. Most low-land forests in western Washington are a mix of conifers with a scattering of hardwood trees, which we try to recreate.

Residential parcels can be very complex to restore. Often there's a house that needs to be removed. There may also be a stream that has been channelized, or bulkheads on a beach, or terracing; all of which will have to be re-engineered. If there is a house, there's often ornamental plantings too. Some (most lawn grasses, spring bulbs, and flower beds) will go away on their own, some (camellias, lilacs, apples) present no serious issues, but a few need to be removed due to their ability to spread and/or prevent establishment of natives. A few ornamental species are nearly impossible to get rid of—yellow archangel (*Lamium strum galiedolon*), vinca (*Vinca minor* and *V. major*), ivy (*Hedera helix* and *H. hibernica*), arum (*Arum italicum*) and creeping

St. Johnswort (*Hypericum calycinum*) form dense cover that excludes other plants. They are very shade and drought tolerant, very difficult to eradicate, and require repeated treatments over several years. They will not go away on their own.

I am often asked what would happen if we did no restoration. This depends on the extent of disturbance on the property, and the weed pressure (density and propagation potential) in surrounding areas. Where the degree of disturbance and the weed pressure are low, we can sometimes get away with little or no restoration. As an example of weed pressure, we can compare forests in the Dabob Bay area to that in the Queets River area. There is lots of English holly (*Ilex aquifolium*) in the forests around Dabob, due to the presence of holly trees planted on residential properties and farms. But in similar forests in the Queets River NRCA, there's no holly—the surrounding forest is not fragmented by residences or old homesteads, so there is little weed pressure. Residential parcels usually present a high degree of both disturbance and weed pressure. They will revegetate on their own, but it's a question of what they revegetate with. Many are infested with blackberry (*Rubus laciniatus* and *R. bifrons*), Scot's broom (*Cytisus scoparius*), knotweeds (*Fallopia* spp.), or reed canarygrass (*Phalaris arundinacea*), all of which form dense stands that exclude other plants and must be controlled. The plants that do get established in the absence of planting, too often, are more invasives.

On a 2019 survey of six cleared but not restored residential parcels acquired from 2010-2015 at the Stavis NRCA in Kitsap County, which is in a mosaic of timber and rural residential uses, four of the six parcels have large patches of tall dense



Site of beachfront home 8 years after removal, re-engineering of stream and beach, and restoration plantings. PHOTO: REGINA JOHNSON

broom and little to no natural regeneration of native trees or shrubs, despite being small parcels surrounded by forest with dense understory. One, acquired and cleared in 2014, still has Scot's broom, vinca, creeping Jenny (*Lysimachia nummularia*), toadflax (*Linaria vulgaris*), creeping Charlie (*Glechoma hederacea*), peavine (*Lathyrus latifolius*), and broadleaf bamboo (*Sasa palmata*). But on two of the parcels, Scot's broom is minimal and natural regeneration of the native forest is sufficient for our purposes.

Deciding what to plant is an involved process. We only plant species that would have occurred on the site in question prior to Euro-American disturbance. To determine that, we look for reference sites and we research what the site was historically—not everything was forest, for instance, and we don't want to plant trees on sites that historically were marsh or grassland. Sometimes documentation of occurrence is in the form of an old WNPS field trip plant list. Then there are a couple of other considerations—what will grow in disturbed sites, and what is available in the nursery trade from appropriate ecoregions. This requires considerations of succession in plant communities. For instance, western hemlock (*Tsuga heterophylla*) is widespread and readily available, but it's not a pioneer species and doesn't like disturbed mineral soil in full sun, so it's not always a good choice. Low Oregon grape (*Mahonia nervosa*) is also widespread and has high wildlife value, but it's very difficult to propagate and doesn't transplant well. Creeping mahonia (*M. repens*) propagates and transplants well and has the same habit as *M. nervosa*, but it is not native west of the Cascade Crest so is not appropriate in our westside restoration sites (though it is fine in ornamental landscapes). Shore pine (*Pinus contorta* v. *contorta*) is readily available, and as a pioneer species with a wide ecological amplitude it will transplant successfully almost anywhere. But in many areas, it either doesn't occur naturally or not in high numbers, so we don't want to plant much of it, even though it would do well. Restoring disturbed areas often leads me to plant species that other practitioners dismiss as “weedy” but I call “early seral”, like blackcap raspberry (*Rubus leucodermis*), trailing blackberry (*R. ursinus*), and even stinging nettle (*Urtica dioica*) (from seed!) in the right spot. They establish well in disturbed soil, grow fast to outcompete invasives, and provide wildlife value. I also plant trees that other practitioners consider to not be naturally occurring, particularly shore pine and Sitka spruce (*Picea sitchensis*), which used to be much more widespread than they are now.

A common plant choice mistake I see frequently is planting understory shrubs where there is no overstory. This leads to the death of many plants. Salal (*Gaultheria shallon*) and ferns grow under trees so they should not be planted at the same time as the trees! I think people know what they want the final product to be, but don't consider that vegetation takes time to develop and plant communities go through successional stages, even in restorations. Other common plant choice tactics that do not fit the mission of the Natural Areas Program are planting species that are native to the state but not to the location (e.g.,

Mahonia nervosa/repens); and planting trees in non-forested landscapes.

Weed control methods include chemical (herbicides), mechanical (cutting, digging, mowing, tilling, tree girdling), and cultural (burning, mulching, planting competitive natives). We use Integrated Pest Management, which means we choose whatever method or combination of methods will be most effective with the least environmental footprint, given our mandate to restore and preserve native ecosystems. Often the best bet is a combination of treatments, for instance mowing large areas of dense Himalayan blackberry, spraying the resprouts, and then planting native trees to shade out any regeneration; this gives excellent results with minimal herbicide use.

In some cases, we are restoring formerly forested land that was converted to pasture. Pasture grasses are very challenging—the root systems are dense and competitive, and the tall grass stems shade out new transplants. We mechanically till rows through the pasture grasses with heavy equipment, mulch the tilled rows, then plant in the rows. We may irrigate for the first two summers, and mow the grass until the new plants are taller than the grass. Without physically removing the grass competition and providing water to compensate for the competitive grass roots, the success rate is low. But once trees reach what foresters call the “free to grow” stage, they will eventually shade out the grasses.

Natural grasslands, unlike pasture-to-forest restoration, require ongoing maintenance as we cannot plant trees to shade out the nonnative grasses. At Lacamas Prairie, Mima Mounds, and Camas Meadows—all fire-adapted grassland ecosystems—we use prescribed burns to remove top-growth and thatch of invasive grasses, then spray the resprouts to give the native forbs (including several listed species) more room to grow.

Restoration ecology is an ever-changing field. Not only is every site different, but our knowledge of weed control methods, plant/wildlife interactions, and plant species distribution changes continually. Not to mention the taxonomic changes and new invasives! At the end of our July 2019 Dabob field trip, many participants commented that they had no idea how much work we put into restoration. I hope that I have given you some understanding of the complexity and the sheer physical effort that goes into this work.

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



Growing Plants for the Burke Museum: An Opportunity for Learning and Inspiration

by Bridget McNassar

Presented with the opportunity to grow plants for the new Burke Museum's landscape back in 2015, Oxbow Farm & Conservation Center was at first simply excited to grow plants for a project that could potentially inspire others to use native plants at home and in other public settings. As time went on, the project proved to be one that provided a deeper wealth of learning and insight than we ever anticipated, with topics ranging from planting design and native plant production to Indigenous sovereignty. While we saw initial opportunity to inspire others, we have been the ones inspired—by both the plants and the keepers of their stories—to make changes. I'd like to share a bit of Oxbow's journey and the thought-provoking moments we've experienced along the way.

many highlighting regional flora—and filled with professionals who are conducting their own native planting experiments in their home gardens, seemed to be a perfect fit for the new Burke's desired native plant landscape. GGN's design consisted of over 50 native species, chosen for beauty, resiliency, and cultural significance—quite a few of which are not commonly seen in landscaping, such as false Solomon's seal (*Maianthemum racemosum*), inside-out flower (*Vancouveria hexandra*), and woolly sunflower (*Eriophyllum lanatum*). The design showcases two of Washington's iconic landscapes: a dry Douglas-fir forest and a Puget Sound camas prairie. This was just what the Burke hoped for as they sought to create an outdoor extension of the museum to showcase our state's natural and cultural heritage, within their vision to “inspire people to value their connection with all life.”

Through this work, the relationship that developed between GGN and Oxbow proved to be a rare and fruitful opportunity for both of us. Typically, plants are sourced almost as an after-thought, towards the very end of a construction project—usu-

ally just a few months before they need to be planted. Since plants aren't a commodity that can be produced on a quick time scale, this last-minute sourcing often means that the desired plants are unavailable, which can lead to major changes in a landscape design. This was somewhat shocking to learn as a grower; it only seemed logical that getting the correct plants would be such an integral part of the success of the landscape that they would be sourced well ahead of planting time. This demonstrates a lack of care or understanding of the unique traits and qualities of individual species of plants. Because Oxbow became involved in the Burke project four years before its completion, we were able to produce the plants so that GGN's design remained largely true to its original intent. Shannon Nichol, founding principal of GGN commented, “With Oxbow's team collecting and propagating seed

to grow normally unavailable native species for this project, we had the rare opportunity to include many Pacific Northwest plants that we've long wished (and repeatedly attempted) to include in our work but have usually been unable to source.” The positive outcomes from our early involvement inspire us to investigate ways to change this system so that nurseries can become involved in projects earlier in the process, to ensure that native species in a design don't get replaced by non-natives.



The south edge of the Burke Yard creates a welcoming gathering place in front of the museum's east entry in this early rendering by architects Olson Kundig. A series of seat steps, facing toward the campus, overlooks the Camas Meadow, design by GGN. RENDERING: OLSON KUNDIG

A Unique Partnership

Early on, I was introduced to the planting design created by the team at Gustafson Guthrie Nichol (GGN), the landscape architecture firm hired by the Burke. While not all landscape architects have a high level of botanical knowledge, I was delighted to learn that this is certainly not the case with GGN. A firm with a portfolio of prominent projects around the globe—

Throughout the four years of this project, Oxbow and GGN have exchanged ideas and learned a bit more about the other's world—GGN even incorporated a few of Oxbow's suggestions for plant species and growing containers into the planting specifications. One of our most important take-aways learned from the landscape architects was the realization that our region lags behind most others in the prominent use of our native flora in urban settings. Having worked in many regions worldwide, Nichol remarked, "The Pacific Northwest, by all measures we've found, is near the bottom of rankings in the inclusion of native species in our yards and public and private plantings."

