Vol. 41 No. 1 March 2019

Sage Notes

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

Lewis's Lost Lomatium Found

By Michael Ottenlips, Boise State University

In 1806, Merriweather Lewis and William Clark were travelling near the junction of the Potlatch and Clearwater rivers in Northern Idaho. Here, Lewis collected the first specimen of *Lomatium triternatum* (nine-leaved biscuitroot) known to science. The plants found at Lewis's original collection site represent a common form recognized by many amateur and professional botanists: a spring-blooming perennial forb with a deep taproot, small yellow flowers organized in a compound umbel, and leaflets arranged in three sets of three (triternate leaf morphology).

While this general form is easily recognizable throughout the Pacific Northwest, there is a large amount of variation on this theme, especially among leaflets and fruits. Plants can have leaflets that range from short and narrow to long and wide, with various fruit sizes and shapes as well. *Flora of the Pacific Northwest* and *Intermountain Flora*, the two long-standing botanical references of our area, treat this variation at the subspecific and varietal level.

In 1992, Arthur Cronquist, a major contributor to the *Intermountain Flora*, described *Lomatium packardiae* (Malheur lomatium) as endemic to the Owyhee region of Southwestern Idaho and adjacent Oregon. Cronquist described *Lomatium packardiae* as having a leaflet morphology similar to *Lomatium triternatum*, but with a different leaf aspect and existing solely on "volcanic ash that has yet to weather into clay." Further exploration by botanists (most notably Don Mansfield and Barbara Ertter) into the understudied Owyhee region revealed populations of *Lomatium* almost identical to *Lomatium packardiae*, except not found in ash beds. Discovery of these populations blurred the taxonomic line between *Lomatium triternatum* and *Lomatium packardiae*.

The diverse morphologies and ecological preferences of the triternate *Lomatium* species (including *L. packardiae*) prompted Dr. Jim Smith (Boise State University) and Dr. Don Mansfield (College of Idaho) to investigate the ancestry and evolutionary histories of *Lomatium* species using DNA-based techniques. These studies indicated that Lewis's original population of *Lomatium triternatum* was most closely related to a *Lomatium packardiae* population from southern Idaho. These studies also indicated that other *Lomatium packardiae* populations were most closely related to wide-leaflet *Lomatium triternatum* var. *anomalum* populations found near Grangeville, Idaho. The DNA-sequence data in this group did not seem to agree with geographic distributions, morphology, or any previously recognized taxonomies!

Obviously, these findings were unexpected and suggested that there was no genetic distinction

Continued on Page 7

In this issue:

IDAHO NATIVE PLANT SOCIETY
PO Box 9451, Boise, ID 83707
www.idahonativeplants.org
public3@idahonativeplants.org

Letter from the President

Your Board of Directors has been busy trying to improve the operations of the Idaho Native Plant Society. We have taken steps to improve the process of annual membership renewal. This includes scheduling routine reminder letters to all existing members, streamlining the online renewal process, and synchronizing the membership renewal process with the membership database. Some of the steps are still in progress, but by the end of this year, we hope to improve the efficiency of membership management for the Society. This will hopefully benefit all members, as well as those responsible for managing membership records.

A second goal for the Board is to improve the visibility of Society activities to all new members. This will be accomplished by sending a letter from the president to all new members, giving them information about chapter structure, and providing contact information for all appropriate officers. Hopefully, this will make membership a more fulfilling experience.

Third, we have approved a measure to slightly increase membership dues. It has been many years since an increase has been discussed. For the past few years, our membership dues have been inadequate to cover ongoing Society operations. This increase should put us on a stronger fiscal foundation. The new dues structure will go into effect at the beginning of 2020. We will detail the new dues structure in a future *Sage Notes* so you can see how it will affect your membership renewal for next year.

Finally, we are hoping to increase the amount of donations available for funding the ERIG program. To make this a reality, the Board is making donation requests for members more visible during the membership renewal process. We have also registered the Society for designated charitable giving programs, such as Amazon Smile and Idaho Gives. We are hoping these efforts will make more funds available for worthy plant conservation efforts in the State of Idaho.

Our organization is healthy and active. Membership brings many benefits to those interested in native plant issues in Idaho. We are optimistic that proposed changes will keep the Society vital into the foreseeable future.

Stephen Love
President

Payette Lake, Idaho. The 2019 INPS Annual Meeting will take place in nearby McCall, Idaho. Photo by Jody Hull.

2019 INPS Annual Meeting

The 2019 INPS Annual Meeting will be held Friday, July 12 to Monday, July 15. It will be hosted by the Pahove Chapter and will be based in scenic McCall, Idaho. Our activity base will be the Peninsula Campground at Ponderosa State Park next to Payette Lake. A list of hotels/motels in McCall as well as campgrounds and RV parks in or near McCall, Idaho, can be found on our website. Reserve promptly!

The Peninsula section of the park has water and electric hook-ups, picnic tables, and bathhouses with flush toilets and hot showers. The pavilion (shelter) that we have reserved for our potluck dinner and gathering is a covered natural structure with 10 picnic tables that will accommodate up to 100 people. There are no restrooms, water, etc. at the shelter itself.

Ponderosa State Park requires a Park Pass, campsite/RV booking, or $5 entrance fee. The park is located at 1920 N. Davis Ave., McCall, Idaho 83638. It is 107 miles north of Boise, and 190 miles south of Moscow.

