



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

Seed Conservation: A Necessary Tool for Uncertain Future

By Angela C. Sondenaar, PhD, Nez Perce Tribe Wildlife Division

Seeds hold both the history of evolution and a promise for the future. They are miraculous instruments of life-giving DNA all packaged and waiting for their opportunity to emerge from the darkness. Is it any wonder that humans have been fascinated by them for eons? Botanists, and especially modern-day botanists who are staring human-induced climate change straight in the face. Will seeds be our planet's salvation in an uncertain future? The developers of the Millennium Seed Bank Project at Kew Gardens seem to think so, as do the creators of the Svalbard Global Seed Vault located in Norway. I tend to agree with them.

Since 2006 the Nez Perce Tribe has been collecting seeds from locally rare species and depositing them into a regional seed bank dedicated to the conservation of rare plants. This seed bank was initially started as the Berry Botanic Garden Seed Bank and has subsequently evolved into the Rae Selling Berry Seed Bank at Portland State University. The collection currently houses over 23,000 accessions from more than 350 rare taxa. A new partnership with the Seeds of Success program is likely to swell the collection considerably in the years to come.

Tribal interest in cryopreservation of native plant seeds arose from the dire condition of prairie communities within the Nimiipuu homeland in northcentral Idaho. A recent assessment by tribal botanists estimates that only 0.4% of the Nez Perce Prairie of the southern Palouse Bioregion remains intact after 140 years of agricultural conversion and other developments (Robins and Sondenaar 2015). The entire ecosystem is endangered, but it still holds remnant populations of re-

gionally endemic native plants that are both scientifically and culturally valuable. We are taking action to try and save what's left. It hasn't been easy, but we are after all, an intrepid bunch of botanists (well, there's really only two of us right now, but we are tenacious nonetheless).

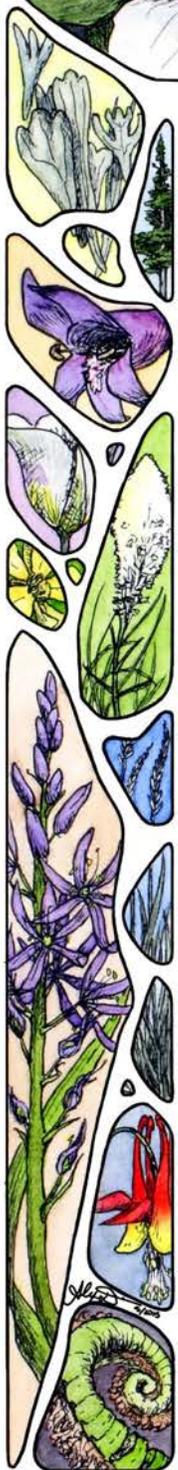
Using funding from the U.S. Fish and Wildlife Service, we have deposited 69 seed collections from 16 different taxa into the Rae Selling Berry Seed Bank. This collection represents seeds from 2,700 individual maternal plants, including 139 Federally Threatened Spalding's catchfly (*Silene spaldingii*) plants from seven sites across three states.

Right about now you might be saying "Is that all? Not much to brag about if you ask me." Let me disabuse you of that notion: collecting rare plant seed is hard work that requires a healthy dose of luck and persistence to pull off. It is absolutely worth it though! There's nothing quite like getting those 20 packets of precious seeds back to the pickup truck at the end of the day despite the 100°

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Letter from the President

Most of us are somewhat familiar with the ERIG (Education Research Inventory Grants) program that is maintained by our organization. Through this grant program, we make up to \$2,000 available for worthy native plant conservation and education programs. The demand for these grants has been growing rapidly during the past few years, but our level of disbursement has not changed much, due to a relatively static level of funding. This past two years, projects ranged from supporting establishment of community pollinator gardens to taxonomic research on critically endangered species. However, we have not been able to fund these projects at the full level of requested support. We simply have not had enough money to support all of these very worthy grant applications that have come to the Society.

We, as an INPS Board, have been discussing ways to encourage more donations to the ERIG program in order to strengthen our offerings for conservation projects. We will likely do a little fund raising at our annual meeting—this next year it appears that the Pahove Chapter is putting together a silent auction. We are also exploring ways to encourage members to donate to ERIG during their annual membership registration. If we could convince each member to donate \$10, we would triple the funds available for grants. This year, we are also exploring the efficacy of investing time into the Giving Tuesday and Idaho Gives internet-based charitable giving programs. If these efforts prove effective, we will put more energy into them in future years.

I hope you see the positive benefits of the ERIG program and donate what you can to strengthen our ability to conserve our native plants and to educate the people of Idaho as to their importance. Thank you for being a part of this great organization.

Stephen Love,
INPS President

Editor's Note: Donations may be made via the INPS website (<https://idahonativeplants.org/erig-news/>). Projects which have been funded are shown in a table. As part of project completion, recipients submit a report for publication in *Sage Notes*. Two of these are found in this issue.

Announcement

2018 Botanical Foray Plant Identification Workshops

After a successful 11th Annual Idaho Botanical Foray last June, we have hundreds of plants that need to be identified. There will be upcoming Identification Workshops that you are all invited to attend if you would like to participate in the identification of those plants. All are welcome regardless of experience. For more information, please contact Don Mansfield (dmansfield@collegeofidaho.edu) or Beth Corbin (botanybeth@gmail.com).

February 7, 6:30 pm: SRP Herbarium, Boise State University (Science Building, 2nd Floor)

March 7: Time and location TBA

2019 INPS Annual Meeting

The Pahove Chapter is delighted to announce that the 2019 INPS annual meeting will be held in McCall, Idaho, Friday, July 12, 2019–Monday, July 15, 2019. Located in central Idaho, McCall is about 5 hours south of Coeur d’Alene, 5.5 hours northwest of Pocatello, and 2 hours north of Boise, a location convenient for many members across the state to attend.

Our activity base will be the Peninsula Campground at Ponderosa State Park next to Payette Lake. Pahove has reserved 11 campsites and a pavilion. This area of the Park has water and electric hook-ups, picnic tables, and bathhouses with flush toilets and hot showers. In addition to its diverse botany, the McCall area offers many local recreational opportunities such as biking, bird watching, boating, hiking, brew pubs, etc.

The INPS website will list McCall motels/hotels, restaurants, RV parks, and other camping options. Reserve promptly—McCall is a busy summer tourist destination. If you want a Peninsula camp site, then ASAP! inform Pahove Treasurer Caroline Morris (fleursmorris@gmail.com), to designate one of the 11 campsites for you. Ten sites are reserved for 3 nights, and 1 reserved for 2 nights @ \$31/night (deposit needed). We also will have exciting give-a-ways and a silent auction to raise funds for ERIG.