Having focused much of my own native plant and nursery studies on restoration and reforestation work, I had never thought too deeply about native plants for urban spaces. But once this was mentioned to me, I began to take notice. In parking lots, traffic circles, public greenspaces, and parks, I rarely saw native species planted. Why is this, when we live in a region with a uniquely beautiful flora? And, at a time in which we are so often reading new reports that outline the plight of pollinators, songbirds, and salmon, how is this clear lack of native species acceptable to us? This was such an impactful realization that it changed the focus of our work at Oxbow's Native Plant Nursery, and we now ponder how we can contribute to changing the trend of under-representation of native plant species in Pacific Northwest urban spaces.

Grown to Survive

Oxbow decided to approach growing the Burke plants similarly to growing plants for a restoration project. One could argue that this was unnecessary; that the plants would be more "pampered" than those in a typical restoration location—regularly tended, irrigated, and weeded—but a busy urban environment creates a harsh home for plants, with cars whizzing by, polluted air, sterile soil, and lack of insect companions. It is an ecosystem much altered from the one in which these plants evolved! With all the importance we were putting on the little corner of 15th Avenue and 45th Street in Seattle's University District, Oxbow knew we needed to grow tough plants, survivors. To this end, we focused our efforts on growing plants from locally sourced seed, with vigorous root systems.



Great camas (*Camassia leichtlinii*) seedlings emerge in late winter in Oxbow's native plant nursery. PHOTO: JESSICA ESKELSEN



Taper-tip onion (*Allium acuminatum*), one of the native species rarely seen in landscaping that was grown at Oxbow for the Burke Camas Meadow. PHOTO: JESSICA ESKELSEN

Almost all of the approximately 70,000 plants we produced for the Burke landscape were grown from seed. Unlike plants produced from cuttings or divisions, which are genetically identical to their parent plant, our choice to use seed as much as possible ensures that each plant will be genetically distinct, which creates a group of plants exhibiting more resilience towards a variety of future conditions at a site. Additionally, we aimed to source seed from Washington State, in order to keep genetics local and in a nod to the Burke being our state's natural history museum.

Of course, there are trade-offs to preserving diversity through seed. Many native plants are difficult to grow from seed, taking extra time and effort to get the seeds to germinate; often growing from seed can add a year or more to production time for a plant. For instance, all of the six native bulb species we grew take three to five years to grow from seed, and evergreen huckleberry (*Vaccinium ovatum*), a major species in the Burke landscape, takes three years via seed. One important lesson for us was the bottleneck that can sometimes occur due to lack of seed availability. Often a desired species is not more widely produced by nurseries because the seed isn't for sale. In such a case, growers would need to collect their own seed from the wild; a task that can be prohibitive due to the time, access, and expertise necessary to accurately and responsibly obtain seed from the wild. Oxbow was lucky enough to be able to collect seed for many of the prairie species from a private property in the San Juan Islands, and many of the forest species from various properties in the Snoqualmie Valley near Oxbow's location. However, in several instances, we were not able to access enough seed and ultimately weren't able to grow quite as many plants as we needed. We would love to see more native seed available in Washington.

Several of the species grown for the Burke were new to us, and we ran into another common issue existing in native plant production: the lack of published growing protocols. There are many native species that work well in landscapes and could be



Examples of the native plant plugs grown at Oxbow that replaced more conventionally used four-inch pots. PHOTO: JESSICA ESKELSEN

sold more widely at nurseries, but they aren't grown simply because there isn't information available for growers as to how to produce the plants in a nursery. Through trial and error (many times more error!), we worked with these new-to-us species and have kept good records throughout the process. In the future, Oxbow aims to share what we've learned in the hopes of getting more people producing these important and beautiful plants.

Many of the plants in GGN's planting design were specified to be produced in standard four-inch-square pots. In an attempt to save nursery space and materials, as well as grow the healthiest root systems that we could, we instead tried growing the plants in various-sized plug containers, like those often used in restoration and reforestation planting. The longer, narrower, open-bottom plug containers allowed straighter, untangled roots to develop, avoiding the root circling that often happens in the bottom of four-inch pots, while producing a plant with an equally robust above-ground portion. The healthier root systems allowed the plants to adapt well to the site when transplanted, and quickly thrive. Additionally, the rugged containers could be re-used many times, thus contributing less waste to the project. We also realized that the plug actually requires less soil than a four-inch pot to produce a similar- (or often better-) quality plant, further saving on resources. We would love to see plug containers used more widely, and are using these plugs with very positive results for several of our other customers' projects. A future challenge is thinking about how plug containers might work in a retail setting.

An Important Perspective

As the new Burke Museum neared completion in 2019, the museum staff thoughtfully worked towards their grand opening, bringing all of their collections—including the plants grown for the landscape—into place in a way that invited wide participation. The Burke Museum's Tribal Liaison, Polly Olsen, helped plan a ceremonial blessing of the Burke plants by indigenous stakeholders. Surrounded by the plants destined for the Burke later in 2019, representatives of the Snoqualmie, Suquamish, Puyallup, Yakama, and Wanapum tribes visited Oxbow and shared stories and songs that expressed relation-

ships, formed over thousands of years, between the humans and plants of the Puget Sound region. We were thrilled at the opportunity to learn more about the plants we had been nurturing and celebrate them with the people who would care for them once planted at the Burke. One of the most striking things I heard that day came from Connie McCloud (of the Puyallup Tribe of Indians) who said, in talking about their dependence on food plants and the responsibility to care for them, "These plants have sacrificed everything for us." This sentiment conveys what I have come to realize is the ultimate reason why we must grow and care for native plants—they simply have as much of a right to exist as we humans, and we have the responsibility to facilitate their care and survival.



The Burke Museum landscape is meant to be a place where humans can reconnect with plants. Here, various Burke stakeholders plant the first camas (*Camassia quamash*) bulbs after the museum opening. PHOTO: JESSICA ESKELSEN

Once the plants are established and happily growing, the Burke has planned for a strong Indigenous presence, tending the plants, gathering food from them, and providing opportunities for teaching and learning important cultural practices. We are honored to contribute plants to a landscape that will invite and allow for such deep human interaction. Though all of us completely depend on plants for our survival, modern societal structure has caused many of us to lose the deep connection to plants that all of our ancestors once had: it has become all too easy to forget their importance. The Burke landscape will have many opportunities to remind us why plants matter, whether it's through witnessing a purple bloom of camas, eating wild strawberries and huckleberries, or sitting amongst the prairie plants as pollinators and birds enjoy the food they provide.

It is our hope that the idea of inviting human interaction with a landscape becomes more prevalent. Oxbow is inspired to work towards providing more opportunities to connect with plants wherever we can, and will continue to look towards the Indigenous people of our region for guidance.

Come Visit, Be Inspired, Take Action

Spring will be a lovely time to view the Burke landscape, with some of the more mature camas (*C. quamash*, *C. leichtlinii*) plants blooming for the first time; salal (*Gaultheria shallon*), strawberries (*Fragaria virginiana*, *F. vesca*), and huckleberries working on their first crop of fruit; and forest groundcovers like wild ginger (*Asarum caudatum*) waking up and spreading through the understory.

In sharing a bit of the background behind the landscape, it is our hope that our friends in the native plant community may be inspired to take actions that will connect us all more deeply to our region and the other living things that we share it with. To help smooth the way to get more Pacific Northwest plants in urban spaces, we need:

- Increased lead time and contracts to work with native plant nurseries
- Increased availability of native seed
- Increased information on growing these important species
- Increased demand to see natives in urban spaces

These are all issues currently keeping native plants from defining our urban spaces, but none are insurmountable. It is our hope that a visit to the Burke Museum inspires all of us, from gardeners to designers, and beyond, to each do our part to move our region toward urban landscapes that celebrate and exist alongside our unique cultural and natural heritage.

For more information about the plants in the Burke Museum's landscape, please visit: <https://www.burkemuseum.org/exhibits/landscape-native-plants>.

Bridget McNassar is the manager of the native plant program at Oxbow Farm & Conservation Center (www.oxbow.org) in Carnation, WA. She is happy to answer questions, you can contact her at bridget@oxbow.org.



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Study Weekend 2020

Co-hosted by Central Washington and
Central Puget Sound Chapters

June 5-7, 2020



Manastash Creek flows through the Lazy F Ranch. PHOTO: JANE ELY

This year's Study Weekend marks a return to the Lazy F Ranch, located in the Manastash Canyon near Ellensburg, which was the site of our 1996 Study Weekend. The ranch has added considerably to its facilities since then, and includes new cabins and a dining hall on its 100+ acres. The 2020 affair will mark a significant departure from past years—besides a good selection of field trips, there will also be three advocacy workshops, one on Saturday afternoon and two on Sunday.

Expect to choose from about 24 field trips in a variety of habitats in the greater Ellensburg area.

For complete information on Study Weekend, visit the WNPS website at <https://wnps.org/wnps-annual-events/study-weekend>.

This Year's Speakers Include:

On Friday evening, join other members for a reception outside of the new dining hall followed by dinner and speaker Dr. David James, Associate Professor in Entomology at Washington State University, who will discuss the importance of pollinators to native plants.

On Saturday evening following the reception and meal, join Dan Glusenkamp, Executive Director of the California Native Plant Society, for a discussion on advocacy and how you can get further involved in promoting and conserving our native plants.



Recent and Notable Additions to Washington's Flora

by David Giblin, Ph.D., University of Washington Herbarium, Burke Museum

Botanists have been systematically collecting Washington's vascular plant flora since the early 19th century, during which time they have documented 3,948 vascular plant taxa (species, subspecies, and varieties). This tally comes from the Washington Flora Checklist (<http://biology.burke.washington.edu/herbarium/waflora/checklist.php>), which I actively manage. Each taxon on that list is backed by a pressed specimen held in at least one herbarium in North America. The University of Washington Herbarium at the Burke Museum has at least one specimen for the vast majority of these taxa.

