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Sage Notes

Newsletter of the Idaho Native Plant Society • Promoting Interest in Idaho's Native Flora

Lessons from Idaho National Laboratory Sagebrush Steppe

By Matt Lavin, Plant Sciences and Plant Pathology, Montana State University Bozeman

The sagebrush steppe of the Idaho National Laboratory (INL) is where I had the pleasure of spending the summers of 2009-2011. I collaborated with colleagues at Montana State University conducting invasive and rare plant surveys. The INL resides in the upper Snake River plains of southeastern Idaho. The INL area comprises almost entirely sagebrush steppe and is considered an "accidental wilderness," like the Hanford Site in southeastern Washington. Weapons research requires a secure ~30x30-mile vacated tract of land.

I also have had the pleasure of studying plant diversity in the sagebrush steppe elsewhere. But the INL sagebrush steppe taught me some general lessons about sagebrush steppe in Montana, northwestern Nevada, southeastern Idaho, and western Wyoming. In contrast to many other parts of the western North American sagebrush biome, this northeast portion has summers that are plant productive and winters too cold for regular Chinooks.

My focus has been on the "sagebrush sea" characterized by expanses of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) at lower elevations or mountain big sagebrush (*A. tridentata* ssp. *vaseyana)* at middle montane elevations. Such "sagebrush seas" in the northeast portion of the sagebrush biome harbor under-appreciated levels of plant species diversity.

What I learned:

Broad expanses of undisturbed to moderately disturbed sagebrush steppe dominated by mountain or Wyoming big sagebrush steppe often harbor 50-75 vascular plant species per hectare. This is a level of local diversity ("alpha diversity") comparable to what I find regionally along riparian corridors and in wetlands, in subalpine or alpine zones, or in open understory of ponderosa or lodgepole pine forests. In addition, different sites within the same region (e.g., Beaverhead County, Montana, Tendoy Mountains and Big Hole National Battlefield) can be 30-50% different in terms of plant species composition ("beta diversity"). This agrees with a study of the INL sagebrush steppe conducted by the late Jay Anderson and colleagues from Idaho State University. Anderson suggested that plant succession predicted by classic rangeland models does not occur in the INL sagebrush steppe. During their 1950-1995 study period, between site ("beta") diversity was at its highest level in 1995 even though it began at a high level in 1950.

Undisturbed to moderately disturbed sagebrush steppe is distinguished from heavily or regularly disturbed sagebrush steppe by harboring a diversity of species in the following native plant functional groups: 1) succulents (e.g., Cactaceae, Crassulaceae); 2) hemiparasites (e.g., Orobanchaceae,

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Letter from the President

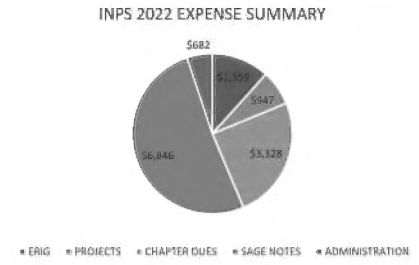
The heart of winter is behind us and the continued northward arc of the sun brings us to the cusp of spring—the season of renewal, new beginnings, and hope. All over the world, people celebrate spring's arrival with traditions and festivities that often involve at least a touch of botany. In Holland, the Flower Parade of the Bollenstreek has elaborate floats made from millions of tulips, daffodils, hyacinths, and other flowers that highlight a parade of over 20 miles between the towns of Noordwijk and Haarlem. Hundreds of thousands of people line the streets to partake in all the colors and fragrances. In Japan, Hanami, which translates to "flower viewing" is the tradition of gathering underneath and enjoying the beauty of cherry blossoms with family and public picnics. In India, Holi, also called the Festival of Colors is a lively celebration with plenty of dancing and singing that marks the end of winter and start of spring. The festivities include throwing colored powder at one another to, among other things, symbolize the blossoms of spring.

Closer to home, the Idaho Rare Plant Conference is held biennially in later winter. This INPS sponsored event is an opportunity for anyone interested to learn about Idaho's rare plant species and participate in discussions about their conservation. One main task for the conference is to review and update the INPS Idaho Rare Plant List. This helps keep the List relevant and credible for land management agencies and others who depend on it for various rare plant conservation objectives. Making the 2023 Idaho Rare Plant Conference a success required a lot of behind the scenes work by a lot of people. Brittni Brown and Kristin Williams deserve special recognition for leading the organizing effort, as do Beth Corbin and Derek Antonelli for their leadership roles in the Southern and Northern Idaho Rare Plant Working Groups, respectively. I thank everyone who participated in this year's conference. Your collective efforts help INPS maintain its strong plant conservation presence in the state.

I also want to wish everyone a Happy Spring, with the thrill of seeing the first wildflowers of the year always one of the highlights.

Mike Mancuso,
INPS President

Financial Report



The Idaho Native Plant Society had steady growth in revenue during the 2022 calendar year. It is in a strong financial position to continue to support its Education Research Inventory Grant (ERIG) program as well as some special projects, conferences and meetings. In addition, a new program offering college scholarships is being developed.

Announcements

2023 INPS Annual Meeting & Campout Accessibility Updates

By Kristin Fletcher and Lisa Horton, Wood River Chapter

The 2023 INPS Annual Meeting Planning Committee has received questions about what are the easier field trips people might enjoy. Sawtooth Country is rugged, almost without exception and we gave a great deal of thought to the variety of hikes, their potential challenges and to clearly stating the level of difficulty so participants could make wise decisions.

It may be that we err on the side of too much caution; however, we've found that people commonly over-estimate their abilities or dismiss the impact of high elevations. We plan to have 2-3 chapter representatives on each hike and will be able to divide a group into more-abled and less-abled, if needed, so all can have an enjoyable time. Hiking poles are highly recommended.

2023 field trips and their possible adaptations

- *Bear Valley and Camas Meadows*—The Bear Valley Wet Hillside is definitely difficult but is immediately adjacent to the road and much can be seen simply by walking along the road. The Big Camas Meadows feature uneven terrain but are adjacent to the road and can be easily seen or a person could walk 50, 100, 200 feet or more in without difficulty.
- *Pole Creek Ranger Station*—Paved path from road, over creek to the Station, but beyond that is clambering over sagebrush.
- *Stanley Lake*—Good hiking trail to wet meadow with a few rocks to dodge; can drive close to endemic site and, with poles or a helping arm, likely walk about 100 feet to the actual site which is small but very cool!
- *Fens* —Close to the road; pretty boggy but you don't have to go far to see the carnivorous species; poles or a helping hand would probably be needed.
- *Redfish Lake*—The boat ride is the best! There are picnic tables and a bathroom on the far side and opportunities for easy botanizing in a gorgeous location.
- *Wildfire*—Some areas will be accessible close to the road but there will also be forays over uneven terrain and downfall for closer looks.
- *Fungi*—The actual site will depend on spring/summer moisture but most, if not all of it, should be pretty easy to access.
- *Botanical Field Sketching*—Easy walking on flat terrain.

Camping

Camping options are slim right before the 4th of July holiday. The Planning Committee has reserved a few campsites at Sunny Gulch Campground and more at three group sites (12-19 miles away), or you can reserve your own. All of our campsites will be shared. This link will take you to a list of other campgrounds, considerable dispersed camping, sites with RV hookups and motels: https://woodriverinps.wixsite.com/wrinps/about-4

Registration

We strongly encourage folks to register as early as possible. We must have registration information, received by mail, no later than May 26, 2023. Please note: taking into account the limited group size accessing the Sawtooth Wilderness Area, respect for fragile and rare species and camping limitations, we have chosen to cap registration at 100 participants this year.

Questions?

Check the link above. More questions? Contact Mary McClanahan at 559-696-9953 or mmcclana@icloud.com. We hope to see you in the Heart of Idaho this June! •

Membership Report

Chapter	Feb. 2020	Sept. 2020	Feb. 2021	May 2021	Apr. 2022	Oct. 2022	Renew 01/23	Expire 12/22
Calypso	36	23	33	42	29	40	18	25
Loasa	21	17	21	21	13	15	4	13
Pahove	119	173	177	194	154	257	82	145
Sawabi	34	35	35	48	53	62	32	31
White Pine	88	108	106	119	93	122	83	56
Wood River	19	41	29	52	77	65	34	33
At Large	12	12	11	11	13	16	13	3
Totals	**338**	**409**	**412**	**487**	**432**	**577**	**266**	**306**

Lessons from INL Sagebrush Steppe ...*Continued from Page 1*

Santalaceae); 3) perennial bunchgrasses (e.g., bluegrasses, needlegrasses, wheatgrasses); 4) nitrogen-fixing New World *Astragalus* (species with high chromosome numbers), *Dalea*, *Psoralidium*, and *Pediomelum*; 5) perennial cespitose forbs (e.g., species of *Arenaria*, *Cymopterus*, *Draba*, *Eriogonum*); 6) shrubs (e.g., Amaranthaceae, Anacardiaceae, Asteraceae, Rosaceae); 7) subshrubs (e.g., species of *Ericameria*, *Eriogonum*, *Leptodactylon*, *Phlox*); and 8) tuberous and rhizomatous species (e.g., species of wheatgrasses, Apiaceae, Asteraceae, Fabaceae, Liliaceae, Santalaceae). An abundance and diversity of native species in these eight groups are not expected in overgrazed rangeland, along regularly maintained roadsides (e.g., compacted by equipment and traffic, graded, mowed, or treated with herbicide), and in any place where human activity is regular or impactful. My working hypothesis is that the plants in these eight groups, because they generally are difficult to domesticate, likely associate with mycorrhizae and other soil microbes in nutrient exchanges. Sites that are physically impacted by humans probably lack intact soil microbial communities, which limits the abundance and diversity of native species belonging to these eight groups. Although some species of these groups can prosper in regularly disturbed settings, they also have the ability to thrive in high-native-cover sagebrush steppe. It is the abundance and diversity of these eight groups that distinguish undisturbed sagebrush steppe, not the presence of just one or two species from these groups.

Undisturbed sagebrush steppe with a recent fire history harbors an abundance and diversity of the aforementioned plant groups (Fig. 1). This suggests that fire disturbance is less impactful on native plant diversity compared to physical disturbances like regular overgrazing. This finding is relevant to post-fire management. Studies by Jay Anderson and colleagues in southeastern Idaho suggest that active rehabilitation of burned sagebrush steppe (e.g., drill seeding) can impede the regeneration of sagebrush steppe from seed bank and underground plant structures. Reducing active management in post-fire sagebrush steppe allows sagebrush steppe in good ecological condition to rebound most rapidly on its own after a burn, despite big sagebrush requiring time to re-establish from seed.

Fig. 1. Thickspike wheatgrass, Fernleaf biscuitroot, and tapertip hawksbeard abundant during 2011 after a 2010 burn in the INL sagebrush steppe. Desert alyssum in the only non-native species in this area. Cheatgrass is rare to absent, which is the case for all INL sagebrush steppe with a burn history ranging 1-25 years. Photo taken on 2 June 2011 near the center of the INL sagebrush steppe. Most fires in the INL area are roadside ignited and thus human caused.

Fig. 2. Cheatgrass (purplish seed heads) is confined to roadsides in Beaverhead County. Southwestern Montana harbors a "sea" of mountain big sagebrush steppe devoid of cheatgrass even though cheatgrass is common along roads. Here, cheatgrass co-occurs with mostly slender wheatgrass and prostrate knotweed. Photo taken 20 July 2011 east of Bannack MT along the Bannack Bench Road.

Cheatgrass is not an issue in the northeastern part of the sagebrush biome. This is because cheatgrass requires hot dry summers and Chinook-prone winters to gain a growing advantage. Cheatgrass throughout much of the northeast portion of the sagebrush biome is confined to roadsides and other heavily impacted sites, such as where herbicide is regularly applied along roads and in and around crop fields (Fig. 2). When fires occur in this area of the sagebrush biome, cheatgrass disappears. Cheatgrass' supposed positive feedback with fire is far from ubiquitous in the sagebrush biome.

An alarmist perspective on fire and cheatgrass is all too common, which is unfortunate because it promotes excessive management of burned sagebrush steppe, which impedes its natural resilience. Western North American sagebrush steppe is most in need of protection from overgrazing and similar physical disturbances, which can be monitored by the abundance and diversity of the above-mentioned eight plant groups. In addition, depending on the climate and location, many areas of sagebrush steppe need protection from excessive management of post-fire conditions, which, to paraphrase Jay Anderson, causes the kind of physical disturbance that impedes the natural resilience of sagebrush steppe. •

Reprinted with permission from "Sagebrush Steppe Lessons from the Idaho National Laboratory" by Matt Lavin, 2021. Friends of the University of Montana (newsletter), Spring 2021.

2022 INPS Native Plant-Related Conservation Projects

By Michael Mancuso, INPS President

About a year ago I challenged each INPS chapter to take an active role in at least one native plant-related conservation project in their part of Idaho. The challenge's intent was to provide each chapter an incentive to make a positive "on-the-ground" difference for native plants in their area and to have fun doing so. Here are some of the conservation-related projects undertaken by INPS chapters in 2022:

Calypso Chapter: The Calypso Chapter has an ongoing effort that began in 2017 to document plant species found in the Antoine Peak Conservation Area. The Conservation Area is in the Spokane/Coeur d'Alene metro area and receives a lot of use. Although on the Washington side of the border, the Calypso Chapter has taken the lead in conducting the surveys with some support from Washington Native Plant Society members. Calypso surveyed new portions of the area in 2022, and has now documented nearly 280 plant species for the Conservation Area. Building on these past efforts, Calypso hopes to participate in the 2023 iNaturalist City Nature Challenge by submitting observations for plants in the Antoine Peak Conservation Area.

Pahove Chapter: The Pahove Chapter adopted a plot as part of a larger collaborative, community restoration project called the Boise River Rewild project. The project's goal is to restore 50+ acres of important habitat along a section of the Boise River in east Boise. The Pahove Chapter adopted one of the 0.5 acre plots within the restoration project area. Pahove held two work days in 2022: one in September to pull and remove numerous bags of noxious and other weed species from the plot, the other in October to plant approximately 450 native grass, forb, and shrub seedlings on the plot. About 20 Pahove members volunteered for one or both days. The project will continue in 2023.

The Pahove Chapter also collaborated with the Boise City Parks and Recreation Department to conduct field surveys for Boise sand-verbena (*Abronia mellifera* var. *pahoveorum*), a species on the Idaho Rare Plant List. Surveys were conducted at nine properties in the Boise area foothills, including six City of Boise open space Reserves. Eight Pahove members assisted with the surveys.

Sawabi Chapter: The Sawabi Chapter helped establish a native plant garden at the Edson Fichter Nature Area in southwestern Pocatello along the Portneuf River in 2022. The Chapter also assisted in the maintenance and replanting and developing signage for the Idaho State University Museum of Natural History's Native Plant Garden, as well as maintenance of the native plant garden at the Idaho Department of Fish and Game office in Pocatello. Sawabi also sponsored twice weekly herbarium plant identification sessions at the Idaho State University Museum of Natural History. Overall these projects added up to several hundred volunteer hours.

White Pine Chapter: The White Pine Chapter initiated two conservation projects in 2022 in response to the challenge. Both are ongoing. The Boot Brush Trailhead Weed Control Conservation Project aims to install boot brush stations and associated signage along heavily used trailheads in the Moscow area to reduce the spread of weeds that compete with native plants. White Pine offered to help trailhead managers design their own signs, focusing on locally problematic weeds, as a cost-cutting option. The White Pine Board approved funding for $250 for each of up to 6 trailhead signs, plus the purchase of posts and brushes. Any remaining costs would be paid by other organizations. This incentive was offered to several Palouse area land manager entities, including the Palouse Clearwater Environmental Institute (PCEI), the Friends of Phillips Farm for the Latah County Park north of Moscow, the Moscow Area Mountain Bike Association (MAMBA) for Headwaters, West Twin, and Moscow Mountain Road Trailheads, and the USFS Palouse Ranger District for Boulder Creek Trailhead. In 2022, a boot brush station was installed at Rose Creek Nature Preserve north of Pullman, Washington, an area that protects a 22 acre Palouse meadow steppe ecosystem remnant owned and managed by PCEI. Based on their feedback, White Pine expects Friends of the Phillips Farm and MAMBA to install stations in 2023.

A second conservation project is for water howellia (*Howellia aquatilis*), a former federally listed Threatened species on the Idaho Rare Plant List. This wetland species has very specific habitat requirements. The aggressive weed reed canarygrass (*Phalaris arundinacea*) has invaded all known water howellia populations in the Palouse area. White Pine Chapter plans to convene a panel of knowledgeable people to try to figure out a way to decrease reed canarygrass and increase water howellia seed production to a point where limited seed collection might be feasible. This seed could then be used to assist with possible future restoration efforts for water howellia. Although this project is still up-in-the-air, White Pine plans to work on it in 2023. •

Cogongrass in Boise? Another Horticultural Plant Gone Bad

By Ann DeBolt, Pahove Chapter (Photos by the author, except where noted)

In early May 2022, Dr. Barbara Ertter informed me of an invasive grass she had observed in the Boise foothills, commonly known as Cogongrass (*Imperata cylindrica*). Barbara had watched this mystery grass for several years, but it hadn't flowered until April 2022, when she asked me to look at it to see if I agreed. I am familiar with Cogongrass because of frequent forays to my home state of Florida, where Cogongrass lines many of the state's roadways and invades farmers' pastures. Often depicted as "one of the worst invasive grass species in the world," Barbara's observation got my attention and I visited the site that day.

Cogongrass inflorescences. This rhizomatous invasive species was creeping into a traditional Kentucky bluegrass lawn in the Boise foothills just above Hulls Gulch Reserve, May 4, 2022.

I collected a voucher for the Boise State University Snake River Plains Herbarium (SRP), summarized my observations of the population in an email to a number of county, state and university weed specialists and scientists, attached a few photos, indicated the email was of "High Importance," and encouraged implementation of "Early Detection, Rapid Response (EDRR)" measures. Because the Cogongrass population was directly above one of Boise's finest and most popular Open Space Reserves (Hulls Gulch), I warned of the potential spread of this fire-adapted rhizomatous grass into the drainages and riparian corridors below, particularly under warming climatic conditions.

Within 5 days, I was pleased to hear back from Jeremey Varley, an Idaho State Department of Agriculture (ISDA) weed specialist in Boise and by day seven we were able to meet at the site, where he collected a specimen and took representative photos of the invasion. Jeremey's specimen was sent to the University of Idaho Weed Diagnostics Lab for confirmation, prior to the state being able to take further action. Also required, upon species confirmation, was a report to the ISDA Director with the intention of adding the species as a 15-month temporary noxious weed under the category of EDRR. If and once approved by the Director, ISDA was to notify Ada County regarding the listing for potential control options as an EDRR species.

Botanist Roger Rosentreter, pointing to Cogongrass invading a homeowner's lawn in the Boise foothills. Uninvaded Kentucky bluegrass lawn is in the far background, where the grass is much greener.

In the meantime, various news outlets caught wind of the story: (https://www.hcn.org/articles/botanists-find-one-of-the-worlds-worst-weeds-spreading-in-the-boise-foothills)(https://www.idahostatesman.com/news/local/environment/article263264088.html)

But before you read more about the process of dealing with a new invader, here is a little background to familiarize you with Cogongrass:

- Cogongrass is an aggressive perennial grass that is distributed throughout the tropical and subtropical regions of the world. Native to SE Asia, it infests nearly 500 million acres of plantation and agricultural land worldwide.
- Cogongrass grows as far north as South Carolina and as far west as Texas (aside from our recent observation). Within the last 50 years, it has become established in the southeastern United States, resulting in infestations of roadways and pastures in Alabama, Mississippi, and Florida.
- In the 1930s and 1940s, Cogongrass was planted in Florida as a potential forage crop and for soil stabilization purposes. However, it was found to be of little economic benefit as forage and a potentially serious pest, and it was subsequently placed on the noxious weed list.
- Cogongrass is a listed Federal Noxious Weed and a federal permit is required to move it interstate. A number of cultivars such as 'Red Baron' and 'Rubra' are still used as garden ornamentals. These are typically referred to as Japanese bloodgrass for the red color of the leaves. Classified as *I.* var. *rubra* or

I. var. *koenigii*, they are short, cold-tolerant forms (known to survive in zone 4b) with smaller rhizomes than the species. The leaves are a bright green when they emerge in spring, then the red color develops on the tips and progresses down the leaf blade, becoming more intensely colored later in the season. This red color may be a response to colder temperatures, as plants can revert to green when grown in a hot location. Reversions to the species have substantially larger rhizomes than the red cultivars, so 'Rubra' varieties have the potential to become invasive. The red cultivated varieties were thought to be sterile, but may not be. Even ornamental types are prohibited in most southern states, but Japanese bloodgrass can still be grown legally in some colder climates where the plants do not spread as rapidly and rarely flower. In northern climates, it is recommended that it should only be planted in containers or in places where it cannot escape into natural areas.

Cogongrass rhizomes at the Boise foothills site. May 11, 2022.

By mid-June, the Idaho State Noxious Weed Advisory Committee (made up of state, federal, county, NGO and other representatives) had recommended the temporary listing of Cogongrass as an Early Detection, Rapid Response (EDRR) Idaho Noxious Weed for a period of 15 months. Once listed, ISDA began reaching out to local vendors and online retailers to inform them that Cogongrass and its varieties can no longer be legally sold in Idaho. (https://invasivespecies.idaho.gov/cogon-grass-factsheet)

Two months to the day after the initial email, Adam Schroeder, Director, Ada County Weed, Pest and Mosquito Abatement, provided an update on their progress with the Cogongrass foothills population. Responsible for working with homeowners and the HOA to control the existing population, Adam reported that a "Land Management Plan" had been developed for the foothills Cogongrass location, the neighborhood HOA had been notified, a glyphosate treatment had been applied, and signs with Cogongrass identification, control actions, and site instructions had been posted. Additional surveys of the surrounding foothills were conducted, with no additional infestations identified. These additional surveys will hopefully be an ongoing process, and might be a good way for Pahove members to get involved. Ada County intends to continue to kill all vegetation (save trees) at the site until they can verify that Cogongrass root structures are destroyed. After this has been confirmed, they will work with the landowner to plant "native competition" and continue to monitor the site moving forward. Ada County also instructed the local HOA site manager to not disturb the site until all remediation actions have been approved.

Jeremey Varley, ISDA weed specialist, collecting a Cogongrass voucher. The specimen was sent to the University of Idaho Weed Diagnostics Lab for confirmation, prior to the state taking further action. May 11, 2022.

Ada County Noxious Weed Control Department posted this sign at the Cogongrass site they treated in the Boise Foothills. Barbara Ertter photo.

In addition to the Cogongrass population in the Boise foothills, ISDA visited a site near Hill Road and Collister Drive, where botanist Roger Rosentreter reported another potential Cogongrass occurrence. This terraced yard did in fact have a lovely garden full of Japanese bloodgrass 'Rubra' which, thanks to the cooperative landowners, has since been treated.

In September 2023, at the conclusion of the 15-month temporary listing of Cogongrass as an EDRR noxious weed, an additional negotiated rulemaking process will need to occur as to whether Cogongrass stays permanently on the noxious weed list and under what category. In the meantime, keep your eyes peeled. According to Virginia Cooperative Extension, "34 to 83 percent of the total number of invasive plant taxa (species, varieties, cultivars) in the U.S. had a horticultural origin". By working together, we really can make a difference. The Pahove Chapter greatly appreciates the opportunity to work with, and the rapid response from, our local agencies charged with managing Idaho's invasive plant species. •

Japanese bloodgrass, Imperata cylindrica var. rubra, growing in a terraced garden in northwest Boise. Ada County Noxious Weed Control Department photo.

Pahove Chapter Co-sponsors Field Survey and Monitoring Project for Boise Sand-Verbena

By Michael Mancuso and Martha Brabec, Pahove Chapter

Boise sand-verbena (*Abronia mellifera* var. *pahoveorum*) is a perennial herb with a showy, head-like arrangement of white to pinkish, funnel-shaped, night-blooming flowers. Its distribution is limited to southwestern Idaho on the north side of the western Snake River Plain where it extends in sporadic fashion along lower foothill sandy slopes and lake bed sediments from Boise to the Horseshoe Bend, Emmett, and New Plymouth areas. Idaho Native Plant Society members were first introduced to Boise sand-verbena by Barbara Ertter in the June 2016 issue of *Sage Notes*. This introduction occurred only a few months after Barbara and her colleague Sonia Nosratinia published their paper describing this new variety. The paper made it clear that Boise sand-verbena warranted conservation attention. It was quickly added to the Idaho Rare Plant List due to its limited distribution, low number of known occurrences, low number of plants at the occurrences, and recognition that much of the species' native shrub-steppe habitat had been severely degraded over time by invasive weeds such as cheatgrass (B*romus tectorum*), cereal rye (*Secale cereale*), and rush skeletonweed (*Chondrilla juncea*). Furthermore, a substantial portion of Boise sand-verbena's habitat overlaps prime real estate for foothills housing development, with some populations undoubtedly already lost due to urban development.

Barbara chose the variety name 'pahoveorum' to honor the many dedicated members of the INPS Pahove Chapter, "many of whom have contributed directly to past and current understanding of the new variety, and whose collective efforts will be instrumental in ensuring the continued existence of this beautiful plant." Recognizing more action on behalf of the species was needed, the Pahove Chapter and City of Boise (COB) Department of Parks and Recreation agreed in 2022 to collaborate on a field survey and monitor project for Boise sand-verbena in the Boise foothills. The surveys would target COB and a few other selected properties in the lower Boise foothills known or suspected to contain potential Boise sand-verbena habitat. The project also aimed to establish monitoring plots at previously documented Boise sand-verbena occurrences located in Camelsback Reserve and Military Reserve (both being COB properties), and where practical, at any new Boise sand-verbena locations discovered during the 2022 survey. We undertook the project to improve our understanding of the conservation status and needs of Boise sand-verbena in the Boise foothills, with emphasis on COB properties, whose land resource managers are tasked with sustaining rare plant populations on lands they administer.

Boise sand-verbena. Photo by Martha Brabec.

We planned the field survey by first reviewing 2019 digital orthophotography maps of Ada County overlaid with COB ownership. The very high resolution of these aerial images allowed us to search for outcrops of habitat potentially suitable for Boise sand-verbena. We prioritized COB-owned properties, but also looked at BLM, Idaho State, and private parcels adjacent to City property or within the Ridge to Rivers trail system. We considered relatively sparsely vegetated sandy openings as potential habitat for purposes of the survey. Based on this assessment, we selected nine properties for field survey in 2022. The selection included six COB properties - Camelsback Reserve, Hulls Gulch Reserve, Military Reserve, Peace Valley Overlook, Pierce Gulch Farm, and Warm Springs/Mesa Reserve. Other properties included Highland Hackberry Subdivision (private land with public access), Peggy's Trail (BLM land), and Table Rock/Mesa Reserve (Idaho State land). One or more areas with potential Boise sand-verbena habitat represented the primary search targets within each property. However, surveyors would also be able to search for the species as they hiked to the main target areas.

A total of 20 Boise sand-verbena survey sites were searched on the nine properties between late April and late May, 2022. Boise sand-verbena was not found at any of the survey sites. This included one of the survey sites in Camelsback Reserve and one of the survey sites in Mil-

itary Reserve where Boise sand-verbena had been documented in the past. Introduced weed species dominated the vegetation at most survey sites. Native herbaceous species and shrubs tended to be substantially less abundant. Most survey sites had sandy substrates that appeared potentially suitable for Boise sand-verbena, at least in places. However, some lacked the proper soil type, contradicting our initial assessment based on aerial imagery. Survey sites had varying levels of ground disturbance, with wildlife tracks and pocket gopher digging being common at some of them. Many sites also had evidence of past wildfire.

The monitoring part of the project consisted of establishing plots at previously documented Boise sand-verbena sites in Camelsback Reserve and Military Reserve, and another in Hulls Gulch along the 8th Street extension road where one Boise sand-verbena plant was found by chance discovery in 2022. Overall, the three plots contained only six Boise sand-verbena plants. In addition to Boise sand-verbena, Pahove Chapter and COB have monitoring plots in place for Aase's onion (*Allium aaseae*) and Mulford's milkvetch (*Astragalus mulfordiae*), two other rare plant species found in the Boise area foothills. Nearly all of these plots are on COB properties. The original concept called for one species being monitored each year on a three-year rotation. In light of the low number of plants found in 2022, it now seems three years may be too long to wait for the next monitoring visit for Boise sand-verbena.

Survey and monitoring results from 2022 highlight the rarity and imperiled conservation status of Boise sand-verbena in the Boise foothills. The species also appears to be at risk rangewide, where it is known from approximately 20 occurrences, many based on old collections made more than 30 years ago. None of the known extant occurrences are large, with all of them having <100 plant, and in some cases <25 individuals based on most recent site visits. As Barbara Ertter warned us in 2016, this is a species whose long-term persistence and conservation appears to be in peril. Pahove Chapter is hoping to conduct more field surveys in 2023 to help clarify the status of Boise sand-verbena in other parts of the species' range.

Searching for Boise sand-verbena in the Boise Foothills. Photo by Ann DeBolt.

Pahove members Barbara Ertter, Ann DeBolt, Kirsten Severud, and Don Essig assisted with the identification of potential Boise sand-verbena habitat areas and conducted the field surveys. Sandy Smith and Jeri Wood assisted on some of the surveys. We also acknowledge all the research and extra pre- and post-field work assistance provided by Barbara Ertter. •

Christopher Davidson 1944-2022

By Barbara Ertter, Pahove Chapter (Photos by the author, except where noted)

The untimely death of Christopher Davidson, Idaho's Garden-Building, Globetrotting Botanist, was a great loss, not only to family and friends, but to the international botanical community in general. This includes his home state of Idaho, where he remained based, even as his focus became increasingly international. Chris epitomizes that under-sung breed of scientist whose manifold contributions seldom make the headlines, in part because he did not seek publicity, but who nevertheless generated an impressively diverse legacy. Botanist, gardener, geologist, bibliophile, world traveler, photographer, benefactor, master of the bon mot, devoted husband and father, doting grandfather, loyal friend: Chris was all of these, and more. This Idaho-centric biography is my tribute to Chris, from one of the friends who mourn the loss of this remarkable person.

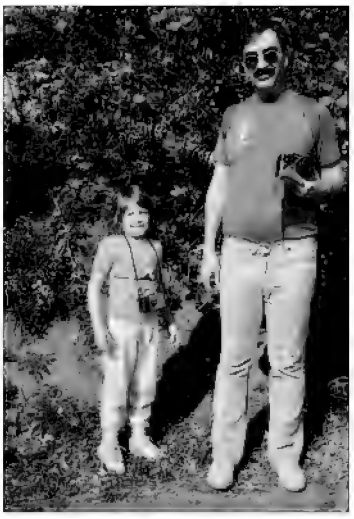
A fourth generation Boisean, Christopher Robert Davidson was born to Robert and Marjorie "Moonie" Moore Davidson on 10 February 1944. Four years later, Moonie divorced Robert and married his cousin Charles "Charlie" M. Davidson, who became Chris's father in all ways that mattered. Chris shared his first name with his mother's grandfather Christopher Wilkinson "C.W." Moore (1835-1916), a prominent founding father of early Boise. Capitalizing on the opportunities presented by the gold rush in southwestern Idaho in the 1860's, C.W. had established the Idaho First National Bank; this became the primary source of the wealth with which he generously supported the geothermal, electric, and transportation development of Boise (MacGregor 2006), a philanthropic tradition continued by several of his descendants. Chris grew up on prestigious Warm Springs Avenue, not far from his great-grandfather's mansion that was the first home in the United States heated with geothermal water. He attended Roosevelt Elementary School, East Junior High (then still near the intersection of Warm Springs and Broadway avenues), and Boise High School.