Memorable field trips will accommodate easy and moderate to strenuous activity levels. Easy hikes will be a half day on mostly level terrain. Moderate to strenuous hikes will be all day with significant elevation gain and/or distance.

More details and a meeting registration form will be posted on the INPS website when all field trips are known.

Tentative Schedule

Friday afternoon

Check in/registration/information packets 12:00 pm–6:00 pm, Peninsula Campground Pavilion, Ponderosa State Park.

Twin Peaks Nursery Tour, 1:00 pm–2:00 pm

INPS State Board meeting, 3:00 pm–5:00 pm

Potluck at the Park Pavilion, 6:00 pm (Please bring something to share with the group.)

Saturday

Lichen Workshop led by Roger Rosentreter and field trips to view some spectacular specimens.

Field trips.

Banquet and Business Meeting 6:00 pm–7:30pm.

Keynote Speaker Barbara Ertter, a longtime botanist and INPS member, will describe the flora and geology of the McCall area, 7:30pm.

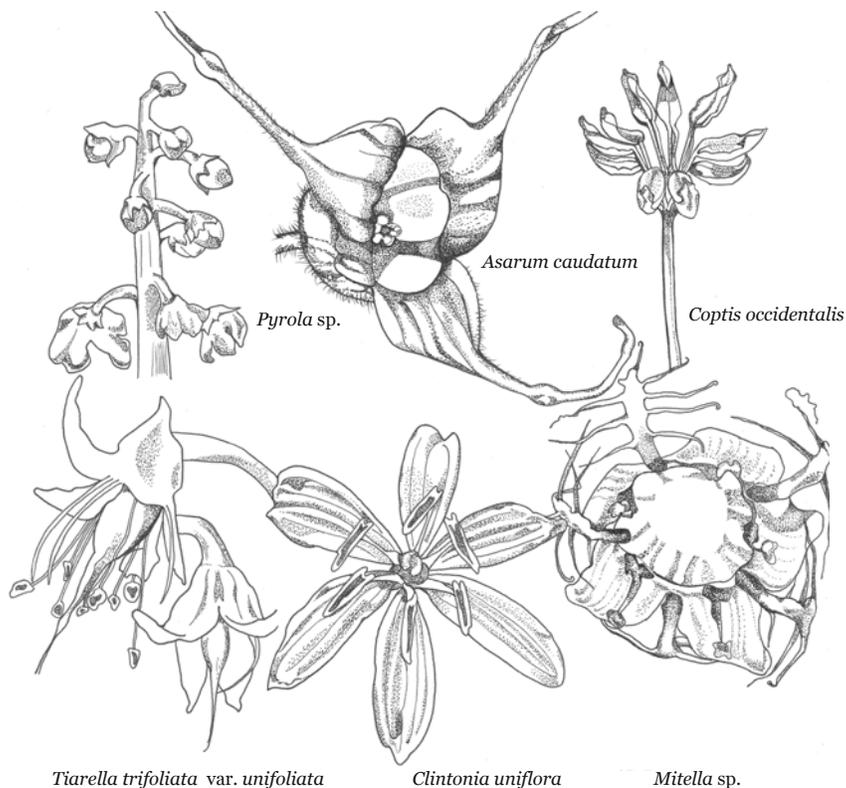
Sunday

Field trips.

Dinner on your own.

Monday

Optional field trips.



Collage of close-ups of Northern Idaho flowers. Illustration by Karie Pappani.

heat, five ticks, and 85% slopes that tried to deter you along the way.

I encourage all of you to consider getting involved in ex-situ seed conservation in one capacity or another. Toward that end, below are some words of wisdom.

1) Make sure you have permission to collect from the landowners and make sure you are actually on their land. With Idaho's new trespass law now in effect, none of your fellow botanists want to read about your untimely demise at the hands of an angry rancher who caught you poaching his lady slippers.

2) Always scout your plant population well in advance of seed set. What you remember as a large robust population from 10 years ago may now be a few struggling individuals drowning in a sea of yellow starthistle. A bummer for all of you!

3) Plan for multiple visits when seed ripening is imminent. Timing is everything and what happened last year may not be repeated this year. Be patient but persistent.

4) Every species is different. You may have to get intimate with your target species to be able to navigate the nuances of their seed ecology: does it produce few viable seeds, are seed predators a problem, does it flower episodically? It's all part of the adventure so enjoy the journey.

5) Don't collect unripe seeds! I repeat, don't collect unripe seeds! It may be tempting because you've forded the river and scaled the cliff to the site, but it is a huge waste of effort and genetics to come away with pale, flat ovules interrupted in mid-development. Just don't do it.

6) Pamper your seeds once you collect them. Don't throw them in the bottom of your pack and dump the new *Flora of the Pacific Northwest* on top of them for the hike out, or forget and leave them in the hot Suburban over the long weekend. Always collect into paper bags (never plastic) and store seeds in a cool, dry place until you ship them off in well-padded boxes to the seed bank.

7) Be tidy. Remove extraneous plant material from your collections before storing or shipping. After all, you don't want to inadvertently harbor unwanted pathogens or hungry insects that may damage your seeds.

8) Don't forget the paperwork! Always fill out your seed collection forms completely, use your GPS unit, take photos, and collect voucher specimens if the population



Flowers and maturing fruit of broad-fruit mariposa lily (*Calochortus nitidus*). Photo by Blair McClarin.

is big enough. Such data are invaluable as our plant communities change over time.

9) Coordinate closely with your seed bank of choice. Listen and learn from them to make sure you share common objectives and collect in a manner that meets their criteria and results in genetically valuable samples. The future of our planet may well depend on it.

Given the latest dire warnings about the scope and scale of climate change, it seems especially urgent that we prepare for the worst-case scenario with regards to our planet's biodiversity. Recent reports by the United Nations and the Federal Government both point to a more rapid rate of climate change than originally thought. A rapidly changing climate coupled with ongoing habitat loss, environmental pollutants, and other conservation challenges provide abundant justification for using seed banking as a conservation tool. The time for action is now and ex-situ seed conservation looks to be a valuable part of emergency preparedness for saving Earth's biodiversity.

There is hope. A few years ago viable tissue recovered from 32,000-year-old seeds of *Silene stenophylla* found in Russian permafrost was successfully grown in the lab and those plants later produced mature seeds of their own. See, I told you seeds are miraculous! •



Lovely pendulant pods of hillside milkvetch (*Astragalus collinus* var. *collinus*). Photo by Blair McClarin.



Botanist Blair McClarin diligently searching for spacious monkeyflower (*Erythranthe ampliata*/*Mimulus ampliatus*) fruit. Photo by Sandra Robins.