One might think that with 200+ years of collecting by amateur and professional botanists that every taxon that occurs here has been found. The data contained in the Washington Flora Checklist suggests otherwise. As the graphic shows, just over the past six years more than 200 taxa have been added to the flora. To be fair, the increase between 2017 and 2018 resulted primarily from incorporating the new taxonomy and nomenclature included in the *Flora of the Pacific Northwest, 2nd edition* (hereafter, *Flora*). Removing that anomalous year, there has still been a steady increase in the number of taxa documented for Washington.

Where do these new taxa come from? There is no single answer, but a generalization that applies is that as more area is covered, more taxa are found (Google "species-area curve" to learn more). Suffice it to say that not every part of Washington has been surveyed. Looking closely at the composition of new taxa found each year shows that both native and nonnative are included on the list. Below is a sampling of a few recent additions to our flora.

Micropus californicus var. *californicus* (cottontop, Q-tips), a native member of the Asteraceae (composite family), was first found in the wild in Klickitat County by Dr. Robert L. Carr in May 2015. Bob didn't make a collection, though he did take a series of outstanding images that confirm the identification (<http://biology.burke.washington.edu/herbarium/imagecollection.php>). I didn't become aware of the photos until he sent them

to me in early 2019. Interestingly, there is a specimen of this taxon at the Washington State University Herbarium collected by Wilhelm Suksdorf in 1915 at his Klickitat County home in Bingen, WA. Given the distance between Suksdorf's home and Bob's photo location, this does not appear to be a garden escape. The next closest populations are in the northern Willamette Valley of Oregon, so the occurrence of this species in Washington is not surprising.

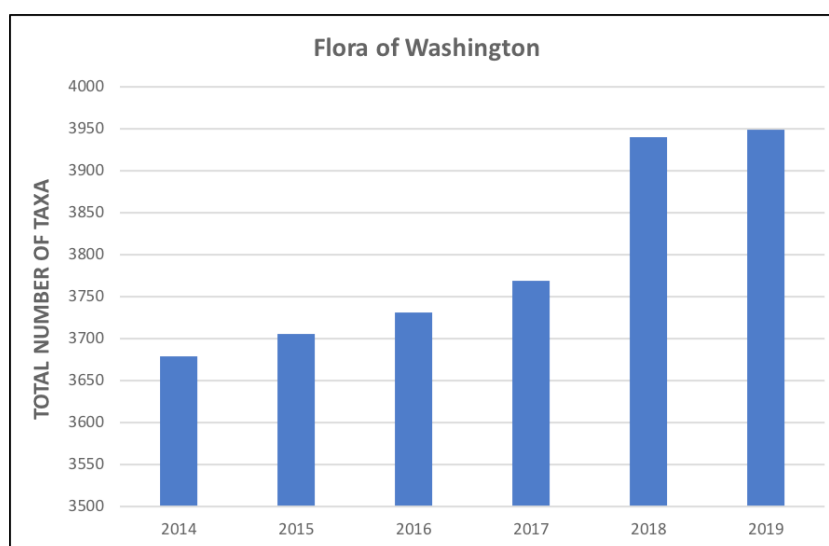
Polypogon maritimus (Mediterranean rabbitsfoot grass), a non-native member of the Poaceae (grass family), was also first collected in Washington in Klickitat County. Peter Zika found it in 2019, growing rather abundantly in a vernal pool near the shores of the Columbia River. This record is a rather significant range extension for this species, with the next closest population occurring in Douglas County south of Eugene, OR. You won't find *P. maritimus* in the *Flora* because Douglas

County, OR is outside of the book's range. In the *Flora* area *P. monspeliensis* is the most common and widespread species in this genus, but the lemmas of that species have awns whereas the lemmas of *P. maritimus* are awnless.

Rorippa sphaerocarpa (roundfruit yellowcress) is a native member of the Brassicaceae that occurs in wet areas along the margins of streams, rivers, ponds, and lakes. While identifying my 2018 collections this past year, I found that I had

collected this species along a backwater channel of the Columbia River in Skamania County. The next closest populations of *R. sphaerocarpa* are in southeast Oregon and adjacent southwestern Idaho. This is quite a range extension, and likely was facilitated by migrating waterfowl.

This short list serves as a reminder that more work remains to fully document Washington's flora. Through additional field work and thorough examination of all herbarium specimens collected in Washington we will continue to generate new discoveries to our flora. The ultimate benefit of this effort will be a more comprehensive understanding of Washington's vascular plant diversity, which of course informs conservation and land management decisions.



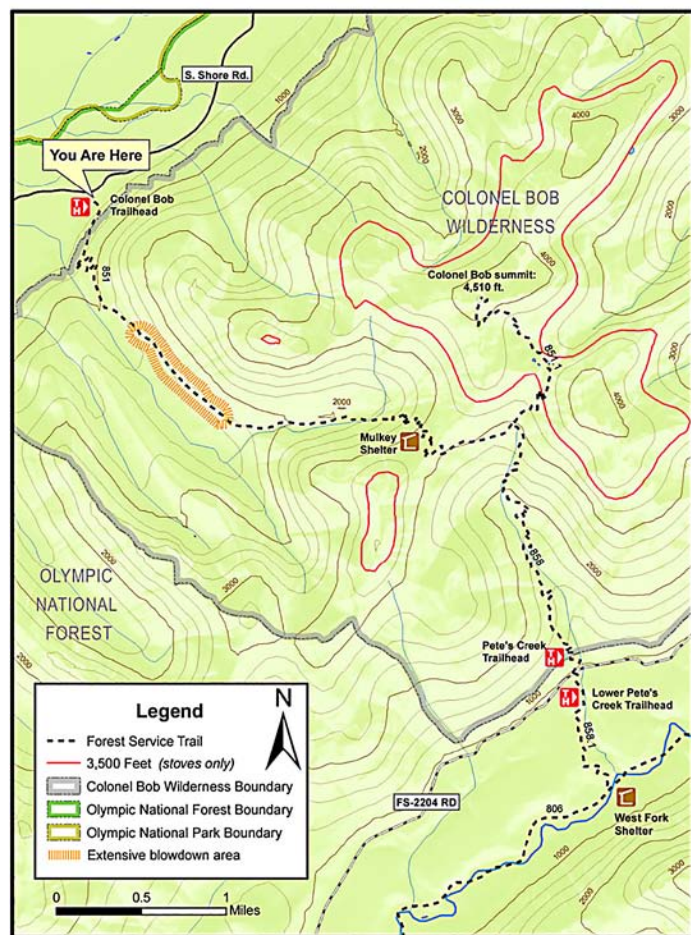
Graph showing the increase in vascular plant taxa in Washington over the past 6 years.

A Natural History of Colonel Bob Wilderness, Southwestern Olympic Peninsula

by Bob and Clare Carlson

Introduction

Some places quite accessible yet infrequently visited seem to have everything: a temperate rainforest with a great variety of vegetation, interesting geology, beautiful views (weather dependent), an opportunity for exercise, wilderness, and usually peace and solitude. One such place is Colonel Bob, a 4498-foot peak in Washington's Olympic National Forest about four miles east of Lake Quinault. This peak is the namesake for the Colonel Bob Wilderness, which lies just south of the southwestern section of Olympic National Park.



Trails up Colonel Bob. MAP: US FOREST SERVICE

Access

Colonel Bob may be climbed on the seven-mile Colonel Bob Trail (elevation gain 4292 feet) from Lake Quinault, or the four-mile Pete's Creek Trail (elevation gain 3500 feet) from the West Fork Humptulips River.

The Colonel Bob trailhead (with starting elevation of 200 feet) is accessed from US Highway 101 by following the South Shore Road northeast for 6.1 miles.

The Pete's Creek trailhead (with starting elevation of 1000 feet) is accessed from Forest Service Road 2204 via the Donkey Creek Road leading from Highway 101. There is a Forest Service outhouse at the trailhead. The two trails meet at an elevation of approximately 2860 feet and continue to the summit. Hiking information is available from the Washington Trails Association and/or *Olympic Mountains: A Climbing Guide 4th Edition*, 2006.

Climate and Weather

The Olympic Peninsula experiences a maritime cool, wet climate. The western region, near the Pacific Ocean and including the Colonel Bob Wilderness, receives the most annual precipitation in the conterminous United States.

The nearest weather station to Colonel Bob mountain is at the Quinault Ranger Station on the floor of the Quinault Valley, 3.7 miles to the northwest (elevation 260 feet). There the mean annual temperature (1931-1976) was approximately 51°F, with a January average minimum temperature of 33.8°F and a July average maximum temperature of 74.2°F. Allowing for a normal temperature lapse rate of 3.57°F/1000 feet of elevation, the mean annual temperature at the summit of Colonel Bob would have been about 36°F.

The average total annual precipitation (1931-1976) at the Quinault Ranger Station was 137.21 inches, with December the wettest at 23.34 inches and August the driest at 3.03 inches. Although the average total snowfall, defined as old and new snow existing on the ground, in January was 7.2 inches, the average winter snow depth was only 1 inch. Of course, the nearby mountains get more rain and much more snow.

Geology

The bedrock of the Colonel Bob Wilderness is the Eocene Crescent Formation, which extends counterclockwise around the Olympic Peninsula from Colonel Bob to Cape Flattery (Tabor, 1975; Tabor and Cady, 1978). The Eocene lasted from 55.8 until 33.9 million years ago; within this epoch, the Crescent basalts were erupted between 53 and 48 million years ago (Eddy et al., 2017).

Much of western North America is composed of exotic terranes, bundles of rocks not emplaced on the continent. The Siletzia terrane, including the Crescent basalts, extends from south-central Oregon to southern Vancouver Island. This terrane is an oceanic plateau composed of basalts, plus sediments deposited on the seafloor. The Siletzia and other terranes were subducted beneath the western edge of North America, creating mountain ranges like the Olympics.

The Quaternary ice age began about 2 million years ago. For millions of years before then, soils developed on the basalts as they weathered in a warmer climate. For the past million years glaciations and interglaciations alternated on a cycle of about 100,000 years. During each glaciation ice advanced down into valleys from high cirques in the Olympics; valley glaciers extended almost to sea level. Colonel Bob and nearby Gibson



Colonel Bob's temperate rainforest on Eocene basalt. PHOTO: CLARE CARSON

Peak have cirques at elevations of about 4000 feet. The valley glaciers radiating from the Olympics included the valleys of the Quinault River to the northwest and the Hump Tulips River to the southeast.