An early passion for natural history, in particular botany and geology, was nurtured by long summers spent in the forested mountains around McCall, based at the Davidson family domain on the west side of Payette Lake. Chris's stepfather, Charlie, had made his first trip to McCall in 1909, at age 12, accompanying two Episcopal missionaries who hoped to convert the Indians rumored to be living there. The venture was a failure (no Indians), but Charlie remained and found work at the fledgling Sylvan Beach Resort, an Adirondack-style retreat that Chris later referred to as Idaho's first ecotourism venture. Charlie and other family members returned the following summer and each year thereafter, camping in tents until Charlie built a cabin for the family in 1918—the first on Payette Lake. The Davidson presence expanded over subsequent decades, as the original full-service resort transformed into a tight-knit community of privately owned "cabins" that balanced the original rustic appearance with increasing modern comforts, nestled in the conifer forest between granite cliffs and sandy beaches (Rutledge & Elliott 2005).

College took Chris out of Idaho, first to Whitman College in Washington for his undergraduate degree, where the availability of mentors and majors tipped the balance of his career path to botany instead of geology. His subsequent graduate work was at Claremont Graduate University in southern California, after which he became Curator of Botany at the Los Angeles Natural History Museum. For his doctoral degree in botany (Davidson 1973), Chris examined the morphology and anatomy of Datiscaceae, a small family with an unusual global distribution, under the guidance of Robert Thorne and Sherwin Carlquist. This cemented a lifelong interest in plant families and genera with uncertain affinities and noteworthy distributions; *Datisca* itself consists of one species centered in California (Durango root, *D. glomerata*) and another one (or two) in Crete, Turkey, and the Himalayas. During his California years, Chris also became fascinated with the Bolivian flora and the complexities of the huge genus *Piper* (Piperaceae), which remained high among his ongoing interests. He added the editorship of *Madroño*, the journal of the California Botanical Society, to his activities in 1981, serving in this position for the next four years. During this period his professional address changed from California back to Idaho, specifically to the Idaho Botanical Garden.

The purpose and timing of Chris's return to Idaho in 1980 were several-fold. On the personal side, his daughter, Sara, was about to be born, and he claimed that he didn't want her first breath of air to be LA smog. On the professional side, he could read the writing on the wall that indicated declining support for botany within what is now known as The Natural History Museum of Los Angeles County. Within a few short years following Chris's departure, the museum abandoned botany altogether, transferring its seed plant collections to Rancho Santa Ana Botanic Garden (now California Botanic Garden) and

dispersing its remaining plant and fungal collections to other institutions. All in all, it was time for Chris to pursue one of his dreams: creating a botanical garden in Boise.



Sara and Chris Davidson in California, 1988.

It was also during this period that I first became acquainted with Chris, and it was a delight to vicariously enjoy his efforts to realize this dream. Although I had also grown up as a fourth-generation Boisean (with my grandfather working in his great-grandfather's bank at one time), gone to the same high school, and even had a nearby family cabin at Sylvan Beach (albeit in the less prestigious south end), the 9-year difference in age kept two introverts from meeting during our early years. It was only when Chris, during his curatorial years, was visiting New York Botanical Garden, where I was pursuing my own doctoral degree, that we were introduced as fellow Idahoans. We kept in touch ever since, with one on-going tradition when I was in town to spend the holidays with family being a winter dinner gathering with other botanists in the Boise area, jokingly dubbed the "Annual Meeting of the Idaho Botanical Society."

Chris owed much of his love of botanical gardens to his stepfather, who had been trained as a landscape architect at the Harvard School of Design. In 1941, Charlie began transforming the Resort's former vegetable garden into what became known as Charlie's Garden, a centerpiece of Sylvan Beach and popular visitor destination for McCall. The property had most recently been used as the site of a 180-bed dormitory during the filming of the epic movie *Northwest Passage*, which used the Sylvan Beach Resort as base camp in 1938 and 1939. The dormitory was then dismantled and moved to the mining town of Stibnite, and Charlie spent months cleaning up the discarded debris to create a blank slate on which to construct his dream garden. German-trained Hans Borbonus helped with the landscaping, in the process getting his start as one of Boise's leading landscape architects, and Charlie's younger sister, Betty Davidson Gregorie, also became a garden fixture (Rutledge and Elliott 2005).

The constantly evolving result was a wonderland of colorful floral diversity amidst granite outcrops and an abundance of water features, created by diverting part of the flow of Sylvan Creek. Although a private garden, members of the public were always welcome to Charlie's Garden, which became a popular venue for weddings and other events. This was not only a place of beauty where Charlie could unleash his talents, but also a testing ground to try out plants from around the world to see which ones were compatible with the mountain climate, including the startling azure flowers of Himalayan blue poppy (*Meconopsis* sp.) My strongest personal memory of Charlie was of him telling me about the dawn redwood (*Metasequoia*) he was planting, during the period when seeds of this rare tree were widely distributed for experimental cultivation; alas, the tree did not survive, but it left an impression on at least one other budding botanist besides Chris.

With such a deep and multifaceted horticultural influence in his formative years, it is only natural that Chris was drawn to the idea of creating a botanical garden in Boise as the next stage of his career. The location selected for this ambitious undertaking had a background as fascinating as that of Charlie's Garden: the abandoned farm and nursery for the original Idaho State Penitentiary near the end of Warm Springs Avenue, where Native Americans had once overwintered and used the eponymous warm springs for healing and spiritual purposes. After inmates rioted over living conditions, improved correctional facilities were constructed south of Boise in 1973. The core of the old penitentiary, including most of the buildings constructed from local sandstone quarried by the prisoners, became a popular visitors' destination run by the Idaho State Historical Society. The surrounding lands and outbuildings, however, remained dormant until 1984, when Chris negotiated the lease of 42 acres on which to make his garden grow.

In this undertaking, Chris was aided by the board of directors he had recruited, comprised of 17 civic leaders and professionals, as well as substantial financial support from his mother, Moonie. An irrigation system was soon installed, nature trails were constructed, and the Meditation, Rose, and Herb Gardens were developed, incorporating surviving trees and shrubs from the original landscaping. An educational program was also initiated, coordinated with the Boise School District's science program, and work-release opportunities were developed for female residents of the adjacent East Boise Community Reentry Center. Chris's original vision included several gardens that would represent some of the Greater Boise area's significant ethnic groups, including Basque, Chinese, and Japanese. He also envisioned a research function, similar to (but vastly scaled down from) programs at Missouri Botanical Garden or New York Botanical Garden; we sometimes joked about how the penitentiary's

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solitary confinement cells would be perfect for researchers' offices!

Alas, much of this dream fell apart when the board of directors went off in a different direction and decided that more "dynamic" leadership was needed. They offered Chris a subsidiary role as an alternative, which came across as a slap in the face and led him to permanently part ways with the Idaho Botanical Garden, along with the not-insignificant funding provided by his mother. Fortunately for the rest of us, the Garden survived this early crisis, with significant credit going to dedicated volunteers and a former work-release participant that Chris had gone to bat for (S. Christoph, pers. comm. 2022). The Garden ultimately thrived to become one of Boise's top destinations and event locations (https://www.idahobotanicalgarden.org/), including Pahove's annual Wildflower+ Show, but we will never know how today's Garden might have differed if Chris had remained at the helm.

For the next stage of his life, Chris continued living in Boise and McCall and raising his daughter, Sara, as a single father, with occasional visits from her mother, Josephine Jones. Chris, Sara, and cat Roosevelt lived initially in a classic home on Jefferson Street until displaced by the expanding medical complex around St. Luke's hospital, after which they moved to Warm Springs Mesa. During this period, Chris happily continued working in Charlie's Garden (Charlie himself having died in 1970), collecting plants, and exploring the mountains around McCall, sometimes with fellow members of the "Idaho Botanical Society," sometimes with visiting botanists from around the country. His major research project for this period was an exhaustive compendium of pollination ecology, pursued in that nearly forgotten era when a comprehensive literature search required repeated visits to major botanical libraries. The never-finished, unpublished result included a detailed synopsis of the pollinators and visitors reported for each angiosperm plant family, arranged in phylogenetic order. The methodical and meticulous approach, the excuse to travel to major botanical institutions throughout the country, and long hours spent surrounded by his beloved books suited Chris just fine!

Chris Davidson and Bob Moseley northwest of McCall, 1989

The death of Chris's mother at the beginning of the new millennium was a tragic blow, but it also opened up new opportunities as Chris came into his full inheritance. In addition, it paved the way for his marriage to Sharon Christoph in Mexico on 30 December 2000, followed by a legal ceremony in the United States on 17 January 2001. The two had originally met when Chris was still involved with the Idaho Botanical Garden. Docent training was one of his activities; Sharon, a recently divorced mother with a background in education, had been encouraged by one of her friends to sign up for the program. However, it was not until well after Chris had left the Garden that the two started spending significant time together, when Sharon became involved with the Garden's education program and turned to Chris for answers to various questions (S. Christoph, pers. comm. 2022). Romance blossomed, eventually resulting in a perfectly complemented partnership, with credit for subsequent accomplishments rightfully including both members of the team.

In addition to significantly expanded financial resources, Chris inherited his mother's houses and associated grounds in both Boise and McCall, including Charlie's Garden. The Boise home, just off of Warm Springs Avenue, had deteriorated too much for simple renovation, so they made the difficult choice to raze it. The curvilinear architectural masterpiece that replaced it deserves a spot on Boise's list of heritage homes, with a key centerpiece being an impressive interior water feature, more characteristic of gardens than of living rooms. A commodious library provided ample room for Chris's large collection of botanical books, with a special climate-controlled vault for the rarest items. Once completed, the Boise home provided luxurious living quarters for Chris and Sharon (and Roosevelt), with plenty of room for guests and whatever family members were in residence. In addition to Sara, the new "hybrid family" now included Penny and Pat, Sharon's two children from her previous marriage to William Crowley (an innovative software entrepreneur for whom my brother coincidentally worked at one time); all three children were now in college, soon to be starting their own families.

Chris and Sharon also took over the maintenance and further development of the spacious gardens around the Boise home and Charlie's Garden in McCall. Both properties have subsequently served as perfect locations for a wide diversity of botanical receptions and other gatherings, as many of us can attest. In both places, many of the classic features and original plantings were left untouched, but other rectilinear beds were gradually replaced with more enticing curved paths and raised berms. Chris continued Charlie's use of both gardens for experimental horticulture, trying out a wide diversity of plants

from areas with comparable growing conditions around the world. Plants representing unusual families, genera, and species were given priority, reflecting his long-standing botanical interests. Chris's love of geology was also in full play, resulting in the inclusion of both numerous rocks collected in Idaho, with a preference for greenish boulders from the ancient suture zone northwest of McCall, and large, striking art stones imported from China. Much of Chris's time in Idaho was spent either out looking for more rocks, or arranging them as stairways and other features throughout Charlie's Garden. He also took regular advantage of a source in China that converted Chris's sketches into a variety of ornamental structures carved from a high-grade granite, which was more uniform and fine grained than, but still harmonious with, the local Idaho Batholith.

Chris Davidson and Sharon Christoph in Charlie's Garden, 2012.

Chris also developed increasing ties to Boise State University, in particular to fellow botanist James F. Smith and the Snake River Plains Herbarium. Chris and Jim began collaborative phylogenetic research on the large tropical genus *Piper* (Piperaceae), which includes culinary black pepper (e.g., Smith et al. 2008). The BSU connection deepened when Sven Buerki joined the faculty in 2017, with Chris's encouragement and backing; this personal relationship became particularly close, with the Buerkis effectively adopted into the extended Davidson/Christoph family. In October 2018, Chris and Sharon even funded a "Forum on Biodiversity of Global Hotspots" at BSU, with Sven as one of a number of distinguished speakers from around the country and beyond. Both botanical research and the herbarium at BSU have been ongoing recipients of Chris's financial generosity, and the herbarium serves as a primary repository for Chris's collections from throughout the world.

Chris Davidson hiking near McCall with Jim Smith and Barbara Ertter. Photo by Steve Martin.

Among the many other organizations for which Chris and Sharon became major benefactors were the Idaho Shakespeare Festival, The Nature Conservancy, the Organization for Tropical Studies, and the Limbe Botanic Garden in Cameroon. As a result of their support of botanical gardens and research in Africa, Chris received an honorary chiefdom in Ghana, while Sharon became an honorary queen mother. They also provided funding for the science building at Whitman College (Chris's alma mater) and are acknowledged as primary supporters of the completely revised second edition of *Flora of the Pacific Northwest*, as well as Vol. 9 of *Flora of North America* (which includes various genera for which I was an author). Much of this funding was done under the auspices of the Botanical Research Foundation of Idaho, formalized in 2008.

All of these activities were tangential, however, to the massive undertaking that consumed the majority of Chris and Sharon's efforts for the next two decades, and which now represents their crowning legacy. This was the audaciously named Flora of the World project, which had the goal of taking diagnostic digital photos of every angiosperm plant family in the world (a moving target, given the ongoing phylogenetic upheaval), in their natural habitat to the extent possible, backed by herbarium specimens as vouchers and made freely available at https://floraoftheworld.org/. Genera within each family provided a secondary goal, especially if rare or otherwise noteworthy. The project emerged when Chris and Sharon took stock of their resources and primary interests (i.e., phylogenetic diversity, international travel, photography) and decided on how they could make the greatest contribution to the international botanical community: *Flora of the World* (FoW) emerged as the winner, to our collective good fortune.

With the decision made, and cameras in hand, Chris and Sharon became globe-trotters extraordinaire, returning to biodiversity hotspots like Madagascar, New Caledonia, and South Africa multiple times in order to catch all of their target plant families in flower and fruit (Miller 2018). Locating these targets depended heavily on collaborations developed with a wide network of local botanists, who often benefited from having critical fieldwork funded by the FoW project. Many of these botanists were affiliated with the Missouri Botanical Garden, with which Chris and Sharon soon forged a close relationship and lasting friendships with numerous staff members. The expeditions were also often tied to significant capacity-building contributions to the various host countries, especially in Africa and South America.

Everyone who had the opportunity to accompany Chris and Sharon on one of these expeditions has their

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own story to tell, replete with adventures and surprises. For Jim Smith, this was their trip to west-central Africa, which included flying into a Nigerian airport only to learn that their outbound flight didn't exist; Sharon's skills and persistence were put to the test before an alternative was arranged. As recalled by Jim, "A nice sentiment that came out of that was when Sharon proposed that if they could only get 1 ticket that I be the one to take it and Chris immediately said, 'and if there are only two, do we leave Jim here? No, we all go or we all stay.'"

Chris Davidson photographing plants in Iraqi Kurdistan, with Tony Miller and Sharon Christoph, 2010.

My own opportunity to join Chris and Sharon on an international adventure was in June 2010, when Ihsan Al-Shehbaz, an Iraqi-American botanist at the Missouri Botanical Garden, arranged for us to participate in a botanical survey of the Kurdish-controlled portion of northeastern Iraq (as presented in a talk to Pahove in March 2011). This was during the optimistic period between the fall of Saddam Hussein and the rise of ISIS, with our hosts among the leaders of the aspirational semi-autonomous Kurdish Regional Government (KRG). Memorable highlights include the students and peshmerga guides trying to get Chris to join them in a traditional line dance; Sharon and I being entertained by a beautifully clad group of young women while resting our feet after a long, hot hike; and convincing our hosts that, no, we did NOT want to visit the Iranian border crossing! Alas, although we did find Biebersteiniaceae, which was the primary target family for FoW, it was already dried up. Chris and Sharon accordingly returned a couple of years later to catch it in bloom, this time personally hosted by the KRG prime minister and his wife, who had worked as a botanist in Beltsville, Maryland.

Young Iraqi botanists and pesmerga trying to get Chris to join a line dance, 2010.

As a key difference from the usual FoW trips, which Chris and Sharon routinely funded, we were repeatedly told to "keep your hands out of your pockets"; i.e., not pay for anything. As partial reciprocation, we subsequently arranged for some of our Kurdish hosts to tour botanical gardens throughout the western US in 2011, in preparation for building their own. After rendezvousing with the delegation in Austin, we traveled to Phoenix, the San Francisco Bay Area, and Boise (including the Idaho Botanical Garden, of course!) This was by no means the only time that Chris and Sharon generously hosted international visitors, but it was certainly among the more memorable.

Local destinations were also fair game, each with their own adventures. In July 2008, College of Idaho professor Don Mansfield drove Chris and a few others of us to where the Three Forks of the Owyhee River converge in Malheur County, Oregon, a remote area accessible only by a challenging road not for the faint-hearted. Exploring the riparian wetlands necessitated some wading in the mid-summer flow, as well as keeping an eye out for the occasional rattlesnake. Chris was delighted to bag fertile Ceratophyllaceae, with *Nitrophila*, *Porterella*, *Triglochin*, *Glaux*, and a number of other genera and species as bonus finds.

The time between international jaunts was mostly spent in either Boise or McCall, delighting in quality time with family and friends, sorting and uploading photos, and planning for pending and future expeditions. In the summer months, Chris and Sharon could often be found working away in Charlie's Garden, where Chris laid much of the stone steps himself, using rocks gathered from nearby parts of Idaho. They also enjoyed introducing their visiting friends to the best that Idaho had to offer, from fine dining (always in jeans!) to whitewater rafting to road trips around the state—the last always with cameras in hand, of course, to catch such regional rarities as *Dasynotus daubenmirei*. And when Botany 2014 was held in Boise, one of the field trips was scheduled for Charlie's Garden, and the nearby pteridology field trip along Sylvan Creek ended at Chris and Sharon's private beach, where participants were graciously treated to refreshments while puzzling over E*quisetum* and *Isoetes* (http://2014.botanyconference.org/info/fieldtripsdescr.php).

Chris and Sharon enjoying dinner at Shore Lodge, McCall, with Alexa DiNicola, Noel and Pat Holmgren, 2015.

Another Idaho-based interest was added to Chris's list in late 2014, when I stumbled across a deposit of Miocene

plant fossils in Ponderosa State Park, just a short paddle from our respective cabins in McCall. As happens, it turns out that credit for the original discovery of the locality actually goes to Chris, who found some fossils at or near the same spot in the late 1970's ("not long after the fossils were formed," according to a letter written decades later). This was presumably during his summer vacation, when he was working at the Los Angeles Natural History Museum. Chris sent his samples to paleobotanist Howard Schorn at UC-Berkeley Museum of Paleontology; a handful were retained and added to the museum's permanent collections. However, the relatively poor quality of the surface-collected fossils, and an only mildly encouraging response from Schorn, were insufficient to deflect Chris from his burgeoning interest in tropical botany.

I was more fortunate, thanks in large part to linking up with paleobotanist Patrick Fields, who had worked with Schorn while a graduate student at UC-Berkeley. Pat's "day job" was on the faculty at Olivet College in Michigan, but he spent part of each summer working on western plant fossils at the Orma J. Smith Museum of Natural History at The College of Idaho. What started out looking like a fairly humdrum fossil flora, dubbed the Ponderosa Flora by Pat, soon proved to be much more significant, especially when more localities were discovered and better preserved material below the surface came to light. A formal publication is in preparation, and an interpretive exhibit is currently under construction for the park's visitor center. Over 70 different kinds of plant fossils have been found thus far, including several new to science—at least one to be named after Chris.

Fossils collected by Chris Davidson in the late 1970s, Univ. California Museum of Paleontology.

To our delight, Chris's decades-old interest was quickly rekindled, and he enthusiastically joined some of the collecting teams, along with Pat, myself, the park's interpretive ranger, and several other volunteers. As one contribution to the cause, he helped arrange for geologist Spencer Wood and geologist/paleobotanist Bill Rember to join us one weekend, trying to puzzle out the geology of the peninsula and how the fossils were formed. He also donated one of his former FoW cameras to the Museum for photographing cataloged specimens and funded some curatorial supplies as well. Equally important, the Ponderosa Flora project expanded our collective circle of friends: Chris and Sharon paid for, and sometimes hosted, additional visits to Idaho by Pat, and we have all repeatedly visited Bill Rember's personal piece of the world-famous Clarkia flora in northern Idaho. Chris particularly enjoyed a trip to the Seven Devils Mountains with Pat, as a kindred spirit who was equally interested in both botany and geology.

Chris Davidson collecting fossils with Patrick Fields and Terri Bryant, 2015.

Although not as well-known to most INPS members as are some of the more locally involved botanists, Chris (and Sharon) did occasionally participate in, or otherwise contribute to, some of our group activities. They joined the Idaho Botanical Foray to the Bear River Range in 2012, at least for a day or two, and the following year hosted a party at Charlie's Garden for botanists en route to the 2013 Foray at Hazard Lake. For the latter, Chris came up with the banner and stand—built of plastic tubing—that became an iconic part of subsequent Forays. Charlie's Garden was also one of the field trip destinations during the INPS annual meeting to McCall in 2019; although Chris had initially agreed to lead this trip, a substitute leader (me) had to step in due to a scheduling miscommunication. Most recently, Chris was the keynote speaker at the Idaho Rare Plant Conference in February 2020, filling us in on the latest with the Flora of the World project. Chris and Sharon were also regulars at, and occasional hosts of, the ongoing "Annual Meeting of the Idaho Botanical Society" and various local botanical receptions.

Chris's talk to the Rare Plant Conference was just before the world turned upside down, as the COVID-19 pandemic swept the globe. International travel came to a screeching halt,

Chris Davidson pressing plants with Brittni Brown at the 2012 Idaho Botanical Foray. Photo by Steve Martin.

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Christopher Davidson ...*Continued from Page 15*

forcing Chris and Sharon to abandon all their carefully planned trips for the unknown future. The silver lining was they could turn their attention instead to the recently rebuilt "cabin" at McCall, an all-season residence that provided increased room and modern comforts while still remaining harmonious with its natural surroundings. Deprived of the usual international outlets for their energy, Chris and Sharon instead focused on furnishing and landscaping the new house, which became a haven to enjoy with extended family and friends. Playing with his and Sharon's grandchildren remained a particular delight for Chris; building an impressive fieldstone retaining wall, with an abundance of succulents and other plants tucked in, was another source of pleasure.

Chris and Sharon at McCall "cabin," 2021.

Tragically, right when the pandemic had eased sufficiently to resume long-deferred new expeditions, in hot pursuit of the final eight families still needed for FoW, Chris was diagnosed with renal cancer. Although initially thought to be treatable, the unexpectedly aggressive malignancy resulted in Chris's rapid decline, ending with his death at home, Sharon and Sara at his side, on 29 August 2022. Celebrations of Life were held the following two weeks, at both Charlie's Garden and their Boise home, with condolences and accolades flooding in from around the globe.

Chris leaves an impressive legacy, with Flora of the World, Charlie's Garden, the Idaho Botanical Garden, and general capacity-building sharing top billing along with his and Sharon's children and grandchildren. Eight tropical plant species are named for Chris, and an additional two bear epithets honoring both him and Sharon, as does the genus *Christopheria* (Smith & Clark 2013). Plans are underway to ensure the continued maintenance and development of the FoW website at Boise State University, with special attention to the remaining families still needed to complete the tally. Charlie's Garden will remain in the family, the extensive botanical library will go to Boise State University, and the best disposition of the pollination manuscript that was his passion for a decade is also under consideration. In addition, a small endowment is currently being established in Chris's honor to support paleobotany curation at the Orma J. Smith Museum of Natural History at The College of Idaho.

Stairway built by Chris in Charlie's Garden.

No tribute to Chris is complete without addressing his signature sense of humor, a dry wit that subtly permeated conversations and letters. Behind his droll Groucho Marx-like visage lay a delivery style more reminiscent of Mark Twain, catching you off guard with deadpan interjections. He loved nothing better than inviting you to join him on extended flights of whimsical fancy, challenging you to keep up. He enjoyed repeatedly watching favorite classics like *Monty Python and the Holy Grail,* which he had memorized, and he even penned two witty articles under the nom de plume "Harald Harebrush" for *The New Boise Rag*, a humor mini-magazine that briefly existed in 1982 (A. Minskoff, pers. comm. 2022).

We miss you, Chris, for your humor, your passion, your generosity, your joy of life, your friendship. You have left the world a brighter and richer place by your time in it, and we are grateful for and enriched by the gift of your memories.

Very special thanks to Sharon Christoph, Jim Smith, Pat Fields, Charlotte Taylor, and Alan Minskoff for freely sharing their own memories of Chris during the preparation of this tribute, and to Steve Martin for allowing the use of his photos. All other photos are by the author. •

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Sylvia Chatburn 1940-2022

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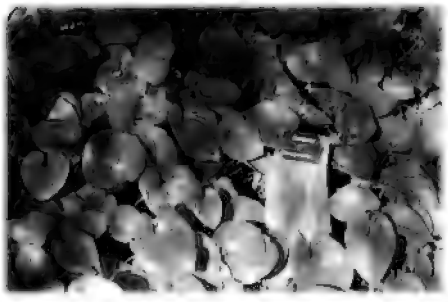
Sylvia Chatburn passed away on February 11, 2022 after a long illness. She had been the manager of the Kinnikinnick Native Plant Arboretum in Lakeview Park since 2000. We know Sylvia because of her connection with the Arboretum, but her life extended far beyond Sandpoint and led to her successful leadership.

Sylvia was born on January 30, 1940 and grew up in Sagle on a large dairy farm. She attended local schools and graduated from Sandpoint High School. She went on to graduate from Wake Forest University in North Carolina. After college she married, raised three children in California and, for several years, lived in Spain; it was there that her travel interest began. In later years, she visited Europe, Egypt, Australia, and South America, including the Galapagos.



She and her family moved back to Sagle, settling on 90 acres, where she gardened and finished the home interior, even doing the woodworking of the kitchen and bathroom cabinets. It was during this time that she lost her husband.

In 1997, a group formed that was interested in native plants and an area to display them. After much searching, they found a corner of Lakeview Park that seemed like a good place. A legal agreement was made with the city of Sandpoint, the Historical Museum and KNPS for an arboretum to be started.

Sylvia headed up a group of volunteers, under the auspices of Lois Wythe, to prepare the area for public display, including paths and habitat areas. Sylvia developed the descriptions and prepared the signs, which are in the Arboretum today. Volunteers are the backbone of the Arboretum, and many have worked there for years. Arbor Day, plant sales, student and other tours are some of the activities that take place in the spring and summer.

Sylvia's additional activities with KNPS included the development and editing of the book, *Landscaping with Native Plants in the Idaho Panhandle.* The book was printed in 2011 and continues to be very popular. Sylvia was active with the Monday Hikers and the Woman's Campout, where she was able to enrich the hikes with her knowledge of native plants. She will be greatly missed. •

CALYPSO CHAPTER

When: Chapter meetings are held on the first Wednesday evenings of March, April, May, and October at 7:00 pm. The public is invited to all chapter activities, which may change, so watch chapter emails for updates.
Where: Meeting are held in the Wildlife Building, North Idaho Fairgrounds, Coeur d'Alene.
Contact: For more information about Calypso Chapter activities, contact Derek Antonelli: ds.ca.antonelli@gmail.com, (208) 691-1070.
Upcoming Events
March 8: Derek Antonelli will give a presentation on the Lily Families.
April 5: George Dumoff will give a presentation on Earthworms and Plants.
April 22: Spring Plant Walk. Post Falls Community Forest.
April 28 to May 1: Worldwide City Nature Challenge, Submit iNaturalist observations. Chapter will plan an outing to support this event.
May 3: The presentation topic for this meeting has not been determined yet. Please submit topic suggestions for this or future meetings.
May 20: Spring Plant Walk. Rathdrum Mountain Park.
June 10: Summer Plant Walk, Location TBD.
July 8: Summer Plant Walk. Location TBD.
July 13 to 17: Idaho Botanical Foray. Cabinet Mountains.

LOASA CHAPTER

When: Meetings are held third Thursday of each month at 7:00 p.m.
Where: Taylor Building, Room 247, College of Southern Idaho, Twin Falls.
Contact: Bill Bridges, bridgesbill34@yahoo.com

PAHOVE CHAPTER

When: Meetings are held the second Tuesday of each month from October–April starting at 7:00 pm. Times, dates, and topics are tentative. Current information will be sent to members via email. Annoucements are also posted on the Pahove Chapter page of the INPS website: https://idahonativeplants.org/pahove/
Where: Chapter presentations currently offer hybrid viewing formats, both in-person at MK Nature Center and a Zoom link for at-home enjoyment.
Contact: For more information about Pahove Chapter activities visit the website: www.idahonativeplants.org or email Karie Pappani at pahove.chapter.president@gmail.com.
Past Events
The Idaho Rare Plant Conference 2023 was a huge success! Learn more in the next issue of *Sage Notes*!
Upcoming Events
March 14: Matt Lavin PhD, Professor at Montana State University will present "The sagebrush sea in southeastern Idaho, Montana, and Wyoming: composition, distinction, and conservation value."
April 11: Bob Moseley will present "Revisiting Shangri-La: Photographing a Century of Environmental and Cultural Change in the Mountains of Southwest China."
April TBA: Native Plant Sale, M.K. Nature Center
May 14: Wildflower Plus Show, Idaho Botanical Garden
May 18: Orton Botanical Garden Tour, Twin Falls
Other News
The chapter currently has tote bags for sale with the Pahove Chapter logo. The cost is $22. Please contact us if you are interested in purchasing one.

SAWABI CHAPTER

When: The Board announces its at least quarterly meetings. Plant walks generally occur each Saturday and Monday through the early blooming season and as the season allows thereafter. Winter programs are scheduled for the first Monday evening of the month. An autumn potluck is also planned.
Where: Winter programs are presented in the North Fork room of the ISU Student Union Building in Pocatello. Field trips generally car-pool from the bison statue in front of the ISU Museum of Natural History.
Contact: Paul Allen at pokyallen@hotmail.com, 208-241-5265
Past Events
Our **Winter Program** featured Wallace Keck, Conservation Supervisor for City of the Rocks, who focused on *Pinus monophylla* (the single leaf pinyon).
Upcoming Events
Plant Walks are ongoing, but not scheduled. Contact Paul Allen if you wish to be alerted.
In **April** we will have a display at the local Environmental Fair celebrating Earth Day.

UPPER SNAKE CHAPTER (INACTIVE)

Contact: Kristin Kaser, kaser.kristin@gmail.com

WHITE PINE CHAPTER

When: Meetings are typically held the third Thursday of the month, September through April. Current information is posted on our chapter webpage:

https://www.whitepineinps.org/WPschedule.html
Chapter members will receive an email notification before all events.

Where: We are currently offering hybrid meetings. The in-person meetings are held at the 1912 Center in Moscow with a zoom link for virtual attendance.

Contact: For more information about White Pine Chapter activities, contact us at INPS, White Pine Chapter, PO Box 8481, Moscow, ID 83843 or whitepine.chapter@gmail.com. Visit the chapter website for upcoming event information: https://www.whitepineinps.org/

Past Events

February 23: Presentation by Joe Kuhl, Director of Stillinger Herbarium, University of Idaho.

Upcoming Events

March 16: Presentation by Alan Martinson about invasive plants. 7:00 pm at the 1912 Center.

April 20: Presentation by Mike Mancuso, President of INPS. 7:00 pm at the 1912 Center.

May 7: Field trip to Mary M. McCroskey State Park led by Pam Brunsfeld.

May 12-13: Annual Native Plant Sale at Latah Fairgrounds.

WOOD RIVER CHAPTER

When: Typically we have talks in the cold months and walks in the warm ones. Non-members are welcome. Please see our website or email newsletter for information on all programs.

Where: Field trip and talk locations and details will be included with the description, posted online and emailed to members and other interested parties.

Contact: For more information about Wood River Chapter activities: email: woodriverinps@gmail.com; website: www.woodriverinps.wixsite.com/wrinps; phone: Mary (559) 696-9953; to subscribe to the newsletter: email us.

Past Events

February 25: "Basics of Using Native Plants in Home Landscapes." Mindy Rider discussed how native plants differ from ornamental varieties. She outlined their differing water needs and growth habits. Rider made some recommendations about her favorite natives to use in your landscape and how to start them from seeds. Mindy Rider is well qualified to educate about native plants. She has worked as a landscaper and horticulturalist for 25 years. Rider currently starts, grows and installs native plants at the Hunger Coalition as part of her job as Food Production Manager.