References and Resources

Idaho Trespass Law 2018:

<https://legislature.idaho.gov/wp-content/uploads/sessioninfo/2018/legislation/H0658.pdf>

Millennium Seed Bank Project: <https://www.kew.org/science/collections/seed-collection>

Rae Selling Berry Seed Bank: <https://www.pdx.edu/seed-bank/the-seed-bank>

Robins, S., and A. C. Sondenaa. 2015. Palouse Prairie Conservation on the Nez Perce Indian Reservation Phase I: Mapping of Potential Remnants. Unpublished Fish and Wildlife Program (#F14AP00640) report submitted to US Fish and Wildlife Service, Spokane, WA.

Seeds of Success: <https://www.blm.gov/programs/natural-resources/native-plant-communities/native-plant-and-seed-material-development/collection>

Silene stenophylla article:

<https://news.nationalgeographic.com/news/2012/02/120221-oldest-seeds-regenerated-plants-science/>

Svalbard Global Seed Vault: <https://www.seedvault.no/>

United Nations Climate Report:

<http://www.un.org/en/climatechange/>

USA Climate Report 2018:

<https://nca2018.globalchange.gov/>

USDA Agricultural Research Stations Seed Preservation

Program: <https://www.ars.usda.gov/plains-area/fort-collins-co/center-for-agricultural-resources-research/plant-and-animal-genetic-resources-preservation/docs/seed-collections/>

USDA Forest Service Nurseries and Seed Extractories:

<https://www.fs.fed.us/forestmanagement/vegetation-management/nurseries/index.shtml>



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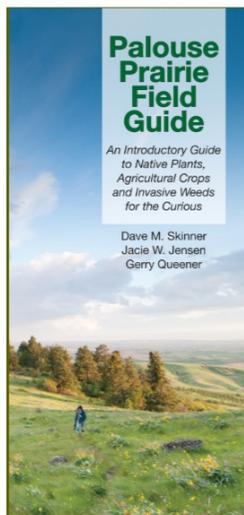
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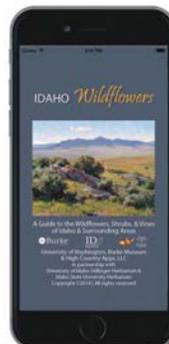
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Meat Eating Plants of Idaho

By Lauren Studley and Lynn Kinter, Idaho Native Plant Society

Dry, cold Idaho may seem like an unlikely place for carnivorous plants. But like the famous Venus flytrap from steamy swamps of North Carolina, some Idaho plants catch and digest insects and other small organisms. They do so to obtain nitrogen and other nutrients, which often are not available due to low pH and leaching in water-logged habitats (Rice 2018). While wetland habitats are not as common in Idaho as in North Carolina, our native carnivorous plants are just as amazing.

Sundew (*Drosera*) in the Sundew family (*Droseraceae*)

Sundews are small forbs with spiny-looking leaves. These ‘spines’ are actually stalks with a gland on top that emits dew-like drops of ‘glue’ to trap unwary insects that land on them, much like flypaper does. As the insect struggles, the sundew leaf slowly wraps around the insect, further trapping it. Stalkless glands on the surface of the leaf then secrete enzymes that digest the insect and absorb nutrients.

In Idaho, sundews grow in mid-elevation fens, wet meadows, and lakeshores. Their bright green leaves speckled with red stalks form low rosettes (<10 cm tall), and their translucent drops of glue sparkle in the sun. Plants usually produce one or two inflorescences bearing several white, five-petaled flowers. The flowering stems are markedly taller than the leaves, probably so that pollinators aren’t trapped. The plants are perennial and form hibernacula—buds of tightly curled leaves—to survive the long, cold Idaho winters.

Two species of sundew are documented in Idaho. Roundleaf sundew (*D. rotundifolia*) has prostrate leaves shaped like ping-pong paddles, hence the species name, which is Latin for ‘round leaf.’ Ours is ‘variety *rotundifolia*,’ the most widespread of three varieties. It is known from Idaho’s northern panhandle, as well as Idaho County. It is also found on the Pacific Coast, the northern and eastern US, and across Canada, Northern Europe and Asia (McPherson & Schnell 2012).

A third species, intermediate sundew (*D. intermedia*), has been falsely reported for Idaho (see the related article on Page 8).



Drosera rotundifolia in a northern Idaho fen. Photo by Marilyn George.

Charles Darwin (1875) used roundleaf sundew to show that plants did, in fact, eat animals. Prior to his work, most botanists did not accept that plants could be ‘insectivorous.’ Darwin tested various substances, including meat, sugar, urine, and olive oil, and found that sundew leaves reacted only to substances containing nitrogen.

English sundew, or great sundew (*D. anglica*), has slender, strap-like leaves that ascend upward at an angle of >45° from the ground. It was first described in England, and is found at higher latitudes around the globe, as well as a few southern areas, including Hawaii and California. In Idaho, this beautiful sundew is known from the northern part of the panhandle, with isolated occurrences in Valley, Custer, and Fremont Counties.



Drosera anglica in an Idaho fen. Photo by Lauren Studley.

As popular houseplants, sundews are susceptible to overharvest in some parts of their global range. Other threats include pollution, siltation, peat mining, and water diversion. Drought can be lethal to the plants, but populations sometimes regenerate from their soil seed bank. Fire suppression can lead to encroachment of shrubs and trees that shade out the sundews. Ants, spiders, and toads are known to steal prey from sundew leaves and can be direct competition when insects are in short supply (McPherson & Schnell 2012).

Bladderwort (*Utricularia*) in the Bladderwort Family (*Lentibulariaceae*)

Idaho is also home to *Utricularia*—the fascinating bladderwort! Its scientific name is Latin for ‘little bag’. Its common name refers to bladders along its underwater stem, along with ‘wort’—the Old English word for ‘plant’. These bladders pump fluid out of their interior, and have a trap door with trigger hairs. As a prey animal swims by, the door snaps inward, allowing water and prey to rush in, then slams shut. The time span of suction itself is half a millisecond—the fastest trapping movement of all carnivorous plants, and among the fastest movements known in the plant kingdom (Vincent et al. 2011). New Jersey botanist Mary Treat, working in the 1870s, was the first to describe their suction mechanism, which had been an enigma to researchers of that time. Suction traps

are found only in *Utricularia*; other carnivorous plants use different mechanisms, such as snap traps and pitfalls (Rice 2018).

While some bladderworts are terrestrial, the Idaho species float or are rooted in shallow, slow-moving waters of fens, streams, ponds, and lakes. They often band together and form large floating mats. To ride out Idaho winters, our bladderworts produce small bulb-like buds, known as turions, which sink to warmer strata at the bottom of the water column.