Colonel Bob has a record of the last glaciation, which extended from about 100,000 to 10,000 years ago. The small lakes between 3400 and 3600 feet just southeast of Colonel Bob are scour depressions carved by the ice. Features are significantly different above and below about 4000 feet. Below that, ancient soils have been removed by the ice, which made striations as it dragged rock fragments over the bedrock. Higher are remnants of reddish soils, the color produced by weathering of the basalt's iron silicates to iron oxides.

This change is visible after the trails merge, at an elevation of about 4000 feet. The bedrock along almost the entire trail is submarine pillow basalts of the Crescent Formation. However, at the trailhead the Crescent Formation includes mudflow breccias (broken rocks deposited by a slurry of water and basaltic debris). Also, at the saddle between Gibson Peak and Colonel Bob, is the northeast-trending Blue Mountain unit composed of a sandstone dominated by small basalt fragments and mica flakes (Tabor and Cady, 1978).

Vegetation

Pete's Creek Trail provides not only a marvelous display of a great variety of plants in a temperate rainforest, but also shows changes in vegetation through 3500 feet of elevation. The following is from the "hike info" of the Washington Trails Association:

The trail is mostly in fairly dense conifer forest, including Sitka spruce, Douglas-fir, Pacific silver fir, western hemlock, and western red cedar ... lots of fern, moss, Douglas maple, fungus, salmonberry, huckleberry, wildflowers ... copious columbine in season as well as paintbrush, cow parsnip, false Solomon's seal (both types), false hellebore, twisted stalk, bistort, arnica, valerian, stonecrop, vetch, and more. (<https://www.wta.org/go-hiking/hikes/colonel-bob>)

The Olympic National Forest website for the Colonel Bob Wilderness states:

The lower slopes are moderately to heavily forested with stands of western hemlock and Pacific silver fir, mixed with western red cedar, Douglas-fir and Sitka spruce ... Lush ferns, shrubs, moss, wild flowers and lichens carpet the forest floor. At higher elevations, subalpine and alpine vegetation, green meadows, rock outcrops and rugged peaks dominate the wilderness landscape.

Several rare plant taxa are found around Colonel Bob, including *Dodecatheon austrofrigidum* (tundra or frigid shootingstar) and *Carex circinata* (coiled sedge). *Dodecatheon austrofrigidum*, a perennial member of the primrose family is only found in northwest Oregon, Pacific County (Washington) and the Colonel Bob wilderness (Bartlett, 2010). Four species of *Carex* are relictual populations from the last glaciation, and are potentially at the southernmost extent of their range, therefore at risk due to global warming. One of these rare sedges, *Carex circinata*, has only three occurrences on the Olympic Peninsula, with one being on Colonel Bob (Bartlett, 2011).



Colonel Bob Wilderness and Quinault River delta. PHOTO: BOB CARSON

On our climb (16 July 2019), thick clouds and light rain reduced the views, but did not dampen our enthusiasm for the old-growth forest, abundant ripe berries, and what appeared to be the peak of summer wildflowers. Of particular interest were the different species of hemlock and cedars growing near one another due to overlapping elevation ranges. Diameters of some western hemlock, western red cedar, and Douglas-fir exceeded four feet, with many Pacific silver firs greater than five feet.

Plants observed during our July hike include:

Trees

Tsuga heterophylla (western hemlock)
Tsuga mertensiana (mountain hemlock)
Pseudotsuga menziesii (Douglas-fir)
Abies amabilis (Pacific silver fir)
Taxus brevifolia (western yew)
Thuja plicata (western red cedar)

Callitropsis nootkatensis (Alaska yellow cedar)
Alnus rubra (red alder)

Shrubs (and small trees)

Gaultheria shallon (salal)
Vaccinium sp. (blueberry, Alaskan &/or oval-leaved)
Rhododendron albiflorum (white rhododendron)
Sambucus racemosa (red elderberry)
Sorbus sitchensis (Sitka mountain-ash)
Rubus spectabilis (salmonberry)
Spiraea douglasii (hardhack)
Oplopanax horridus (devil's club)
Ribes lacustre (black gooseberry)
Acer spp. (maple, vine &/or Douglas)
Paxistima myrsinites (falsebox)

Wildflowers

Maianthemum racemosum (false Solomon's-seal)
Streptopus sp. (twisted-stalk)
Trillium ovatum (western trillium)
Lilium columbianum (tiger lily)
Xerophyllum tenax (bear-grass)
Veratrum viride (Indian hellebore)
Corallorhiza striata (striped coralroot)
Bistorta bistortoides (American bistort)
Sedum sp. (stonecrop sp.)
Tiarella trifoliata (foamflower)
Aquilegia formosa (red columbine)
Vicia americana (American vetch)
Lupinus sp. (lupine)
Heracleum maximum (cow-parsnip)
Mertensia paniculata (tall bluebells)
Castilleja miniata (commom red paintbrush)
Achillea millefolium (yarrow)
Symphyotrichum sp. (aster)
Eriophyllum lanatum (Oregon sunshine)
Adenocaulon bicolor (pathfinder)
Anaphalis margaritacea (pearly everlasting)
Dicentra formosa (Pacific bleeding heart)
Campanula rotundifolia (common harebell)

Enjoy your climb of Colonel Bob—the trail is steep but nowhere dangerous. May the skies be clear so that you can look down to the glacial trough that holds Quinault Lake, and see beyond to the maze of the Olympic peaks. The sunshine will make the rainbow of flowers even more beautiful. You will experience natural history at its best because of the variety of trees, shrubs, and wildflowers, and the landscape carved by rivers and glaciers.

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Bob Carson, Phillips Professor of Geology and Environmental Studies Emeritus at Whitman College, was raised in western Virginia and northern New England; he studied at Cornell, Tulane, and the University of Washington. He is the author of several books including *Hiking Guide to Washington Geology and Where the Great River Bends*, among others. Clare, a retired Whitman associate dean, has lived in the Pacific Northwest and overseas; her degree in biology is from the University of Washington.



Thank you for Participating in Strategic Planning

WNPS has hosted focus group sessions around the state to collect input on the 2020 Strategic Planning Process. Many chapter leaders, committees and members have attended an additional meeting this spring to vision WNPS in 2025. Environmental scans and Stakeholder interviews will be the next step to add additional input.

A complete summary will be available on the website the end of March for all to review. Stay apprised of this project online at wnps.org/reports-and-minutes/strategic-planning-2020. Member comments are welcome here also.

The State Board of Directors will meet in retreat April 3-5, 2020 to review and prioritize all the discovery work and build the strategic planning framework with consultants, the Ostara Group.

What do you think WNPS does Best?

Ten Things You Always Wanted to Know About Weeds (But Were Afraid to Ask)

by Walter Fertig

Weeds (a.k.a. non-native, alien, exotic, naturalized, or introduced plants) are widely recognized as one of the most serious threats to native biological diversity and human agro-economic systems. In North America, over 25,000 plant species have been imported over the past three centuries, of which nearly 5,000 have become established outside of cultivation. A small but particularly aggressive subset of these species have invaded over 100 million acres of land across the United States and each year gobble up new territory more than twice the size of the state of Delaware (Brumback 1998). A study by The Nature Conservancy found that competition with invasive plants and degradation of habitat by exotics is a factor in the decline of 42% of the Threatened and Endangered species in the United States (Stein and Flack 1996). Economic losses from reduced agricultural yields, loss of forage, increased fire frequency, and damage to infrastructure over the past century number in the billions of dollars.

To combat the spread of non-native plants, it is important to be more aware of weeds and their impacts. As a public service, *Douglasia* offers the following ten factoids to improve our reader’s WIQ (Weed Intelligence Quotient):

1. “Weed” is not a well-defined, scientific term.

Ronald Stuckey and Ted Barkley (1992) described a weed as “a plant-out-of-place” that insists on growing where it is unwanted. According to this definition, almost any plant could be considered a weed if it pops up uninvited in a garden, pasture, or natural plant community. Biologically speaking, weeds tend to be well-adapted to disturbed habitats, such as gravel stream-banks, burned areas, roadsides, plowed fields, grazed pastures, or vacant lots. Weeds are often equated with rats, pigeons, cockroaches, or other organisms that readily exploit human-manipulated environments, and resist our efforts to control them. “Weed” is also applied as a common name for a diverse assemblage of unrelated plant species that often have unremarkable flowers or grow wild in cultivated landscapes. Examples include duckweeds (*Lemna*), hawkweeds (*Hieracium*), knapweeds (*Centaurea*, *Rhaponticum*), knotweeds (*Fallopia*, *Persicaria*, *Polygonum*), locoweeds (*Oxytropis*), milkweeds (*Asclepias*), pepperweeds (*Lepidium*), and ragweeds (*Ambrosia*).

2. A lot of “weeds” are native.

The popular guide book *Weeds of the West* (Whitson 1991) describes over 300 common weed species, of which nearly one-third are native! This book defines a weed in starkly utilitarian terms as “a plant that interferes with management objectives for a given area of land at a given point in time.” Unfortunately, this means that many ecologically important native species such as big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Eri-*

cameria nauseosa), and honey mesquite (*Prosopis glandulosa*) are classified as weeds, on par with non-native invaders like cheat-grass (*Bromus tectorum*) or common St. Johnswort (*Hypericum perforatum*). When speaking of problematic, foreign weeds it is better to use more specific terms, such as “non-native,” “exotic,” “introduced,” “naturalized,” or “invasive” to differentiate these from native species that happen to grow in the wrong place or are naturally adapted to early successional habitats. Care should be taken not to overly anthropomorphize these terms, though, especially in light of our current political climate in which immigration has become demonized. All of us (plants and humans alike) are native to the Earth after all.

3. In the United States, non-native species make up between 12-53% of any state’s flora.

The distribution of introduced plant species is not even across the country. States with equitable climates, a large agricultural sector, or a long history of human settlement tend to have more introduced species than those with harsh climates, short growing seasons, or a relatively light human footprint. Thus the states with the highest number of non-native species are Hawaii (1,597), California (1,099), and New York (1,082), while states with relatively few introduced taxa include Alaska (405), Wyoming (348), and North Dakota (171) (Alaska Center for Conservation Science 2019, Baldwin 2012, Fertig 1999, Imada 2012, Stuckey & Barkley 1993). Hawaii has the highest percentage of introduced species, with 53.5% of the state’s flora consisting of naturalized plant taxa, while Wyoming has one of the lowest at 12.6%.