Upcoming Events

March 23: Talk presented by Linda Ries at 5:30 pm at Town Center West, Hailey. "What's that Buzzing in my Yard? A Quick Look at the Amazing World of Native Bees." Learn how to identify local native bees, explore their life cycles and gain tips on how to encourage these bees to thrive and survive in your yard. This class will focus on bumble bees, mason bees, and leaf cutter bees, as well as other native bees. Learn how native bees contrast with imported honeybees and the increasing threats from pesticides and poor cultural practices. We will also discuss which bees pollinate your fruit trees and vegetables. Our presenter, Linda Ries, has loved insects since she was a girl. After gaining her Forest Biology B.S., Linda worked for 20 years for the U.S. Forest Service. She continues to educate us through her work with 4-H, the Hailey Arboretum and the Hailey Tree Committee. This talk is cosponsored by the Hailey Public Library and will be recorded and available in the future on our chapter's website.

May 20 or June 3: Camas Prairie Trip to Centennial Marsh. Details will be announced when we can see when the camas lilies will bloom and that information will be available on our chapter website and through our email newsletter. •

IDAHO NATIVE PLANT SOCIETY
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Memberships run calendar year. New memberships enrolled after June 1 include the following year. ***Renew or join online:*** *https://idahonativeplants.org/membership/*

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Vol. 45 No. 2 June 2023

Sage Notes

Newsletter of the Idaho Native Plant Society • Promoting Interest in Idaho's Native Flora

2023 Rare Plant Conference Report

By Beth Corbin, Southern Idaho Rare Plant Working Group Coordinator, with Carol Prentice
Photos by Nancy Miller

The 2023 Rare Plant Conference was held February 28–March 2 this year, once again at the Idaho Department of Fish and Game (IDFG) building in Nampa. Everyone I talked to agreed this was an exceptionally good Rare Plant Conference (RPC), with great presentations, good snacks, botany fun, interesting posters with engaged presenters, a well-attended banquet, a significant number of Rare Plant List ranking updates, and a fun post-conference field trip. We all were so glad to be back in-person for the first time since 2020; the networking and reconnecting was particularly sweet for the 60-some conference attendees.

The RPC is generally held every two years, sponsored by Idaho Native Plant Society, and is attended by a wide variety of agency, INPS, academic, and interested public members. Primary objectives of the RPC include sharing information on Idaho's rare plants and related subjects and updating the INPS Rare Plant List. This list is used by land and resource agencies to inform management and to help prioritize conservation activities.

We started the RPC Tuesday afternoon with opening remarks from INPS President Michael Mancuso, noting that the first RPC was in 1984. By my count this is the 31st RPC, although the agenda and swag show it as the 30th, not counting the 2022 on-line RPC. Our excellent conference co-chairs Kristin Williams and Brittni Brown did introductions and gave logistical information. Ben Legler (now at University of Wyoming) was our keynote speaker, providing us with an insightful overview of Idaho's *Botrychium* (moonworts), including the conference logo plant, *B. hesperium*.

Agency updates were next, and we heard informative presentations from Karen Colson (U.S. Fish and Wildlife Service), Robert Jaeger (USFWG) on whitebark pine, Anne Halford (Bureau of Land Management), Tova Spector (U.S. Forest Service Region 4, virtually), Amanda Hendrix (USFS R1), Lynn Kinter & Jennifer Miller (IDFG), and Angela Soddenaa & Blair McClarin (Nez Perce Tribe, virtually). Our evening casual social was held at Fiesta Guadalajara in Nampa, where companionship, Mexican food, and a few margaritas were enjoyed.

Wednesday was our full conference day, starting with conservation talks where we learned a lot. Clara Buchholtz from Boise State University shared her research on *Astragalus mulfordiae*, that pollinators highly increase fruit development and there is low overlap between pollinator species inhabiting the Boise Foothills vs. the Owyhee Front. Wallace Keck gave us an update on pinyon pine (*Pinus monophylla*) at City of Rocks Reserve where they are removing black-stain fungus infected trees to protect healthy ones. Soledad Diaz from Corvallis spoke on using remote sensing for rare and uncommon plant detection, particularly showing alarming trends in

... *Continued on Page 4*

In this issue:

IDAHO NATIVE PLANT SOCIETY
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Letter from the President

The Idaho Native Plant Society depends on volunteers to get things done—whether it's leading a field trip, helping at a chapter's native plant sale, disseminating information about native plants at a community event, serving on a committee, updating the website, responding to email inquiries, keeping the financial books in order, organizing the annual meeting, writing an article for *Sage Notes*, being a chapter or state board member, and the list goes on. INPS is fortunate to have a dedicated cadre of volunteers to help the organization meet its mission and serve its membership. Articles about two exceptional INPS volunteers, Nancy Miller and Paul Shaffer, are included in this newsletter.

Recently, several members volunteered to form and serve on the INPS Scholarship Committee. This committee was tasked with formulating and implementing a plan to establish a long-term scholarship program sponsored by INPS. Many hours of research, coordination, and perseverance later, the scholarship program is now in place and will make its first award for the Fall 2023 semester. I applaud the Scholarship Committee volunteers for all their hard work bringing the scholarship program to fruition. An article in this issue of *Sage Notes* by Lindsey Barber, the scholarship committee chair, provides more information about the scholarship. Additional information about the scholarship is also now available on the INPS website. It includes a link to donate to the scholarship fund. The more robust this fund becomes, the more scholarships INPS will be able to sponsor each year. Education is central to the INPS mission, and I see the scholarship program as a way to help college or university students interested in native plants and plant communities attain their goals. They will be needed as future native plant advocates.

The Wood River Chapter has been working hard organizing this year's INPS Annual Meeting, to be held June 30 to July 3 in the beautiful Sawtooth Valley area. I hope to see many of you at the meeting for a good dose of wildflowers and camaraderie.

Thank you to everyone who volunteers time, knowledge, and passion to benefit Idaho's native flora. Enjoy your time in the hills this spring and summer, in your native plant garden, or wherever you have the opportunity to spend time with your favorite plants.

Mike Mancuso,
INPS President

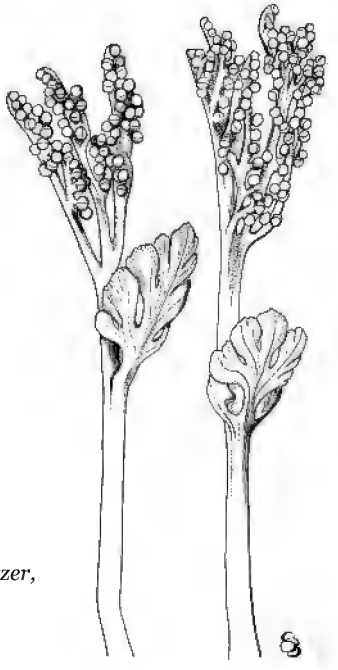


Illustration of western moonwort, Botrychium hesperium, by Sharon Birzer, botanical illustrator. This image was included in the handouts for the RPC conference. https://sharonbirzer.com

INPS Scholarship Program Has Taken Root!

By Lindsey Barber, Calypso Chapter

The Idaho Native Plant Society is excited to announce the inaugural year of its annual scholarship program! The INPS board has allocated funds for an annual scholarship in the amount of $2,000 to be awarded to an Idaho college or university student demonstrating an interest in native plants and plant communities. Through the scholarship, INPS supports the education of those who will carry on the INPS mission for years to come.

The INPS Scholarship Committee was created in November of 2022 to ensure the success of the program. The committee is made up of volunteers from INPS chapters across the state: Penny Morgan (White Pine), Bill Bridges (Loasa), Liz Martin (White Pine), Paul Ries (Wood River), Don Morishita (Loasa), and Lindsey Barber (Calypso). Lindsey is a new INPS member and currently serves as chair of the Scholarship Committee.

It can be challenging to initiate a scholarship program when committee members are located hours away from each other, but through Zoom meetings and Google Drive, all things are possible! Early committee work focused on establishing the criteria for eligibility, determining how applicants would be evaluated, detailing the funding, and agreeing on how to administer the award. Later work included drafting the application, building a list of contacts to help solicit applicants, and creating social media posts and informative flyers for wider dissemination. The work accomplished this year will serve as the baseline for continued administration of the scholarship each Fall.

We've received many positive comments from the faculty members and other professionals we contacted as a way to share information with students. We also used the INPS Instagram and Facebook accounts to spread the word. People told us, "This is a generous scholarship," and, "Our students will be eager to apply!"

The deadline for submitting a completed application package was April 30, 2023. The INPS Scholarship Committee received applications from 22 applicants! The committee will now select the winner of the award for the 2023-2024 school year. The winner will be profiled in a future issue of *Sage Notes*.

For more information, including the criteria that will be used to select the best candidates, please visit the INPS website at https://idahonativeplants.org/scholarship-news/. We welcome your comments and questions at INPSScholarship@gmail.com. If you wish to donate to the INPS Scholarship, you may do so using PayPal at https://idahonativeplants.org/scholarship-news/. Your contributions will help us continue to offer scholarships well into the future. •

A*stragalus mulfordiae* suggesting the cumulative probability of quasi-extinction is very likely to occur within a 60 year period. Joe Kuhl from University of Idaho updated us on the Stillinger Herbarium, where they hope to hire a collections manager soon.

After a break and more botany fun (a candy plant occurrence treasure hunt), we began the rare plant species conservation ranking. I gave an overview of the process (including the NatureServe Global and State ranks and the Rank Calculator) within the Rare Plant Working Groups (RPWG) and culminating at the RPC. I also presented some simple name changes for updates to the Rare Plant List.

Derek Antonelli single-handedly presented ranking proposals from the Northern Idaho RPWG for 15 plants, including a few mosses (see the discussion and tables below for specifics). The Southern Idaho RPWG started ranking presentations mid-afternoon, which were continued on Thursday. Wednesday ranking presenters were Jennifer Miller, Carol Prentice, Sandy Smith, Sam Seabrook-Sturgis, and me.

Late afternoon was the poster session (organized by Michael Ottenlips) and social. About a dozen posters on a variety of plant-related topics were presented, with representatives from several different colleges/universities, government agencies, and a private company. Our banquet consisted of a very tasty dinner catered by Kanak Attack, followed by a talk (delivered remotely) by Cathy Cripps of Montana State University about whitebark pine and its co-dependence with high elevation mycorrhizal fungi, which was very interesting.

Thursday morning the RPC continued with three more conservation presentations. Trevor Caughlin from BSU talked about using drone technology to map and monitor native plant communities in the sagebrush steppe, to provide standardized measurements of plant community structure. Don Mansfield, emeritus from College of Idaho, talked about his recent publication separating slickspot peppergrass (*Lepidium papilliferum*), into two taxa (*L. papilliferum* and *L. montanum* var. *owyheense*), including some implications for management of this federally listed plant; he also uncovered a third taxon, *L. phylonitron*, in the complex that needs to be investigated. Francis Kilkenny from Rocky Mountain Research Station talked about forage kochia's spread from fuel-break plantings into slickspot peppergrass and Davis peppergrass (*Lepidium davisii*) sites.

We then had the rest of the SIRPWG ranking presentations, from presenters Sandy Smith, Lynn Kinter, Jessica Irwin, Elle Kramer, Rose Lehman, and me. Of note, we had three new people research and two new presenters. To wrap up the RPC, INPS Pahove Chapter President Karie Pappani gave closing remarks for the conference.

But wait, there's more! Barbara Ertter led an optional field trip to the Boise Foothills above Eagle (Big Springs Trailhead and the Ada/Eagle Bike Park) where sagebrush buttercups were in bloom and we observed numerous plants not in flower as well as a few lichens. That evening, some of us gathered at Brick 29 Bistro in Nampa for a great casual social dinner and chance to renew and make new acquaintances.

There was a lot packed into those two half-days and one full day and many people to thank. But first, here's more information on the rare plant rankings. In total, 50 plants were presented and ranked. The majority of these (26) were plants currently on the Rare Plant List which had not been ranked at a RPC using the RPWG & NatureServe Rank Calculator. Another 15 plants ranked are new additions to the List, including two recently published plants (*Potentilla maryae* and *Townsendia lemhiensis*). Four plants are removed from the list based on updated information. Two plants had been previously ranked using this process, but ranks were updated based on new information. Two plants were ranked that are endemic to Idaho but not rare. And one plant was evaluated but not added (see Tables 1-5). These changes have been made to the Idaho Rare Plant List and the 2023 version is posted on the INPS website.

These rankings and presentations represent a lot of hard work by the RPWG members, as well as the active participation and ratification by attendees of the RPC. The result is an updated Rare Plant List reflecting the best available scientific information for Idaho's rare plants. And of course the RPC as a whole could not occur without the dedication of its planners and implementers. Special recognition is due to our 2023 RPC coordinators Kristin Williams and Brittni Brown for pulling off not only this RPC but the 2022 on-line RPC! In addition to those already mentioned, thanks go to: moderators Crista O'Conner, Rose Lehman, and Anne Halford; registration Janet Bala, Craig Carpenter, and Karie Pappani; treasurer Karen Getusky; scribes Lynn Kinter (real-time rank calculator recorder), Clara Buchholtz, Sam Seabrook-Sturgis, and Elle Kramer; botany fun Kristin Kaser; snacks Carol Prentice; banquet coordinator Crista O'Conner; IT Jim Strickland; venue coordination Jennifer Miller; swag Kristin Williams, Brittni Brown, Holly Giard, and Elle Kramer; copies Holly Giard; and all who helped with setup and cleanup.

We hope to see you at the 2025 RPC! •

Table 1. Plants on Rare Plant List not previously RPC Ranked (26)

Species	Common Name	Presenter	State Rank	Status
Astragalus mulfordiae	Mulford's milkvetch	Carol Prentice	S2	RARE
Betula pumila	Bog or swamp birch	Derek Antonelli for Blair McClarin	S2Q	RARE
Carex aboriginum	Indian Valley sedge	Beth Corbin	S1	RARE
Carex abrupta	Abrupt sedge	Beth Corbin	S3	RARE (from REVIEW)
Carex chordorrhiza	Creeping sedge	Derek Antonelli	S2S3	RARE
Carex magellanica ssp. *irrigua*	Boreal bog sedge	Derek Antonelli	S2S3	RARE
Ceanothus prostratus	Mahala-mat ceanothus	Sandy Smith	S1*	RARE*
Cleomella hillmanii var. *goodrichii*	Goodrich's rhombo-pod	Jessica Irwin	S2	RARE
Cyperus bipartitus	Shining flatsedge	Beth Corbin	S3S4	RARE
Downingia insignis	Parti-color downingia	Jennifer Miller for Michael Daines	S1S2	RARE
Ericameria parryi var. *montana*	Parry's rabbitbrush	Rose Lehman	S2	RARE
Erigeron humilis	Low fleabane	Sandy Smith	S2	RARE
Eriophorum angustifolium ssp. *angustifolium*	Tall cottongrass	Beth Corbin	S3	RARE
Eriophorum viridicarinatum	Green-keeled cottongrass	Derek Antonelli	S2	RARE
Eryngium alismifolium	Inland coyote-thistle	Jennifer Miller	S1S2	RARE
Gaultheria hispidula	Creeping snowberry	Derek Antonelli for Blair McClarin	S2	RARE
Lupinus uncialis	Inch-high lupine	Jennifer Miller	S3	RARE
Mentzelia mollis	Smooth stickleaf	Beth Corbin	S2S3	RARE
Penstemon compactus	Bear River Range beardtongue	Jennifer Miller	S2	RARE
Prenanthella exigua	Desert prenanthella	Beth Corbin	S2	RARE
Primula alcalina	Alkali primrose	Sandy Smith	S2	RARE
Primula incana	Jones primrose	Sandy Smith	S1	RARE
Pyrrocoma integrifolia	Entireleaf goldenweed	Sandy Smith	S3	RARE
Ranunculus pygmaeus	Dwarf buttercup	Sandy Smith	S1	RARE
Streptopus streptopoides	Small twisted stalk	Derek Antonelli for Blair McClarin	S3	RARE
Tellima grandiflora	Large fringe-cup	Derek Antonelli for Blair McClarin	S2	RARE

**Adams County population only*

Table 2. Plants Ranked and Added to the Rare Plant List (15)

Species	Common Name	Presenter	State Rank	Status
Allium macrum	Rock onion	Beth Corbin	S1	RARE
Cleomella hillmanii var. *hillmanii*	Hillman's rhombo-pod	Jessica Irwin	S2	RARE
Cleomella hillmanii	Hillman's stinkweed	Jessica Irwin	S2S3	RARE
Epilobium suffruticosum	Shrubby willowherb	Carol Prentice	S2	RARE
Geocaulon lividum	False toadflax	Derek Antonelli	S3	RARE
Grimmia hamulosa	Dry rock moss	Derek Antonelli for Alma Hanson	S1	RARE
Impatiens ecornuta	Spurless touch-me-not	Derek Antonelli	S2	RARE
Juncus hemiendytus	Hermann's dwarf rush	Beth Corbin	S2	RARE
Neottia borealis	Northern twayblade	Elle Kramer	S3	RARE
Polytrichastrum formosum	Bank haircap moss	Derek Antonelli for Karen Gray	S1	RARE
Polytrichastrum longisetum	Long-stalked haircap moss	Derek Antonelli for Karen Gray	S1	RARE
Potentilla maryae	Mary's cinquefoil	Beth Corbin	S1	RARE
Rhodiola integrifolia ssp. *integrifolia*	Western roseroot or King's crown	Derek Antonelli	S2S3	RARE
Stephanomeria paniculata	Stiff-branch wire-lettuce	Beth Corbin	S1S2	RARE
Townsendia lemhiensis	Lemhi Townsend daisy	Lynn Kinter	S1	RARE

...Continued on Page 6

2023 Idaho Rare Plant Conference...*Continued from Page 5*

Table 3. Plants Removed from Rare Plant List (4)

Species	Common Name	Presenter	State Rank	Status
Aliciella triodon	Coyote gilia	Beth Corbin	None	No verified Idaho Records
Carex fuliginosa	Shortleaf sedge	Beth Corbin	None	No verified Idaho Records
Cercocarpus montanus	Colorado birchleaf mountain-mahogany	Sandy Smith	None	No verified Idaho Records
Iris versicolor	Blue flag iris	Derek Antonelli	None	Considered exotic in Idaho

Table 4. Others (5)

Species	Common Name	Presenter	State Rank	Status
Carex vernacula	Native sedge	Beth Corbin	S3	Re-ranked; maintain RARE
Chaenactis evermannii	Evermann's pincushion	Sandy Smith	S4	Endemic but not rare
Pyrrocoma insecticruris	Camas or bugleg goldenweed	Sam Seabrook-Sturgis	S2	Re-ranked; maintain RARE
Scopidium scorpioides	Hooked scopidium moss	Derek Antonelli for Alma Hanson	None	Specimen thought to be this is not; no verified Idaho records; do not add
Trifolium longipes var. *penduculatum*	Long-stalk clover	Sandy Smith	S4	Endemic but not rare

Table 5. NatureServe Rank Descriptions. See NatureServe.org for ranking information. S refers to ranking for the state of Idaho. Q= Taxonomic uncertainty.

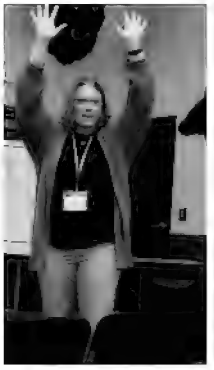
Rank	Brief Description
S1	Critically Imperiled
S2	Imperiled
S3	Vulnerable
S4	Apparently Secure
S5	Demonstrably Secure

Michael Ottenlips standing with our excellent poster presenters.

Brittni Brown (RPC 2023 co-chair) and Michael Mancuso discussing conference logistics.

Karen Colson speaking with a group after her USFWS presentation on Endangered Species Updates and Conservation Highlights.

Derek Antonelli and Beth Corbin (Rare Plant Working Group Chairs) (both standing) with group.



Elle Kramer helping with Botany Fun at break.

Crista O'Connor (standing, with group) started the conference off right as our moderator the first day.

Michael Mancuso, Peggy Faith, Don Mansfield, Nyika Campbell, Lisa Harloe, Kristin Williams (RPC 2023 co-chair), Derek Antonelli, and others in line for a snack.

Bur Buttercup is Not a Friend of Mine

Article and Photo by Roger Rosentreter, Pahove Chapter

Bur buttercup *(Ranunculus testiculatus, Ceratocephala testiculata*) is native to Eurasia. Now common in many dry-land habitats at low elevations, it was uncommon when I began my botanical career in Southern Idaho in the late 1970s. Back then, I made a formal collection of this annual invader and was so proud to show this "new" plant to College of Idaho botany professor Dr. Patricia Packard. Dr. Packard is best known for her stern character, but she had a delightful twinkle in her eye when she saw my collection. This invader was first reported for Idaho near Mountain Home. (R. L. Piemeisel 40-398; Apr 11, 1940).

Unfortunately for western rangelands, bur buttercup quickly became much too common. To control this plant, we need to know and understand its habits:

Description

- Low-growing annual, from 1-2 inches tall, with light green, antler-like leaves
- Small single yellow flowers which grow taller than leaves
- Five petal flowers that mature to oval-shaped, spiny burs; each bur produces 5 to 80 seeds
- Short taproot

Phenology

- Fall, winter, or spring annual with germination dependent on when ground temperatures reach 41°F
- Flowers produced quickly, within 3 weeks of germination
- By late spring to early summer, plant foliage dries and turns brown and brittle, once shallow soil moisture is gone
- Burs are sharp and annoying to humans and wildlife

Chemistry

This and other buttercup species contain alkaloids, glycosides (mustard oils) and protoanemonin, which are toxic to humans and animals (Gleadow & Møller 2014). Contact with plant sap may cause inflammation and blistering of the skin, while ingestion can cause irritation of the mouth, vomiting, and diarrhea (Patra & Saxena 2009). Hence, no animals eat this plant.

Ecology and Phenology in SW Idaho

I have found that biological soil crust field work at low elevations is best conducted in early spring, prior to maturation of bur buttercup fruits. Immature fruits are green and flexible rather than stiff and spiny, so field work is much less painful. The weather is often cool and moist too, perfect conditions for identification of biocrusts.

For the last six years, I have volunteered at the World Center for Birds of Prey campus south of Boise. Habitat restoration has been the focus of my volunteer efforts (See *Sage Notes*, June 2022, page 10). For the first few years, we mostly battled summer cypress or kochia (*Bassia scoparia, Kochia s.*). Once the kochia was removed, it opened up more bare ground for bur buttercup to explode. Bur buttercup's growth and phenology have differed somewhat every year. Let's look at the last few years as an example (Table 1):

Bur buttercup germinated 3.5 months later in 2023 than it did in 2021. This produced much smaller plants and fewer seeds per plant. The persistent winds have also dried the surface soil between storms. In March 2023, bur buttercup plants were initially so small and short that it was difficult to grip them for removal.

IPM Recommendations for Control

- Hand pull plants prior to seed maturation.
- Shallow tillage or hoeing will control young plants.
- Apply a mulch layer 3 inches deep to reduce seed germination.
- Apply an appropriate post-emergent broadleaf herbicide directly to target weeds.
- If perennial vegetation dominates the site, then apply a pre-emergent herbicide before bur buttercup germinates.

Literature Cited

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Table 1. Weather and germination phenology and biomass of bur buttercup.

Year	Fall	Winter	Spring	Germination	Biomass
2021	dry/mild	wet/mild	wet/mild	Oct, Nov	large plants
2023	very dry/ cold	wet/cold	wet/cold & windy	late Feb, March	small plants

Idaho 25 Peaks Project

By Michael Mancuso, Pahove Chapter

Getting to the top of many Idaho peaks can be a challenge, but you are rewarded with grand views, joy, gratitude, and if you time your visit right, a bonanza of wildflowers and more botany than may first meet the eye. Idaho's highest mountains reach elevations that extend beyond the biological limit of trees. This is the alpine, an ecosystem that supports a diversity of low-growing plants tougher than they may look. In Idaho, alpine habitats have received less systematic botanical scrutiny and documentation in the past compared to forest, shrub-steppe, riparian, or other lower elevation ecosystems in the state. Many Idaho peaks have been visited by plant collectors over the years, but their collections tended to be selective and the visits rarely included making a complete plant species list for the summit area. An article by Paul Allen in the December 2022 issue of *Sage Notes* introduced INPS members to the Idaho 25 Peaks Project. Here, I give a little more background about the project and summarize what we found on the 10 summits visited during summer 2022.

David Giblin with the University of Washington Herbarium initiated the Washington 50 Peaks Project in 2021 to better document that state's alpine flora. His project aims to conduct botanical surveys on 50 high elevation summits in Washington's Cascade Mountains over a 5-year period. His project caught the attention of other botanists and ecologists who recognized the value of obtaining similar floristic information for alpine habitats outside of Washington State. This shared interest led to expansion of the project in 2022 to include alpine summit surveys in British Columbia, Wyoming, Colorado, New Mexico, and Idaho. The Idaho 25 Peaks Project is Idaho's contribution to what has developed into a collaborative, multi-jurisdictional project for alpine botanical surveys in western North America. Our goal for Idaho is to conduct botanical inventories on 25 alpine summits in the state over a 3-year period that began in 2022.

The Idaho effort is volunteer-based and modeled after Washington's 50 Peaks Project, with surveys consisting of a thorough inventory of all vascular plant species found on selected peaks using specimen collections and field observations. The result is a complete checklist of each peak's vascular flora. The project has floristic, biogeographic, and conservation goals that include (1) obtaining a more comprehensive floristic baseline for Idaho's high elevation plant diversity; (2) improving understanding of the distribution of Idaho's high elevation plant diversity; and (3) documenting populations of plant species on the Idaho Rare Plant List encountered during the summit visits. The project also aims to have an education component by providing field botany and plant collecting experience to participants less familiar with these skills.

Derek Antonelli, Beth Corbin, Trista Crook, Anne Halford, Jessica Irwin, Mike Mancuso, Don Mansfield, Mike Merigliano, Bob Moseley, and Renee Mullen, all Idaho botanists/ecologists experienced with the state's flora and mountains, volunteered to lead or co-lead surveys to one or more Idaho summits in 2022. Group research and discussions led to a preliminary list of Idaho peaks potentially suitable for the project based on criteria such as geographic distribution, variability in geologic substrate, relatively straightforward accessibility, and lack of much if any previous plant collecting history. Team leaders/co-leaders then selected which peak they wanted to survey. To recruit team assistants we sent an announcement outlining the opportunity to participate in the project to the INPS membership and to several Idaho university/college instructors and herbaria directors who might have interested students. Pre-field work tasks included producing preliminary plant lists for each summit using in-

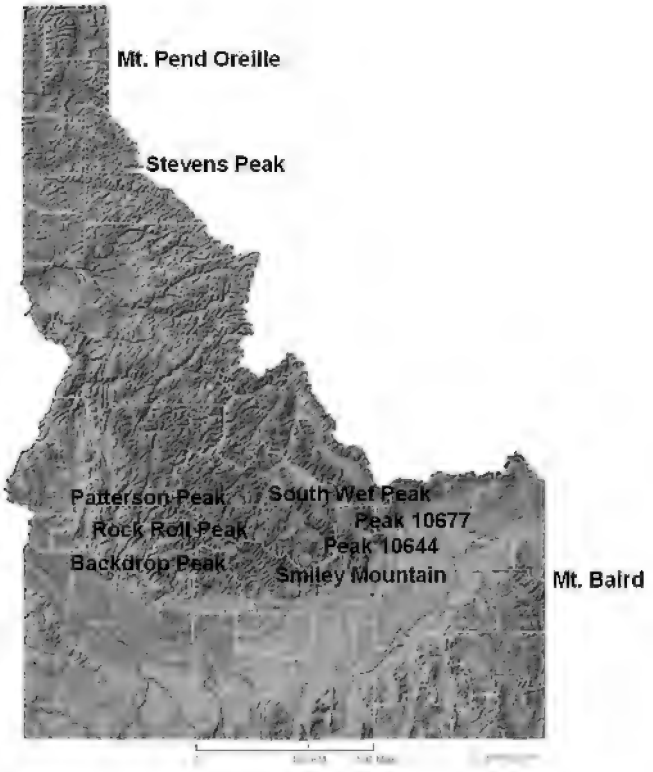


Figure 1. Location of Idaho 25 Peaks Project summits surveyed in 2022.

formation from the Consortium of Pacific Northwest Herbaria website, acquiring maps and access information, and acquiring U.S. Forest Service Region 1 and Region 4 plant collecting permits.

Our intent was to sample as much of the alpine zone for these selected peaks as possible. Upon arrival at a peak, team leaders used their best judgment to delineate boundaries for the summit survey area based on features of the topography, vegetation, substrate stability, and safety concerns. The survey area for each peak was documented as a polygon using GPS Tracks or by drawing a perimeter on an aerial image of the summit. Surveys were conducted by walking a series of loose transects or intuitive meanders, sampling all slope aspects and as many microhabitats in the survey area as possible. Surveys consisted of a thorough inventory of all vascular plant species found in the summit area using both specimen collections and field observations. Field observations minimized collecting well-documented, widespread/common species team leaders could confidently identify in the field, providing extra time to search for less common species over a larger area on the summit. We assigned each species on the peak to an abundance category and also noted its phenology, and on which aspects it occurred. The peak inventory protocol included collecting leaf tissue samples for a subset of vouchered species, and also one or more rock samples to help document the summit's geology. Notes recorded information about the summit, its vegetation, whitebark pine (*Pinus albicaulis*), and other points of interest such as pollinators and disturbances. At a minimum, we took photos of the summit survey area, general vegetation patterns, and the surrounding landscape. Some teams also took photographs of plant species found on the summit.

Teams sampled a total of 10 summits in 9 different mountain ranges during summer 2022 (Figure 1; Table 1). All except the two northern Idaho peaks exceeded 10,000 ft elevation. Plant diversity on summits ranged from 35-73 species (Table 1). A total of 308 voucher collections were made. Associated leaf tissue samples were collected for 206 (67%) plant collections. These were sent to Dr. Hannah Marx at the University of New Mexico for her ongoing morphological trait analyses and DNA analyses research for high elevation plant species. Summit survey areas varied in size from <1-36 acres. Voucher specimens collected at each peak are deposited at the Snake River Plains Herbarium (Boise State University), Stillinger Herbarium (University of Idaho) or Ray J. Davis Herbarium (Idaho State University). Overall, teams hiked a total of 73 round trip miles from trailheads or other starting points to the peak summits which were reached via day hikes except for a backpack trip to South Wet Peak. Summit ascents totaled approximately 25,000 ft of elevation gain.

Overall, we documented 238 distinct plant taxa on the 10 summits, including 181 forb, 36 graminoid, 15 shrub, and 6 tree species. *Antennaria microphylla* (white pussytoes) and *Polemonium viscosum* (sky pilot) occurred on 8 summits, the most of any species. *Achillea millefolium* (common yarrow), *Antennaria umbrinella* (umber pussytoes), *Astragalus kentrophyta* (thistle milkvetch), *Erigeron compositus* (cut-leaf daisy), *Hulsea algida* (alpine hulsea), *Oxyria digyna* (mountain sorrel), *Packera werneriifolia* (rock butterweed), *Juncus parryi* (Parry's rush), *Poa secunda* (Sandberg bluegrass), *Ribes montigenum* (alpine prickly currant), *Trisetum spicatum* (spike trisetum), and whitebark pine were the other species recorded on five or more summits. One-hundred forty species (59%) occurred on only one summit. *Carex* (sedge) contributed 11 species, the most of any genus, followed by *Erigeron* (fleabane) with 9 taxa, *Castilleja* (paintbrush), and *Eriogonum* (buckwheat) with 7 taxa, *Poa* (bluegrass) and *Penstemon* (beardstongue) with 6 taxa, and *Antennaria* (pussytoes), *Boechera* (rockcress), *Draba* (draba), and *Potentilla* (cinquefoil) with 5 species each. Summit species represented 38 plant families, the 3 largest being Asteraceae (aster family) with 52 taxa (22%), Poaceae (grass family) with 20 taxa (8%), and Brassicaceae (mustard family) with 18 taxa (7%). The project documented populations of 8 species on the Idaho Rare Plant List. This included one or more rare plant species on all summits. One of these rare plant species, whitebark pine, was recorded as very rare, rare,

Table 1. Idaho 25 Peaks Project summits surveyed in 2022.