All Idaho bladderwort species have yellow flowers that resemble those of snapdragons, with the petals fused to form an upper lip, lower lip, and spur. In field surveys, bladderworts are often found without flowers, but can be identified based on leaf, branch, and turion traits. Some of our species are perennial, others annual, or both.

Common bladderwort (*U. macrorhiza*, *U. vulgaris* ssp. *macrorhiza*) is Idaho's largest and most widespread species. Found throughout the northern, central, and eastern parts of the state, it is easily spotted when its bright yellow flowers up to 20 mm long rise above the water surface some 20 cm.

Lesser bladderwort (*U. minor*) is minuscule compared to common bladderwort. Its pale yellow flower is only 8 mm long, and the lower lip juts out well past the upper lip. It is known in Bonner, Boundary, Custer, Fremont, and Boise Counties. It is also found across the northern and western US, and is of conservation concern in many states, including Idaho.

Flatleaf bladderwort (*U. intermedia*), with flowers up to 16 mm long, is intermediate in size between common bladderwort and lesser bladderwort. It is reported from Boundary, Bonner, Kootenai, Teton, and Bear Lake Counties. Its range across the US is similar to lesser bladderwort.

Humped bladderwort (*U. gibba*) has flowers up to 12 mm long. Its specific epithet is Latin for 'hump' or 'swelling' in reference to the inflated base of the lower lip of the corolla. This species is documented in Bonner, Custer, Fremont, and Kootenai Counties, but most US reports are on the west coast, and the eastern and central states.



Utricularia macrorhiza with bladders. Photo by Lynn Kinter.



Utricularia with its snapdragon-like flower. Photo by Lynn Kinter.

At our 2018 Idaho Rare Plant conference, humped bladderwort was moved from 'Review' to 'Rare' on the Idaho Rare Plant List. INPS ranked it 'S1—Critically imperiled' in the state due to few occurrences and high threats, including hydrologic change, development, and fire suppression resulting in trees and shrubs encroaching and shading formerly open sites. Flatleaf bladderwort and lesser bladderwort also are in need of conservation status ranking.

Other carnivorous plants

In addition to bladderworts and sundews, California butterwort (*Pinguicula macroceras*, *P. vulgaris* ssp. *macroceras*) may occur in Idaho. Kartesz/BONAP (2018) and USDA Plants Database (2018) report it from our state based on Casper (1962, 1966), however Casper shows only crude range maps that include the northern tip of Idaho—he does not cite any collections. Ray Davis (1952) noted that it "should be in Idaho, but I have never seen a collection of it." California butterwort was collected in northeastern Washington on the Pend Oreille River in 1969 and 1979, and in 1937 on the Kootenay River in southern British Columbia (CPNWH 2018), so INPS members in northern Idaho should keep an eye out for it.

California butterwort grows in shady seeps and river banks. With pale to dark purple flowers, it looks at first glance like a tall violet. Its leaves are often yellow or rusty orange, and form a low rosette. The upper surface is covered with sessile and stalked mucus glands—much like sundew (McPherson & Schnell 2012). The common name is related to use of the leaves to curdle milk and treat udder ailments, and possibly because they feel buttery. 'Pingu' is Latin for fat, greasy, or stout (McPherson & Schnell 2012).

There are no records of pitcher plant (*Sarracenia*) in Idaho, though it is known from central Washington. California pitcher plant, or cobra lily, (*Darlingtonia*) is limited to the western parts of California and Oregon. Both genera use pitfall traps—long narrow upright tubes with a pool of digestive liquid at the bottom.

Idaho is far from the native range of Venus flytrap (*Dionaea muscipula*), which is limited to a small area on the North Carolina/South Carolina border. However, this fascinating carnivore is naturalized at Summer Lake in Skagit County, Washington.

In addition to the genera described above, one other carnivorous plant is native to North America. Powdery-strap air plant (*Catopsis berteroniana*) looks like a giant pineapple top, and is in the same family—the

Continued on Page 8

bromeliad family (Bromeliaceae). Living on trees in Florida, its strap-like leaves form a tank that holds rainwater. A powdery coating on the leaves causes insects to lose traction and fall into the water, from which the plant can absorb nutrients.

Carnivorous plants are uncommon in Idaho in part because their wetland habitats are uncommon. Their habitats can also be hard to reach. When you happen upon one of Idaho's delicate fens or slow meandering waterways, be sure to keep an eye out for these carnivorous gems. •

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Disproving Reports of Intermediate Sundews in Idaho

By Lynn Kinter, Idaho Department of Fish and Game

How do we 'prove' that something doesn't exist? As the maxim goes, "Absence of evidence is not evidence of absence."

It can be extremely difficult to demonstrate that a particular plant species doesn't exist in Idaho once someone has reported that it does. Field searches for the plant may turn up nothing, but we can't conclude the plant isn't there—it may be dormant underground or hidden in some unseen corner. It may have been extirpated since the first report, or the original location data may have been recorded or interpreted incorrectly so that subsequent searches are in the wrong place.

In the last decade, I've investigated several claims of which I was skeptical. In some cases, such as spider milkweed (*Asclepias asperula*) and alpine poppy (*Papaver radicum*), I was able to find verified specimens and conclude that the plant is, or at least was, present. In other cases, including horsetail milkweed (*Asclepias subverticillata*) and pincushion cactus (*Escobaria vivipara*), I and others have invested a great deal of time, traveled to far corners of the state, combed herbarium collections, contacted experts, and sorted through scientific literature—only to find an absence of valid records.

One particularly frustrating case was intermediate sundew (*Drosera intermedia*), which is widespread across eastern North America. The first Idaho report of

this carnivorous plant was in Boundary County by Rob Bursik (1993): "Prior to 1992, it was not known from the Pacific Northwestern U.S. I found a rather dense but localized population of several hundred individuals in the Smith Creek RNA [Research Natural Area] while doing this study... Although I and other botanists had previously visited SCRNA, no one had recognized the individuals of intermediate sundew as being different than the individuals of long-leaf sundew [=English sundew] (*D. anglica*), which also occurs in SCRNA. Both round-leaf sundew (*D. rotundifolia*) and long-leaf sundew occur in [nearby] Cow Creek Meadows. The discovery of intermediate sundew represents yet another recent state record in the vascular peatland flora in Idaho."

Bursik gives no details on how his state record differs from the other two sundews, nor does he cite an herbarium specimen. His record is documented in the Idaho Natural Heritage Program (INHP) database as 'Element Occurrence (EO) 1, Smith Creek RNA': Rob Bursik 10 Aug 1992. "~500 genets" over 2 ha (0.02 sq km). The EO 1 report cites a collection by University of Idaho botanist Doug Henderson, 5161, housed at UI's Stillinger Herbarium (ID). However, in checking this specimen, I found that it is *Eriogonum capistratum* collected 24 Jun 1979 near Corral Creek Summit, Custer County—it has no connection to Smith Creek or *Drosera*. Notably, there is a

D. anglica collection by Rob Bursik (1390, 22 Jul 1988, ID) from Smith Creek RNA.

In 1993, Bob Moseley, Bursik, et al. (1994) report two more intermediate sundew occurrences: Mays Creek Fen and Huckleberry Creek Fen in the Sawtooth Valley Peatlands RNA, Custer County. They emphasize that these are the only other known sites in Idaho, and are far disjunct from the known range. They recommend that their collections be sent to ID for verification.