Washington state has at least 1,039 naturalized vascular plant taxa (Washington Flora Checklist 2019), making it one of the more weed-rich states in the U.S. These non-natives

Percentage of Introduced Vascular Plant Species in Selected State Floras

State	Number of Introduced Species	% of Flora that is Introduced	Number of Introduced Species per log/area
Hawaii	1597	53.5	378.2
California	1099	14.5	195.8
New York	1082	35.8	210.5
Washington	1039	28.3	197.3
Illinois	782	27.5	151.1
Utah	503	13.1	94.2
Alaska	405	17.5	65.5
Wyoming	348	12.6	64.4
North Dakota	171	15.0	32.5

Updated from Rejmanek and Randall (1994) with new data from Alaska Center for Conservation Science 2019, Baldwin (2012), Fertig (1999, 2007), Flora of Alaska (2019), Imada (2012), and Washington Flora Checklist (2019)



Hieracium aurantiacum (Orange hawkweed) is an introduced species native to Europe. Like many “weeds” it is found primarily in sites that are highly disturbed by human activities, such as lawns, roadsides, and old pastures. photo: BEN LEGLER FROM THE SKAGIT RIVER, WA. (WITH PERMISSION FROM BURKE HERBARIUM IMAGE COLLECTION)

account for 28.3% of the state’s flora. Rejmanek and Randall (1994) compiled data on introduced species from California and other states and calculated the number of alien species per log/area of each state (taking the log of the area adjusts for the discrepancy in size between the states.) Based on these data, New York, Hawaii, California, and Washington still rank as the most weed-rich states, while Alaska, Wyoming, and North Dakota are more weed-free (see table previous page).

4. The majority of non-native species in North America come from Europe and Asia.

In part, this reflects patterns in the immigration of humans to North America, with the majority coming from Europe (and presumably introducing their own invasive natives on purpose or by accident). Being from comparable latitudes, the climates of Europe, Asia, and North America are similar, which may also explain the success of Eurasian plant immigrants. Far fewer non-native species in North America come from tropical countries, or from the southern hemisphere.

In Washington, 80% of our naturalized plant species originated from Eurasia, while only 1% are derived from Africa or Australia. About 15% of the state’s naturalized flora originally

came from elsewhere in the United States, with more species coming from the eastern and central US (130 taxa) than from Oregon, California, or the southwest (35 taxa) (Washington Flora Checklist 2019).

5. Relatively few North American plant species are invasive elsewhere in the world.

Although many New World crop species have thrived when introduced elsewhere in the world (such as maize, tobacco, potatoes, and tomatoes), relatively few “weedy” species from the Americas have joined them. A few exceptions are tall coneflower (*Rudbeckia laciniata*) and bigleaf lupine (*Lupinus polyphyllus*), two western species that are widely cultivated in Europe and have escaped along roadsides and in wetlands. Several North American pine species have also escaped from cultivation to become aggressive pests in Scandinavia, New Zealand, and South Africa. Erect prickly pear cactus (*Opuntia stricta*), originally native from the southeastern United States and Mexico to northern South America, has become a serious ecological pest in Australia and southern Africa. Far more weed species have come to North America from the Old World than vice versa. Ecologists have suggested that the longer history of agriculture and animal husbandry in Europe and Asia made “native” Eurasian weedy species pre-adapted for similar conditions once they were brought to North America. (The absence of their native predators and diseases would have also been a factor in their success.)

6. What makes a weed species successful?

Native weedy species and invasive plants share a number of life history characteristics that make them good at exploiting disturbed sites, whether these were caused by natural events, such as volcanic eruptions, fire, or flooding; or created by humans through road and building construction, tilling soil, or removing tree cover. Herbert Baker (1974) observed that successful weeds usually have some of the following traits:

- Seeds that are long-lived and do not have specific germination requirements
- Rapid growth and quick flowering (often associated with an annual growth habit)
- Seeds that are produced in great abundance and throughout the growing season
- Flowers that can produce seed through self-pollination, or if pollinated, are mostly by wind or common, generalist pollinators
- Seeds that disperse readily in the local area and over long distances
- If perennial, plants able to spread vegetatively and re-sprout from broken stem or root fragments (e.g. rhizomes or stolons)
- Few predators in their new homes (herbivores and disease organisms that kept them in check in the Old Country are not present)

- Aggressive competitors for light, space, and water

Daehler (1998) added to this list by noting the success of many nitrogen-fixing plants, vines, clonal trees, grasses, and aquatic to semi-aquatic herbs in invading natural areas around the world. Current quarantine programs designed to screen out new agricultural weeds may need to be expanded to include this broader group of potential invaders.



Hieracium cynoglossoides (Scouler's hawkweed) is an example of a native "weed" that may occur in disturbed sites or natural plant communities. Because of its lack of economic value or appearance, it is deemed a "weed", even though it is not introduced. PHOTO: BEN LEGLER FROM THE SUMMIT OF SALMO MOUNTAIN IN PEND OREILLE COUNTY, WA. WITH PERMISSION, FROM BURKE HERBARIUM IMAGE COLLECTION.

7. Many introduced species are actually rare.

While the truly obnoxious introduced weeds cause most of the ecological and economic damage (and get most of the negative press), many introduced species fail to spread much from their original points of arrival and do not become major problems. In Washington, 62 of the state's 1,039 introduced and naturalized plant species have not been observed since before 1980 (6%) and 574 species are known from 10 or fewer populations (55%). When new species are first documented in the state it is important to confirm whether the population is native or introduced, so as not to squander limited conservation resources on a "rare" weed. Eradication is also much more plausible if new weed populations are treated before they get a chance to multiply and become established elsewhere.

8. If two introduced species hybridize in North America to form a new species, is that species native?

While this might sound like a hypothetical question, it has actually happened on several occasions. Washington State University botanist Marion Ownbey (1950) discovered two cases of hybridization occurring between introduced populations of yellow salsify (*Tragopogon dubius*), meadow salsify (*T. pratensis*) and oysterplant (*T. porrifolius*) in the vicinity of Pullman. While the vast majority of hybrid progeny were sterile, a few individuals had by chance undergone a doubling of their genome, and were able to produce fertile fruit. Ownbey named

two of these fertile hybrids as new species (*Tragopogon miscellus* and *T. mirus*). Both hybrid species have spread elsewhere in North America in weedy habitats. Since they evolved in the Pullman area, does this make them native to Washington? A similar example has been documented with two introduced species of Russian thistle (*Salsola tragus* and *S. australis*) crossing in California to form a new, fertile species (named *S. ryanii*) endemic to the state (Hrusa and Gaskin 2008). Just as problematic perhaps is when a native species crosses with an introduced one to form a new taxon, as happened in the northwest with native spurless jewelweed (*Impatiens ecalcarata*) hybridizing with introduced spotted jewelweed (*I. capensis*) to create the new species Pacific jewelweed (*I. × pacifica*) (Zika 2006).

9. If you can't beat 'em, eat 'em!

As every gardener knows, keeping weeds under control is a back-breaking, expensive, time sink with little prospect of real success. Rather than giving in to despair, an alternative can be to turn the table on weeds by making them the object of our gustatory desires. Many introduced plants after all, were formerly cultivated for food or medicine. One such example is the common dandelion (*Taraxacum officinale*) and its close cousin, the red-seeded dandelion (*T. erythrospermum*), both introductions from the Old World. Ancient Egyptians consumed dandelions to treat stomach and kidney disorders. Europeans have a long history of using fresh dandelion leaves for salads and ground roots as a coffee substitute. In American folklore, dandelions have been used in remedies for warts, rheumatism, and gallstones. Modern science confirms the nutritional value of *Taraxacum*. Dandelion greens have 50% more vitamin C than tomatoes, double the protein content of eggplant, and twice the fiber of asparagus. They are also rich in potassium and iron (Gonzalez-Castejón et al. 2012). And the leaves can be used for making dandelion wine! Greens should be picked before the yellow flowers appear (after which they become more acidic) and harvested in areas free of chemical herbicides.

10. What can I do?

Containing the spread of invasive, non-native plants will require the cooperation of all citizens. Gardeners need to take a keener interest in the origin and invasiveness of plants that they select for their homes and parks. Species that are known to be invaders should be avoided. Retail seed providers and botanical gardens need to take great care in determining the possible negative consequences of new garden or crop species before they are offered to the public. Nature enthusiasts need to take more responsibility for learning the identity of non-native plants and reporting new infestations to the appropriate land management agency, county weed and pest office, or extension service. Weed control organizations need to continue developing new, integrated techniques to combat invading plants while not compromising the health of humans and the environment. Cooperation of all of these groups, and continued vigilance will help stem the tide of exotic plant invasions.

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Walter Fertig is the state botanist with the Washington Natural Heritage Program and pulls weeds on 5 acres in McCleary.



iNaturalist: the Robotanist that is Stealing my Job

by T. Abe Lloyd

How many times have you heard clients wish that plants wore name tags? When was the last time you listened to a botany student complain that dichotomous keys are for dinosaurs and genetic barcode scanners will be the way of the future? Unfortunately for me, the next best thing already exists, and it is called iNaturalist. This app combines the smartest field guide you've ever used with a some of the function of a digital herbarium, along with a nerdy social media network. Worst of all, it's free. Simply take a picture of a plant (or almost any other organism) and an artificial intelligence computer model will make identification recommendations. Herbarium curators share my sense of tenuous job security because this app can also display species distribution maps created from the GPS location associated with each observation.



I found only temporary solace in thinking that "this is only a citizen science project; the data quality will be too poor to be useful." Then I learned about their quality control measures. Everyday users and professional botanists that have been brainwashed by the machines can view and vet each other's observations and make identification recommendations at all taxonomic levels. They thought of ways to crowd source everything.

The app is even trying to replace my best friend and sole joy in life: Facebook. Like many social media networks, you can sign up to receive notifications. With iNaturalist, you can subscribe to get notification anytime someone observes a taxon of interest, or makes an observation in a place of interest. You can also follow the observations of other botanists and their unpaid robotic interns. For example, I can see that fellow Koma Kulshan chapter member Pam Borso has made 2,281 observations including 1,050 species. Nice job, Pam!