Peak Name	Mountain Range	County	Elevation ft (m)	Plant Species
Backdrop Peak	Smoky	Blaine	10,099 (3078)	45
Mt. Baird	Snake River	Bonneville	10,025 (3056)	44
Mt. Pend Oreille	Cabinet	Boundary	6755 (2058)	35
Patterson Peak	White Cloud	Custer	10,872 (3314)	73
Peak 10644	White Knob	Custer	10,644 (3244)	49
Peak 10677	Lost River	Custer	10,677 (3254)	37
Rock Roll Peak	Boulder	Blaine	10,458 (3188)	65
Smiley Mountain	Pioneer	Custer	11,513 (3509)	43
South Wet Peak	Lost River	Custer	11,138 (3394)	35
Stevens Peak	Bitterroot	Shoshone	6838 (2084)	44

...Continued on Page 10

On approach to Peak 10644. Photo by Claire Parsons.

View south from summit of Peak 10644. Photo by Claire Parsons.

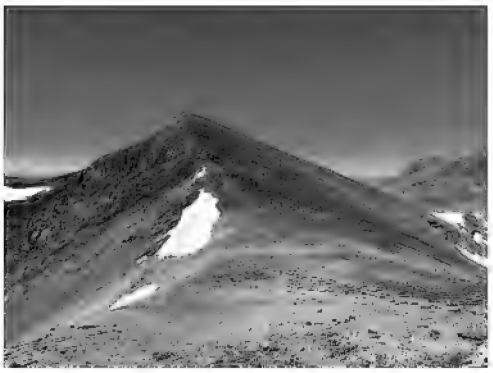
Peak 10677. Photo by Jessica Irwin.

Astragalus kentrophyta, South Wet Peak. Photo by Gary Hundt.

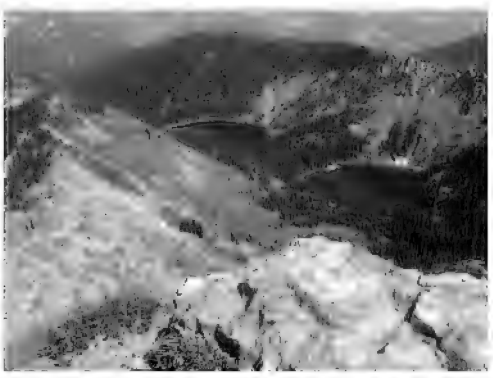
Cerastium beeringianum, South Wet Peak. Photo by Gary Hundt.

Hulsea algida, Rock Roll Peak. Photo by Don Mansfield.

SE ridge, Rock Roll Peak. Photo by Don Mansfield.



South Wet Peak summit. Photo by Bob Moseley.



View NE from Stevens Peak at Stevens Lakes. Photy by Derek Antonelli.

View SE from Patterson Peak. Photo by Don Mansfield.

Backdrop Peak 2022, Tao Huang collecting plants. Photo by Becky Reed.

or scattered on 7 summits. The summits contained a variety of geologic substrates, including examples of igneous, metamorphic, and sedimentary rocks ranging from Precambrian to Tertiary in age.

As an all-volunteer effort, the team leaders gratefully acknowledge the volunteers who assisted on the peak surveys: Emily Hintzman, Liz Martin, Jason Smith (Mt. Pend Oreille); John Harbuck, Darryl Steigemeirer, Bob Wilson (Stevens Peak); Paul Allen, Kristin Kaser, Linda Merigliano (Mt. Baird); Becky Reed, Tao Huang, Heather Johnson (Backdrop Peak); Brittni Brown, Claire Parsons, (Peak 10644); Kirk Halford, Sean Halford, Cara Halford, Riley Gibson, Laura Gibson, Ethan Ellsworth (Smiley Mountain); and Paul Allen, Gary Hundt, Kim Ragotzkie (South Wet Peak). We also thank INPS for contributing funds to the project in 2022 to reimburse volunteers for vehicle fuel expenses. •

Lifetime Membership

Nancy Miller Awarded INPS Lifetime Membership

By Penny Morgan, White Pine Chapter President

Nancy Miller was recently awarded a Lifetime Membership in the Idaho Native Plant Society. Our board voted unanimously to recognize Nancy for her leadership in both the White Pine Chapter and our state organization during her 34 years as a member. As INPS President Mike Mancuso said, "Nancy is one of the key volunteers INPS can depend on to get the 'behind the scenes' work done." Former INPS President Steve Love said she was the "go-to" person for her knowledge and commitment to INPS.

At the state level, Nancy served as past Secretary and current member 'at large' on the INPS State Board. She is instrumental in the state website. As Mike Mancuso said, "Simply put, INPS would be a less effective organization without its website, and the website would be less effective without Nancy's many contributions to it." Similarly, Nancy's writing and reviewing have contributed to many years of informative *Sage Notes*.

Reid and Nancy Miller. Photo by Bettie Hoff.

Five board members of our local White Pine Chapter nominated Nancy. She has served on almost all of our committees and chaired several of them. Nancy is the webmaster for the White Pine Chapter. Nancy has been instrumental in our native plant sale, now in its 13th year. Nancy has engaged many members as volunteers where we delight in learning together. Year after year, even during the pandemic, whether in-person, online, or both, Nancy has ably helped our plant sale be successful. This year we will sell almost 3,000 plants of more than 100 different species, many of which are grown and donated by members encouraged by Nancy. Wow. Through the sale, many people have found great joy from growing native plants in yards and conservation projects, thus adding diversity, inspiring beauty, and providing food and habitat to pollinators. Our native plant sale proceeds are used in local native plant conservation and education projects.

Nancy has been a strong supporter of conservation efforts for native plants and their communities, particularly when those efforts support pollinators and birds. She has established many native plants in an old field near her home. Though she does not have a botany background, Nancy has learned how to propagate and establish plants native to the endangered Palouse Prairie ecosystem. She often collects and shares seeds with people wanting to grow native plants in their yards. Her seeds and many ideas have contributed to the success of the Pleasant Hill Farms nursery that grows plants for local conservation. Nancy kindly shares her knowledge gained through active listening, trying things, and being curious. She is a keen observer. Many people and native plants benefit. She has mentored many of us.

We are grateful for Nancy's enthusiasm, kindness, and sage advice to help guide the INPS. Nancy's husband, Reid Miller, has been her stalwart knight and helpmate. Nancy and Reid have been delightful members making countless contributions to the Idaho Native Plant Society. As Steve Love said, "Nancy's exceptional service has actively contributed to the conservation of Idaho's native plants." Nancy enthusiastically supports native plants and the people who love them. •

Mary Conitz 1929-2022

Article and Photos by Nancy Miller, White Pine Chapter

Mary Conitz was a long-time member of the INPS White Pine Chapter. She passed away September 20, 2022, at the age of 93. She and her husband Merrill, who passed away in 2009, were early members of the chapter, joining within a few years of when the chapter formed. They regularly participated in chapter activities, events, and field trips. They enjoyed the company of other early members, many of whom were in forestry at UI or in various land management and research agencies. Merrill served as President in 1999 (with Mary's assistance) and on the White Pine Chapter Board in other capacities for several years.

Mary on the Elk River field trip. Photo by Nancy Miller.

Many of you who remember the Conitz family will have heard the story about how they met but it bears repeating. Although Mary was from the Midwest, her family had moved to Cheney where she graduated from high school. During her college years this young music major worked as a camp cook for the Forest Service in Northern Idaho, and it was at one of these camps she met Merrill, who was also working for the Forest Service in the white pine blister rust control program. Mary later related that she thoroughly enjoyed cooking for all those hungry workers and living in wild Idaho. Together Mary and Merrill enjoyed being in the woods and relishing what the natural world offered. After graduation and marriage, Merrill began work at UI and they built their first home on Ridge Road. Mary returned to her musical career, teaching music lessons and participating in many musical events. The lure of international adventure interested them, and they began a long odyssey of international work and travel interspersed with living and working in Moscow and its environs.

There were years in Kenya—working in Nairobi—introducing their children to the wildlife and national parks. Mary taught, directed musical theater for the school and played with the Nairobi Orchestra. From their many experiences in Africa, they would later share their knowledge of many trees and shrubs of East Africa with the chapter. This article is too brief to include some of their other adventures in Africa and volunteer activities in China.

Mary with the group on the Elk River Field Trip. Photo by Nancy Miller.

As they approached retirement, they decided to return to the Moscow area where they built their forest home near Deary (the 4th of 5 homes Merrill built during his lifetime); they planted a tree farm on previously farmed land. In 1999 they gave the chapter a tour of their forest home and the tree farm. Their daughter Margo relates that they especially enjoyed the forest area and managed it for conservation, and it was a special place where other family members could enjoy the woods of Idaho with them. She told of the many trails Merrill built to specific spots on the property where they knew special wildflowers could be found.

Mary was very involved in the music world of the area. She taught in schools near their Deary home and played with the Hog Heaven Big Band and the Washington-Idaho Symphony.

Mary and Marge Stage on the August 2009 INPS Freezeout field trip. Photo by Sarah Walker.

After Merrill's passing, Mary finished editing and publishing his novel, "The Wells of Belisa Kulal." She continued an active independent life, managing their properties, and walking and cycling with friends and family especially on the Latah Trail system. She continued to participate in chapter activities even through the COVID years. Sarah Walker had this remembrance: "Mary certainly did keep going. One dreary late winter day (years ago) I drove to an out-of-town access to the bike trail, near Troy, to find something skiable. There wasn't much snow left but some of us still wanted to slide around on our skis! That other "someone" was Mary. She was out there skiing too, I discovered. We had a good chat about women needing some daily time outside and taking ourselves out there to do just that." Janet Campbell said she learned an important winter outdoors precaution from Mary—always be wary of "tree wells" around the bases of trees under the snow. It's possible Mary might

have stepped in one while cross country skiing or snowshoeing and damaged a leg. Janet (as well as others) admired how Mary just kept going over the years, attending field trips and talks, valuing her independence, and participating in life to the fullest—always with a friendly smile and concern for others.

Reid and I have fond memories of dancing to the Hog Heaven Band with Mary playing with the group—the last time was not that long ago. We also had the pleasure of playing tennis with our dedicated group of players, including Merrill before he passed away. •

Volunteer Recognition

Thank You to Paul Shaffer

By Michael Mancuso, INPS President and
Karie Pappani, Pahove Chapter President

Photo courtesy Paul Shaffer.

The Idaho Native Plant Society is fortunate to have many volunteers dedicated to its success. One of these people is long-time Pahove Chapter member Paul Shaffer. Among his many contributions to INPS, Paul has been generous in lending his IT expertise for over 20 years. With Paul's help, INPS was able to build, and in subsequent years maintain, a well-regarded and user-friendly website, including the capacity for members to renew their INPS membership and make donations. Paul did the research and acquired the software INPS uses to keep track of membership and other organizational tasks.

Paul was instrumental in initiating Pahove's Annual Native Plant Sale. This event continues to be a resounding success and important way for INPS to connect with the larger Treasure Valley area community. Paul's work for INPS flies under the radar and goes unrecognized by most members. This made it especially gratifying to publicly recognize and acknowledge Paul at the April Pahove Chapter meeting. Paul received a gift card as a small token of our appreciation for his many years of service to INPS.

We would also like to acknowledge Paul's contributions to the design and development of the *Treasures of the Boise Front* website (https://boisefrontnature.com/). Barbara Ertter's inspiration for this website came from her goal of increasing public appreciation for the flora of the Boise Front and making it available online. Thank you, Paul! •

Barbara Ertter discussing the rare plant, Allium aaseae, during our RPC 2023 field trip. Photo by Lynn Kinter.

CALYPSO CHAPTER

When: The next chapter meeting will be October 4, 2023 at 7:00 pm. Chapter meetings are held on the first Wednesday evenings of March, April, May, and October. The public is invited to all chapter activities, which may change, so watch chapter emails for updates.

Where: Meeting are held in the Wildlife Building, North Idaho Fairgrounds, Coeur d'Alene.

Contact: For more information about Calypso Chapter activities, contact Derek Antonelli: ds.ca.antonelli@gmail.com, (208) 691-1070.

Past Events

May 20: Spring Plant Walk.

Upcoming Events

June 10: Summer Plant Walk, English Point Trails. Joint activity with Panhandle Back Country Horsemen.

June 30 to July 3: INPS Annual Campout and Meeting, Stanley.

July 8: Summer Plant Walk, UI Experimental Forest. Joint activity with the White Pine Chapter.

July 13 to 17: Idaho Botanical Foray, Cabinet Mountains.

August 12: Mountain Plant Hike, Benard Peak to Farragut State Park.

October 4: Calypso Chapter meeting. The presentation topic for this meeting has not been determined yet. Please submit topic suggestions.

LOASA CHAPTER

When: Meetings are held third Thursday of each month at 7:00 p.m.

Where: Taylor Building, Room 247, College of Southern Idaho, Twin Falls.

Contact: Bill Bridges, bridgesbill34@yahoo.com

PAHOVE CHAPTER

When: Meetings are held the second Tuesday of each month from October–April starting at 7:00 pm. Times, dates, and topics are tentative. Current information will be sent to members via email. Annoucements are also posted on the Pahove Chapter page of the INPS website: https://idahonativeplants.org/pahove/

Where: Chapter presentations currently offer hybrid viewing formats, both in-person at MK Nature Center and a Zoom link for at-home enjoyment.

Contact: For more information about Pahove Chapter activities visit the website: www.idahonativeplants.org or email Karie Pappani at pahove.chapter.president@gmail.com.

Past Events

Chapter presentations for the 2022/2023 season ended with a flurry of activities this spring including our Annual Native Plant Sale, Adopt A Plot, Boise Metro Area City Nature Challenge, Wildflower + Show, Orton Botanical Garden Tour, Friends of Military Reserve Pahove Chapter Demonstration Table, and an End of the Season Social Garden Party hosted by Russ and Janet Buschert. Thank you so much to our board members who manage and coordinate these events:

- Annual Native Plant Sale: Susan Ziebarth, Vicki Henderson, and Kirsten Severud
- Adopt A Plot: Karie Pappani, Kirsten Severud, and Ray Corbin
- Wildflower + Show: Barbara Ertter
- Orton Botanical Tour: Caroline Morris, Ann DeBolt, Vicki Henderson, and Susan Ziebarth
- Friends of Military Reserve Tabling Event: Barbara Ertter
- End of the Season Social-Garden Party: Peggy Faith. Special thanks to Russ and Janet Buschert for opening their lovely home and native garden to us to enjoy.

And a HUGE thanks to all of the volunteers who make these events possible! We couldn't do it without each and every one of YOU. We appreciate your help! And thank you to all of our MEMBERS who support our chapter. You are the best!

Upcoming Events

We will continue to keep you updated on botanical news and activities happening in our area over the summer. However, we do take a break from presentations from June-September. See you for those in the fall!

SAWABI CHAPTER

When: Board meetings are held at least quarterly and will be announced. An autumn potluck is also planned.

Where: Winter programs are presented in the North Fork room of the ISU Student Union Building in Pocatello. Field trips generally car-pool from the bison statue in front of the ISU Museum of Natural History.

Contact: Paul Allen at pokyallen@hotmail.com, 208-241-5265

Past Events

May 1: Annual meeting for the Sawabi Chapter. Officers were elected and we discussed this season's plant walks.

Upcoming Events

Plant walks will be announced via email for most Saturdays and some Monday evenings throughout the spring and early summer.

UPPER SNAKE CHAPTER (INACTIVE)

Contact: Kristin Kaser, kaser.kristin@gmail.com

WHITE PINE CHAPTER

When: Meetings are typically held the third Thursday of the month, September through April. Current information is posted on our chapter webpage: https://www.whitepineinps.org/WPschedule.html

Where: We are currently offering hybrid meetings. The in-person meetings are held at the 1912 Center in Moscow with a Zoom link for virtual attendance.

Contact: For more information about White Pine Chapter activities, contact us at INPS, White Pine Chapter, PO Box 8481, Moscow, ID 83843 or whitepine.chapter@gmail.com. Visit the chapter website for upcoming event information: https://www.whitepineinps.org/

Past Events

May 11-13: Annual Native Plant Sale was held at the Latah County Fairgrounds Depot Building. This sale consisted of an online sale May 11-12 followed by an in-person sale on May 13.

May 21: Field trip to Mary M. McCroskey State Park was led by Pam Brunsfeld, retired UI Systematic Botany Instructor and UI Stillinger Herbarium curator.

Upcoming Events

Dates TBD: Tours of native plants in local gardens and yards and other early spring fieldtrips have been postponed from their originally scheduled dates in early May. We are eagerly awaiting the arrival of spring this year! Check our event calendar for the latest information on rescheduling: https://www.whitepineinps.org/WPschedule.html

WOOD RIVER CHAPTER

When: Typically we have talks in the cold months and walks in the warm ones. Non-members are welcome. Please see our website or email newsletter for information on all programs.

Where: Field trip and talk locations and details will be included with the description, posted online and emailed to members and other interested parties.

Contact: For more information about Wood River Chapter activities: email: woodriverinps@gmail.com; website: www.woodriverinps.wixsite.com/wrinps; phone: Mary (559) 696-9953; to subscribe to the newsletter: email us.

Upcoming Events

June 3: Native Plant Sale. We're partnering with the Hunger Coalition on this event. Paid up Members of INPS will be able to have early entry and first choice of the available material. Mindy Rider of the Hunger Coalition has grown these native species and the sale benefits the Hunger Coalition. Regular sale hours begin at 10 am. Members only sale runs from 9 am-10 am at the Hunger Coalition, 110 Honeysuckle, Bellevue ID.

June 10: Camas Prairie Trip to Centennial Marsh. We'll try to shoot for the best bloom of the lovely camas lily, Camassia quamash. It should also be a great day for viewing water and shore birds and maybe even nesting sandhill cranes. Watch this site and the newspaper for updates but with all the snow, we think the bloom will be later than usual. Meet at Timmerman Hill Rest Stop by 8:45am MT to leave at 9am. Rated Easy, mostly driving.

June 21: Croy Canyon Solstice Let's do an evening walk on this longest day of the year. Meet for carpooling at Hailey Park & Ride at 6:15 pm to leave at 6:30 pm MT. We'll head out Croy and do one of the trails, depending on the bloom. Expect to see lots of variety and discuss plant adaptations for living in such a dry environment. Rated Medium for difficulty.

July: You'll have to come to the State Meeting if you want plant hikes in July!

August 16: Hailey Alley Walk. Our popular alley exploration walk is back. Explore the alleyways of Hailey with members of the Wood River Chapter. You may be surprised at the variety of plants we will see. We can talk about garden escapees, invasive plants, Idaho natives, trees and more. This "hike" will be around a mile but rated Easy although the terrain can be a little uneven. Allow 2 hours. Meet outside Town Center West (River St X Croy St, Hailey) at 6:15 pm MT, ready for head out walking at 6:30 pm.

September 16: Noxious Weeds TBA. There are, unfortunately, plenty of examples of these plants in our valley. Learn why they are so successful, why they are unwelcome and how to control them. We will also talk about the difference in a weed and a noxious weed.

October TBA: Members Only Hike. We are still scheming on this one, but it will likely involve Ponderosa Pines, just as a teaser. More details will be forthcoming. •

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Idaho Native Plant Society Membership Form

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□ Loasa (Twin Falls)
□ Pahove (Boise)
□ Sawabi (Pocatello)
□ Upper Snake (Idaho Falls) - *Inactive*
□ White Pine (Moscow)
□ Wood River (Ketchum/Sun Valley)
□ No Chapter

Membership Level:
□ Student $10
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□ Individual $20
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□ Household-Senior $25
□ Sustaining $40
□ Patron $100+

Please indicate if your membership is: □ New □ Renewal
I would prefer to receive ***Sage Notes***: □ Print □ Electronic □ Both

Send completed form and full remittance to:
Idaho Native Plant Society, P.O. Box 9451, Boise, ID 83707

Memberships run calendar year. New memberships enrolled after June 1 include the following year. ***Renew or join online:*** *https://idahonativeplants.org/membership/*

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Vol. 45 No. 3 September 2023

Sage Notes

Newsletter of the Idaho Native Plant Society • Promoting Interest in Idaho's Native Flora

What Good Are Herbaria?

By Peter Lesica, Friends of the University of Montana Herbarium, Newsletter Editor

Herbaria have been around for centuries. They are often considered museums, but they lack things that the average person considers interesting. There are no stuffed animals, no awe-inspiring artwork and no interesting hands-on learning machines. Most people think of herbaria (if they think of them at all) as a work place for eccentric plant taxonomists. But these days there is a lot going on.

Herbaria have historically served several functions. The majority of visitors to the University of Montana Herbarium (MONTU) are interested in using the collections to verify specimens they collected during their field work. Perhaps the most important use of the collections in the past has been for taxonomic studies where taxonomists request loans in order to examine examples of Montana plants first-hand. A recent history of MONTU specimen loans can be found by examining the "Loans for Research" section in past newsletters (umt.edu). Recent loans have included specimens of *Sphagnum*, *Stellaria* and *Tofieldia*. Herbarium specimens also provide data on plant geographic distributions such as those presented in local and regional floras[9,16]. These functions have been greatly facilitated by the recent drive to database and photograph herbarium specimens, allowing researchers to acquire data on location, habitat and gross morphology from across North America and the world by simply going online. MONTU received a National Science Foundation grant in 2005 to digitize our specimens.

More recently, herbarium collections have provided data for studies in several other fields of diverse biological research. The Montana Natural Heritage Program employs herbarium data to conduct niche modelling where climate, soil and geographic variables are used to determine potentially unknown locations for rare and endangered plants. Doug Soltis used herbarium data to elucidate hotspots of plant endemism in Florida[36]. A different endangered plant study conducted across eastern North America compared the size of a valuable medicinal plant, American ginseng (*Panax quinquefolius*) over the course of almost two centuries. Ginseng plants collected from northern populations did not decline in size, while plants from midwestern, Appalachian and southern states showed sharp declines in stature. Human harvest could explain the rapid change in ginseng stature[21].

Herbarium collections have also proved useful in studies on the evolution of morphological traits. Australian researchers used over 1900 herbarium specimens to demonstrate that morphological traits of introduced plants have shown significant

... *Continued on Page 4*

In this issue:

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Letter from the President

This is really one big thank you letter. The Sawtooth Mountains provided a majestic backdrop for this year's INPS Annual Meeting, hosted by the Wood River Chapter. Sharing outstanding presentations, a diverse set of field trips, and warm comradery made for an educational and fun event. With a little over 100 participants, including members from every INPS Chapter, it was the best attended Annual Meeting ever. This success did not materialize out of pixie dust. It took more than a year of an incredible amount of planning, coordination, and hard work by Wood River Chapter member volunteers to make the Annual Meeting such a great success. Lisa Horton led the team of Jay Dorr, Patti Dorr, Pam Ephgrave, Renoir Finizio, Kristin Fletcher, Diane James, Allison Kennedy, Cindy Lunte, Mary McClanahan, Kathy Noble, Rose Rumball-Petre, Linda Ries, Paul Ries, Deanna Schrell, Cindy Shearstone, Ted Stout, Kimber Traue, Ann Hastings, Mark Trentin, Poo Wright-Pulliam, and Susan Woodruff. Exemplary teamwork allowed this team of volunteers to overcome several special challenges to having the Annual Meeting in such a popular place as the Sawtooth Valley. My heartfelt thanks to every one of these volunteers. Field trips included botany in meadow, forest, wetland, and shrub-steppe habitats; from valley floor to subalpine elevations. Some trips included elements of geology, history, or forest resource management. A sincere thank you to all field trip leaders, Paul Allen, Steve Botti, Steve Bunting, Beth Corbin, Jay Dorr, Kristin Fletcher, Robin Garwood, Lynn Kinter, Paul Link, Don Mansfield, Mary McClanahan, Penny Morgan, Paul Ries, John Shelly, Eva Strand, Tim Frazier, Matt Filbert and Poo Wright-Pulliam.

An announcement about the new INPS Scholarship Program was one of several highlights at the well-attended dinner held at the Stanley Community Center on the second night of the Annual Meeting. Penny Morgan summarized the INPS Scholarship Program and acknowledged fellow Scholarship Committee members who took the concept of a scholarship and made it a reality. Paul Ries followed by telling us about the two recipients being awarded the first INPS scholarships. Hearing their stories gave the scholarship a personal touch and reminded us all that education will always be a key part of the INPS mission. My sincere gratitude to INPS Scholarship Committee members Lindsey Barber (Calypso), Bill Bridges (Loasa), Liz Martin (White Pine), Penny Morgan (White Pine), Don Morishita (Loasa), and Paul Ries (Wood River). You all did an amazing job and INPS now has a framework in place to award scholarships annually.

For better or worse I was re-elected INPS President during the Business Meeting part of the Annual Meeting. This outcome means you will have to put up with me for another two-year term. The INPS Secretary was another Board position up for election this year. Mary McClanahan (Wood River Chapter) graciously agreed to place her name in the hat and was elected the new INPS Secretary. Thank you Mary. Mary replaces Janet Bala, who served as the INPS Secretary starting in 2015. Before this position, Janet was the ERIG Committee Chairperson and also the INPS Vice-President for one term in 2009-2010. A long-time Sawabi Chapter member, Janet has served as this chapter's President, Vice-president, and Treasurer over the years. It is easy to see that Janet has served INPS for many years and she looks forward to continuing this service in new capacities. I leaned heavily on Janet to navigate my first term as INPS President. I cannot thank Janet enough for all her time and effort on behalf of INPS. I look forward to working with her in the future on other INPS endeavors.

Michael Mancuso, INPS President

INPS Instagram Hits 1,000 Followers!

By Anna Lindquist, Former Instagram Manager

The INPS Instagram continues to grow, reaching 1,000 followers this August. That's 1,000 plant loving people, organizations, and businesses! Knowing there are that many plant enthusiasts out there gives me hope and it's why INPS started the Instagram account—to share knowledge and love of Idaho's plants with a diverse audience.

INPS is lucky to have several enthusiastic and Instagram savvy members who have recently taken over management of the INPS account: Peggy Faith, Sarah Hill, Daniel Murphy, and Kristy Snyder. Thank you! However, social media content curation takes time and we'd like to encourage more folks to participate. So, if you're like me and there are more photos of plants on your phone than anything else, share them with us! We know our members have some great plant photos and stories to tell and hope that the INPS Instagram can be representative not only of the adventures of these Pahove Chapter members, but also of the incredible plant diversity around the state and within other chapters.

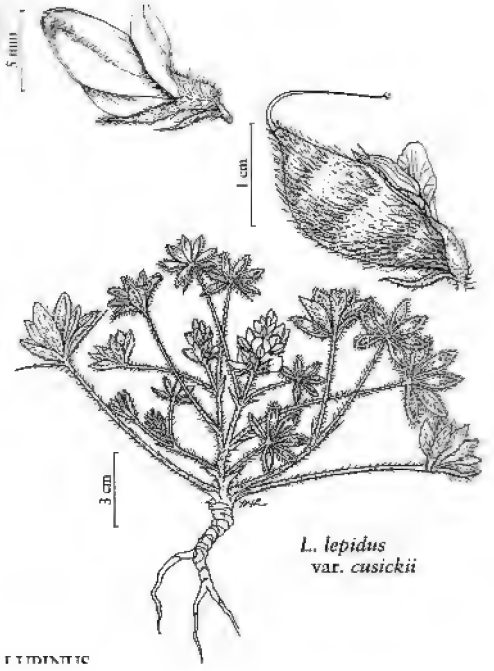
If you'd like to contribute photos to the INPS Instagram, send an email to inpssocialmedia@gmail.com. Please include your name for photo credit and a description of the photo content (i.e. the name of the plants, people, and/or places in the photo). If you have a specific caption in mind for the photo, share that, too! We welcome photos of plants, landscapes, insects and wildlife enjoying native plants, and plant people. Make sure to follow, like, and share the INPS Instagram and cheers to the next 1,000 plant lovers! •

INPS Sponsors Botanical Illustration in Flora of North America Vol. 11

By Karie Pappani, Pahove Chapter

The State INPS and White Pine Chapter sponsored an illustration of *Lupinus lepidus* var. *cusickii* in the *Flora of North America Vol. 11* in 2018. In April 2023, we received an art print of the species and a thank you letter for our sponsorship of this illustration, mentioning that it has been a long time in the making and a massive undertaking. This volume can be pre-ordered from Oxford University Press (www.oup.com).

Opportunity still exists to sponsor an illustration as part of the Flora project. The Flora of North America Association (FNAA) brings the scientific knowledge of many botanists together in what will be 30 volumes that contain botanical illustrations drawn by professional artists. •



Flora of North America

April 24, 2023

Idaho Native Plant Society
PO Box 9451,
Boise, Idaho 83707

Dear Idaho Native Plant Society friends,

Thank you so much for sponsoring the illustration of *Lupinus lepidus* var. *cusickii*, by Yevonn Wilson-Ramsey in Flora of North America Volume 11. This volume has been a long time in the making, truly a massive undertaking. Part 1 is 541 pages, and Part 2 is 567 pages, not including front matter. It covers 153 genera and 1245 species, the work of 67 authors, more than 90 reviewers, and multiple editors. Both parts of volume 11 will be sold together as a set, and the pagination is continuous between the two parts. The Literature Cited and the Index are in part 2. The volume is currently listed for preordering at $95.00 for both parts, available from Oxford University Press (www.oup.com).

I'm enclosing a high-resolution print of the art on archival paper. When we first started the sponsorship program, I said a digital file would be sent on a CD as well. Often the CDs did not work correctly and in any event many computers no longer take them, so I have discontinued that. If you would like a digital copy, let me know and I will email it to you.

I'm happy to tell you that Volume 14, which contains Gentianaceae, Apocynaceae, Convolvulaceae, and Solanaceae, is in press, expected to be published this October. Volume 13 is nearly ready to go to press, but there is still time to sponsor art in it—I would need to know by May 8 if you want to sponsor anything (for it to be included in the print volume). We are inviting sponsors for the last volumes, 15, 16, 18, and 29. Lists for those are enclosed, with the list of volumes published. Sponsoring FNA artwork makes it possible for us to pay the technical editors working on these final volumes.

We are very grateful for your support.

Best wishes,

Nancy

Nancy R. Morin

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Herbaria *continued from Page 1...*

change during the last 150 years[4]. The results suggest that rapid evolution in introduced plant species could be common. Similarly, herbarium specimens from the last 140 years were used to understand the evolution of common ragweed (*Ambrosia artemisiifolia*) as it became more invasive under the influence of human disturbance in eastern North America[18]. Researchers in Belgium used molecular genetics methods to examine herbarium specimens of European tumble mustard (*Sisymbrium austriacum*) and found strong divergence in flowering time genes over the past 100 years, indicating that rapid genetic adaptation preceded the spread of this species and possibly assisted in overcoming environmental constraints[38]. Grass taxonomists used molecular markers from herbarium specimens to elucidate the patterns of speciation in the bluestem grasses[20]. Researchers from Canada and Europe used herbarium specimens from the past two centuries to determine that modern farming methods have enhanced the evolution and speed of invasion in the agricultural weed waterhemp (*Amaranthus tuberculatus*)[14].

The most common use of herbarium specimens in this age of molecular genetics has been exploration of human-caused global changes. There have been numerous studies of changes in the timing of annual plant developmental stages (phenology). A recent study showed that herbarium records did provide accurate estimates of the mean flowering date over almost two centuries[5]. Numerous studies of flowering phenology based on herbarium specimens have been employed to examine the effects of climate change[25,27,33]. In 2021 the California Botanical Society published an entire issue of their journal, Madroño (Vo. 68, No.4) on plant phenology. More than one-third of the articles used herbarium data to determine how climate change was altering flowering date both within and among species and how these changes might affect plant persistence[19,28,29,37,42]. Based on herbarium specimens, flowering date of rare species in the Central Rocky Mountains has become 42 days earlier since the late 1800s, with plants in sagebrush basins showing the strongest accelerations. High winter temperatures were associated with the acceleration of phenology in low elevation sagebrush habitats, whereas high spring temperatures explained accelerated phenology in the high elevation alpine habitat[26]. Similarly across New England, the mean leaf-out dates across all species and sites were circa one half day earlier per decade[7].