The same report (Moseley et al. 1994) states, “The sundew at Mays Creek Fen had been erroneously identified as *D. rotundifolia* for many years. *D. intermedia* is the only sundew known from the Sawtooth Valley.” This statement puzzles me because in 1994, ID had a collection of *D. anglica* from the Sawtooth Valley: Louis K. Mann 215, with C. Worley, 29 Jul 1936. Mann, a Boise native, was then a UI undergraduate; he went on to become a prominent professor at University of California, Davis, where a building is named in his honor. The accession number on his *D. anglica* collection indicates it would have been in the herbarium long before the 1990s, or even the 1980s, when Moseley and Bursik worked in the herbarium as Masters students. I also worked there in the 1980s, and in now picturing the steps they would have taken before making their statement, it seems to me that they would have examined the *Drosera* collections. Perhaps they did, but Mann’s collection could have been misfiled or out on loan.

The Sawtooth Valley EOs (Element Occurrences) are documented in the INHP database: EO 2, Mays Creek Fen: Moseley and Bursik, 10 Aug 1993. Revisited by Mabel Jankovsky-Jones and Chris Murphy, IdCDC, 12 Sep 2001. “Many thousands of individuals” over 40 ac (0.16 sq km). Herbarium collection by Rob Bursik 2938, ID. EO 3, Huckleberry Creek Fen: Moseley and Bursik, 10 Aug 1993. “Many thousands of genetets” over 10 ac (0.04 sq km). Herbarium collection by Rob Bursik 2954, ID.

On 29 Nov 2016, my colleague Janice Hill searched the stacks at ID and reported: “ID has only 2 *D. intermedia* specimens (Chuck Wellner 4357 and Bob Steele 779); both were originally identified as *D. anglica* and hand-annotated as *D. intermedia*. Carolyn Ferguson [ID employee] and I compared the handwriting on the annotations to that of Doug Henderson’s in his collection journals and decided it probably was not Doug’s handwriting. The Stillinger Herbarium has the entire set of Doug’s collection journals. Checking Doug’s journals for the 10 Aug 1992 date at Smith Creek RNA, I could not find any collections made by him on that date.

“As regards the possibility of a backlog of Rob’s [Bursik] specimens to be mounted and/or scanned, we

checked all our cabinets of unmounted specimens and found none of Rob’s. As far as scanning, we are almost done scanning the entire collection (finishing the last family, Asteraceae). Also checked through a backlog of specimens to be imaged, but they are mostly recently mounted specimens from Dave Tank’s summer class collections; found none of Rob’s.”

To me, it seems likely that Bursik’s collections would have been validated before the Idaho Native Plant Society added the species to the Idaho Rare Plant List in ~1993. However, I can find no specimens of *D. intermedia* (present or former identification) by Henderson, Bursik, or Moseley in ID, nor any of several electronic databases that I’ve searched. Michael Mancuso and I contacted Bursik repeatedly through the years to ask about his collections. On 13 Jun 2017, he responded that he had the specimens in Minnesota and would send them to ID the following week. To date, they have not been sent.

I looked at Chuck Wellner’s collection 4357 from Smith Creek, Boundary County, 6 Jul 1990, and Bob Steele’s collection 779 from “near Summit Creek” in Valley County, 5 Jul 1974. Both were originally identified as *D. anglica*, which looks correct to me. Both have *D. intermedia* annotations in similar handwriting, but no author or date.

The reports by Moseley and Bursik may be the basis for two USDA PLANTS Database records (2016) in the Sawtooth Valley Peatlands RNA: “Kim Pierson, 10 Aug 1993. Field observation validated by National Plant Data Team staff. . . Identification method: Comparison of herbarium specimens.” Kim Pierson, former Botanist on the Sawtooth NF, may have made collections on which the USDA records are based, but I have not been able to locate the specimens, nor get a response from her about them. Current Sawtooth NF botanists Deb Taylor and Thomas Stewart have searched herbaria at all Sawtooth NF offices, and cannot find the specimens.

I checked with Larry Mellichamp about his *Flora of North America* treatment (2015), which lists Idaho for *D. intermedia*. He emailed (pers. comm. 14 Nov 2016), “It has been years since I looked at herbarium specimens of *Drosera*. So, I can say that I do not remember a specimen from Idaho. It is listed in FNA as in Idaho—my editors did more checking at the last minute than I did and listed it there, usually based on literature citations.”

In addition to looking for herbarium specimens, I pursued other leads. John Kartesz’s (2016) data in the Biota of North America Program are based on the three Idaho Natural Heritage Program records. Ray Davis (1952) doesn’t list it in the *Flora of Idaho*. I presented my

Continued on Page 13

Flora of the Pacific Northwest, 2nd Edition is Now Available

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

The University of Washington Herbarium of the Burke Museum is pleased to announce the publication of *Flora of the Pacific Northwest*, 2nd Edition. It has been 45 years since C. Leo Hitchcock and Arthur Cronquist published their groundbreaking one-volume, condensed version of the 5-volume *Vascular Plants of the Pacific Northwest*. Given the universal appeal of this remarkable book, we thought the time had come to update it.

For decades academic researchers, field botanists, students, and amateur botanists have relied on the one-volume of “Hitchcock” to identify and understand the evolutionary relationships of the region’s vascular plants. One is hard-pressed to find another regional flora with such well-honed keys supported by a comprehensive set of illustrations. It is just this combination that made the one-volume *Flora* such an indispensable resource. However, the passage of 45 years has a way of rendering any flora obsolete due to the generation of new knowledge over such a timespan. This has probably never been so true as for the past 45 years.

When the original *Flora* came out in 1973 the use of DNA to elucidate family and genus-level relationships was still a decade away, and vascular plant taxonomy had changed only incrementally over the prior few decades. However, since the 1980s, when DNA extraction and analysis protocols were applied to vascular plants, significant parts of the original *Flora* quickly became outdated (e.g., genera assigned to the Scrophulariaceae eventually were more accurately placed in more than half a dozen other families; the Liliaceae was found to be composed of nearly a dozen families; and species in the grass genus *Agropyron* would end up mostly assigned to other genera). This isn’t a criticism of the *Flora*, but rather a clear example of how any flora is a snapshot of what is known at the time of publication.