How it works

Download the free iNaturalist app from wherever you get your apps. iNaturalist functions equally well on both Apple and Android operating systems. You will be prompted to create an account when you open the app for the first time, or go to their website on a desktop to create an account. Now you are ready to begin . . . if you really want to.

The platform is built around observations, usually consisting of photographed organisms. Like a herbarium specimen, each observation ideally includes a location, date, species name, and a description of characteristics not visible in the photographs. Unlike the tedium of making specimen labels, your smarty-pants phone can do most of this for you. When you use the app to take photographs of the flower, leaf, whole plant, and

habitat the app will automatically record the date, time, and location. These can all be changed later or harvested from file metadata if you are uploading images from another camera. If you have an internet connection in the field, you can view identification recommendations. If not, you can leave the species name blank, or identify it to the level that you know it (for example, to family or genus).

Back at home, open the app and allow your observations to upload to the internet. Now you can open the desktop version of iNaturalist to see your observations or continue working on your smartphone. Either way, further identification is a snap. Just click on the What Did You See tab, and it will provide suggestions that you can click to accept or view to research further. If you already know the name simply start typing a species, and it will autofill with the correct spelling. Once someone else agrees with your identification, it will become “research grade.” Observations that lack a date, photo, or location, will always remain categorized as “casual” observations. If someone disagrees with your observation and suggests a different name, the app labels the observation with the point of taxonomic consensus. For example, if I think my observation was *Rubus pedatus* and David Giblin thinks it was *Fragaria vesca*, iNaturalist will label it Rosaceae because both are members of the Rose Family. Then if I change my mind and agree with David, it becomes research grade.

iNaturalist can also be used to create Projects and Guides. Projects are containers for observations and usually have a discrete geographic area, such as a park, mountain, or trail. While project parameters are highly customizable, many project curators allow anyone to contribute observations to their Project. Guides are lists, photographs, and descriptions of organisms known to occur in an area. You can create a Guide in iNaturalist by uploading a species list.

For example, a user could import our WNPS species list for Hannegan Pass. iNaturalist then couples the list with stored photos and descriptions of the organisms on the list; so it is a little like cutting all the pages out of Mark’s wildflower book and only bringing those you need on a hike. The Guide essentially gives you access to information before you make observations.

iNaturalist is a joint venture of the California Academy of Sciences and National Geographic. It was started in 2008 by a team of UC Berkeley School of Information students for their Master’s final project.

Abe Lloyd teaches at Western Washington University and is a member of the Koma Kulshan Chapter.



Pro Tips

The name settings are customizable. You can force iNaturalist to use scientific names instead of the default common names.

You can “batch edit” observations to add several to a project at the same time. Hover over your profile image and select Edit Observations from the drop-down menu.

Seedling Identification: A Guide to Appreciating Young Plants

by Kyra Kaiser

When learning how to identify plants, I started small. My first formal introduction to plant identification with taxonomic keys began on the forest floor of Mount Rainier. Equipped with *A Guide to Seedling Identification for 25 Conifers of the Pacific Northwest* by Jerry Franklin, my field crew members and I scrutinized meter-by-meter plots for recent germinants. We counted and identified thousands of western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and Douglas-fir (*Pseudotsuga menziesii*) seedlings, to name a few species. The data contributed to a research study led by my plant ecology professor at the University of Washington, Dr. Janneke Hille Ris Lambers, concerning the effects of climate on seed germination and seedling survival.

As a side effect of the job, I started seeing conifer seedlings everywhere, from landscaping strips in parking lots to the Pinetum section of the Washington Park Arboretum in Seattle. Finding seedlings became a game. This game is useful for forecasting the future vegetation structure of a site under different management scenarios. For example: will a newly planted restoration site develop into a mature native plant community? Perhaps not, if invasive seedlings are abundant and the site is unmanaged. However, short-term invasive species control could create a different post-restoration story.



A Douglas-fir (*Pseudotsuga menziesii*) seedling, distinguishable from other conifer species by its red stem and five to eight cotyledons cupped upward. PHOTO: KYRA KAISER

Unfortunately, there are few resources for seedling identification. Recognizing this knowledge gap, I decided to create a seedling identification guide for the Hille Ris Lambers lab. Admittedly, my project was also an excuse to pursue my

interests in plant propagation, plant identification, scientific writing, and photography while earning credit toward a college degree. My philosophy? Writing a guide would be the best way to master my interests while contributing to my field. I began with a rough outline for a year-long project, which morphed into a two-year project that culminated in a 59-page book.

My book, *A Seedling Identification Guide for Common Plants on Mt. Rainier and the North Cascades*, features photographs and key traits for thirty native species in the seedling stage. These species range from trees and shrubs to wildflowers and sedges. Since I wanted my book to serve as a multipurpose resource, I also detailed the steps that graduate student Kimberly Ertel and I took to grow these species from seed. While I observed and photographed the plants for my book, Ertel measured relative growth rate, biomass, and later frost tolerance for her master's thesis, *Investigating Physiological Trade-offs in North Cascades Plant Species*.

Ertel and I shared propagation duties and plant care, which helped us problem solve and save time during the propagation process. Despite our careful planning, this process held frequent surprises! Mold rotted our limited seed supply during stratification. Seeds germinated and died before we were ready to plant. Then, post-planting germination was so successful that we had to thin most species. The seedlings grew at a rate that almost outpaced my efforts to observe, photograph, and record their morphology and development.

My photographs capture sequential stages of early plant development from multiple angles, with a penny in each photograph for size reference. My notes describe basic species traits such as leaf shape, color, and length, as well as sometimes overlooked traits such as leaf thickness, hairiness, and angle. Consolidated from my experience, here are a few tips on identifying seedlings.

Expect to be challenged!

Seedlings are tiny, lack prominent features such as flowers and fruits, and have similar leaf shapes. Aside from conifers, which resemble miniature trees, most seedlings look different than their mature forms. Identifying seedlings requires learning how to distinguish among subtle differences in shape, texture, color, and size.

Count cotyledons.

Cotyledons are the first leaves of a seedling and originate in the seed. All subsequent leaves are true leaves, which often differ in morphology from cotyledons. Classifying a seedling as a monocot, dicot, or polycot is a quick way to narrow species possibilities. Monocots have one cotyledon, dicots have two, and polycots have more than two. Monocots and dicots are flowering plants, also known as angiosperms. The other major category of seed-producing plants is gymnosperms, which are non-flowering. Monocots include lilies, grasses, rushes, and sedges, while dicots include all of the other flowering plant species. Conifers, which are classified as gymnosperms, are con-



Rounded triangles with notched tips define the shape of piggyback plant (*Tolmiea menziesii*) cotyledons, though identification is easier after the first true leaf appears. PHOTO: KYRA KAISER

sidered polycots as a group because they typically have three or more cotyledons. There are a few notable conifers in our native flora that have two cotyledons: Alaska yellow cedar (*Callitropsis nootkatensis*), Pacific yew (*Taxus brevifolia*), and western red cedar (*Thuja plicata*). However, these species are not technically dicots because the term only refers to flowering plants. On the other extreme, some species of pine (*Pinus*) have more than twelve cotyledons! Given this large range in cotyledon number, counting cotyledons is especially useful for identifying conifer species.

Use the rule of thirds.

At first glance, most broadleaf species (i.e., dicots) appear to have small, round cotyledons. However, there are many types of round shapes. To use a familiar example: A navel orange and red delicious apple are both round, but most people can distinguish between outlines of the two fruits. The orange is circular, while the red delicious apple is narrower at the base than the apex. Granted, it is harder to distinguish between the shapes of unfamiliar objects, such as cotyledons. One useful trick involves dividing a leaf into thirds with imaginary horizontal lines. Analyze the shape of each third. Is the leaf round, notched, or pointed at the apex and base? Is the cross section of the leaf wider at the apex, middle, or base? Moving from base to apex, does the width of the leaf increase, remain constant, or decrease in each third? Then compare the shape of each third to other seedling specimens and photos. By focusing on these details in addition to generalized leaf shapes, it is easier to accept or reject a species candidate as a match.

Look for hairy details.

Check for the presence of hairs along the upper and lower leaf surfaces, leaf margin, and stem. Sometimes hairs are too small to be seen without a magnifying glass—be sure to use one! More species have hairless (glabrous) cotyledons than hairy ones, so discovering hairs can greatly reduce the species candidate pool. The location of hairs is also important. At the cotyledon stage, fringecup (*Tellima grandiflora*) only has hairs on the upper leaf surface, while thimbleberry (*Rubus nutkanus*) has hairs on the leaf margin and stem but not leaf surface. Hairs are more common on true leaves than cotyledons, but the location, density, and structure of hairs still varies among species.



Hairy cotyledon margins are a key identification trait for a thimbleberry (*Rubus nutkanus*) seedling. PHOTO: KYRA KAISER

Size is relative.

Smaller seedlings usually emerge from smaller seeds. Intuitively, gardeners know this. Large seedlings germinate from sunflower, bean, and pumpkin seeds; tiny seedlings germinate from carrot, lettuce, and spinach seeds. These general size differences are often more useful for identification than exact seedling size, which varies slightly based on environmental conditions, genetics, and age. For example, greenhouse grown seedlings are more robust than those exposed to cold, drought, or other outdoor stressors. When identifying species with similar seedling morphology, such as conifers, collecting specimens from the same area and comparing sizes among species can help.

Search for seeds.

Seed shells stuck to cotyledons provide another clue to the identity of a seedling. The remains of a seed from which a seedling germinated may also be found on the ground nearby. In dicots, the shape of a seed usually matches the shape of the cotyledons. Consult images in the PLANTS database (<https://plants.sc.egov.usda.gov/java/>) or seed catalogs of native plant nurseries for help with seed identification.

Location matters.

In nature, seedlings often emerge from seeds produced by nearby plants. In addition to scanning the ground for seedlings, survey the species in the surrounding plant community. Other potential seed sources include the historical plant community;

invasive plants removed from an area may still have viable seeds in the soil.

Employ multiple lines of evidence.

Cotyledon number, leaf shape and texture, and seedling size, color, and location define a species, but relying only on one or two traits can lead to misidentification. Differences in leaf shape may be indistinguishable between closely related species; seedling color and size typically vary with light, water, and soil nutrient levels. Species are best characterized using multiple identification traits.