Herbarium specimens can also be used to document temporal changes in plant morphology. Researchers in French Guiana analyzed herbarium specimens of the rainforest species *Humiria balsamifera* that date as far back as 1788 and showed that as atmospheric carbon dioxide levels increased with industrialization, plants responded by increasing photosynthetic activity and using more water[3]. Herbarium specimens of 42 species across three continents documented a response in floral pigmentation to anthropogenic climatic change, suggesting that global change may alter pollination through its impact on floral color, with repercussions for plant reproductive fitness[13]. Researchers in Kansas used 13 decades of foliar isotopes from herbarium specimens to find that nitrogen availability has declined in spite of anthropogenic increases in deposition. These results suggest that declines are driven by increased ecosystem N storage as a result of increased atmospheric CO2[22].

Long-term data from herbarium specimens can provide information to resource managers, helping to prioritize needs, make effective management decisions, and develop targeted prevention[2]. Researchers in Indianapolis, Indiana compared pre-1940 herbarium records with their current flora. They found a 2.4 species/year rate of decline for native species with a 1.4 exotic species/year increase over the past 70 years in Indianapolis[6]. Invasion researchers used herbarium specimens to determine whether exotic species exhibited morphological changes following their invasion into the United Kingdom. They found that trait changes occurred early in their invasion and these changes were still occurring one to two centuries after their introduction. They suggest that this information provides important clues for their appropriate management[8].

Pressed plants, especially mosses, can often act as storage sites for atmospheric pollutants. Spanish researchers found that mineral concentrations in north and east regions of Spain have substantially changed throughout the twentieth century[32]. Concentrations of nitrogen as well as phosphorus and sulphur have increased in the last decades[31], and atmospheric CO2 concentration has increased by 25% over preindustrial levels[30]. Over the past century herbarium moss specimens showed a strong trend of increasing foliar nitrogen content in South Africa[40]. On the bright side, over the past century, lead has declined in both northern England[35] and Rhode Island[34].

Herbarium specimens provide information on the presence of and susceptibility to insect pests and disease. For example, researchers from across the United States examined herbarium specimens to determine that the lengthening growing seasons are resulting in more extensive insect damage[24]. European researchers studying the horse-chestnut leaf-mining moth used amplified nuclear and mitochondrial DNA fragments from larvae pressed within leaves of herbarium samples collected across Eu-

rope from the past 150 years. They determined that this highly invasive moth had a Balkan origin and set back its history in Europe by more than a century[15]. Climate scientists in Raleigh, North Carolina used historical specimens to find that an herbivorous scale insect has increased in the hottest parts of the city and during the hottest years in nearby forests[41]. Researchers from the University of Virginia and Amherst College examined thousands of herbarium specimens to determine the range of anther-smut in the eastern United States. The disease occurred exclusively on perennial plants, and incidence in *Silene virginica* and *S. caroliniana* increased significantly over the past century and was higher in marginal populations[1,12]. Herbarium specimens of infected plants provide an historical record of both the geographic distribution and genetic diversity of citrus bacterial canker. An exact match of pathogen genotypes from Japan and Florida demonstrated that Japan was the source of the original outbreak of the canker in Florida in 1911[17].

The above examples of recent research using herbaria are far from exhaustive. Many more examples can be found in recent review articles[10,11,39], and many uses of herbarium specimens are just beginning to happen[23]. So next time you walk into the University of Montana Herbarium, think of it as a time capsule for plant biology. •

This article first appeared in the Friends of the UM Herbarium 2023 newsletter (https://www.umt.edu/herbarium/documents/newsletters/2023-foh-newsletter.pdf).

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2023 INPS Annual Meeting Summary

By Kristin Fletcher, Wood River Chapter President

Each year the INPS Annual Meeting and Campout attracts members and friends to explore an area of our state. This year, over 100 folks participated in the 2023 "Heart of Idaho" Campout hosted by the Wood River Chapter based at Sunny Gulch Campground in Central Idaho near Stanley.

We were delighted to be your hosts and share the beauty and diversity of all Central Idaho has to offer. The weather cooperated magnificently and the flora was simply outstanding. Who's ever seen meadows of stonecrop before?!

Special thanks to those of you from other chapters who agreed to lead field trips. You were awesome and your expertise added so much to everyone's experiences. Our small chapter located far from universities and colleges simply couldn't have done it without you. Thank you!

Ross Fork Fire hike participants. Photo by Robie Wilson Litchfield.

Fabulous evening presenters included Tim Frazier who took us into deep space through his amazing telescopes and introduced participants to a month-old supernova despite a bright moon. Dr. Paul Link, emeritus geology professor from Idaho State University, introduced us to the fascinating and mind bogglingly complex geology of Central Idaho. Steve Botti, Mayor of Stanley and creator of the gorgeous *Illustrated Guide to the Flora of Yosemite National Park*, walked us through the complexities of his newest project, a top-notch local taxonomy for the Sawtooth National Recreation Area. A sidenote: Steve's looking for a botanical illustrator, sjbotti@gmail.com.

Hats off to the amazing planning committee, some dozen strong, so capably led by Lisa Horton. You folks were beyond awesome!!

Last, but not least, special thanks to participants who graciously adapted to the paucity of group campsites

Malm Gulch. Photo by Sarah Walker.

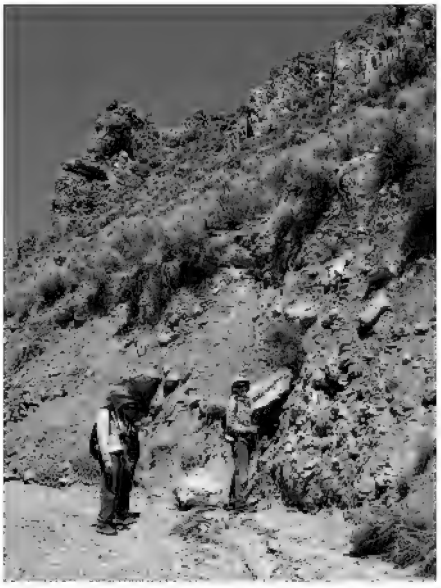
available in the Sawtooth Valley with good humor and carpooling. We reserved the only 3 group sites in the Valley, realizing it would mean extra driving and inconveniences, but, hopefully, resulted in new friendships!

Plant lists, including Steve Botti's draft Asteraceae key, can be found at the Wood River Chapter website https://woodriverinps.wixsite.com/wrinps/about-4. Email any updates or changes to woodriverinps@gmail.com.

The Calypso Chapter will host next year's annual meeting and campout near Sandpoint in gorgeous North Idaho. Stay tuned for details! •

Prickly pear cactus, Malm Gulch. Photo by Kristin Fletcher.

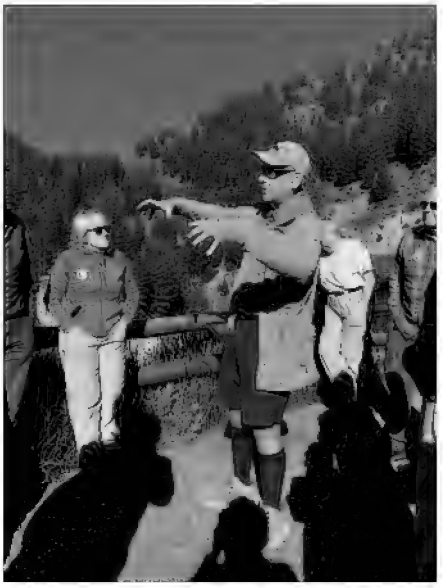
Pygmy bitterroot. Photo by Deanna Schrell.



Steve and Monaquita Love and Sarah Walker in Malm Gulch. Photo by Kristin Fletcher.

View from Sunny Gulch Campground. Photo by Lisa Horton.

Stonecrop. Photo by Sarah Walker.



Paul Link. Photo by Sarah Walker.

Wildfire Sapsucker holes. Photo by Kristin Fletcher.

Wildfire ecologist Penny Morgan and Ketchum District Ranger Matt Filbert. Photo by Kristin Fletcher.

INPS Annual Meeting Elk Meadow Field Trip

By Michael Mancuso, INPS President

A series of peaks exceeding 9000 feet elevation form the headwaters for Elk Creek in the Sawtooth National Recreation Area. The gradient for Elk Creek flattens and its valley widens considerably approximately 5 miles downstream of these headwater peaks. This change in topography is the setting for Elk Meadow, a large wetland complex that extends nearly 2.5 miles. The lower end of this meadow complex was the destination for one of the July 2nd field trip options during the INPS Annual Meeting. Reaching the meadow required a 2.5 mile hike from the Elk Meadow trailhead, itself located approximately 8 miles northwest of Stanley.

Before reaching the meadow, the trail passed through lodgepole pine-dominated forest habitat. In many places, trees near the trail were relatively short and small diameter, indicative of a younger forest stand. However, taller, larger diameter trees occurred in other sections. Whortleberry (*Vaccinium scoparium)* was probably the most consistently common forest understory plant species along the trail. Unfortunately, it was still too early in the summer to indulge in this species' delicious berries. The flowers of prairie lupine (*Lupinus lepidus*) provided a sweet fragrance wherever patches of this species occurred. In several places, we could smell this species before seeing it. One consequence of the wet spring/early summer was an abundance of several tiny annual plant species no more than an inch or two tall, such as blue-eyed Mary (*Collinsia parviflora*), annual phlox (*Microsteris gracilis*), and closeleaf knotweed (*Polygonum polygaloides*). It was eye-opening to some field trip participants that flowers could be so small. At one point we stopped at several dead lodgepole pine to look for telltale insect galleries under the bark, verifying mountain pine beetle to be the culprit of the tree's demise. Encountering several different mushrooms along the trail provided an opportunity to discuss the importance of mycorrhizae fungi in forest ecosystems. After finding a few small whitebark pine (*Pinus albicaulis*) trees we discussed white pine blister rust, a serious introduced fungal pathogen to five-needle pines in North America. We talked about fungi in a different context after coming across a large patch of *Cladonia* lichen growing on soil in a shaded area right along the trail.

Within sight of Elk Meadow we stopped for lunch to take advantage of the last patch of shade before entering open meadow habitat. The meadow contained many species not seen earlier on our hike. A few examples included several sedges (*Carex* spp.), several willows (*Salix* spp.), white bog orchid (*Platanthera dilatata*), our only orchid for the day, western polemonium (*Polemonium occidentale*), and primrose monkeyflower (*Erythranthe primuloides*). We did not try to identify the several moss species present. Crista O'Conner kept a running tally of the plant species we saw during the field trip. By the time we returned to the trailhead, the list numbered 95 species in 31 different plant families (Table 1). It's a good day when everyone learns a few new plants. Field trip participants included Patti Dorr, Don Essig, Peggy Faith, Samuel Flynn, Valdon Hancock, Mike Mancuso, Janelle Nelson, Crista O'Conner, Deanna Schrell, Mark Trentin, Carol Wade, and Mike Wade. •

Elk Meadow field trip participants. Photo by Michael Mancuso.

Table 1. *Plant list (Scientific Name, Common Name) for Elk Meadow field trip, July 2, 2023. Compiled by Crista O'Conner with assistance from other field trip participants. * = non-native*

Apiaceae (Parsley family)	
Ligusticum tenuifolium	slenderleaf lovage
Asteraceae (Sunflower family)	
Agoseris aurantiaca	orange agoseris
Agoseris glauca	short-beaked agoseris
Antennaria corymbosa	flattop pussytoes
Antennaria microphylla	white pussytoes
Arnica cordifolia	heartleaf arnica
Artemisia tridentata ssp. *vaseyana*	mountain big sagebrush
Cirsium scariosum	elk thistle
Erigeron glacialis	glacier fleabane
Nothocalais nigrescens	speckled false dandelion
Packera streptanthifolia	cleftleaf groundsel
Senecio integerrimus	western groundsel
Senecio triangularis	arrowleaf groundsel
Stenotus lanuginosus	wooly goldenweed
Taraxacum officinale *	common dandelion
Wyethia amplexicaulis	white mule's-ears
Betulaceae (Birch family)	
Betula glandulosa	bog birch
Boraginaceae (Borage family)	
Mertensia sp.	bluebells
Plagiobothrys sp.	popcorn-flower
Brassicaceae (Mustard family)	
Rorippa sp.	yellowcress
Caryophyllaceae (Carnation family)	
Eremogone congesta	ballhead sandwort
Spergularia rubra *	red sandspurry
Caprifoliaceae	
Lonicera involucrata	black twin-berry
Lonicera utahensis	Utah honeysuckle
Cupressaceae (Cypress family)	
Juniperus communis	common juniper
Cyperaceae (Sedge family)	
Carex geyeri	elk sedge
Carex lenticularis	shore sedge
Carex sp.	at least 2 other species
Ericaceae (Heath family)	
Vaccinium scoparium	whortleberry
Vaccinium uliginosum ssp. *occidentale*	bog huckleberry
Fabaceae (Pea family)	
Lupinus lepidus	prairie lupine
Lupinus sericeus	silky lupine
Trifolium longipes	long-stalked clover
Grossulariaceae (Currant family)	
Ribes cereum	wax currant
Ribes lacustre	swamp gooseberry
Ribes viscosissimum	sticky currant
Hydrophyllaceae (Waterleaf family)	
Nemophilia breviflora	Great Basin nemophilia
Phacelia idahoensis	Idaho phacelia
Juncaceae (Rush family)	
Juncus balticus	Baltic rush
Juncus sp.	at least 2 other rush species
Luzula sp.	woodrush
Montiaceae (Miner's lettuce family)	
Calyptridium umbellatum	pussypaws
Montia chamisso	water montia
Onagraceae (Evening-primrose family)	
Epilobium ciliatum	common willow-herb
Epilobium glandulosum	glandular willow-herb
Taraxia subacaulis	long-leaf goldeneggs
Orchidaceae (Orchid family)	
Platanthera dilatata	white bog orchid
Orobanchaceae (Broomrape family)	
Castilleja cusickii	Cusick's paintbrush
Castilleja gracillima	slender paintbrush
Castilleja miniata	scarlet paintbrush
Pedicularis bracteosa	bracted lousewort
Phrymaceae (Lopseed family)	
Erythranthe primuloides	primrose monkeyflower
Pinaceae (Pine family)	
Abies lasiocarpa	subalpine fir
Pinus albicaulis	whitebark pine
Pinus contorta	lodgepole pine
Plantaginaceae (Plantago family)	
Collinsia parviflora	blue-eyed Mary
Penstemon globosus	globe penstemon
Penstemon procerus	small-flower penstemon
Poaceae (Grass family)	
Achnatherum sp.	needlegrass
Hordeum brachycarpum	meadow barley
Phleum alpinum	alpine timothy
Poa bulbosa *	bulbous bluegrass
Poa pratensis *	Kentucky bluegrass
Poa secunda	Sandberg bluegrass
Poa wheeleri	Wheeler's bluegrass
Polemoniaceae (Phlox family)	
Leptosiphon harknessii	Harkness linanthus
Microsteris gracilis	annual phlox
Polemonium occidentale	western polemonium
Polygonaceae (Knotweed family)	
Eriogonum flavum	yellow buckwheat
Polygonum douglasii	Douglas' knotweed
Polygonum polygaloides	closeleaf knotweed
Rumex sp.	sorrel
Primulaceae (Primrose family)	
Dodecatheon pullchellum	pretty shooting star
Ranunculaceae (Buttercup family)	
Caltha leptosepala	common marsh-marigold
Delphinium bicolor	little larkspur
Delphinium sp.	larkspur
Ranunculus alisimifolius	plantainleaf buttercup
Thalictrum occidentale	western meadowrue
Roseaceae (Rose family)	
Dasiphora fruticosa	shrubby cinquefoil
Fragaria virginiana	mountain strawberry
Geum macrophyllum	large-leaved avens
Geum triflorum	prairie smoke
Potentilla glaucophylla	vari-leaf cinquefoil
Potentilla gracilis	graceful cinquefoil
Salicaceae (Willow family)	
Populus tremuloides	aspen
Salix eastwoodiae	Eastwood's willow
Salix planifolia	plane-leaf willow
Salix wolfii	Wolf's willow
Saxifragaceae (Saxifrage family)	
Heuchera sp.	alumroot
Lithophragma parviflorum	smallflower prairiestar
Micranthes oregana	bog saxifrage
Valerianaceae (Valerian family)	
Valeriana sitchensis	Sitka valerian
Violaceae (Violet family)	
Viola adunca	blue violet

2023 Education, Research, and Inventory Grant Program Awards

By Steve Rust, ERIG Committee Chair

The INPS Education, Research, and Inventory Grants (ERIG) Program seeks to stimulate and promote research, conservation, and educational activities which contribute to the appreciation, conservation, or knowledge of Idaho's native flora and plant communities. Announcement of the 2023 grant opportunity was printed in the December 2022 issue of *Sage Notes*. In response, thirteen proposals were received. Though each proposal had specific merits, the ERIG Committee unanimously selected six proposals which stood out from the others. The INPS Board funded five ERIG proposals, the sixth proposal, titled *Revisit to GLORIA Monitoring Sites in the Lemhi Mountains, Idaho*, was funded independent of the ERIG Program. Following is a summary of the ERIG Program lineup for 2023.

Long Term Monitoring of a Wildflower Community in the Bear Lake Region

Submitted by Emily Burgess, Utah State University, the objective of this project is to contribute to our understanding of how native plant communities are responding to climate change, and the consequences they might experience as climate change continues to progress. The phenological monitoring study will build on plant community data collected by Dr. Theodore Daniel (Utah State University) in the late 1960s. Contemporary data collected through the ERIG-supported project will provide a unique opportunity to understand how the phenology and composition of this wildflower community has changed over the last 45 years.

Idaho Native Plants and Pollinators—Go Hand in Hand!

Submitted by the City of Hailey, this project will focus on educating the public about the benefits of native plants in nurturing native pollinators including bumble bees, mason bees and leaf cutter bees. Established in 1996, The Hailey Native Plant Arboretum provides an outdoor learning laboratory for education about the value of native plants. Two past ERIG grants funded the creation of individual plant signs which list scientific, common names, and plant characteristics. This grant will contribute to the acquisition of permanently placed, full color display panels on native bee identification and how to use native plants in landscaping to encourage native bees and other pollinators.

Demonstrating Importance of Idaho Native Plants through Weiser Depot's Landscape Design

The Weiser Depot Landscape Committee (consisting of the Weiser Architectural Preservation Committee and Weiser Garden Club) will utilize ERIG funding to improve landscaping at the historic Oregon Short Line Railroad depot located in Weiser, ID. The Committee's goal is to develop more purposeful plantings and model environmentally friendly gardening practices. Specifically, its objectives are to make environment-friendly, low-maintenance choices, display Idaho native plants that encourage pollinators, and educate community members about the importance of native plants and pollinators.

Phylogeny and Taxonomy of the Eriogonum deflexum Complex (Polygonaceae)

Eriogonum is the fourth most species-rich plant genera in the United States. Knowledge of the phylogeny of *Eriogonum* is, however, incomplete. Fifty species of *Eriogonum* occur within Idaho, thirteen of which are on the Idaho Rare Plants List (May 2022). With support of the ERIG program, Mahima Dixit, California Botanic Garden/ Claremont Graduate University, we will work on the phylogeny of the *Eriogonum deflexum* complex (subgenus *Ganysma*)—a group whose flowers are oriented upside-down. The study will include Idaho annuals *Eriogonum cernuum*, *E. hookeri*, and *E. watsonii*. Objectives of the study are to determine how many times downward-pointing involucres and flowers have evolved in *Eriogonum*; determine how the annuals are related to the perennial *Eriogonum austrinum* and one undescribed species; and test the existing classification and propose improvements as needed, including changes in circumscription and description of new taxa.

Idaho Falls Area Native Plant Demonstration and Education Gardens

Happyville Farm, a non-profit urban farm, was established in Idaho Falls in 2019 with the mission to offer outdoor environmental education to all ages, grow fresh organic produce for donation to food-insecure people in our community, and support both the natural world and people's social and physical health by providing a vibrant outdoor green space. 2023 ERIG funding will support four planting projects: a xeriscape planting along the sidewalk median; native grasses, forbs, and shrubs to

support insects of the region's shrub-steppe ecosystem; a bed of native plants that support Monarch butterflies; and an area of native shade-tolerant plant species.

Many thanks to ERIG Committee members Cara Hastings, Derek Antonelli, Janet Bala, Penny Morgan, and Ray Corbin for their help in making this work possible. •

ERIG Project Report

Native Plant Demonstration Garden Signage Project

Article and Photos by Adam West, Extension Educator—Horticulture, University of Idaho Extension, Twin Falls County

Years ago, the University of Idaho Extension Twin Falls County Office and the Southern Idaho Master Gardener Association working with the Twin Falls County Commissioners installed a penstemon demonstration garden at the Twin Falls County West Building. The garden has been a focal point for many years and additional varieties have been added over the years. The signage was installed using laminated printed signs that were 2 x 3 inches which have photo-degraded over time and left the plants unlabeled for the last few years.

Due to the success of this garden, I was approached by the county commissioners and offered another spot on the grounds of the building to install another demonstration garden. I worked with Dr. Steve Love from the University of Idaho Aberdeen Research and Extension Center to select plants for this area. We determined that a buckwheat demonstration garden would be good for this location as it has no supplemental irrigation. The first planting happened in September, with a follow up planting in June the next year. This garden has become a focal point as it sits on the corner of the property at the intersection of a busy road.

In the fall of 2019, a new group of Advanced Master Gardeners were working on a project to complete their certification. The project chosen was a native pollinator demonstration garden. Proposals were made to the county commissioners for a couple of locations and at the County West Building and a site was selected. Then COVID-19 happened, and the project was delayed. Site preparation began early fall with the first round of planting going in in late-September. Additional plants were added in the spring and the ERIG funding with the Idaho Native Plant Society was applied for to provide signage to all three demonstration gardens.

Due to complications of plants being stolen and issues with getting plants established during the dry winter of 2021-2022, the signage project was delayed. After another round of spring planting, we were ready to put in the signage. Working with the Orton Botanical Garden, we looked at different signage options and decided to go with a larger 5 x 7-inch engraved sign for the plant material. Sign bases were purchased and a local engraving company began the task to engrave the sign plates.

Thanks to this grant from the Idaho Native Plant Society, we have highly visible, durable, and easy to read singnage for the plant materials in our demonstration gardens. These gardens are important to the Master Gardeners and Advanced Master Gardeners, building occupants, the University of Idaho Extension Office, Twin Falls Pollinator Council, local schools, and the public to demonstrate water conservation, pollinator habitat, and native plants in the landscape. Thanks to this new signage we will be able to demonstrate these plants for many years. •

Floristic Inventory of the Caribou-Targhee National Forest and Curlew National Grassland in Idaho, Utah, and Wyoming

Article and Photos by Michael Daines, USDA Forest Service, Idaho Falls

This article reports on research that was generously funded by an Idaho Native Plant Society Education, Research, and Inventory Grant (ERIG) and is condensed and adapted from my MS thesis based on this research (Daines 2023). Due to a relative paucity of historical collections in parts of the Caribou-Targhee National Forest and Curlew National Grassland in eastern Idaho, northern Utah, and western Wyoming, an updated inventory for the area was needed. I report here a brief floristic summary of the vascular plants documented from the Caribou-Targhee National Forest and Curlew National Grassland (CTNF-CNG).

The CTNF-CNG is a diverse and geographically spread-out area that includes low-elevation sagebrush steppe (as low as about 1400 m/4,600 ft elevation) in the Curlew National Grassland and at the margins of some of the mountains (Figure 1), mid-elevation aspen and conifer forests in many of the mountain ranges (Figure 2), and high-elevation alpine tundra, especially in the Teton Range, Henry's Lake Mountains, Centennial Range, Beaverhead Mountains, and Lemhi Range (up to about 3,718 m/12,198 ft elevation at the summit of Diamond Peak; Figure 3). The flora of the region is broadly influenced by several major floristic regions, including the Pacific Northwest, the northwestern Great Plains, the Great Basin, the Wasatch Range, and the deserts of southwestern Wyoming (Ertter and Moseley 1992, Henderson 1992, Irwin 2014, Johnson 2019), evidenced by the inclusion of parts of the study area in five EPA Level III Ecoregions.

Figure 1. *Pediocactus simpsonii and Castilleja angustifolia in a sagebrush-grassland community, west side of the Beaverhead Mountains, Clark Co., ID (the Lemhi Range is in the background).*

In all, my MS advisor, Neil Snow, and I collected 3,189 new voucher specimens in and near the CTNF-CNG. Collection information for all collections is available on any Symbiota-connected botanical Consortium portal or website (e.g., intermountainbiota.org, swbiodiversity.org). In addition to newly collected specimens, online botanical databases were consulted to determine which taxa to include in the resulting annotated checklist, which accompanies my MS thesis. The taxonomy we employed largely follows that used in the PC program Floristic Synthesis, produced by the Biota of North America Program (Kartesz 2022).

Figure 2. *Mixed shrubland, aspen, and mixed conifer communities in the Gannett Hills east of Meade Peak, Caribou Co., ID.*

Based on both new and historical collections, a total of 1557 vascular plant taxa (including species, subspecies, varieties, and hybrids) are known to occur in the CTNF-CNG. A total of at least three state records and 137 county records were documented, a few of which were reported previously (Daines et al. 2022). In addition, we documented 38 new records for the CTNF-CNG. *Sphaeralcea parvifolia*, collected in the Curlew National Grassland, was a state record (Daines et al. 2022). *Sphaeralcea parvifolia* may be best viewed as an adventive (non-native) taxon in Idaho, as one possible source was an experimental planting in the Curlew Valley (Pendery and Rumbaugh 1990).

Draba thompsonii, collected in the alpine zone of the Lemhi Range, in the Pass Creek drainage (Figure 3), also represents a state record and a disjunction of approximately 700 km from the nearest populations in the Cascade Range of Washington (Kartesz 2022). Otherwise,

Figure 3. *A view of the alpine zone in one of the north forks of Pass Creek, Lemhi Range, Butte Co., ID, including a view of Diamond Peak (at the right).*

Figure 4. *A specimen of Draba thompsonii, collected in the alpine zone of one of the north forks of Pass Creek, Lemhi Range, Butte Co., ID.*

the species is known from British Columbia and Yukon (Kartesz 2022, I. Al-Shehbaz, pers. comm., Mar. 2023); further surveys in alpine areas in and near the Lemhi Range may be warranted because the species may be more common than we previously realized (I. Al-Shehbaz, pers. comm., Mar. 2023). *D. thompsonii* resembles the widespread *D. lonchocarpa*, but *D. thompsonii* can be distinguished by its broader, fewer-seeded, consistently twisted fruits (Hitchcock and Cronquist 2018; Figure 4).

Boechera lasiocarpa, another state record, was collected in the Bear River Range in Bear Lake County in extreme southeastern Idaho. *B. lasiocarpa* is otherwise known from a relatively narrow region in northern Utah, including the southern Bear River Range, but had not been collected in the Idaho portion of the Bear River Range (Kartesz 2022, Al-Shehbaz and Windham 2010, intermountainbiota.org). I collected a specimen essentially identifiable as *B. lasiocarpa* on the south ridge of Sherman Peak in subalpine rock outcroppings. However, certain morphological features of my specimen do not match perfectly with *B. lasiocarpa*. Further collections and possibly expert confirmation would be helpful.

One notable county record was the documentation of *Ericameria parryi* var. *montana* (commonly known as Centennial rabbitbrush) in the Lemhi Range in Butte County, Idaho (Figure 5). The presence of this taxon on the divide between Rocky Canyon and Sawmill Canyon in the Lemhi Range came by surprise, since all previous literature reported the variety to be narrowly endemic to the Red Conglomerate Peak area in Clark Co., Idaho and Beaverhead Co., Montana (Gary Baird, pers. comm., Sept. 2022; e.g., Mancuso and Moseley 1990, Hitchcock and Cronquist 2018). Future surveys could target other subalpine/alpine ecotones in the general vicinity around Rocky Canyon.

Figure 5. *Ericameria parryi var. montana (Centennial rabbitbrush), in situ on the ridge between Rocky Canyon and Sawmill Canyon, Lemhi Range, Butte Co., ID.*

Some of the first records for the CTNF-CNG were relatively conspicuous plants that had likely been noticed by others but had not been collected, vouchered, and databased online. One of these species is *Hydrophyllum occidentale*, which was found to be abundant to dominant in the understory of some *Acer grandidentatum* forests in the central Bannock Range, north-north-west of Malad (Figure 6). Another conspicuous species that apparently had not been collected in the study area was *Pinus ponderosa*, which was found growing in Mink Creek Canyon, Bannock Co. (Daines et al. 2022), in Table Rock Canyon in the Big Hole Mountains in Bonneville Co., and along US 20 on the Island Park Plateau in Fremont Co. The population in Bannock Co. was derived from plantings at a nearby guard station (Rose Lehman, pers. comm., May 2023), but is clearly naturalized over a fairly wide area with trees of differing age classes (Daines et al. 2022); the other two populations each consisted of only one or two to about ten trees and are of less obvious origin. In addition, a plantation of *P. ponderosa* occurs somewhere on the CTNF in the Dubois Ranger District (Rose Lehman, pers. comm., May 2023).

Figure 6. *A forest dominated by Acer grandidentatum (in the overstory) and Hydrophyllum occidentale (in the understory) in the central Bannock Range, Oneida Co., ID.*

In addition to specific county, state, and study area records, my study highlights regional trends in vascular plant diversity. Significant hotspots of diversity in the CTNF-CNG occur in the low to mid-elevation wetlands

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on plateaus in Fremont Co., Idaho (Moseley et al. 1991) and Teton Co., Wyoming (Heidel 2019), as well as surrounding mountains such as the Teton Range and Henry's Lake Mountains. In fact, Fremont Co., Idaho overall has the greatest vascular plant richness by county in the study area at 916 taxa, followed by Teton Co., Wyoming at 792 taxa (Table 1). •

Table 1. *Number and percentage of vascular plant taxa documented by county in the Caribou-Targhee National Forest and Curlew National Grassland.*

County	Number of taxa	Percentage of total taxa
Fremont	916	58.9%
Teton, WY	792	50.9%
Clark	747	48.0%
Bonneville	699	44.9%
Bear Lake	537	34.5%
Teton, ID	529	34.0%
Caribou	506	32.5%
Franklin	419	26.9%
Bannock	404	26.0%
Madison	359	23.1%
Lincoln	303	19.5%
Oneida	299	19.2%
Lemhi	298	19.2%
Butte	233	15.0%
Box Elder, UT	32	2.1%
Power	31	2.0%
Cache, UT	3	0.2%

Author: *Michael Daines (Pittsburg State University, Pittsburg, KS; USDA Forest Service, Idaho Falls, ID; mdaines@gus.pittstate.edu, michael.daines@usda.gov)*

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Rooting for Idaho: Establishing Archaeological Identification Criteria for Edible Roots

Article and photos by Molly Carney, Assistant Professor, Dept of Anthropology, University of Arkansas

For many Indigenous Native American communities throughout present-day Idaho and Northwestern North America, tuberous root foods were commonly consumed as plant food staples. Most Idaho citizens are familiar with the role of salmon, trout, deer, wapiti, bison, or camas bulbs in Indigenous foodways. Called First Foods by Indigenous Native communities, these staples were important in both subsistence and cultural practices. Edible roots, however, are the less well-known First Foods. These plant foods were available early in the spring and could be easily dried, stored, and prepared throughout the year. Plants such as kouse or biscuitroot (*Lomatium* spp.), bitterroot (*Lewisia rediviva*), or balsamroot (*Balsamorhiza sagittata*) were among the most common and valuable plant foods that sustained Native American communities throughout Idaho for millennia.