In 2012 the UW Herbarium approached the University of Washington Press about producing a 2nd edition *Flora*, and the idea was enthusiastically received. Serious work on the project began in 2013 and culminated in a printed version published in October 2018. This was truly a team and regional effort, with treatment authors and financial support for the project coming from all of the areas covered by the *Flora*: Washington, Idaho, Montana, Oregon, and southern British Columbia.

The changes between the 1st and 2nd editions of the *Flora* are extensive and occur from cover to cover. We have added a regional map and index to plant families on the inside covers, a more robust introductory section (the 1st edition had two pages!), included over 1,000 new illustrations, and added about 100 more pages. Table 1 summarizes important changes between the 1st and 2nd editions of the *Flora*. Most notable perhaps are the increases in the numbers of family and genera, along with a near doubling of the non-native taxa now documented in the region.

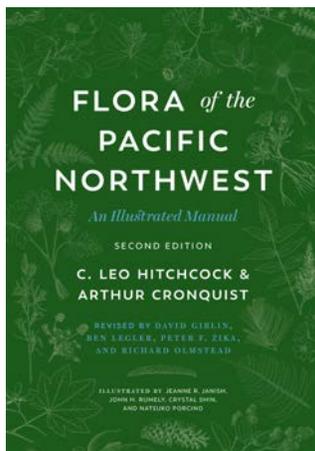
Now that we have the print version out, we are working with the UW Press to release an ebook version suitable for tablets and iPads. In 2019 we will begin raising funds to expand the website to provide updates to taxonomy, nomenclature, and identification keys as new information becomes available. In this way we hope to make sure that we don’t wait another 45 years before the contents of the print version are updated. You can find out more about the *Flora*, 2nd edition on the project website:

<http://www.pnwherberia.org/florapnw.php>

Special thanks go to our colleagues in Idaho who provided financial support for this work, particularly Chris Davidson and Sharon Christoph, along with the Kinnikinnick and Pahove chapters of the Idaho Native Plant Society. Dr. Jim Smith at Boise State University provided invaluable feedback and editorial support for draft versions of the book. The *Flora* 2nd edition can be purchased through the UW Press website (<http://www.washington.edu/uwpress/search/books/HITFL2.html>) and should be available through your local booksellers. •

Citation

C.L. Hitchcock and A. Cronquist. 2018. *Flora of the Pacific Northwest: An Illustrated Manual*, 2nd Edition. Edited by D.E. Giblin, B.S. Legler, P.F. Zika, and R.G. Olmstead. University of Washington Press, Seattle, WA. 936 pp.



	Flora, 1st edition	Flora, 2nd edition	Change	% Change
Families	129	159	30	23.3
Genera	826	1,141	315	38.1
Species	3,555	4,818	1,263	35.5
Infraspecies	1,393	1,329	-64	-4.6
Native Taxa	3,559	3,891	332	9.3
Exotic Taxa	722	1,444	722	100
Total Taxa	4,281	5,335	1054	24.6

Table 1. Summary of major changes between the editions of *Flora of the Pacific Northwest*. Thanks to Ben Legler for compiling these numbers. *The term taxa refers only to terminal taxa, also called minimum-rank taxa, consisting of subspecies and varieties along with those species that lack subspecies or varieties.

ERIG

INPS ERIG Solicitation for Proposals

Every year the Idaho Native Plant Society (INPS) awards grants through the Education Research Inventory Grant (ERIG) program. Since 2005 the INPS has awarded over \$24,000 in grants of up to \$1000. Continuing in that tradition in 2019, the INPS will partner with projects that contribute to the appreciation, conservation, or knowledge of Idaho's native flora and vegetation. The purpose of the ERIG program is to stimulate and lend support to educational, research, and conservation activities that promote an appreciation for native plants and plant communities in Idaho. The Idaho Native Plant Society encourages you to submit a proposal for projects that may qualify. The deadline for submitting proposals is March 31, 2019.



Grant guidelines: The ERIG program is intended to support direct project costs. Grant proposals should not include expenses for salary and personal benefits, the purchase of personal equipment, equipment not dedicated to the project, indirect costs, or other expenses not essential to the project. Here are some examples of costs the grant may cover:

- Direct costs of travel, meals, and lodging.
- 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. Please be succinct:

1. *Project Title*
2. *Contact Information*: Name, address, phone number, organization/affiliation, and email.
3. *Project Description*: Outline the project objectives, methods, and final product.
 - a. Explain how the project will benefit the appreciation, conservation, or knowledge of Idaho's native flora or vegetation.
 - b. Will there be public access to the project?
 - c. 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 written award to complete their projects. Successful applicants will be required to submit a final report to the INPS documenting project accomplishments and a summary of the project to be published in the INPS newsletter, *Sage Notes*. We encourage applicants to become an INPS member if they are not already, however, membership is not a prerequisite to apply for, or receive an ERIG grant.

Please submit proposals by email to Bob McCoy at sawabi.inps@gmail.com or by post to: ATTN: ERIG Committee Chair, Idaho Native Plant Society, P.O. Box 9451, Boise, ID 83707.

Sawtooth Botanical Garden: Carol's Wildflower Garden Project

By Kathy Noble, Sawtooth Botanical Garden, Gardens and Facilities Manager

In 2015, the Sawtooth Botanical Garden decided to re-design its largest native plant garden. This is one of the first gardens visitors see when walking from the parking lot into the Garden. It was badly overgrown, weedy, and infested with rhizomatous grasses. Many of the original forbs had been pushed out altogether. We began a major clean-up by spraying, weeding, and removing unwanted materials, including a couple of ground squirrel homes and an old unoccupied badger tunnel. We then reworked the irrigation heads so that instead of spraying down the hill, the rotors would spray up the hill. This change significantly improved the water distribution. Even though we did not water more often, the plant material was being watered more evenly and everything bloomed longer and more prolifically.



We began working on our plant list with Dr. Stephen Love at the University of Idaho Aberdeen Research Station, and Steve Paulson at Native Roots. This garden is dedicated to Carol Blackburn for all the hundreds of volunteer hours she has given to the Sawtooth Botanical Garden the past 20 years. After receiving a degree in wildlife management from Humboldt College, Carol moved to Idaho and decided she wanted a Horticultural degree from the University of Idaho. She became an Idaho Native Plant Society member shortly after arriving in Idaho in 1979. Carol continues to be an indispensable resource to the Sawtooth Botanical Garden, someone we continue to consult with on an almost weekly basis.