Acknowledgements

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Seedling Identification Resources

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Kyra Kaiser recently graduated from the University of Washington with a B.S. in Plant Biology. You can contact her at kj20875@comcast.net. Her book, *A Seedling Identification Guide for Common Plants on Mt. Rainier and the North Cascades*, can be accessed at faculty.washington.edu/jhrl/Kaiser_PNW_SeedlingGuide_2019.pdf.



Education Grant Cycle Open

The WNPS Education Committee is currently accepting grant applications for the Spring cycle.

The 2020 application submittal deadline is May 15th. Grants from \$300 - \$1000 are available.

Proposal guidelines and past projects are posted online at wnps.org/education-grants.

Applications are submitted to education@wnps.org.

Herbarium Specimens as Conceptual Art: *Botanizing Hope* with Lou Cabeen

by Katherine Darrow

For Seattle artist, Lou Cabeen, personalized herbarium specimens are a way to honor and reflect on human relationships with plants.



Herbarium Martyrium: 12 Plant Allies in the Geography of Hope is a collection of hand-stitched botanical illustrations commemorating species used in phytoremediation. PHOTO: LYNN O C THOMPSON

While browsing the art galleries at Bainbridge Art Museum one afternoon, I did a double take: Here was a collection of herbarium sheets on display in the book arts exhibit, with beautifully arranged specimens described by detailed labels. Looking more closely, I read that these were from the archives of *Herbar-*

ium Martyrium, a Collection of Plant Martyrs. Instead of actual plant material, each specimen is a meticulously hand-stitched illustration. Reading more closely revealed that this collection, *12 Plant Allies in the Geography of Hope*, represents species that are used on industrial sites for phytoremediation, which is the use of plants to stabilize, remove, or transfer contaminants from soil or groundwater. Chernobyl, petrochemical facilities, and mine sites are noted as the “Location” for each specimen, with their use in each situation described in more detail. Some are indicator species, while others are able to take up or break

down toxins, thereby decontaminating soils riddled with heavy metals and poisonous chemicals. Several of the species represented, including common sunflower (*Helianthus annuus*), willow (*Salix* spp.), and cottonwood (*Populus* spp.), are among the native flora of Washington.

These artistic renditions of herbarium specimens are part of a larger body of work called *Botanizing the Anthropocene* by Seattle artist Lou Cabeen, created during a research partnership with fellow artist Sarah Jones. Another collection in this series is titled *Herbarium of Useful Plants*, a presentation of carefully pressed plant specimens collected near her home, collaged with recipes, handwritten notes, illustrations,

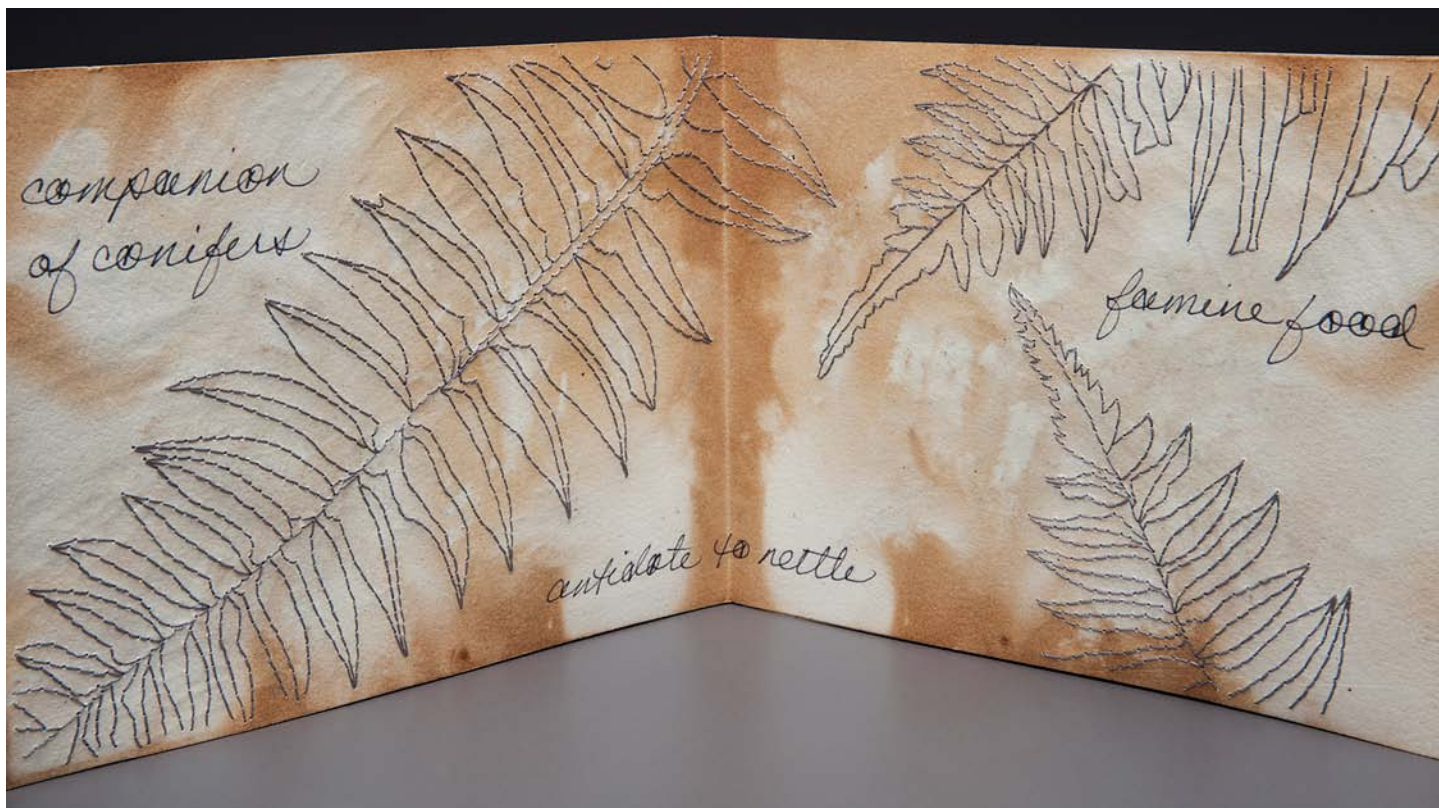
maps and medicinal information. Other artworks in the series diverge from the herbarium format, including a set of forty letter-pressed flash cards titled *Words Every Child Has A Right To Know Vol. 1*, that alerts the viewer to the attrition of human experience with nature in the 21st century.

“I’m not a botanist, but I took a lot of time to understand the goal of the herbarium specimen,” says Lou, who I visited at her studio in Seattle, not far from University of Washington where she was a Professor of Art specializing in fiber and book arts (1998-2015). A traditional plant press is now an important tool in her studio. “The idea of transgressing the scientific format is a way to blend the ethos of mind and heart. Through my artwork, I wish to contribute to the growth of a social norm of conservation and serving the communal good,” she explains.

Cabeen’s interest in botanical illustration and herbarium specimens was ignited during a visit to the Chelsea Physic Garden in London, a botanical garden specializing in ethnobotany since 1673. There she discovered the science of phytoremediation, which set her off on a two-year journey researching plants, visiting herbaria, and studying botanical art collections. In 2018, a three-week creative residency at Bloedel Reserve culmi-



Words Every Child Has the Right to Know Vol. 1 is a set of flash cards designed as a commentary on the decision of the Oxford Junior Dictionary to eliminate these words referring to plants in order to update the book for 21st century children. PHOTO: LYNN O C THOMPSON



Sword Fern Elegy is a lovingly embroidered accordion book with a handwritten poem lamenting the mysterious die-off of ferns in Seattle's Seward Park. It is part of a new body of artwork by Lou Cabeen called *Botanizing Hope*. PHOTO: LYNN O C THOMPSON

nated in a workshop on how to use herbarium sheets as artistic statements and as a way to explore personal relationships with plants. Each piece is also an expression of grief over the current specter of climate change. For Cabeen, making personalized herbarium specimens is also a way to cope with despair by appreciating how just being around plants can remediate our own souls.

Learn more about Lou Cabeen and her artwork at her website, <https://www.loucabeenart.com>.

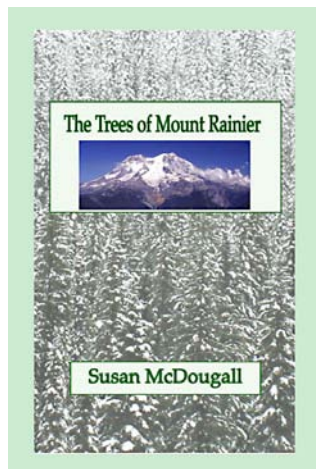
Katherine Darrow is a freelance botanist and plant photographer living in Port Townsend. She currently serves as co-chair of the Olympic Chapter.



Trees of Mount Rainier Now Available in Digital Format

by David Giblin

In 2007, WNPS member Susan McDougall published *The Trees of Mount Rainier: Forest Composition and Processes*. A long-term student of Mount Rainier's natural history, Susan distilled her knowledge and insights of "the Mountain's" trees and forest communities into a 174-page book published by Sound Books. A second edition of the book was published in 2015; however, due to its popularity it has since gone out of print. Anyone familiar with book publishing knows that additional print runs can come at a prohibitive price for



authors. The good news is that Susan and her husband David Biek (author of *Flora of Mount Rainier National Park*) have done the technical work necessary to make the book available once again in digital format for Kindle readers (search for the title at [amazon.com](https://www.amazon.com)).

Readers of the book will find a wealth of information about the conifer and broadleaf flowering tree species that comprise Mount Rainier's extensive forests. Descriptions of each species are supported by images to help with identification in the field. There is also a wealth of general botany and plant ecology contained in the book, so readers from amateur to professional backgrounds will find the content of interest. Congrats to Susan and David for ensuring that the book remains accessible in the Information Age!

David Giblin is Herbarium Collections Manager and Research Botanist at the University of Washington Herbarium, Burke Museum.