Today, there is a growing movement among tribal communities in promoting those First Foods traditions and working to revitalize Indigenous diets and taste buds. Part of the larger food security and sovereignty movements, people throughout the Northwest are working to reclaim autonomy over their food systems and to guarantee access to culturally important foods. As an ethnobotanist and archaeologist, much of my work over the last 10 years has been in examining the ways people harvested, prepared, stored, and managed plant foods through time. Lately, this work has shifted to highlighting the creative food systems and cuisines that Indigenous peoples developed specifically to support traditional harvesting and preparation practices and to reinvigorate a taste for these First Foods for people today. By looking at the plant remains within archaeological sites we can better understand what and how plant foods were managed or cared for by Indigenous peoples, how they were prepared and consumed as these descendant communities continue to reincorporate these practices and foods into their everyday lives. Unfortunately, however, we still know very little about these histories of subsistence as there's been very little archaeological research targeting plant remains in the past. Luckily, that's changing.

Lewisia rediviva in early spring at the right time to harvest, before the flower opens.

Balsamorhiza sagittata in Hells Canyon.

With the support of the ERIG grant, this project sought to bring together historic, ethnographic, and botanical resources and literature to fully characterize the ways people engaged with common edible roots in the past and also to predict what these plant remains might actually look like after they were processed or prepared. However, correctly identifying these root foods within archaeological sites can be quite tricky. For plants to preserve for hundreds to thousands of years, they must be carbonized and fossilized by fire, or they must be left in extremely dry and protected places like rock shelters. Secondly, roots are not like other plant organs—they contain very little lignin and even if the roots preserve, their cellular morphology might not remain intact, making it extraordinarily difficult to identify the plants based upon cellular anatomy. Finally, many of these root foods are quite starchy and may have left behind starch grains on tools or in soils. The main goal with this project, then, was to collect specimens of the most commonly consumed roots throughout Idaho (Table 1) and document tissue structures and starch grain morphology within these roots.

Before I went into the field to collect plant specimens, I wanted to know more about how Native American communities used these plants. Many Indigenous root diggers in the past and present have shared their ethnobotanical knowledge with the scientific community and these oral and written records offer windows into worlds

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of people-plant relationships. For example, specific harvesting tools such as digging sticks, often made of ocean spray (*Holodiscus discolor*) or antler, were perfectly designed to remove roots from the soil without breaking the edible portion. Cultural norms also guided the timing and art of harvests. Bitterroot is harvested before the plant flowers in spring. Water parsnip or wild carrot may be harvested both in spring and a second time in summer. Harvesting root foods was also done with an eye towards future harvests and sustainable food systems. For balsamroot, only the smaller "carrot-sized" roots were collected and the larger plants with woodier taproots left to go to seed and continue growing. Roots were also prepared for winter storage or as valuable trade items. Young *Lomatium* roots and tubers were harvested and processed by removing the epidermis and either baking or air-drying roots. These dried *Lomatiums* could then be pounded into patties or cakes and stored for long periods of time or traded widely. All these practices were tied to specific months, guiding the movements and daily patterns of people throughout the year as they harvested specific plants (and animals) in time with the changing seasons.

Contemporary welded digging stick.

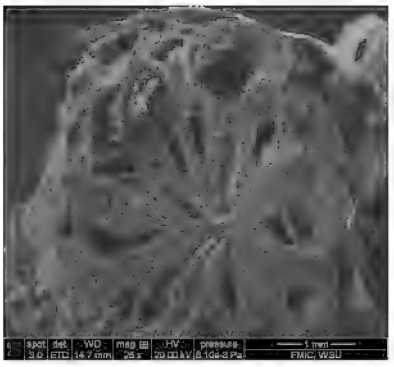
Next, I looked to the Global Biodiversity Information Facility (GBIF – gbif.org) to pinpoint public lands and spaces where other native plant enthusiasts had identified some of our target species. The GBIF brings together herbaria data with crowd-sourced, citizen science-derived GPS locations and taxonomic identifications to allow scientists, researchers, and any other interested laypeople to explore the rich biotic communities throughout our planet. I was specifically interested in working with the GBIF, as it is open access and free to use online, making the data accessible to anyone. I was also interested in exploring and contributing to plant locations on public lands so that others too could follow in our footsteps. I did not want to infringe on Tribal lands and specifically wanted

An example of an archaeological slate knife from North Idaho that may have been used as a hoe or other digging/ food processing tool. Date unknown. It may be possible to test this tool or others like it for starch grains.

Table 1. *Edible plants collected for this study. Ethnobotanical uses are drawn primarily from Nancy Turner's 2007 Food Plants of Interior First Peoples, Royal BC Museum handbook and Eugene Hunn and David French's 1981 paper Lomatium: A Key Resource for Columbia Plateau Native Subsistence, Northwest Science 55(2):87-94.*

Scientific Name	Common Names	Ethnobotanical Uses
Balsamorhiza sagittata	Arrow-leaved balasamroot, wild sunflower	Peeled and roasted or steamed and could be dried and stored.
Lomatium canbyi	Canby's biscuitroot, white camas, snowdrops	Cooked fresh, boiled, or air-dried whole. Could be made into patties or cakes.
Lomatium cous	Biscuitroot, cous, kouse	Boiled, dried whole, ground, or created into small cakes.
Lomatium dissectum	Chocolate tips, fernleaf biscuitroot, wild celery	Young roots eaten, used as medicine, or in hide tanning.
Lomatium geyeri	Geyer's biscuitroot	Sprouts eaten, roots formerly eaten but little information.
Lomatium macrocarpum	Wild carrot, desert parsley, sweet potato	Usually roasted or boiled with other foods such as lichen, tiger lily bulb, or meat.
Lomatium triternatum	Wild celery, narrow-leaved desert parsley	Greens consumed, but few references to root cooking.
Lewisia rediviva	Bitterroot, sand or desert rose	Eaten raw or boiled, baked, added to stews, or air-dried.
Perideridia gairdneri	Wild caraway, yampah, wild carrot	Peeled immediately after August harvest and eaten raw, mashed, boiled, or pit steamed.
Sium suave	Water parsnip or wild carrot	Can be eaten raw, steamed, or fried.

to respect those locational data to protect those populations because edible and medicinal plant knowledge can be protected and private knowledge for some Indigenous communities.



Experimentally charred Sium suave cross section.

Between the spring and summers of 2022 and 2023, I visited several locations across north Idaho to collect experimental and voucher specimens of each of the plants listed in Table 1. These plant specimens were brought back to Washington State University and the University of Arkansas where we separated specimens into three groups: 1) for experimental charring to see what the plants might look like archaeologically, 2) for thin-sectioning using a microtome to better characterize the interior root cellular morphology, and 3) for processing to isolate starch grains. I also brought some of the experimentally charred roots to the scanning electron microscopy lab at the University of Arkansas to generate high resolution images of these plant remains.

My current students and I are still working on describing the features and anatomy of roots and starch grains to create those reference guidelines for other archaeologists and ethnobotanists. There are, however, a few emerging examples where other teams have been able to identify some of these plants in archaeological sites. Tuberous roots identifiable to the *Lomatium* spp. genus were noted in an approximately 500-year-old roasting pit near Wenatchee Lake, Washington. These roots were roasted with ponderosa pine and alder wood, perhaps adding a desired smoky flavoring. Others have had success using sonicating toothbrushes on ground stone mortar to extract biscuitroot (*Lomatium* sp.) starch grains in eastern Oregon. Our project aims to help refine those identifications to species while also helping out archaeologists working in Idaho and beyond to trace these histories of plant use. Our larger goals too are to look at the vast diversity of root foods that people consumed and better understand subsistence decisions, recipes, and food-related conservation or management practices specifically to share with our partners, to hand off the decision-making and conservation process, and make it possible for the old foods to come back into the limelight.

White camas (L. canbyi) (left) and bitterroot (L. rediviva) (right), peeled and dried for storage.

One of the other goals of this project is to upload our reference images and information to an open access database (*Cultural and Historic Guide to Northwest Native Plants*) to allow anyone interested to view and contribute to this project. Although university herbaria, printed plant guides, and websites like the GBIF are fantastic resources, they aren't often geared toward the features archaeologists are interested in. Paleoethnobotanists usually make their own reference collections, but this can also take quite a bit of time. By uploading these images in an online database, we can continuously update identification criteria and other ethnobotanical facts and also create community. If you are interested in the project or just in learning more about the ethnobotanical uses of native plants in our region, please check out the website at *nwnativeplants.org*! •

Lomatium macrocarpum pith stained showing anatomical features and location of starch grains within root.

About the author: *Molly Carney was a postdoctoral scholar at Washington State University before joining the University of Arkansas as an assistant professor of archaeology. You can see what the Paleoethnobotany Lab is up to at https://paleoethnobotany.uark.edu/ and meet some of the Arkansas students involved in this work. She can be contacted at mc143@uark.edu.*

INPS Scholarships for the Next Generation of Native Plant Advocates

By Penny Morgan, Paul Ries, and Lindsey Barber, Scholarship Committee Members

Your INPS Scholarship Committee has great news to share! We awarded our first two scholarships. Our committee members from INPS chapters across the state included: Lindsey Barber (chair and member of Calypso chapter), Penny Morgan (White Pine), Bill Bridges (Loasa), Liz Martin (White Pine), Paul Ries (Wood River), and Don Morishita (Loasa). Next year, Liz Martin will be chair as Lindsey and her family are moving to Denmark for new jobs for Lindsey and her husband. Our committee established the criteria for eligibility, determined how applicants would be evaluated, detailed the funding, and agreed on how to administer the award. So many people learned about INPS as we contacted a long list of people working with students in related academic programs across the state and created social media posts and informative flyers for wider dissemination. Idaho college or university students demonstrating an interest in native plants and plant communities are eligible for the $2000 scholarship award each. We had 28 applicants from five 2- and 4-year colleges in Idaho.

We congratulate Abbey Moody and Richard Rachman, first recipients of the Idaho Native Plant Society Scholarship. All applicants received a free 1-year membership in INPS. In alignment with our INPS mission, we sought to award our scholarship to students interested in understanding and increasing the appreciation of our native flora. Through the scholarship, INPS supports the education of those who will carry on the INPS mission for years to come. Our committee found it very challenging to choose Abbey and Richard from the 28 great applicants.

Abbey Moody, our undergraduate student recipient, is a sophomore at Boise State University studying Biology with an emphasis in Evolution, Ecology and Behavior along with an additional emphasis in Secondary Education and a Teaching Endorsement in Natural Sciences. She is a Presidential Scholarship Awardee who plans to work towards a master's degree and eventually a doctorate. Her goal is to become a researcher and science professor. This summer she is working as an Outdoor Educator at the Boise Foothills Learning Center teaching students about native and invasive species and helping them better understand ecological processes. She received an enthusiastic letter of recommendation (and he said that twice in the letter) from Professor Stephen Novak in Boise State's Department of Biological Sciences. He has been so impressed by her in his classes that he offered her a position working in his lab starting in the fall. She will be collecting data and conducting genetic analysis on native European populations of ventenata grass, which is an invasive in western rangelands. The goal is to identify the source populations of ventenata we have in the Western U.S. and assess the genetic and evolutionary consequences of this invasion. In her application, Abbey said she first became interested in native plants and invasives she saw while trail running in the Boise foothills. She became so interested she began doing research, which led her to change her major from Veterinary Medicine to Ecology. She is self-supporting and says this scholarship will help her reduce her work hours this coming year so she can more fully focus on her education.

Richard Rachman, our graduate student recipient, describes himself as "first and foremost a native plant nerd" and says his love of plants and field identification started in Community College as an avid iNaturalist user. He went on to study at Cal State Northridge and earn both a BS in Ecology with a minor in GIS, where he received a competitive scholarship studying dendrochronology of sagebrush, and a masters in Biology studying the relationship between wildfire and invasive species. In his letter of recommendation, his current research advisor says Richard has the best botanical skills of any student he has ever worked with and regularly teaches other students how to identify local plants.

Richard is an active member of the LGBTQQI+ professional organization, Out to Innovate (https://noglstp.org/), has served on the student board for the California Native Plant Society, and was active on the board of the Southern California Botanists where he helped establish a scholarship program to help low-income students attend the annual symposium. Richard worked for the National Park Service studying the 2018 Woolsey Fire, leading wildflower hikes with women's groups, native plant nurseries, and various LGBTQQI+ outdoor organizations, and also worked alongside the BLM and USGS as a field technician studying plants and Greater sage-grouse in sagebrush steppe.

In his free time, he volunteers with the Xerces Society coordinating volunteer efforts to conserve monarch butterflies. His efforts were featured in the Los Angeles Times. In his current endeavors as a Ph.D. student in the Caughlin Lab at Boise State University, he will be investigating the use of drone imagery to understand changes in the spatial distribution of plant communities after wildfires. He will also be mapping the probabilities of goat-

head abundance to aid in eradication efforts. One of his goals is to continue to integrate science communication and education outreach into his research to make it meaningful for local communities. He believes bringing the process of scientific research together with community partners and the public is imperative to preserve native plant habitats.

Please encourage students you know to apply next year. For more information, including the criteria used to select the best candidates, please visit the INPS website at https://idahonativeplants.org/scholarship-news/. We welcome your comments and questions at INPSScholarship@gmail.com. If you wish to donate to future INPS Scholarships you may do so using PayPal at https://idahonativeplants.org/scholarship-news/. You can also mail a check to INPS stating your desire for it to go towards the scholarship program. Your contributions will help us continue to offer scholarships well into the future. We thank Mike Mancuso and the INPS board for establishing the scholarship program, and for funding two (instead of the one initially planned) awards and the INPS membership given to all the students who applied. We also thank all the applicants and those who wrote recommendation letters for them—we welcome you all to be active in INPS. •

Conservation in Action

Adopt a Habitat!

Article and Photos by Alice Crockett, Pahove Chapter

The plea gained momentum this Spring 2023. The City of Boise, Golden Eagle Audubon, Idaho Fish and Game, Ada County, Idaho Parks and Recreation, etc. all voiced their requests. Volunteers were needed to adopt, restore, weed/plant, clean up, and spruce up the community land we, the citizenry, all share. ADOPT-A-HABITAT by Parks and Recreation is the one Crockett & Company chose to support. The original (2001) Oregon Trail Parkway Plan provides a bit of history about the entire Oregon Trail Parkway project (https://www.cityofboise.org/media/3619/oregon-trail-parkway-plan-2001.pdf).

Alan Crockett hard at work.

In February 2023, Alan Crockett contacted the City of Boise's Martha Brabec and Kristin Gnojewski about adopting the Oregon Trail Parkway Habitat section along Boise Avenue between Bown Crossing and Law Avenue. They enthusiastically gave their "YES" to the adoption. And so it began...

Mother Nature joined our efforts in the first couple of months by showering, raining and giving drinks to newly planted seedlings. Pruning, weeding, and clearing of overgrown and dead vegetation came next. Then came the pickup and hauling or chipping of the pruning, weeding and clearing.

As spring and summer heated up, the seedlings (sagebrush, antelope bitterbrush, goldenrod, black hawthorne, golden currant, fern bush, mountain mahogany, etc.) needed water weekly. The Ridenbaugh Canal is on one side of this Habitat, a sidewalk and Boise Avenue are on the other. The Canal Company has Siberian elms and chain link fence to separate their responsibilities from (now) our adopted habitat. To begin with, we watered the seedlings by filling 2 ½ gallon jugs with culinary water at home and watered the seedlings, one at a time, directly into their little water wells. They got more of a sip than a drink.

July!!! Days heated up. The question: how to keep the surviving seedlings alive (and us, too) in this heat? Alan's solution worked!!! How? The Answer: Go to "Opera in the Park" in Julia Davis Park on July 8th. At intermission, gather discarded pint beer cups from the Beer Garden vendors. Enjoy the lovely, musical evening and, after waving your 'light stick' at the finale, bring the plastic cups home. In the morning of July 9th, Alan borrowed a large hat pin from my pin cushion, poked a small hole in the side at the bottom of each beer cup. We loaded the truck with empty beer cups and full water jugs. Watering thirsty Oregon Trail seedlings came next. The beer cups collected at the Opera worked perfectly as a slow drip for plants. When we filled the cup with water, the tiny pinhole spout slowly watered the thirsty plant. We even returned to the Gene Harris Bandshell that morning for more cups. (Alan jumped into a recycle bin and retrieved about 70 more.) It did take time to water the seedlings this way, but after we finished, we could backtrack and pick up the empty beer cups. The plants said "Thank you." We came home. •

Beer cup drip waterer.

Crockett & Company: *Alan & Alice Crockett, Ann DeBolt, Roger Rosentreter, Mike & Chris O'Brien, Howard Sheppa, Dwight Allen*

Pam Brunsfeld: Field Trip Leader and Extraordinary Botanist

By Penny Morgan, White Pine Chapter President

Our White Pine Chapter board and members presented Pam Brunsfeld with the White Pine Cone Award during the 2023 annual meeting of INPS. Pam is one of the first recipients of this new award given by our White Pine Chapter to members who have made outstanding contributions over the years. As Judy Ferguson said, "Pam has phenomenal plant identification skills. She is also fondly renowned for both her great love of penstemons and of honey bees. Her field trips have sparked many people's interests in learning to identify native plants." As Bettie Hoff said, "Pam loves to help people learn about plants," and she is gifted at it!

Pam, a professional botanist for 50 years, is widely recognized for her botanical expertise. Pam is the retired Director of the Stillinger Herbarium at the University of Idaho where she was instrumental in having the Stillinger Herbarium be part of the Consortium of Pacific Northwest Herbaria (with Matthew Parks). Pam conducted botanical work for the Challis National Forest. She worked on the alpine flora of east central Idaho and did numerous endangered and threatened plant surveys. With her late husband, Steve, and now on her own, she runs Brunsfeld Botanical, conducting botanical surveys throughout Washington, Idaho, and Oregon, mainly for endangered and threatened plants, and now identifying Palouse Prairie remnants for Whitman County. Pam is much admired and sought after for her knowledge.

Pam helped establish the White Pine Chapter of INPS. She was our first secretary. She has served as President, Vice President, and Secretary for the Chapter, and as state secretary of INPS. She has led field trips—at least one per year—for our chapter. She has been a field trip leader for three annual meetings of INPS—last year she led three field trips in one annual meeting. Her species lists are amazing—complete, with updated and older names. We especially appreciate her enthusiastic presentation of taxonomy and memorable information about individual species. She has given numerous talks and workshops. Pam has led tours of her yard where we have seen all 33 species of penstemons growing amongst many other plants. Pam is an artist working with stained glass and with hand-woven baskets—she has contributed both to the silent auctions to support the ERIG program. Pam has mentored many students who have gone on to become botanists and professionals in natural resources.

Pam taught general botany and systematic botany, and she worked with students at the Stillinger Herbarium at the University of Idaho. Upon retirement, Pam became a beekeeper. Pam now concentrates on native plants for pollinators and xeriscaping. She has presented on that subject to Latah County Extension, Palouse Clearwater Environmental Institute, Moscow Garden Club, and other organizations. She currently serves on the Moscow Tree Commission and Bee City Committee. We look forward to her forthcoming book about native plants for pollinators.

We honor Pam for all this and more that she does for BOTH our chapter and for Idaho Native Plant Society state-wide. We gave Pam a beautiful cone of western white pine (*Pinus monticola*) from a tree planted by Ray Hoff, a long-time member of our chapter (we thank his wife Bettie for selecting a particularly beautiful cone!). Western white pine is an icon of the forests of northern Idaho, and it is the state tree of Idaho. Congratulations, Pam. You are richly deserving of recognition. •

2023 Pahove Chapter Mother's Day Wildflower+ Show

Article and Photos by Barbara Ertter, Pahove Chapter

Pahove Chapter's 5th Annual Mother's Day Wildflower+ Show, held at the Idaho Botanical Garden on May 14, was another smashing success! About 135 species were represented, in spite of the late spring, and we could easily have had more if there had been additional collecting teams (mostly by me with some helpers in the Boise Front, plus collections by Beth Corbin and Carol Prentice in the Owyhee Front). We probably had the largest attendance yet, with an estimated 20-30 people at a time during peak hours. As a special attraction, this year's "+" in "Wildflower+ was Amy Dolan's table on Idaho bees and the new Master Melittologist Apprentice Program (Oregon State University Extension Service), which was very popular.

As so often happens, the weather turned out to be perfect for an outdoor setting, but only AFTER we had committed to holding it indoors (again). This year we had more and better signage directing people to the classroom building (thank you, Susan, Peg, and Eric), augmented by Kevin Laughlin's initiative of manning the "teaser" table, acting as greeter/barker to encourage Garden attendees to check out the Wildflower+ Show, and pointing them in the right direction. A total of 12 Master Naturalists volunteered to help with set-up and/or clean-up, doing an absolutely phenomenal job. Bob Moseley and BSU student Chadwick DeFehr were also invaluable coworkers for nearly the entire stint, as well as helping with the collecting. And I can't thank IBG event staff enough for making all this possible! BIG thanks to everyone!!! •

Labeled vases for each species.

Kevin Laughlin enticing garden visitors to the Wildflower+ Show.

Amy Dolan sharing her enthusiasm for bumble- and other bees.

Arrangement for show, before the crowds arrive.

CALYPSO CHAPTER

When: Chapter meetings are held on the first Wednesday evenings of March, April, May, and October. The public is invited to all chapter activities, which may change, so watch chapter emails for updates.
Where: Meeting are held in the Wildlife Building, North Idaho Fairgrounds, Coeur d'Alene.
Contact: For more information about Calypso Chapter activities, contact Derek Antonelli: ds.ca.antonelli@gmail.com, (208) 691-1070.

Upcoming Events

October 4: Calypso Chapter meeting at 7:00 pm. The presentation topic for this meeting has not been determined yet. Please submit topic suggestions.

LOASA CHAPTER

When: Meetings are held third Thursday of each month at 7:00 p.m.
Where: Taylor Building, Room 247, College of Southern Idaho, Twin Falls.
Contact: Bill Bridges, bridgesbill34@yahoo.com

PAHOVE CHAPTER

When: Chapter meetings with intriguing presentations are held the second Tuesday of each month from October–April starting at 7:00 pm. Times, dates, and topics are tentative. Current information will be sent to members via email. Announcements are also posted on the Pahove Chapter page of the INPS website: https://idahonativeplants.org/pahove/
Where: Chapter presentations currently offer hybrid viewing formats, both in-person at MK Nature Center and a Zoom link for at-home enjoyment.
Contact: For more information about Pahove Chapter activities visit the website: www.idahonativeplants.org or email Karie Pappani at pahove.chapter.president@gmail.com.

Past Events

For the second year in a row, the Pahove Chapter had a table at the "**First Time Adventure**" event at Lucky Peak State Park on Saturday, June 17. Attendance was unfortunately minimal due to cool overcast (very pleasant for us, but not what draws people to the park) and *E. coli* restrictions in effect. It was still a good opportunity to refine the whole tabling concept and expand our outreach to a wider demographic. And we all enjoyed learning how to make twine out of hemp dogbane (*Apocynum cannabinum*) under the careful tutelage of Peg Faith!

Pahove table ready for action, with Peg Faith and Ti Macklin. Photo by Barbara Ertter.

Visitors to the Pahove table, being helped by Peg Faith and Ti Macklin. Photo by Barbara Ertter.

Upcoming Events

September 26: Fall Kick-Off Party and Seed Exchange at Smokey Mountain Pizzeria and Grill (1805 State Street), 6:00 pm.
October 10: Carol Prentice will present on "Timothy E. Wilcox: Army Surgeon at Fort Boise, Boise's First Resident Botanist/Naturalist."
November 14: Kerry Byrne, Cal Poly, will present "Beneath our feet: Harnessing the power of the soil seed bank for restoration."
December 12: Cathy Ford, Idaho Transporation Deparment, will talk about their "Roadside Pollinator Project."

SAWABI CHAPTER

When: Board meetings are held at least quarterly and will be announced. An autumn potluck is also planned.
Where: Winter programs are presented in the North Fork room of the ISU Student Union Building in Pocatello. Field trips generally car-pool from the bison statue in front of the ISU Museum of Natural History.
Contact: Paul Allen at pokyallen@hotmail.com, 208-241-5265

UPPER SNAKE CHAPTER (INACTIVE)

Contact: Kristin Kaser, kaser.kristin@gmail.com

WHITE PINE CHAPTER

When: Meetings are typically held the third Thursday of the month, September through April. Current information is posted on our chapter webpage: https://www.whitepineinps.org/WPschedule.html

Where: We are currently offering hybrid meetings. The in-person meetings are held at the 1912 Center in Moscow with a Zoom link for virtual attendance.

Contact: For more information about White Pine Chapter activities, contact us at INPS, White Pine Chapter, PO Box 8481, Moscow, ID 83843 or whitepine.chapter@gmail.com. Visit the chapter website (https://www.whitepineinps.org/) for upcoming event information and visit our YouTube Channel for video recordings of past talks (https://whitepineinps.org/WPYoutube.html).

Upcoming Events

We will post our fall schedule of speakers as they are confirmed. Check our webpage for the most up-to-date information.

WOOD RIVER CHAPTER

When: Typically we have talks in the cold months and walks in the warm ones. Non-members are welcome. Please see our website or email newsletter for information on all programs.

Where: Field trip and talk locations and details will be included with the description, posted online and emailed to members and other interested parties.

Contact: For more information about Wood River Chapter activities: email: woodriverinps@gmail.com; website: https://woodriverinps.wixsite.com/wrinps; phone: Mary (559) 696-9953; to subscribe to the newsletter: email us.

Past Events

August 16: Our popular Hailey Alley Walk is back. Attendees explored the alleyways of Hailey with members of the Wood River Chapter. They talked about garden escapees, invasive plants, Idaho natives, trees and more.

Upcoming Events

September 16: Noxious Weeds, TBA. There are, unfortunately, plenty of examples of these plants in our valley. Learn why they are so successful, why they are unwelcome and how to control them. We will also talk about the difference between a weed and a noxious weed.

October TBA: Members Only Hike. We are still scheming on this one, but it will likely involve ponderosa pines, just as a teaser. More details will be forthcoming.

November TBA: Fall Potluck Share a meal and play botany bingo for great prizes. Election of Chapter Officers for 2024 is also held at this time. •

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Idaho Native Plant Society Membership Form

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□ Calypso (Coeur d'Alene)
□ Loasa (Twin Falls)
□ Pahove (Boise)
□ Sawabi (Pocatello)
□ Upper Snake (Idaho Falls) - *Inactive*
□ White Pine (Moscow)
□ Wood River (Ketchum/Sun Valley)
□ No Chapter

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Memberships run calendar year. New memberships enrolled after June 1 include the following year. ***Renew or join online:*** *https://idahonativeplants.org/membership/*

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https://idahonativeplants.org/sage-notes/

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SAGE NOTES

Newsletter of the Idaho Native Plant Society

50th ANNIVERSARY

of the

ENDANGERED SPECIES ACT

December 28, 1973 - 2023

Special Issue: Idaho's Plants and the Endangered Species Act


Packard's milkvetch


Water howellia


Spalding's catchfly


Goose Creek milkvetch


Ute ladies'-tresses


Christ's paintbrush


Slickspot peppergrass


Mac Farlane's four-o'clock


Whitebark pine

IDAHO NATIVE PLANT SOCIETY
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Letter from the President

President Richard Nixon signed the Endangered Species Act (ESA) into law on December 28, 1973. The Act aims to protect and recover species at risk of extinction and aid the conservation of ecosystems and habitats needed by the species. The ESA continues to be one of the cornerstones of our nation's conservation ethic. To commemorate the ESA's 50th anniversary, this issue of *Sage Notes* highlights several Idaho rare plant species that have directly benefited from ESA-related conservation activities. Before passage of the ESA, conservation laws in the United States were generally restricted to animal species. The ESA expanded recognition and protection to include plants, too. The need has never been greater. There are currently 941 plant species federally listed as Endangered or Threatened in the United States, with approximately 40% of them endemic to Hawaii.

Here in Idaho, we have five listed Threatened species—Spalding's catchfly (*Silene spaldingii)*, Macfarlane's four-o'clock (*Mirabilis macfarlanei*), slickspot peppergrass (*Lepidium papilliferum*), Ute ladies'-tresses (*Spiranthes diluvialis*), and whitebark pine (*Pinus albicaulis*). They all receive regular funding for conservation projects from the U.S. Fish and Wildlife Service (USFWS), the agency responsible for implementing the ESA.

I will highlight one species here that I have personal experience with, MacFarlane's four-o'clock. It was listed as Endangered by the USFWS in 1979, thus becoming the first member of Idaho's flora to receive ESA designation. At the time, MacFarlane's four-o'clock was known from one population in Hells Canyon with fewer than 100 individuals. In subsequent years, new MacFarlane's four-o'clock populations were discovered, livestock management was improved where populations did occur, and monitoring found population numbers and habitat conditions to be stable. This improved conservation outlook led the USFWS to reclassify MacFarlane's four-o'clock from Endangered to Threatened status in 1996. Conservation work for MacFarlane's four-o'clock continues with ongoing monitoring, field surveys, outplanting of new populations, propagation research, and weed control efforts.

This history of conservation projects would not have been possible without the ESA. It is clear the ESA has played a major role in improving the conservation outlook for many of Idaho's rarest plant species. Keeping the ESA strong and effective will require the support of everyone who values and enjoys our rich biological heritage and who wants to ensure this treasure can be passed on to future generations.

Finally, I want to say thank you to everyone who has participated in protecting and working to recover Idaho's listed plant species, from agency biologists and support staff to citizen scientists and advocates.

Michael Mancuso
INPS Prsident

In this issue:

Announcement

2024 INPS Annual Meeting/Campout

By Derek Antonelli, Calypso Chapter President

The Calypso Chapter of Coeur d'Alene is excited to host the 2024 Idaho Native Plant Society Annual Meeting and Campout. We have selected historic Farragut State Park as the venue for the event. The gathering will take place from Friday, June 14, through Monday, June 17. Mark your calendars accordingly.

Location: Farragut State Park, the largest state park in Idaho, is located on the shores of Lake Pend Oreille (https://parksandrecreation.idaho.gov/parks/farragut/). Located in the middle of the Idaho Panhandle, it has a rich and diverse flora. It also has a long, varied history. It was the homestead of John and Carrie Leiberg in the late 1880s. John completed extensive botanical surveys in the area and Carrie was a frontier doctor. During World War II over 300,000 sailors completed their basic training at Farragut. In the 1960s Farragut hosted the Boy Scout World Jamboree attended by thousands from around the world.

Camping: We have reserved the Thimbleberry Group Campsite at Farragut State Park. This huge site will provide us with an opportunity to keep the Annual Meeting participants together in one location. The site amenities include a lighted restroom with flush toilets, numerous picnic tables, ample spots to set up tents in wooded areas, and a large field in which to park RVs. The site has a source of potable water, but no water or electric hookups for RVs. If you need to have hook ups for your RV, you can make your own reservation at one of the Farragut's many nearby campgrounds. There were still over 100 reservable campsites available at Farragut SP as of late October. We expect those to go quickly in the spring.

At the Thimbleberry Group Campsite, we have no practical limit on the number of people camping, but we have a limit of 60 overnight vehicles, and trailers count as separate vehicles. (I know it's weird, but those are the rules.) As a result we will charge a single $30 fee for each vehicle for all three nights. If four campers all come in a single vehicle there is only a single $30 fee. Pickup campers, vans and motor homes count as one vehicle. Since trailers are counted in our 60-vehicle limit, they will be charged a $30 fee in addition to the $30 fee for the tow vehicle. Just think of it as free camping but with a parking fee.

Idaho State Park Passport: Because it is a state park, every vehicle is required to have an Idaho State Park Passport. It can be purchased for $10 online or by mail at the time of vehicle registration renewal, or it can be purchased in person from any county DMV office. If you come in a vehicle that does not have a Park Pass, the park will charge $7 for each day you are there—more for non-Idaho residents.

Events: We will have our traditional potluck on Friday evening. Saturday evening will be our annual meeting and banquet—we do not yet know the meal fee—to be held at the Athol Community Building five miles from Farragut State Park. We expect to have distinguished author and naturalist, Jack Nisbet, as our keynote speaker.