Inspired by Dutch designers Henk Gerritsen and Piet Oudolf and their natural garden design work, Carol and I pored over nursery and seed lists from the Canadian border to Colorado and Utah looking for just the right plants to make the new native plant garden uniquely Idaho within the constraints of our budget. We started with grasses and then added forb species that the Garden did not already display. Fortunately, Native Roots was able to procure the seed for the plants we were most interested in showing (see Plant List). We also brought in some additional landscaping rock, and filled in the badger hole.

In June 2018, while we were still cleaning the planting area, our plugs arrived from Native Roots and we started planting the south facing slope. The very next day, a visitor backed their car right over the bottom of the bed and our new plants. So, we decided to place edging stone

around the bottom of the bed so that the next visitor would hit the stone and know to stop their car. This garden space is a fairly steep berm, and we decided that a gravel mulch to minimize weed establishment would not be workable. We could not figure out how to beat gravity and keep the gravel mulch from moving down the hill at every opportunity. So for now, we have been weeding a section of the garden every week. The plants are all in blocks by variety to facilitate labeling and also to help volunteers and employees figure out which plants to pull or leave. I had read Denver Botanical Gardens *Gardening with Altitude: Cultivating a New Western Style* and learned about the difficulties they had in establishing a native garden. I knew we could not simply mix the plant varieties randomly, nor could we have any rhizomatous grass species. On August 12, 2018, we finally completed the last block of plantings and had a celebratory pitcher of iced tea!

As this native plant garden matures, we intend to harvest some of the grasses for a neighboring garden that needs some work, and replace the harvested grasses with more forbs. Native Roots was unable to get seed to germinate for 5 of our ordered forb species. We temporarily filled in these spaces with grasses. I would like to include more variety as Native Roots develops more woody materials and additional perennial species.

All gardens are art works in progress; they are never static. As new native plant varieties are developed, I hope we will be able to add those to our pallet so that Carol's Wildflower Garden will always look new and interesting to the many visitors who come to see the Sawtooth Botanical Garden. I would like to thank the Idaho Native Plant Society for awarding us ERIG funds to help purchase irrigation and other material used in the native plant garden, and for their ongoing support and encouragement to show off the beautiful native plants of Idaho, and for continued efforts to educate the public about the diversity and seasonal beauty of Idaho's natural flora. •

Plant List: *Bromus marginatus*, *Deschampsia caespitosa*, *Calamagrostis rubescens*, *Elymus elymoides*, *Koeleria macrantha*, *Muhlenbergia wrightii*, *Oryzopsis hymenoides*, *Sporobolus airoides*, *Aquilegia desertorum*, *Aquilegia scopulorum*, *Hymenoxys acaulis*, *Penstemon confertus*, *Potentilla jepsonii*, *Sphaeralcea munroana*

Sawtooth Botanical Garden: Alpine Rock Garden Project

By Kathy Noble, Sawtooth Botanical Garden, Gardens and Facilities Manager

The Sawtooth Botanical Garden has a circle garden positioned adjacent to Carol's Wildflower Garden that originally held a large stone sculpture and perennial plant species. However, over time this circle garden turned into a complete weed patch. One problem was an overhead spray irrigation system inadequate for the job. The Garden board decided to concentrate native plants and landscapes representative of Idaho's south-central ecosystems in the northwestern section of the Garden complex. Towards this end, we planned to remake the circle garden into an alpine rock garden.

To turn the circle garden weed patch into an alpine rock garden we needed the help and tutelage that only Dr. Stephen Love from the University of Idaho Research Station could offer. Dr. Love came to the Garden to present a class on native plants, and we took the opportunity to show him the alpine rock garden area and ask for recommendation locating plants in the planned project area. Dr. Love jumped at the chance to grow 18 varieties of *Eriogonum* for us from seed he had collected over the last 10 years. This will be the beginning of a formal botanical collection of buckwheats that we hope to add to in the coming years. It was exactly the help we needed to jumpstart the project.

We immediately started working on eradicating the weeds. After creating a clean planting area, we added

5–6 tons of landscaping stone, and gathered weathered snags and root wads to add texture and interest to the garden area. We next added native soil mixed with gravel to improve drainage and then began planting. Lastly we converted to drip irrigation and covered the tubes with gravel mulch. We hope to complete the irrigation and mulch before the snow flies but may have to add the finishing touches in the spring. I would like to thank the Idaho Native Plant Society for awarding us ERIG funds to help purchase irrigation and other material used in the rock garden project. •

Plant List: *Penstemon deustus*, *Penstemon eriantherus*, *Penstemon fruticosus* var. *fruticosus*, *Penstemon gracilis*, *Erigeron compositus*, *Eriogonum arcuatum* var. *arcuatum*, *Eriogonum caespitosum*, *Eriogonum capistratum*, *Eriogonum compositum*, *Eriogonum corymbosum*, *Eriogonum heracleoides*, *Eriogonum jamesii* var. *flavescens*, *Eriogonum niveum* var. *niveum*, *Eriogonum ovalifolium* var. *depressum*, *Eriogonum ovalifolium* var. *nivale*, *Eriogonum ovalifolium* var. *ovalifolium*, *Eriogonum ovalifolium* var. *purpureum*, *Eriogonum strictum* var. *proliferum*, *Eriogonum sphaerocephalum*, and *Eriogonum umbellatum*.

Intermediate Sundews.....Continued from Page 9

quandary to the South Idaho Rare Plant Working Group—none of the experienced botanists and enthusiasts there knew of verified records.

My last hope was to find *D. intermedia* in the field. Fortunately, in July 2017, I was able to take a day off of fieldwork and go to the Sawtooth Valley sites with Barry Rice and Beth Salvia, carnivorous plant experts from UC Davis. In an interesting connection, Barry's office on the UC Davis campus is just a brief walk from the Louis K. Mann Laboratory.

With Deb Taylor as our guide, we found lots of *D. anglica* at Mays Creek fen. We found no *Drosera* at Huckleberry Creek fen—it may be that we weren't in the same part of the fen that Moseley et al. (1994) investigated; or it may be that *Drosera* was no longer present—we noted shrubs and pines encroaching. A few days later, Barry and Beth searched the Smith Creek site

and found *D. anglica*; further searches in the vicinity yielded only *D. anglica* and *D. rotundifolia*.

As I thought about how generously Beth, Barry, Deb and others had given their time to solving this conundrum, one lesson stood out: New 'discoveries' need to be documented with collections that have been verified by experts! Improbable reports of *D. intermedia* circulated for 25 years without verification, causing botanists to spend much effort that could have been focused on other rare plants.

In 2018, I presented our efforts and the absence of verified reports or specimens at the Idaho Rare Plant Conference. The attendees and I concluded that *D. intermedia* was falsely reported from the state and should be removed from the Idaho Rare Plant List. In this case, absence of evidence is, in fact, evidence of absence.