Missing Washington Plant Found in Illinois

by Walter Fertig

Oregon geranium (*Geranium oregonum*) is about two feet tall and has large bright pink or purple flowers with prominent veins on the petals (these reflect UV light and help guide bumble bees to nectar at the base of the flower, much like runway lights help pilots land an airplane at night). Despite its size and showiness, this species has only been found once in Washington, and has not been seen again since 1936. It is a prairie and oak woodland obligate species and is known primarily from the dry interior valley system that runs from southern British Columbia to northern California and includes the Puget Trough of Washington and Oregon's Willamette Valley.

The last person to see this species in Washington was George Neville Jones, who at the time was a graduate student at the University of Illinois studying the *Geranium* species of North America. Jones made an herbarium collection and recorded his observation in a 1943 paper in the botanical journal *Rhodora*, noting the specimen was deposited at "UI." Each major herbarium in North America has a unique two or three-letter code to identify it. For years, no one could track down Jones' specimen because "UI" is the code for a small herbarium in Uintah County, Utah. Some people began to question if Jones actually made his collection in Washington and whether the species ever occurred in the state.

Last year I became interested in the case of the missing *Geranium*. I tracked down the 1943 monograph and on the first page Jones was identified as a graduate of the University of Illinois. It then occurred to me that "UI" was not the code for the Uintah County herbarium, but probably stood for the University of Illinois. I searched some online databases but was unable to find the Jones specimen. Undeterred, I emailed David Seigler, the collections manager of the



Geranium oregonum, photographed at Moon Point on the Willamette National Forest in Oregon.
PHOTO: MARK TURNER



Herbarium sheet for Jones' 1936 collection of *Geranium oregonum* at Mill Plain, Clark County, Washington. PHOTO: UNIVERSITY OF ILLINOIS HERBARIUM

University of Illinois herbarium and asked if he could find the specimen. Seigler wrote back with double good news: not only did he find the errant collection, but he sent a digital photograph of the specimen. The label clearly indicates it came from "Mill Plain, Clark County, Washington." The image also is of sufficient quality that the specimen can be positively identified as *Geranium oregonum*.

Mystery solved ... except no one has relocated Oregon geranium in Washington since Jones' time. If you are exploring wet prairie sites in Cowlitz, Clark, or Lewis counties, keep an eye out for a tall, showy, pink-flowered geranium—it might just be the mystery geranium!



Chetzemoka Trail Signage Project

by Fred Weinmann

Our Chetzemoka Trail signage project represents an integral portion of a much larger regional project that celebrates the historical and cultural heritage of the Jamestown S’Klallam Tribe. This project provided an opportunity for the Olympic Peninsula Chapter to participate with the broader Port Townsend community, while highlighting our conservation work at Kah Tai Prairie in Port Townsend. That is to say, the project allowed us to share the cultural and ethnobotanical significance of our camas prairie with a wide diversity of people. For an overall description of the Chetzemoka Trail Project, which includes 18 separate signs at culturally significant locations, see http://www.tribalmuseum.jamestowntribe.org/hsg/exhibits/chetzemokatrail/ct_menu.php. The overall trail project was sponsored by the Native Connections Action Group and the Jamestown S’Klallam Tribe.



Blue camas (*Camassia quamash*) in flower at the Kah Tai prairie.
PHOTO: FRED WEINMANN

Our chapter’s portion of the project was to work with the Native Connections Action Group to design a sign and prepare text for placement at the Kah Tai Prairie in Port Townsend. Preservation of this 1.4-acre remnant camas prairie within Port Townsend has been the subject of previous grants funded by the Washington Native Plant Society; however, this was our first opportunity to celebrate the cultural significance of the Prairie in cooperation with a large regional project. The goal of our sign is to inform those who follow the Trail about the historic significance of camas prairies to the livelihood, history, and culture of the Jamestown S’Klallam Tribe.

Our sign was completed and erected in June 2019. The sign is near the existing kiosk at Kah Tai Prairie, adjacent to the Port Townsend Golf course parking area. There is a second Chetzemoka Trail sign nearby, within the golf course, adjacent to a



Jamestown S’Klallam tribal members gathering to study the plants of the prairie. PHOTO: FRED WEINMANN

bronze sculpture of Chief Chetzemoka. Thus, our prairie sign is likely to receive quite a lot of traffic by those following the Trail.

A well-attended dedication ceremony was held on June 29th to commemorate the completion of the Chetzemoka Trail. The ceremony concluded with the dedication of a newly carved totem erected at a main intersection in the heart of downtown Port Townsend.

Another sign on the Chetzemoka Trail is located at Froggy Bottoms. This is a small wetland within Port Townsend created some 20 years ago. Technical advice for creation of this wetland was provided by Dixie Llewellyn, a long-time Olympic

Text of Chetzemoka Trail Sign at Kah Tai Prairie

This site is the last remaining vestige of the natural prairie that spanned the qata’y Valley between wetland areas. Relatively dry upland areas of the valley provided camas bulbs for S’Klallam people to eat. The 1.4-acre camas prairie was officially preserved by the Olympic Peninsula Chapter of the Washington Native Plant Society in 1987.

Periodic controlled burns of prairies were a regular practice of the S’Klallams, who recognized that burning the woody debris of prairie plants encouraged new growth from safely buried roots and exposed foraging animals for hunting.

Camas harvesting was done by women, who broke ground with digging sticks (generally of fire-hardened ironwood or ocean spray). They had to be well aware of the difference between blue and white (death) camas, in order to harvest only the edible variety. They turned over a section of ground, pulled out the largest camas bulbs, and returned the earth to its original spot to continue growing.

The bulb of the blue camas, a main carbohydrate of the S’Klallam diet, was roasted and ground into flour that could be stored for winter. Radiocarbon dates from camas ovens at Ebey’s Prairie on Whidbey Island directly across Admiralty Inlet from Port Townsend suggests these traditional cooking methods are at least 2,000 years old.

Study Weekend 2020: Advocating for Native Plants

by Becky Chaney, WNPS Conservation Committee Chair

Land conversion, harvesting, climate change, pollution, invasive species: all of these impact Washington's native plant biodiversity and overall ecologic productivity. As members and leaders of WNPS, we have a responsibility to uphold our mission of conserving native plants through advocacy. Is this a burden? Perhaps. Does studying policy and legislation increase our understanding of how native plants co-exist in the broader context of 2020 society? Certainly. Does activism increase individual and group engagement with plants and people? Absolutely!

This year the WNPS Study Weekend will focus on advocacy. The hikes leading us to tantalizing plants may include broader information on the conservation background of the trails we walk and the lands they cross. How did these lands become conserved for us to enjoy today? Are they public, private, protected, still at risk? Did WNPS play a part in their protection?



Eriogonum compositum (heartleaf buckwheat) in a meadow on Table Mountain near Ellensburg. PHOTO: MARK TURNER



Kah Tai prairie sign on the Chetzemoke trail, with acknowledgment of WNPS. PHOTO: FRED WEINMANN

Peninsula Chapter board member. The sign at this location celebrates the cultural significance of wetlands to the Jamestown S'Klallams but also focuses on the general importance of wetlands and their native flora.

This project was funded by the Washington State Native Plant Society and by contributions from individuals of the Olympic Peninsula Chapter of the Native Plant Society. We appreciate the initiative, diligence, and support of the Native Plant Connections Group who provided the opportunity for our Chapter to participate in the Chetzemoka Trail Project.

Fred Weinmann joined the Washington Native Plant Society in 1976. Since then he has been a frequent leader of botanizing field trips. He is past chair of the Central Puget Sound Chapter, the state Board of Directors and the Olympic Peninsula Chapter of the WNPS.



How? When? Questions for our speakers will have a similar focus. What policies promote pollinator habitat? What advocacy tools are most effective in California? Do you prefer education or regulation? Are effective policies prescriptive or voluntary? How do we work effectively within a rapidly evolving political landscape?

Whether concerns are for urban, rural, or wild land plant protection, WNPS improves the chance of having your voice heard. Two new advocacy workshops led by WNPS Conservation Committee leaders will occur during study weekend. **How to be an Advocate for Native Plants** is an interactive, start-to-finish how-to for the WNPS native plant advocate, covering steps necessary to advocate individually and on behalf of WNPS. **Understanding Advocacy** covers the basic regulatory tools affecting the conservation of native plants and animals. This will include an overview of administrative law and a review of the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA), including the origins of these statutes, their intent, and the administrative and public processes associated with each.

To wrap up study weekend, WNPS President Van Bobbitt, Past President Clay Antieau, and I will join Daniel Gluesenkamp, the executive director of the California Native Plant Society, for a conversation further exploring these topics. WNPS has a very active Conservation Committee and a long history of advocacy. But how do we take advocacy to the next level? And what lessons can be learned from the California Native Plant Society and other environmental organizations?

In a volunteer organization such as WNPS, advocacy only occurs with an involved membership. Come listen and join the conversation. We are interested in hearing from you. We are interested in working with you to conserve our native environments for others to enjoy in the future!

Becky can be reached via e-mail at conservation@wnps.org. She is always happy to hear your conservation interests, concerns, and comments. Please include "WNPS Conservation" in the subject line.



Native red-flowering currant (*Ribes sanguineum*) blooms in a Bainbridge Island garden. PHOTO: MARK TURNER

Support Our Work

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

Become a Member

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

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

Donate through Your Workplace

- Workplace giving is an easy way to support WNPS.
- Federal Employees may donate through the Combined Federal Campaign—CFC # 69374. NEW! The CFC is now a giving option for retired Federal workers.
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- Workplace matching gifts: Your employer may offer to match your charitable donations—and help your gift do more. contact your workplace's charitable giving contact.

WNPS Endowment Fund Giving

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

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

Make A Planned Gift

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

Here are examples of how to make a planned gift:

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

There are many other ways you can make a charitable gift through estate planning—consult your lawyer or financial planner.

Make A Stock Donation

WNPS can now support a transfer with a brokerage account.

Learn all the ways you can support WNPS at www.wnps.org/donate. For more information on giving options, call the WNPS office 206-527-3210.

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



Gairdner's penstemon (*Penstemon gairdneri*) typically blooms in mid- to late April on sandy soils in eastern Washington. These flowers were photographed near Wanapum Dam in Grant County. PHOTO: MARK TURNER

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Common camas, *Camassia quamash*, at Lacamas Prairie Natural Area, a combined natural area preserve (NAP) and natural resources conservation area (NRCA) near Camas, Washington.
PHOTO: MARK TURNER