Activities: We have ideas for hikes and field trips in development for both Saturday and Sunday. Ideas include:

- A short hike through the western red cedar forest in Rathdrum Mountain Park. There's a possibility of seeing the phantom orchid there.
- Numerous trail hikes throughout Farragut State Park itself. Over 200 species of plants have been found within the park.
- A Lost Lake hike near Sagle. Rattlesnake-fern is one of the many plants found along this trail.
- A hike at the BLM's recreation site located at Blue Creek Bay just south of Coeur d'Alene.
- An Ice Age Floods driving tour. The massive floods started at Farragut State Park when the glacial dam burst.
- A talk and walk at the Leiberg home site.
- A challenging hike to both north and south Chilco Peaks.

Pre-Registration: Our planning is highly dependent on knowing how many participants will be coming to the Annual Meeting. To give us a good idea of how many might show up, we hope you will pre-register for the meeting. There is no cost to pre-register, and pre-registration is easy: just send us an email at INPSAnnualMeeting@gmail.com. You should include your email address, the number of participants in your party along with their names, if you will be staying at the group camp site, how many vehicles including trailers your party will be bringing. There is no obligation to attend from pre-registering—hopefully you can come, but if you can't make it, that's okay. There is no requirement to pre-register, but our activities will be available on a first-come first-served basis. Pre-registration lets you get in line early.

The costs for the annual meeting fall into four areas: a registration fee for each individual attending, an Idaho State Park Passport, a camping fee for each vehicle (including trailers) at the group site, and a meal fee for each meal ordered for the Saturday evening banquet.

We should have a great Annual Meeting. Hope to see you in picturesque northern Idaho! •

16th Annual Idaho Botanical Foray

By Derek Antonelli, Calypso Chapter President, with special account by Kristin Kaser

The Stillinger Herbarium at the University of Idaho hosted the 2023 Idaho Botany Foray, July 13 to 17. The Botany Foray has occurred every year since 2008. Idaho's major herbaria sponsor the Idaho Botany Foray on a rotating basis. Those herbaria are located at Boise State University, College of Idaho, Idaho State University, and the University of Idaho. The foray is essentially a giant

The 2023 Idaho Botanical Foray had 23 participants from throughout the state and around the world. Photo by Steve Martin.

plant collecting expedition by professional botanists and interested amateurs. The hosting herbarium selects a location within Idaho that been under-collected in the past. The goal of the botanical survey is to increase the understanding of Idaho's plant diversity and document the distribution of Idaho's plant species.

This year the foray was conducted in the Cabinet Mountains just north of Lake Pend Oreille. We set up camp at the Huckleberry Dispersed Campsite located along Trestle Creek. The campsite is nestled in the moist western red cedar forest found along the creek. We borrowed portable picnic tables from Idaho Fish and Game to provide a platform for pressing and preserving our collected plant specimens. Each morning Friday through Sunday we would gather at the campsite to discuss potential plant collecting sites in the surrounding area. Once collecting sites were selected, we would divide into groups and head into the field. Some groups would venture to sites that required long difficult hikes, while others would drive along a road stopping to collect a short distance from the road.

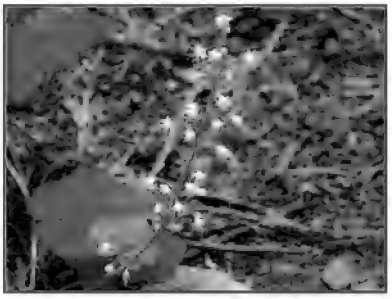
Group preparing to collect plant specimens up a hillside along Wellington Creek Road. Photo by Dick Smith.

After spending the day in the field collecting plants, the groups returned to the campsite in the afternoon. There the plants were pressed to preserve them for future study. Each plant specimen was carefully laid out between sheets of newsprint and labeled. The plants within the newsprint were stacked in piles with pieces of cardboard separating each plant specimen. The stacks of plant specimens and cardboard were cinched down tightly to rapidly pull the water out of the specimens. The stacks of plant specimens were transported back to the herbarium at the end of the weekend. Once dried, the plant specimens will be identified to species. They will then be mounted on herbarium sheets and stored in herbarium cabinets. These specimens will potentially be used for centuries to answer important botanical and ecological research questions.

Group on a 13-mile trek to collect plants up the East Fork Creek drainage. Photo by Kristin Kaser (shown in front).

The collecting sites were located in the Cabinet Mountains in the Lightning Creek and Trestle Creek drainages and along the lower reaches of the Pack River. Most of the collecting sites were located within the Kaniksu National Forest of the Idaho Panhandle National Forests, but one site was located on the Idaho Fish and Game Gold Creek property along the lower reaches of the Pack River. An Idaho rare plant, black snakeroot (*Sanicula marilandica*), was collected on the Gold Creek property. Collecting sites within the National Forest include areas around Lake Darling and Moose Lake. One group travelled up Wellington Creek Forest Road all the way to the ridge stopping to collect plants in a variety of habitats along the way. Deer fern (*Struthiopteris spicant*) which is another Idaho rare plant was collected in a small wetland along the road. Another group took a seriously long hike up the East Fork of Lightning Creek. Kristin Kaser's "a day in the life of a plant collector" account of that hike follows:

Dan Turck took our group on a botanical adventure in search of a rare paintbrush (Castilleja) species that grows in higher elevation habitats. While we never found the paintbrush species, Dan discovered a new population of subalpine larch (Larix lyallii). He jumped for joy when he realized the grove of conifers more than a 1/4 mile away was indeed L. lyalli.



Foam flower (Tirella trifoliata var. unifoliata) is a common species found in the mesic forests of northern Idaho. Photo by Steve Martin.

Before our group began the hike, we got some real world practice of changing the van's tire which had the misfortune of picking up a nail. We got it all changed out once we found a parking lot. We drove up to the trailhead along Lightning Creek, passing the active Bee Top forest fire to the west, and took the turnoff towards East Fork Creek. With several creek crossings in pursuit of an unused trail, the decision was made that we'd make one more try to find the turn off by heading back to the trailhead. Our group was so excited to be on the lookout for a rare plant, we had blown past the obvious trail turnoff. Once sorted out, we hiked up a surprisingly well marked trail. It cut across the hillside through big openings of huckleberry patches. I had never thought it was possible to eat too many huckleberries until then.

As our group hit five miles, a lovely trail marker declared Mile 1 but we continued our jaunt towards those rocky outcrops that may potentially have the elusive Castilleja species. As we passed by all the reasonable habitat and the trail became slightly steeper, everyone was generally in good spirits for an unplanned adventure and we continued to ascend the hillside. At a flatter stretch of the trail, it was decided to continue to reach the top and try to find an old lookout station. We reached the ridge not long after, all very excited to sit and relax while others poked around the collapsed wooden structure of the old lookout. All except Dan who announced he'd need to just look into Montana because we were so close. After a short time, he came back nervously, but excitedly, to announce he thought he'd found a new population of alpine larches. However, they were growing far enough away he was hoping some of us would go with him. Three of us took the bait, much to his surprise, and we headed up the mountain into Montana. None of us had planned for such a great adventure, but we were all excited to see the various alpine species. Once we gained the ridge line, we saw the distinctive growth pattern of Larix clinging to the cliffs, but to determine which species, Dan needed the cones. Off we went, trying desperately to not get sidetracked by the alpine itself and reach the patch of deciduous conifers. After a while searching for cones, then pondering obscure differences between scales, Dan declared they were indeed Larix lyallii.

Dan Turck excited about finding a new population of subalpine larch (Larix lyallii) in the Cabinet Mountains. The tree on the left is subalpine larch. Photo by Kristin Kaser.

One group of plant enthusiasts pressing the day's collection of plant specimens to preserve them for future study. Photo by Steve Martin.

The extended hike had added an hour and we were anxious to head back to the main group. Dan had notified the foray organizers we would be late as we had service on the top ridge but the lower abandoned lookout lacked cell reception. The main group was planning to head back down and we were hoping to rejoin them. The descent went quickly and we reached them as they were already packed up ready to leave. The trudge back down the side cut hillside was much longer now that we'd familiarized ourselves with the flora, no longer novel, but the setting sun cast a beautiful orange glow from the nearby wildfire onto everything. Once we reached the creek, many refilled their water bottles, but I took my pack off and laid in the water. I don't often get such a lovely reward like a cool creek where I work in the sagebrush steppe on the east side of the state. It was the perfect temperature. After our break, we set out for the van. We made it back before dark and pulled into the foray campsite just as a few concerned members were heading out as a search party. They were very relieved to see us and we talked about our wonderful 13-mile adventure.

Continued on Page 7....

Botanical Conference

Botany 2023 in Boise!

By Barbara Ertter et al, Pahove Chapter

On July 22-26, 2023, over 1,000 members of the Botanical Society of America, American Society of Plant Taxonomists, American Bryological and Lichenological Society, America Fern Society, International Association of Plant Taxonomists, and Society of Herbarium Curators converged on Boise for their annual joint meeting. Held in the recently expanded Boise Centre, this was the second time the meetings were held in Boise, the previous time being in 2014. Dubbed "Botany 2023," and subtitled "One World," the conference attracted participants not only from throughout the United States, but from many other countries around the world.

As can be expected, numerous members of the Idaho Native Plant Society gave talks, led field trips, and otherwise participated in the wide range of available activities. Don Mansfield was tapped to give the Regional Botany Special Lecture, enthralling the audience with the floristic highlights of southwestern Idaho and adjacent Oregon. Other talks and posters by local botanists, including students from BSU, covered topics ranging from goathead control to *Lomatium* taxonomy to historical botanist T. E. Wilcox (the latter also the topic of a recent Pahove presentation: recording at https://youtu.be/ZyEnwPc5rtQ).

Prior to the several days of concurrent sessions, Don led a field trip to Leslie Gulch/Succor Creek, Jim Smith took a group to Snowbank Mountain south of Cascade, and Barbara Ertter and Crista O'Connor had their group ride the chairlift up to Deer Point to walk back down to Bogus Basin lodge. In addition, Barbara organized an informal outing with "Team Abronia" to see the Boise Sand-Verbena (*Abronia mellifera* var. *pahoveorum*). After the conference, Barbara introduced some paleobotanists to the newly installed exhibit at Ponderosa State Park in McCall, focused on the plant fossils discovered in the park. BIG thanks to local coordinator Jim Smith and everyone else who made Botany 2023 possible! •

Botanical Conference

Botany in Action!

By Karie Pappani, Pahove Chapter, Photos by Sean Finn

A call to action was part of the 2023 Botany Conference in Boise. Michael Mancuso, our INPS State President, along with Jim Smith, Director of the Snake River Plains Herbarium; Sean Finn and Danae Falls, Golden Eagle Audubon Society; Helen Fisher, plot lead; and myself, plot lead and INPS Pahove Chapter President, orchestrated a successful activity on Sunday, July 23, kicking off the Conference by getting our hands dirty. We weeded, watered, and monitored our designated plots as part of the Boise River REWild Adopt A Plot. Thirteen individuals took action by participating in the activity. It was a great way to show people from other states about the hard work that is going on to improve riparian habitat along the Boise River corridor for pollinators, birds, and wildlife. •

Botanical Illustration Workshop

Article and Photos by Karie Pappani, Pahove Chapter

I was fortunate to have the opportunity to attend a workshop led by Linda Vorokbick titled "What Makes Botanical Illustration Science." I learned of this opportunity last minute, but I made sure to attend this two hour session on Sunday, July 23. The Botany 2023 Conference offered a grand collection of symposia, workshops, field trips, poster sessions, exhibits, and guest speakers. It was a well done conference. For me, the icing on the cake was this illustration workshop.

Example of Linda's work as a bookmark.

Linda has been an illustrator and a teacher for over 25 years. She shared her tips on how best to illustrate a credible piece of work. Some of these include: using multiple voucher specimens for all drawings, proper scale bars, as much detail as possible with diagnostic characters, and careful selection of colors reflective of actual living plants. It is important that the illustration represents the plant as best possible. To learn more more about her work, you can visit https://www.vorobikbotanicalart.com/. •

Photos of Linda's slideshow presentation.

Idaho Botanical Foray *...Continued from Page 5*

We had a very successful foray. During the three days of botanizing effort, we collected nearly 900 plant specimens. More importantly we were able to establish a great comradery among the 23 participants. Participants came from throughout the state and around the world. We had someone join us from the coast of British Columbia and we had a graduate student from Nigeria. Here is a list of those who participated in the 2023 Idaho Botany Foray: Preston Andrews, Derek Antonelli, Pete Boas, Lorel Boas, Daniel Botello, Lisa Maria Bresett, Beth Corbin, Jennifer Costich-Thompson, George Gehrig, Alma Hanson, Kristin Kaser, Steve Martin, Anna Miera, Phebian Odofuwa, Amy Petersillie, Jim Smith, Jason Smith, Dick Smith, Sandy Smith, Alan Steele, Annie Taylor, Margurite Trost, and Dan Turck.

The Idaho Botany Foray is open to anyone who wants to join us. Novice collectors are especially welcome. If you would like to be informed about future forays, submit a request to the author (ds.ca.antonelli@gmail.com) to be added to the email notification list. •

The Green Gap: Challenges of Protecting Plants Under the Endangered Species Act

By Linda L. Howard, Biology and Society PhD Candidate, UCN Red List Authority, Arizona State University

As we near the end of 2023, it is a time to celebrate with family and friends and look to the future in hopes of a safe, peaceful, and prosperous new year. But this year also marks an auspicious milestone in the legal protection for non-human species: the 50th anniversary of the Endangered Species Act (ESA). On December 28th, 1973, President Nixon signed the ESA, a law that pioneered robust species-based protections in the United States and inspired legislation worldwide. Over the last fifty years, the ESA has shepherded the recovery of 22 plant species and pulled numerous others back from the brink of extinction.[1] More than 1,650 U.S. and nearly 700 international species are currently listed.[2]

In abstract, public popularity for the ESA remains consistently high, with surveys ranking support for the ESA between 70-90%.[3] Unsurprisingly, support declines when people are faced with the impacts and inconveniences of its enforcement. Most vocal, broad opposition to the Act comes from industry and politicians. Efforts to weaken the ESA, though largely unsuccessful, have grown at an alarming pace even as the global biodiversity crisis intensifies. Although plants constitute 59% of domestic ESA species,[2] listed species only represent a small percentage of imperiled plants in the United States. Flaws in the law and its implementation recapitulate the broader challenges to plant conservation: lack of resources, opposition from those industries and activities that imperil plants, and the prevalence of plant perception impairment, aka "Plant Blindness." Although we should celebrate this milestone, it is also an ideal time to address some of the problems and needed changes to help the Act work better for plants.

Historically, the ESA was not the first law targeting species protection in the United States, but it was the first to specifically include the ability to protect plants. The earliest actions towards what we might, in modern parlance, call conservation sought to shield places of unique or uncommon beauty from the excesses of resource extraction. However, the federal designation of national parks and other refugia provided incidental protections to the populations and species living within their boundaries. Arguably, being sessile and seen as an aesthetic part of the landscape, plants may have benefitted more from these protections than their animal counterparts. Still, for both plants and animals, these protections were insufficient, leading to increased efforts to protect species. The ESA is the direct descendant of the 1966 Endangered Species Preservation Act and the 1969 Endangered Species Conservation Act. Both laws sought to stem declines in wildlife and fish species imperiled by a growing human influence on the landscape. These early laws acted as drafts from which the ESA was composed, though the process was not without conflict and controversy.

The ESA was the most sweeping effort to rectify the disregard for human impacts on other species. But even from its inception, the law regarded species hierarchically. Considerable push-back against the inclusion of plants delayed the eventual passage of the ESA by several months. Spearheaded by Alaska Senator Ted Stevens, preliminary drafts of the law excluded all references to flora.[4] Excluding plants was a deliberate choice, not because there was no recognition of botanical extinction risk, but because it was politically expedient and a lack of botanical knowledge complicated enforcement. Interest groups raised concerns that including plants would create challenges for agricultural production, while others feared it would divert resources from animal conservation.

Through its inclusion of plants, the 1973 passage of CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, signaled an end to the rounds of debate on the issue and forced the conversation to shift from whether to include plants, to how to incorporate them and enforce their protection. Anticipating its eventual ratification, legislators resigned themselves to including plants and crafted guidance for the CITES-listed species and domestic plants for ESA listing.[5] Perhaps, due to being removed and added back into the drafts, plants are mentioned fewer times throughout the text, and Section 12, titled "Endangered Plants," consists of only one sentence.[6]

At its most rudimentary, the ESA considers species dichotomously; species are either listed or unlisted, but within those two branches, nuance exists. The ESA defines imperiled species in three ways. First, taxa described as Endangered include "any species which is in danger of extinction throughout all or a significant portion of its range."[6] Listed species can also be labeled as Threatened, described as "any species which is likely to become an endangered species within the foreseeable

future throughout all or a significant portion of its range."[6] The third taxa category is Candidate species that await listing decisions in a limbo-like state of limited, but better than nothing, protections. The candidacy phase acts as a bottleneck for listing and has been used as a political tactic to delay listings. This tactic, coupled with an underfunded and understaffed listing agency, has reduced listings and amplified a backlog of candidates, particularly since the year 2000. Only 27.3% of successful species listings have occurred since 2001, and the average number of listings per year has declined from a pre-millennium average of 36 species to 20 species per year.[7] As a consequence, litigation has increased to force the U.S. Fish & Wildlife Service (USFWS) to address the listing bottleneck and meet the legally required timeline for listing species.

The threshold for listing a species consists of five criteria, any one of which was intended to be sufficient cause to list:

1 "the present or threatened destruction, modification, or curtailment of its habitat or range"
2 "overutilization for commercial, recreational, scientific, or educational purposes"
3 "disease or predation"
4 "the inadequacy of existing regulatory mechanisms"
5 "other natural or manmade factors affecting its continued existence"[6]

Once listed, the hierarchical treatment of species becomes apparent, most notably in the prohibition of "taking" or harming protected animal species without a permit. No such protections were extended to plants until the ESA was amended in 1982, which included a provision prohibiting the harming or removing of listed plant species on federal lands. It was limited to federal lands because plants were considered the property of landowners, while animals were considered transient, common property whose fate was determined by the government. Plants were owned by whoever owned the property on which they grew. Restricting harms to plants on private property was viewed as "federal overreach," harkening back to fundamental arguments about centralized power, but it also reflected the broader ethical premise that plants are primarily resources, left out of discussions granting intrinsic value to non-human species.

A second important distinction between plants and some animal species is the treatment of hybrids, which has been used to deny listing and to de-list several plant species. The definition of species in the text of the ESA is "any subspecies of fish and wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature."[6] By excluding plants and invertebrates in the wording of the definition, "distinct population segment" can be interpreted to exclude plant hybrids. Although the literature doesn't agree to what extent, most sources concur that nonanthropogenic hybridization is an important form of speciation in plants[8,9] and one that inherently creates rare taxa subject to stochastic threats.

With the passage of the ESA, the Smithsonian Institute was tasked with creating a list of plant species thought to need federal protection. Titled "Threatened and Endangered Species of the United States," the list from the Smithsonian proposed over 3,000 plant species for listing. From that original proposal in 1975, 23% have been listed. Of the current 971 ESA-listed plant species, 635 were on that original list, though many took decades to achieve listing.

The Idaho contingent from the Smithsonian list consisted of 60 taxa. Of those, two have been granted ESA protections as threatened species, *Mirabilis macfarlanei* (MacFarlane's four-o'clock), listed in 1979, and *Silene spaldingii* (Spalding's catchfly), which was finally listed in 2001, twenty-six years after its initial candidacy proposal. In the years between the publication of the Smithsonian list in 1975 and its eventual listing in 2001, Spalding's catchfly existed in a common but unenviable position of federal conservation limbo, waiting for a final listing decision far longer than the median listing time of 12.1 years.[10]

Of the 60 Idaho species proposed as part of the original Smithsonian list, 20 were described by the USFWS during the 1993 bulk review as listable.[11] Seven were assigned Category 1, meaning sufficient evidence was available to list, but species were considered low priority for listing, aka warranted but precluded.[11] The remaining 13 were ranked as Category 2, meaning listing is likely warranted, but insufficient evidence was available to list at the time of the decision.[11] In the NatureServe rankings for imperilment, 8 of those 20 have been most recently ranked as Critically Imperiled or Imperiled. Although not an exact proxy for listing suitability, threat rankings offer a snapshot of imperilment and a means of identifying potentially overlooked species for conservation actions, including but not limited to ESA listing.

Three notable Idaho species have been removed from listing consideration during the last decade: *Castilleja christii* (Christ's paintbrush), *Astragalus anserinus* (Goose Creek milkvetch), and

Continued on Page 10....

Astragalus cusickii var. *packardiae* (Packard's milkvetch). Each of the removed species was excluded for similar reasons. The USFWS described their removal as "Due to the species being in a conservation agreement and the best available information on biological vulnerability and threats is insufficient to support a conclusion that the species warrants listing as a threatened species or an endangered species."[12] All three species are subject to threats from grazing, off-road vehicles, non-native species, and fires.[13,14,15] Both *Castilleja christii* and *Astragalus cusickii* var. *packardiae* are ranked by NatureServe as Critically Imperiled, while A*stragalus anserinus* was most recently ranked as Imperiled by NatureServe.[13] All three species are rare and vulnerable to multiple common threats. Only time will tell if existing conservation agreements are sufficiently robust to prevent their slide towards extinction.

My criticisms of the Endangered Species Act come from a desire to improve it, particularly for plants, and to see the law be a viable and vital part of plant conservation for another 50 years. The ESA has reduced extinction risk for those plant species who are successfully listed, but far too many imperiled species are rejected or slip through the cracks. Plants are crucial parts of nearly every biome on the planet, and in the coming years, more plant species will need even greater protection. If we are to protect plants from extinction, the Endangered Species Act must be part of a suite of solutions addressing the needs of plants on a changing planet. •

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ESA Anniversary Report - Threatened Species

MacFarlane's four-o'clock (*Mirabilis macfarlanei*)

MacFarlane's four-o'clock (*Mirabilis macfarlanei)* is a perennial wildflower with large clusters of bright magenta flowers. MacFarlane's four-o'clock can be found in steep river canyon grassland habitats.There are thirteen known populations of MacFarlane's four-o'clock and ten of those exist in Idaho.

Threatened, First Listed Plant in Idaho

MacFarlane's four-o'clock was originally listed as Endangered in the Endangered Species Act (ESA) in 1979. Resulting from ongoing recovery efforts and the discovery of new populations, MacFarlane's four-o'clock was downlisted to Threatened in 1996. Five-Year Status Reviews indicate that the population is stable, but despite ongoing annual survey efforts, no new populations have been discovered. The most recent Five-Year Status Re-

view was completed in 2015 and a new one was initiated in 2020. (https://species.idaho.gov/other-species-info/-macfarlanes-four-oclock/)

The main threat to MacFarlane's four-o'clock continues to be invasive non-native plant species like cheatgrass, yellow starthistle, dalmation toadflax, and rush skeletonweed. The exotic species compete with MacFarlane's four-o'clock for space, light, water, and nutrients, and the presence of cheatgrass can drastically increase the frequency and intensity of wildfires. While the 2015 Five-Year Status Review states that MacFarlane's four-o'clock is not in immediate threat of extinction, it also emphasizes that populations are not secure from habitat degradation threats caused by invasive nonnative species and increase of wildfires. (https://species.idaho.gov/other-species-info/macfarlanes-four-oclock/) •

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ESA Anniversary Report - Threatened Species

Spalding's catchfly (*Silene spaldingii*)

Spalding's catchfly (*Silene spaldingii*) is a perennial with green to white to pinkish flowers with sticky hairs on the leaves, stems, and flower bracts that trap insects. It is found in the Palouse Region of Washington, Oregon, and Idaho, and in northwestern Montana and adjacent British Columbia. It is found in grasslands, sagebrush steppe, and sometimes open forest at elevations ranging from 1,900 to 3,600 feet. Spalding's catchfly was listed as threatened in 2001.

Threatened, but with a Promising Success Story

Threats include loss of habitat due to human development, habitat degradation, off-road vehicle use, livestock grazing, fire, and invasive non-native plants. A recovery plan for Spalding's catchfly was finalized in 2007. Management actions are in place. Read more about this species' progress in the article on Page 14. •

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Slickspot Peppergrass (*Lepidium papilliferum)*

Slickspot peppergrass (*Lepidium pappiliferum)* grows as a an annual or a biennial plant. There are many clusters of pretty white flowers on each plant. It is found in soil inclusions known as slickspots in sagebrush steppe habitats of southwest Idaho.

Slickspot peppergrass was first listed by the U.S. Fish and Wildlife Service in 2009 as a Threatened species under the Endangered Species Act of 1973, as amended (74 FR 52014) due to two primary threats: the increased frequency and intensity of wildfire and the introduction and spread of invasive non-native plants. The Idaho District Court vacated the decision to list the species on August 8, 2012, and remanded the final rule to the Service to reconsider the definition of "foreseeable future" for this species. Slickspot peppergrass was reinstated as Threatened (81 FR 55058) effective September 16, 2016. (https://ecos.fws.gov/ServCat/DownloadFile/169600)

Threatened, New Draft Recovery Plan Open for Public Comment

Threats to slickspot peppergrass are habitat destruction; decline and fragmentation from agricultural and urban development; activities associated with, and grazing by, domestic livestock; competition from non-native vegetation; alterations of the natural fire cycle; and fire rehabilitation activities (https://www.fws.gov/species-publication-action/endangered-and-threatened-wildlife-and-plants-listing-plant-lepidium).

Roughly 78,000 acres of critical habitat for this species was designated in 2023. A draft recovery plan is out for comment currently. Please submit any comments by January 3, 2024 (https://www.fws.gov/story/2023-11/slickspot-peppergrass-recovery-planning). •

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Ute Ladies'-Tresses (*Spiranthes diluvialis)*

Photo by Lynn Kinter.

Ute ladies'-tresses (*Spiranthes diluvialis*) is an orchid with white or ivory colored flowers in a many flowered spike, glandular-pubescent stems, and leaves largest near the base and progressively smaller further up the stem. It grows specifically in riparian areas (moist meadows, gravel bars, high flow channels, sloughs, and river terraces.) In Idaho, it occurs in the floodplains of the Henry's Fork and the South Fork of the Snake Rivers (Miller 2021). This species is found in several other states.

Ute ladies'-tresses was listed as Threatened in 1992. Threats to this plant are non-native plants, water management, drought, flooding, livestock grazing, roads, urbanization, and recreation activities. The U.S. Fish and Wildlife Service (USFWS) is now recommending that Ute ladies'-tresses be delisted due to recovery. These determinations came after a Species Status Assessment Report and 5 Year Review were completed in June and August of this year. This species was found to be resilient enough to withstand disruptions to the population. Also, the USFWS states that there are no significant portions of the species range that are threatened or endangered. The rulemaking process will be initiated soon to move forward with delisting this species.

Listed as Threatened, Recommended for Delisting

Very recent findings concerning Ute ladies'-tresses in Idaho have been reported by botanists Jennifer Miller, Lynn Kinter and Rose Lehman. Jennifer Miller, Plant Research Ecologist with the Idaho Department of Fish and Game (IDFG), led assessments on Ute ladies'-tresses at the Sand Creek Wildlife Management Area, Chester Wetlands Segment, in 2023. Roughly 1,000 plants were observed. According to Jennifer, "In recent years (2014, 2018, 2021 and 2022), we've found new plants a short ways outside the previously mapped sub-pops, but this year we were seeing them much further away. We also found a new sub-pop!" The BLM also did a full assessment at Fisher Bottoms and partial counts from a couple other areas. Jennifer, along with Lynn Kinter, botanist at IDFG, have also conducted recent surveys at Cartier Slough WMA (Wildlife Management Area) and Deer Park WMU (Wildlife Mitigation Unit). Rose Lehman, botanist with the U.S. Forest Service, has also reported a recently found large (over 500 plants!) expansion of the Ute ladies'-tresses occurrence below Palisades Dam (Leahman 2023). •

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Idaho's Intriguing Orchids, by Lynn Kinter, *Sage Notes*, September 2016 https://idahonativeplants.org/wp-content/uploads/2018/02/SageNotesSeptember2016-Revised.pdf

A Guide to Ute ladies'-tresses in Idaho, by Jennifer Miller, Idaho Department of Fish & Game, November 2021

Ute Ladies'-Tresses (*Spiranthes diluvialis*) below Palisades Dam (also referred to as the Tag Alder Creek Area): A summary of 2023 Findings, by Rose Leahman, Caribou-Targhee National Forest and Curlew National Grassland, November 2023

Spalding's Catchfly Recovery on the Palouse—Paradise Ridge

By Brenda Erhardt, Conservation Planner, Latah Soil & Water Conservation District, and White Pine Chapter

Since 2013, the Latah Soil and Water Conservation District (Latah SWCD) has been involved in the recovery effort for Spalding's catchfly (*Silene spaldingii)*, an ESA-listed plant. To date, Latah SWCD has planted 3,118 Spalding's catchfly to support U.S. Fish and Wildlife Service's (USFWS) recovery efforts within the Paradise Ridge/Gormsen Butte Key Conservation Area (Paradise KCA) in Latah County, ID. One of the Spalding's catchfly recovery plan goals is to maintain a minimum of 27 populations with at least 500 reproducing Spalding's catchfly plants per a minimum of 27 KCAs throughout Spalding's catchfly's range (USFWS 2007). The Paradise KCA is one of 3 KCAs in the Palouse Grasslands physiographic region and is a critical location for the recovery of this rare plant.

Spalding's catchfly plants were not found to occur naturally within this KCA prior to the start of transplanting efforts in 2013. However, the site was chosen as a KCA and recommended for recovery plantings through the coordinated efforts of Latah SWCD, USFWS, and the Spalding's catchfly technical team given the limited quantity and quality of intact Palouse Prairie remnants containing suitable habitat. Most of the original Palouse grasslands have been converted to agriculture, are privately owned, and are highly fragmented. The Paradise KCA has multiple private landowners dedicated to Palouse Prairie preservation and restoration. All properties where Spalding's catchfly is planted are currently placed in conservation easements, owned by a conservation agency (Palouse Land Trust), or owned by conservation-minded landowners who have given permission to plant Spalding's catchfly on their property.

Spalding's catchfly recovery goals for the Paradise KCA include establishing 500 individual plants within the Paradise KCA and future monitoring should show an upward trending or stable trajectory of the population. Starting from zero plants in 2013, monitoring results through spring 2022 now show that we have 618 Spalding's catchfly currently growing in the KCA. Spalding's catchfly is a plant sensitive to its surroundings and is difficult to establish from plants and/or seed. Therefore, achieving the goal of over 500 plants on the KCA is a satisfying milestone and efforts will continue to ensure that this number continues to grow to allow for the Paradise KCA population to contribute to the ultimate recovery of Spalding's catchfly throughout its range. More details on Latah SWCD's Spalding's catchfly planting and monitoring efforts can be found in the Latah SWCD Spalding's catchfly planting and monitoring protocols and reports on the Resources page on the Latah SWCD website (https://www.latahswcd.org). •

Whitebark Pine (*Pinus albicaulis*)

Idaho's Newest Threatened Plant under ESA

Whitebark pine (*Pinus albicaulis*) is a tree with bundles of five needles, thin, scaly, grayish bark, and separate male and female cones on the same tree. This long-lived tree can live from 500 to over 1,000 years and grow up to 66 feet tall. It may be confused with limber pine (see reference on how to distinguish tree species). Whitebark pine is a climax species in montane forests at high elevations, up to 12,000 feet. It can be found in central

and northern Idaho. Threats to whitebark pine are mortality caused by the non-native white pine blister rust, impacts from altered fire regimes, and climate change. Whitebark pine was a Candidate species for listing dating back to 2011. This plant was then updated to proposed Threatened in 2020 and officially listed as Threatened on December 15, 2022. It is the most recently listed species in Idaho. •

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ESA Anniversary Report - Removed Species

Christ's Paintbrush (*Castilleja christii*)

Photos by Lynn Kinter.