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Chapter News

CALYPSO CHAPTER

When: Meetings are the first Wednesdays of March, April, May and October at 7:00 pm. Field trips take place during the spring, summer, and early fall months.

Where: Meeting are held in the conference room of Idaho Department of Fish and Game, 2885 W. Kathleen Ave., Coeur d'Alene

Contact: Derek Antonelli, ds.ca.antonelli@gmail.com.

LOASA CHAPTER

When: Meetings are held the third Thursday of each month at 7:00 pm.

Where: Taylor Building, Room 248, College of Southern Idaho, Twin Falls.

Contact: Bill Bridges, bridgesbill34@yahoo.com.

Upcoming Events:

January 17: The speaker will be Tom Stewart from the Forest Service.

February 21: The speaker will be Andy West from Master Gardeners.

March 21: Kelvin Jones will give a presentation on Caves and Seeds.

April, 18: Sue from the BLM will give a presentation on fire restoration.

May 16: Don Morishita from the BLM will give a presentation on his work with weeds.

PAHOVE CHAPTER

When: Meetings are held on the second Tuesday of each month from September–April at 7:00 pm. Dates, times, or topics are occasionally subject to change. Upcoming meeting information is sent to members via postcard and/or email. Events are also posted on the Pahove Chapter page of the INPS website: <http://idahonative-plants.org/local-chapters/pahove/>

Where: The MK Nature Center Auditorium, 600 S. Walnut Street, Boise.

Contact: For more information about activities please visit the Pahove Chapter page on the INPS website, or email Karie Pappani at pahove.chapter.president@gmail.com.

Upcoming Events:

January 15: Holly Hovis and Kristin Lohr will give a presentation on Schoolyard and Community Gardens.

February 12: Bill Rember will give a presentation on the Clarkia Fossil Flora.

March 12: Lisa Harloe will give a presentation on the Owyhee Flora; and Michael Ottenlips will give a presentation on his research for the genus *Lomatium*.

April 9: Bill Borland will give a presentation on pond scum.

Southern Idaho Rare Plant Working Group: Led by Beth Corbin, this group meets throughout the year to research and exchange information on Idaho's rare flora in preparation for the Idaho Rare Plant Conference held every other year. If you are interested in participating in this process, please contact Karie Pappani at pahove.chapter.president@gmail.com.

Board Position Openings:

Pahove chapter is seeking a new board president. Current president, Karie Pappani, has served the chapter exceptionally for 8+ years, and the time has come to select her successor. Additional board members are also sought to fill various positions. Interested individuals are encouraged to contact the board at pahove.chapter.president@gmail.com.

SAWABI CHAPTER

When: Meetings are held on the third Monday night of October, November, January, February, March and May. Programs begin at 7:00 pm and refreshments are available afterwards. Each meeting is preceded by a short presentation on the plant family of the month.

Where: The Middle Fork Room of the Pond Student Union Building, lower Idaho State University campus.

Contact: Paul Allen, pokyallen@hotmail.com.

UPPER SNAKE CHAPTER

The Upper Snake Chapter is currently inactive.

Contact: Rose Lehman, jojorose@cableone.net.

If anyone is interested in reviving the chapter, they are welcome to contact Rose.

WHITE PINE CHAPTER

When: Meetings are held once a month except during the summer. Field trips can occur most any month.

Please check the chapter website at

www.whitepineinps.org for events which may be scheduled or finalized after *Sage Notes* is printed; or email the chapter officers at whitepine.chapter@gmail.com.

Where: Great Room, 1912 Building, 412 East Third St., Moscow (between Adams and Van Buren) at 7:00 pm.

Contact: INPS, White Pine Chapter, PO Box 8481, Moscow, ID 83843 or whitepine.chapter@gmail.com

Upcoming Events:

February 7: Pam Brunfeld, retired Systematic Botany instructor, and director and curator of the University of Idaho Stillinger Herbarium, will be speaking on "Plants

and Pollinators." She will provide information on ornamental and native plant species you can plant in your garden to benefit butterflies, birds, and bees. This program is jointly sponsored by the White Pine Chapter and the Palouse Audubon Society.

March 21: Steve Cook, University of Idaho Professor of Forest Entomology and Plant Pathology, will present a program on Forest Health. Steve led a very interesting field trip in July 2018, and we had requests for more information on this timely topic.

April 24: Mike Hays, Botanist with Nez Perce-Clearwater National Forest, will present a program on his work protecting Spalding's catchfly (*Silene spaldingii*) habitat on the "island" between the Snake River and the Salmon River. He will review the Recovery Plan for Spalding's catchfly and describe how his work fits into this plan. Mike will report on new findings, including four new Spalding's catchfly occurrences found by his crew in

Hells Canyon this past summer. The program will also include results from crupina control efforts. This and other weeds species are becoming the bane of recovery and restoration efforts for many native habitats. Mike will share what they are learning from their control treatments.

WOOD RIVER CHAPTER

When: Meetings are held various weekday evenings beginning at 7:00 pm.

Where: Meetings are held at the Sawtooth Botanical Garden, located three miles south of Ketchum, on Highway 75 and Gimlet Road.

Contact: John Shelly at boshelly@cox.net for information about field trips and presentations. Also, check the Sawtooth Botanical Garden website: sbgarden.org for updates on presentations. •

Intermediate Sundews.....Continued from Page 13

Traits for differentiating the *Drosera* species

D. rotundifolia has round leaves (wider than long) that are prostrate.

D. anglica has narrow strap-like leaves (3-8 mm wide), most of which ascend upward at $>45^\circ$ (a few leaves on some plants may be prostrate).

D. intermedia has leaves that are intermediate in shape (2-4 mm wide) and arranged in a hemisphere--some prostrate, some ascending, and some at the angles in between.

Leaf shape may look similar in the latter two species, so leaf arrangement can help. Field photos can be valuable, since pressing often distorts the arrangement. Also, the flowering stems of *D. anglica* go straight up from the base, while those of *D. intermedia* arise at an angle or horizontally and then arc upward (Voss 1985).

D. anglica has spindle-shaped seeds; *D. intermedia* has stout, ellipsoid seeds. The seed coat of *D. anglica* has a flat appearance, like panes of stain glass (termed 'longitudinally striate'), while the seed coat of *D. intermedia* is papillose (Barry Rice, pers. comm. 18 Jul 2017). Additionally, *D. intermedia* is the only North American *Drosera* that forms central stems to 20 cm long over successive years of growth (McPherson and Schnell 2012). •

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Loasa (Twin Falls)	Senior \$10
Pahove (Boise)	Student \$10
Sawabi (Pocatello)	Individual \$17
Upper Snake (Idaho Falls)	Household \$22
White Pine (Moscow)	Sustaining \$35+
Wood River (Ketchum/Sun Valley)	Patron \$100+
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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