Christ's paintbrush (*Castilleja christii*) is a showy, yellow to yellowish-orange flowered perennial endemic to a single population on Mt. Harrison in the Albion Mountains of Cassia County, Idaho, where it occurs in subalpine meadow and mountain sagebrush communities. Christ's paintbrush was designated as a Candidate species under the Endangered Species Act in 1980. A Candidate Conservation Agreement was put in place in 2005 and subsequent actions have greatly reduced livestock grazing, off-road vehicle, and recreation-related threats to the species. In addition, weed control efforts have greatly reduced the abundance of the non-native rhizomatous grass smooth brome within the population. These actions contributed to Christ's paintbrush being removed from Candidate status in 2012. •

Removed from Candidate List in 2012

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Keeping Mt. Harrison Colorful, by Karen Colson
https://idahonativeplants.org/wp-content/uploads/2022/04/SageNotesMarch2022.pdf

Packard's Milkvetch (*Astragalus packardiae*)

Packard's milkvetch (*Astragalus packardiae*) is an erect perennial with sparse foliage, light-purplish flowers and inflated, yellow-green to sometimes red-mottled fruit pods. It is endemic to an approximately 10-square mile area in the northeastern corner of Payette County where it grows on distinctive whitish, sparsely vegetated outcrops surrounded by what was historically shrub-steppe habitat. Packard's milkvetch was designated a candidate for listing as Endangered or Threatened in 2010.

Removed from Candidate List in 2014

Threats to the species included disturbances and alterations to its habitat from off-road motorcycles, livestock grazing, wildfire, and weed invasion. A series of conservation actions and management plans outlined in a Candidate Conservation Agreement between the USFWS and BLM led to Packard's milkvetch being removed from Candidate status in 2014. •

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Goose Creek milkvetch (*Astragalus anserinus*)

Goose Creek milkvetch (*Astragalus anserinus*) is a mat forming perennial forb with pink to purple showy pea-like flowers and grayish leaves. It is found in an approximately 100 square-mile area of the Goose Creek drainage centered near the three-corners common border of Idaho, Utah, and Nevada. It occurs on soils formed from volcanic tuff in open sagebrush-steppe or Utah juniper communities from 5,000 to nearly 6,000 feet elevation. Goose Creek milkvetch was designated a Candidate species under the Endangered Species Act in 2009. Threats include an altered wildfire regime, firefighting and post-fire disturbances, invasive annual weeds, livestock trampling, habitat degradation, and restoration activities. Goose Creek milkvetch was removed from candidate status in 2015. •

Removed from Candidate List in 2015

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ESA Anniversary Report - Delisted Species

Water Howelia (*Howellia aquatilis*)

Water howellia (*Howellia aquatilis*) is a winter annual with branched, submerged, or floating stems. White to light purple trumpet shaped flowers can be seen at or above the surface of the water. It grows in freshwater wetlands and ponds that were once associated with glacial potholes and former river oxbows that flood in the spring, but usually dry at least partially by late summer (https://www.fws.gov/species/water-howellia-howellia-aquatilis).

Water howelia is endemic to the Pacific Northwest and found in California, Idaho, Montana, and Washington. Threats to this plant include invasive plants, such as reed canarygrass; climate change; modifications to hydrology, such as conversion of wetland systems; urban development; timber harvesting; and livestock use of wetlands. (https://explorer.natureserve.org/Taxon/ELEMENT_-GLOBAL.2.136199/Howellia_aquatilis, https://www.fs.usda.gov/wildflowers/Rare_Plants/profiles/TEP/howellia_aquatilis/index.shtml).

Delisted Species

Water howellia was proposed for listing as Threatened in 1993, determined to be Threatened in 1994, initiated as a draft recovery plan in 1996, underwent a Five Year Review in 2007, and was removed from listing (officially delisted) in 2021. •

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Pollination Insights for *Astragalus mulfordiae*

By Clara Buchholtz, PhD candidate in Ecology, Evolution, and Behavior, Boise State University

Introduction

Narrow endemic plants are especially vulnerable to extinction due in part to their limited range sizes and often narrow niches and low reproductive output (Holmes et al. 2008, Harnik et al 2012, Enquist et al. 2019). Knowledge about their reproductive biology is fundamental to both in situ and ex situ conservation efforts, but remains lacking for many species (Weller 1994). This information is especially important for plants that rely on pollinators for reproduction because their conservation needs must also encompass the needs of their pollinators. These may include surrounding nutritional and nesting resources or protection from insecticides, and often these extend beyond the boundaries of the plant populations (Nicolson & Wright 2017).

Not Listed But the Future Outlook is Grim

Astragalus mulfordiae growing in the Boise Foothills. Photo by Clara Buchholtz.

In April 2022 we began work to fill knowledge gaps about the reproductive ecology of *Astragalus mulfordiae*, a rare species that has been of conservation concern for many years. Our objectives were to 1) identify whether *A. mulfordiae* relies on pollinators for reproduction, 2) identify its likely pollinator species within two regions of its range: the peri-urban Boise Foothills and rural-agricultural Owyhee Front, and 3) evaluate sources of disturbance in its habitat at scales relevant to both *A. mulfordiae* populations and insect pollinators.

Astragalus mulfordiae

Astragalus mulfordiae is a perennial forb in the legume family (Fabaceae). It is endemic to the Snake River Plain of southwestern Idaho and eastern Oregon where its range encompasses an approximately 100 x 100 mile area (Pyramid Botanical Consultants 2019). It grows with a deep taproot in loose sandy soils, often on dry south and west-facing slopes dominated by mixed desert shrub species (Moseley 1989). It emerges in early spring, with its flowering time usually occurring between April and late June. Reproductive output is quite variable, with large and mature plants capable of producing many hundreds of flowers and fruit. Prior to this study, little was known about its reproductive biology or relationship with pollinators.

A. mulfordiae is a BLM Type 2 special status plant, indicating that it is imperiled throughout its range and has a high likelihood of being petitioned for federal listing (Pyramid Botanical Consultants 2019). A formal monitoring program was initiated in Idaho in the late 1990s, and recent re-surveys have shown steep declines in its populations (Mancuso 2001, Pyramid Botanical Consultants 2019, Mancuso & Brabec 2019). Contributing factors include habitat loss and degradation stemming from multiple sources such as development, agriculture, and recreation (Mancuso 2001, Pyramid Botanical Consultants 2019, Mancuso & Brabec 2019).

Study Locations

Our project included six study sites, with three in the Boise Foothills and three in the Owyhee Front. The Boise Foothills sites fell within the City of Boise and were near residential areas and greenspaces popular for

Kylie Stear (City of Boise intern and BSU student) collecting pollinator exclusion experiment data. Photo by Clara Buchholtz.

outdoor recreation activities such as hiking, mountain biking, and dog-walking. The Owyhee Front sites were along the Snake River in Owyhee County and were near agricultural operations (primarily corn and alfalfa), as well as recreational activities along the river.

Methods

Clara Buchholtz setting up the pollinator exclusion experiment. Photo by Helina Alvarez.

We initiated the pollinator exclusion experiment in April 2022, with data collection continuing through the first week of July. The experiment compared fruit and seed production on inflorescences excluded from pollinators with tulle fabric bags to open-pollinated control inflorescences. We estimated the likelihood of fruit and seed production in each treatment using generalized linear mixed models with binomial distributions and logit-link functions. In our models, we also controlled for variation that may have been due to differences in sites and plants.

To identify likely pollinators of *A. mulfordiae*, we collected insects that contacted the reproductive parts of *A. mulfordiae* flowers during a series of observation periods at each site. We identified these insects using dichotomous keys, and with the generous guidance of Boise State personnel including Ian Robertson and Emily Sun. Many of the specimens were bees from the family Megachilidae, which can be notoriously difficult to accurately identify to species. For these and other challenging species-level identifications we contracted with taxonomist Skyler Burrows.

Collecting pollinators from A. mulfordiae. Photo by Clara Buchholtz.

We collected anthropogenic disturbance data for each site using existing data products (such as land cover classification maps) and GIS software. This data comprised 12 variables, falling within the categories of agriculture, development, ground cover, and fire. We considered two different scales for our disturbance measurements: the plant scale (measured as the plant population boundary), and the foraging insect scale (a buffer around each plant population based on an estimate of likely foraging distances from Cane 2001).

Results

Our pollinator exclusion experiment showed that *A. mulfordiae* is highly reliant on pollinators for reproduction. Flowers receiving the exclusion treatment had only a 2.1% likelihood of producing fruit, as compared to a 25.4% for those in the random control and 30.4% for those in the tagged control. Our seed set analysis showed that the small number of fruits that were produced in the exclusion experiment had no difference in the likelihood of producing seeds, with around 30% of ovules developing into seeds across all treatments.

Seed set in a fruit collected from A. mulfordiae. Photo by Clara Buchholtz.

In total, we collected 155 floral visitors from *A. mulfordiae*, representing 4 taxonomic orders, and at least 9 families, 16 genera, and 33 species. The most abundant *A. mulfordiae* visitors at each site were mason bees from the genus *Osmia*, which comprised 108 of the total 155 specimens, and represented at least 22 species. The most abundant of the *Osmia* were *Osmia albolateralis* (35 specimens), *Osmia* aff. *clarescens* (24 specimens), and *Osmia nigrifrons* (14 specimens). The abundance and richness of *Osmia* species we collected at each site differed, with the Boise Front showing overall greater richness and abundance of insect visitors.

Our disturbance data showed that sites differed with regards to agricultural, development, ground cover, and fire disturbances. Overall, the Owyhee Front sites had higher exposure to agriculture-related disturbances. For example, two Owyhee sites showed notably higher risk for exposure to insecticides relative to all other sites. Disturbances related to human development, such as the coverage of impervious surfaces like pavement and proximity to roads, were predictably higher for the Boise Foothills sites. Measures for ground cover showed less variation, and metrics such as invasive annual grasses had high coverage at sites. Fire history differed between sites, with those in the Owyhee Front generally having more recent and frequent exposure to fires than those in the Boise Foothills.

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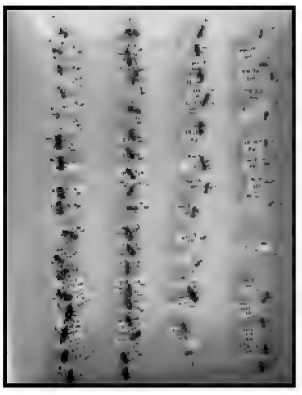
Discussion

Results from the pollinator exclusion experiment suggest *A. mulfordiae* relies on pollinators for reproduction, and its fruit production is significantly reduced when pollinator visitation is diminished. However, the small number of fruits the plants produced in the exclusion treatment showed no significant reduction in seed set, suggesting that *A. mulfordiae* may be weakly self-compatible. The full details of *A. mulfordiae*'s mating system remain unknown because it is possible for plants to be self-compatible but still require a floral visitor to trip flower structures to release pollen. Such a mechanism is sometimes found within the *Astragalus* genus (Soltani et al. 2021). However, an experiment with a more extensive set of pollination treatments would be needed to determine which system applies for *A. mulfordiae*.



Some of the insects collected from A. mulfordiae flowers. Photo by Clara Buchholtz.

The results from our insect collections suggest that *Osmia* species are likely important pollinators for *A. mulfordiae*. However, *A. mulfordiae* also appears to attract a diversity of other insect visitors. This aligns with findings for other *Astragalus* species, many of which have plant-pollinator relationships with bees from the family Megachilidae, including *Osmia* (Watrous & Cane 2011, Soltani et al. 2022, Schurr et al. 2019). Differences in the species of visitors between sites indicate that local pollinator networks may differ substantially from one another, with the possibility that some are more vulnerable to disruption than others. For example, a single species (*Osmia albolateralis*) made up nearly two thirds of the visitors to *A. mulfordiae* at one of the Owyhee Front sites. Disruption to *A. mulfordiae*'s relationship with this species would likely be more detrimental to plants at this site than at sites where no single species of visitor dominated so heavily.

Our disturbance data showed that disturbances known to impact both plants and pollinators were prevalent although distributed differently across our study sites. Impacts from fire as well as agriculture (particularly pesticide use) likely pose a higher threat to Owyhee populations, while human development stressors are more prevalent in the Boise Foothills. Taken together, the evidence from the pollinator exclusion experiment, insect visitor identifications, and disturbance data, suggest that considering the site-specific threats facing surrounding pollinator communities, and in particular the needs of species in the genus *Osmia*, is an important dimension to conserving and restoring *A. mulfordiae* populations. •

Acknowledgements

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Salvaging Abronia mellifera var. *pahoveorum*

By Barbara Ertter et al., Pahove Chapter

In the early morning of Thursday, June 15, the handful of cars driving up the Bogus Basin Road were presented with a puzzle: Why were five people kneeling on the curb at one location, engrossed in some mysterious activity? What was happening was an impromptu salvage effort of otherwise doomed and/or superfluous seedlings of the Boise Sand-Verbena (*Abronia mellifera* var. *pahoveorum*). This beautiful but extremely rare plant, restricted to the foothills between New Plymouth and Lucky Peak Dam, was only recognized as a distinct variety in 2016 (see "A Big Welcome to Idaho's Newest Rare Plant!", *Sage Notes* 38[2]: 8—9, 2016).

Due to its recent appearance in the conservation arena, very little is currently known about the Boise sand-verbena's requirements and reasons for rarity, other than can be deduced from general observations. It is apparently a relatively short-lived perennial, occurring as scattered populations that can fluctuate dramatically from year to year. Periodic recruitment from the seedbank is evidently critical, in combination with sporadic dispersal between the loose sandy sites that are the plant's preferred habitat. Alas, these habitats have been disappearing from the Boise Front, mostly because of conversion to invasive non-native grassland or to prime real estate development.

One of the Boise Foothills Rarest Plants: Not Listed, But Should It Be?

To hammer home just how rare the Boise sand-verbena is, the sobering reality is that the bumper crop of seedlings that happened to germinate at this particular roadside site in 2023, serendipitously noticed by Barbara Ertter, outnumbered all the currently known adult plants in existence. And most were doomed if left alone, either because of overcrowding or because they were within the "death zone" of routine highway maintenance. And yet this same bare zone resulting from highway maintenance was providing exactly the right conditions for germination, at least this spring. Fortuitously, an arrangement had recently been made for Daniel Murphy to attempt propagation of the Boise Sand-verbena at the Idaho Botanical Garden, with the hope of augmenting and re-establishing populations on land managed by the Boise City Department of Parks & Recreation. Daniel's initial efforts at seed germination had only limited success, possibly because of a late start, so the opportunity to jump-start the program with seedlings that needed salvaging was a godsend.

A quick flurry of emails ensued among Barbara, Daniel, and Boise Parks and Recreation Ecologist Martha Brabec, to decide when the three of us could rendezvous for a salvage effort, assisted by Erin Manzutto and

Continued on Page 22....

Dylan Werlinger. And so there we were, lined up along the Bogus Basin Road on a delightfully chilly morning, doing what we could to give these struggling seedlings a chance to carry their species into the future. Dozens of baby sand-verbena are now under Daniel's care at IBG, in the company of other rare sand-verbena that Daniel is also ministering to. This includes the related Yellowstone Sand-verbena, a globally imperiled species found only on the shores of Yellowstone Lake. We wish these seedlings the best of luck, and hope that one day they and their progeny will one day repopulate the Boise Front with their fragrant snowballs of night-blooming flowers. •

2024 Education, Research, and Inventory Grant Program

By Steve Rust, ERIG Committee Chair

To support its mission Idaho Native Plant Society (INPS) annually grants awards through the Education, Research, and Inventory Grant (ERIG) Program. Since 2005 INPS has awarded over $30,000 in grants of up to $1000 that stimulate and lend support to educational, research, and conservation activities that promote an appreciation for native plants and plant communities in Idaho. Continuing in that tradition in 2024, INPS will partner with projects that contribute to the appreciation, conservation, and knowledge of Idaho's native flora and vegetation. Idaho Native Plant Society encourages you to submit a proposal for projects that may qualify. The deadline for submitting proposals is February 15, 2024.

Grant Guidelines: The ERIG program is intended to support direct project costs. Grant proposals should not include expenses for salary and personnel benefits, the purchase of personal equipment, equipment not dedicated to the project, or other expenses not essential to the project. Indirect costs such as administrative costs will not be funded. Expenditures shall be verified by receipt submittals. Here are some examples of costs the grant may cover:

- Direct costs of travel, meals, and lodging for the project.
- Supply and service expenses used for the sole purpose of the project (e.g., native plant material, interpretive signs, lab materials).
- Printing costs for public outreach material or research publications.

Application Procedure and Requirements: Proposals must contain the following information, as line items, in the application. Please be succinct:

1. Project Title.
2. Contact Information: Name, address, phone number, organization/affiliation, and email address.
3. Project Description:
   a. Outline the project objectives, methods, and final product.
   b. Explain how the project will benefit the appreciation, conservation, or knowledge of Idaho's native flora.
   c. Where applicable, will there be public access to the project?
   d. Describe how project success will be evaluated.
4. Itemized budget: Outline an overall project budget, including the amount you are requesting (up to $1,000). Include other funding sources.
5. Timeline: Please provide a timeline for completion of all major milestones associated with the project, including presentation of the results.

Project proposals must pertain to native plants of Idaho. Please limit grant requests to a maximum of $1,000 and be aware that less may be awarded due to INPS budget constraints and the number of applications submitted. Recipients of these awards have a timeline of two years from the date of the award to complete their projects. Successful applicants are required to submit a final report to INPS documenting project accomplishments and a summary of the project to be published in the INPS newsletter, *Sage Notes*. INPS membership is not a prerequisite to apply for, or receive, an ERIG grant.

Please submit proposals by email to Steve Rust at srust@naturescap.com (refer to "ERIG proposal" in the subject line) or by mail to: ATTN: ERIG Committee Chair, Idaho Native Plant Society, P.O. Box 9451, Boise, ID 83707. •

ERIG Project Report

The City of Hailey Thanks INPS for ERIG!

By Linda Ries, Wood River Chapter, Hailey Tree Committee, Arboretum Volunteer

The City of Hailey, the Hailey Tree Committee, and the Wood River Chapter of the INPS wish to express their appreciation for the 2022 ERIG grant to fund the creation of sixty-five plant signs that have been placed at the Hailey Native Plant Arboretum. The signs are made of long lasting anodized aluminum. Seven species of trees, eight species of shrubs, 23 species of forbs, and 10 species of grasses are newly signed. These signs have common name, scientific name, some information about the plant, and where it is native. With the addition of these new signs the Arboretum has been utilized more often as visitors take the time to wander the site and read the signage to learn the native plant names. Community volunteers working in the Arboretum have been told many times how much everyone loves and appreciates the new signage! In fact there are "regulars" who walk through the Arboretum just to see what is in bloom! This summer a local nature journaling club was given a tour of the Arboretum and a chance to draw and paint from living specimens. In addition to the new signage, a lovely stone bench has been placed in memory of long time INPS member, Wood River Chapter President and highly esteemed botanist Carol Blackburn. The bench is tucked under two large Douglas firs, one of which Carol donated in 1996!

There is great potential for research opportunities at this Arboretum site to demonstrate to the public more about native plants and their adaptations, and there is a local opportunity to showcase species that are tough and drought-tolerant for use in urban landscapes. Many species in the Arboretum have thrived with only drip irrigation or no irrigation at all. Examples of some of these durable species include curl leaf mountain mahogany (*Cercocarpus ledifolius*), oneseed juniper (*Juniperus monosperma*), Utah juniper (*Juniperus utahensis*), Rocky Mountain juniper (*Juniperus scopulorum*), Gambel oak (*Quercus gambelii*), sulfur buckwheat (*Eriogonum umbellatum*), Wyeth's buckwheat (*Eriogonum heracleoides*) and several species of *Penstemon*. The Arboretum is an ideal location to observe and learn more about native species of Idaho, the Great Basin, and the Rocky Mountains. Local native landscapers and arborists go there to collect native plant seed and also visit the site with their clients to look at mature native plants. The Arboretum is the only site in Hailey which has both the Idaho State Tree western white pine (*Pinus monticola*) and the Idaho State Flower syringa (*Philadelphus lewisii)* for students and the public to observe and learn about. The Arboretum attracts many pollinators, especially native bees, and deer, elk, moose, and several species of birds have been seen. •

Wyeth's buckwheat (Eriogonum heracleoides).

Penstemon venustus.

Tiger swallowtail butterfly on syringa (Philadelphus lewisii).

Greater Cultural Diversity Needed in Ecological Restoration Projects

By Sidney Fellows and Christina Stucker-Gassi

The Northwest Center for Alternatives to Pesticides (NCAP) is celebrating a decade of on-farm habitat work that has helped dozens of farmers and ranchers prioritize habitat projects that benefit pollinators and other valuable insects! We have contributed tens of thousands of dollars toward habitat projects that have lasting impacts. Not only do these plants provide vital nectar, pollen, and nesting material for numerous species, they also cycle nutrients and sequester carbon. In addition to these benefits, our work positively contributes to the rise in initiatives to plant more native plants. While we celebrate this work, we want to share with you some guiding thoughts for the next ten years.

Our organization's habitat work will continue to prioritize planting native plants. Intermountain west plant species have long been part of Indigenous communities as food, medicine, materials, and creation stories. In honor of these rich relationships, NCAP's team of Sidney Fellows (Shoshone-Bannock and Chippewa-Cree) and Christina Stucker-Gassi (European American) are taking native plant habitat efforts in new directions. Through collaboration with Sho-Ban tribal citizens and departments, the Fort Hall Native Plant Project was created to indigenize our plant conservation efforts and support Indigenous-led restoration at the Tribes' reservation in what is now Fort Hall, Idaho.

Over the past year, the Fort Hall Native Plant Project aided in restoration and enhancing activities centered around native flora on the reservation to advance tribal-led priorities of land management, exercising tribal plant knowledge, and strengthening human-plant relationships. This work has provided us the opportunity to better prioritize the human-nature relationships that tribal citizens often understand to be the backbone of ecological restoration and conservation efforts. The Sho-Ban tribal community, during our team's work with tribal departments to implement native plant habitat, communicated their interest in incorporating tribal values into our team's conservation efforts. These tribal priorities complement NCAP's work that encompasses wilderness protection, river and wetland conservation, and biodiversity conservation through native habitat installations. The Tribes' guidance to integrate their cultural values into our conservation efforts represents valuable innovation in conservation.

Our habitat team is contemplating how the cultural keystone species concept can guide our team's part within the conservation community to incorporate diverse social values. Ann Garibaldi and Nancy Turner introduced and defined the concept as the culturally salient species, such as plants or animals, that "shape in a major way the cultural identity of a people." Even the Endangered Species Act, which is among the best pieces of federal legislation we have to support ecological restoration activities, has continually undermined tribal sovereignty and cultural identity. We are learning that good ecological restoration restores both social and ecological systems. Restoration efforts can prioritize, and therefore help maintain, Indigenous social, ecological, political, epistemological, and moral systems through implementing efforts like the cultural keystone species concept. In this way, ecological restoration can be a path that exudes goodness and diverse expansion. Through purposeful diversification, restoration can go beyond restoring ecological systems by uplifting tribal sovereignty, honoring different cultural values, and strengthening human-nature relationships. •

CALYPSO CHAPTER

The public is invited to all chapter activities. All chapter activities are subject to change—watch chapter emails for updates. Contact Derek to be added to email list.

When: Chapter meetings are held on the first Wednesday evenings of March, April, May, and October.

Where: Meetings will be held in the Idaho Fish and Game (IDFG) Hunter Education Building, 2885 W Kathleen Ave, Coeur d'Alene.

Contact: For more information about Calypso Chapter activities, contact Derek Antonelli, ds.ca.antonelli@gmail.com, (208) 691-1070.

Upcoming Events

March 6: Calypso Chapter meeting. 7:00 pm. The presentation topic for this meeting has not been determined yet. Please submit topic suggestions.

April 3: Calypso Chapter meeting, 7:00 pm. The presentation topic for this meeting has not been determined yet. Please submit topic suggestions.

April 27: Farragut State Park Hike. Meeting point and time to be determined.

May 1: Calypso Chapter meeting, 7:00 pm. The presentation topic for this meeting has not been determined yet. Please submit topic suggestions.

May 17: Lost Lake Hike. Meeting point and time to be determined.

May 31: Rathdrum Mountain Park Hike. Meeting time to be determined.

June 14 to 17: INPS Annual Campout and Meeting, Farragut State Park. Calypso Chapter is hosting this year.

LOASA CHAPTER

When: Meetings are held third Thursday of each month at 7:00 p.m.

Where: Taylor Building, Room 247, College of Southern Idaho, Twin Falls.

Contact: Bill Bridges, bridgesbill34@yahoo.com

PAHOVE CHAPTER

When: Chapter meetings with intriguing presentations are held the second Tuesday of each month from October–April starting at 7:00 pm. Times, dates, and topics are tentative. Current information will be sent to members via email. Announcements are also posted on the Pahove Chapter page of the INPS website: https://idahonativeplants.org/pahove/

Where: Chapter presentations currently offer hybrid viewing formats, both in-person at MK Nature Center in Boise and a Zoom link for at-home enjoyment.

Contact: For more information about Pahove Chapter activities visit the website: www.idahonativeplants.org or email Karie Pappani at pahove.chapter.president@gmail.com.

Past Events

September 26: The Pahove Chapter hosted a season kick-off party at Smokey Mountain Pizzeria and Grill in Boise. The event was well attended. Pizza, beverages, and great conversation were enjoyed by all. Additionally, we had a seed exchange table set up in the corner of the pizzeria patio. Many seeds were swapped including native plants (biscuitroots, bee plants, milkweeds, and more!), garden veggies, and even a few tropical species for the indoor plant lover.

October 10: Carole Prentice and Barbara Ertter gave a wonderful presentation filled with local knowledge and great research on Timothy Wilcox, an early botanist who spent time at Fort Boise.

November 14: Kerry Byrne, Cal Poly, presented "Beneath Our Feet: Harnessing the Power of the Soil Seed Bank for Restoration."

December 12: Cathy Ford spoke about the ITD Roadside Pollinator Project.

Upcoming Events

January 9: Richard Rachman, Boise State University, will speak on "Goatheads and Invasives." Susan Ziebarth will add a snippet on "Goatheads: Native to Bosnia and Croatia."

February 13: Michael Mancuso will speak on the 25 Peaks Project.

SAWABI CHAPTER

We welcome the public to our chapter's informative winter programs and warm weather plant walks.

When: All plant walks and winter programs are no longer prescheduled but will be announced via email.

Where: Winter programs are presented in Pond Student Union Building classrooms, ISU Campus, Pocatello.

Contact: For more information contact Paul Allen 208-241-5265 or pokyallen@hotmail.com

UPPER SNAKE CHAPTER (INACTIVE)

Contact: Kristin Kaser, kaser.kristin@gmail.com

WHITE PINE CHAPTER

When: Meetings are typically held the third Thursday of the month, September through April. Current information is posted on our chapter webpage: https://www.whitepineinps.org/WPschedule.html

Where: Meetings are held in-person in the 1912 Center Lecompte Auditorium (2nd floor) in Moscow at 7:00 pm. Video recordings of meetings will be made available on our YouTube Channel a few days after each meeting.
Contact: For more information about White Pine Chapter activities, contact us at INPS, White Pine Chapter, PO Box 8481, Moscow, ID 83843 or whitepine.chapter@gmail.com. Visit the chapter website (https://www.whitepineinps.org/) for upcoming event information and visit our YouTube Channel for video recordings of past talks (https://whitepineinps.org/WPYoutube.html).
Past Events
November 16: Presentation by Chris Duke, Phoenix Conservancy, "Pocket Prairies: Leveraging Small Urban Spaces as Vital Habitat and Seedbanks for Native Plants."
Upcoming Events
January 18: Presentation by Pam Brunsfeld, retired curator of University of Idaho's Stillinger Herbarium, "Superbloom in the Southwestern US."
February 15: Presentation by Eva Strand and Steve Bunting, University of Idaho,"The Importance of Old Trees in Juniper Woodlands."
March 21: Presentation by Aram Aramian, "Breeding and Raising White Pine Blister Rust-Resistant Seedlings."
May 16-18: Native Plant Sale. Latah County Fairgrounds.

WOOD RIVER CHAPTER

When: Typically we have talks in the cold months and walks in the warm ones. Non-members are welcome. Please see our website or email newsletter for information on all programs.
Where: Field trip and talk locations and details will be included with the description, posted online and emailed to members and other interested parties.
Contact: For more information about Wood River Chapter activities: email: woodriverinps@gmail.com; website: https://woodriverinps.wixsite.com/wrinps; phone: Mary (559) 696-9953; to subscribe to the newsletter: email us.
Past Events
November 16: "Native Plants, Native Peoples." Talk by Kristin Fletcher, chapter President and knowledgeable naturalist. Kristin offered a look at ways local native plants supported indigenous peoples to not simply survive but thrive in our harsh climate. In partnership with Hailey Public Library. The talk is available via video at www.haileypubliclibrary.org >Library Programs.
December 2: Annual Fall Potluck share a meal was held at Town Center West with botany bingo played for great prizes. Election of Chapter Officers for 2024 was also held at this time.
Upcoming Events
January 23: "Superbloom 2023." Talk by Pam Brunsfeld. Pam will share her visit to the Antelope Valley Poppy Preserve, Carrizo Plain and the Mojave Desert of southern California, which experienced an exceptional "superbloom" in spring 2023. Pam is the retired University of Idaho Stillinger Herbarium Director and Systematic Botany Instructor. Since retirement she has visited the Southwest deserts every spring to view and learn the flora. She has been able to witness two super blooms. This program will be available via Zoom and, later, by recording. More information on how to get the link will be posted at https://woodriverinps.wixsite.com/wrinps after January 1 and also in our newsletter.
March 21: Presentation by Bob Moseley on the flora of the most floristically diverse temperate ecosystem on earth, the alpine region of Tibet. Bob says "(there are) 200+ species of *Pedicularis*, 180 rhododendron species, 100 primroses etc." In addition to lots of images of flowers and their habitats, Bob will explore the cultural uses and traditions of ethnic groups of the region in his talk. Bob is the author of Khawa Karpo: Tibetan Traditional Knowledge and Biodiversity Conservation. In partnership with Hailey Public Library. The talk will be available for live streaming or, later, via video, at www.haileypubliclibrary.org >Library Programs. 5:30-7:00 pm MT at Town Center West (Hailey, Croy X River Sts).
April TBA: When most of the snow is gone from Murdock Trail in the SNRA, we will host a field trip to see what nature has been up to while snow has been on the ground. Of interest will be basal rosettes of plants, plants with leathery leaves that don't lose their leaves in fall, lichens, trees, birds, animals and whatever our geeky brains find of interest. This walk is rated Easy/Moderate. The trail is good but there are some uneven places, possibly walking in snow, moderate elevation change.
May 25: Opening Day at Silver Creek Preserve. Our chapter will host an information table on plants native to this Nature Conservancy area. New this year: explore interesting plant structures up close and personal with the benefit of the Education Center's dissecting microscopes and assistance from members of our chapter.
June TBA: Plant Identification Class at Silver Creek Preserve education center.
Early to mid June TBA: Members only hike at Silver Creek Preserve. Some surprises, we promise. Bring your binoculars, because you never know what you will see.

IDAHO NATIVE PLANT SOCIETY
PO Box 9451, Boise, ID 83707
www.idahonativeplants.org
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Chapter Affiliation:

□ Calypso (Coeur d'Alene)
□ Loasa (Twin Falls)
□ Pahove (Boise)
□ Sawabi (Pocatello)
□ Upper Snake (Idaho Falls) - *Inactive*
□ White Pine (Moscow)
□ Wood River (Ketchum/Sun Valley)
□ No Chapter

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Please indicate if your membership is: □ New □ Renewal
I would prefer to receive ***Sage Notes***: □ Print □ Electronic □ Both

Send completed form and full remittance to:
Idaho Native Plant Society, P.O. Box 9451, Boise, ID 83707

Memberships run calendar year. New memberships enrolled after June 1 include the following year. ***Renew or join online:*** *https://idahonativeplants.org/membership/*

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https://idahonativeplants.org/sage-notes/