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

More detailed information, along with a registration form, is available on the INPS Website: https://idahonativeplants.org/statewide-annual-meeting/

Schedule of Events

Friday afternoon

- Check in/Registration/Information Packets, 12 noon–6 pm at the Peninsula Shelter, Ponderosa State Park.
- Tour Twin Peaks Nursery (51 E, Lake Fork Rd., McCall) OR visit Charlie's Garden (Sylvan Creek Road, McCall), 1 pm-2 pm.
- INPS State Board Meeting, 3 pm-5 pm.
- Potluck at the Peninsula Shelter, 6 pm. Please bring something to share with the group. We will provide the main course, grilled BBQ burgers/hotdogs with fixings and condiments.

Saturday

- Lichen/Bryophyte Workshops led by Roger Rosentreter, retired BLM botanist/lichenologist, and Alma Hanson, retired USFS botanist, followed by field explorations around Ponderosa State Park to view some spectacular specimens. Bring your hand lens.
- Granite Mountain Field Trip. An easy hike will take you around a meadows/riparian community with *Saxifraga bryophora* var. *tobiasiae*. The moderate/strenuous hike will venture to the lookout on top of the mountain with views of the Salmon River Mountains and the Seven Devils Mountains.
- Banquet Dinner/Business Meeting at McCall Senior Citizen Center (701 1st Street) from 6 pm–7:30 pm. Keynote Speaker, 7:30 pm–8:30 pm, will be Barbara Ertter, retired curator of Botany, University of California, Berkeley. She will speak on "Flora and Geology of the McCall Area." A silent auction to raise funds for ERIG will also take place Saturday evening from 6 pm–8:30 pm.

Sunday

- Granite Mountain Field Trip. (See details above.) Easy to moderate/strenuous.
- No Business Lookout Field Trip. This is one of the last remaining lookouts of a set spanning McCall to Fairfield, a showcase that was originally built by the Civilian Conservation Corps in the 1930s. Easy/moderate.
- Lick Creek Summit Field Trip. A beautiful subalpine forest with open rock outcrops and seeps/ponds abound. Easy/moderate.
- Dinner on your own.

Monday

- Optional Field Trip. North Fork Payette River meanders kayak/canoe trip.

Eriogonum Workshop

Like treasure hunts? This may interest you. The Southern Idaho Rare Plant Working Group would like to hold a workshop (emphasis on working) on a certain group of wild buckwheats with difficult taxonomy, perhaps next fall. To have adequate specimens for comparison, we would like to encourage people to make pressed collections across Idaho of any *Eriogonums* in the *E. crosbyae*, *E. prociduum*, *E. capistratum*, *E. mancum*, *E. soliceps* group that they come across, provided that the occurrence has not been previously well-vouchered and there is a large enough population present to not impact viability. For information, contact Beth Corbin (botanybeth@gmail.com).

2020 Idaho Rare Plant Conference

It's not too early to start thinking about the 2020 Idaho Rare Plant Conference. If you are interested in coordinating the 2020 RPC, please contact Beth Corbin (botanybeth@gmail.com), Karie Pappani (pahove.chapter.president@gmail.com), or Derek Antonelli (ds.ca.antonelli@gmail.com). Much previous work has been done, so anyone with good organizational skills can step right in. Similarly, if you are interested in helping with the RPC Planning Committee, please contact one of the above individuals. We can use all kinds of different skills, and it's a fun group of folks to work with. Thank you!

Request for Help with *Ivesia* Research in Idaho

Ivesia is a genus in the rose family. I need help collecting leaf and seed samples for three *Ivesia* taxa from anywhere within the state of Idaho. The three taxa are *Ivesia tweedyi, Ivesia gordonii* var. *wasatchensis* and *Ivesia gordonii* var. *gordonii*. This collection is part of my PhD dissertation on cytotaxonomic investigation of *Ivesia* to understand speciation and phylogenetic events within the genus. Fresh leaf samples will be used for flow cytometric analysis, while seeds will be germinated for use in root tip squashes for karyotyping studies. Findings from this study will be used to determine ploidy level, somatic cell chromosome number, and nuclear genome size of the plant species, in relation to other species in the genus. If you are interested, kindly contact Israel Borokini (tbisrael@nevada.unr.edu or 775-200-3249) for more information. *—Israel Borokini, PhD candidate, Department of Biology, University of Nevada, Reno.*

2018 FINANCIAL REPORT

The Idaho Native Plant Society is member-supported. This support is used to publish the quarterly *Sage Notes* newsletter and fund the Education Research Inventory Grant (ERIG) program. The ERIG program has granted $24,000 to over 50 projects benefitting native plants since it was established in 2002.

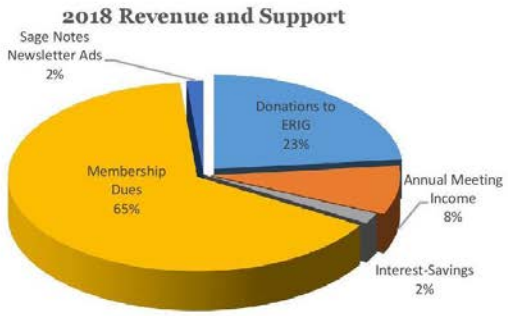
The Idaho Native Plant Society is a 501(c)(3) non-profit organization. Dues and donations qualify as tax-deductible.

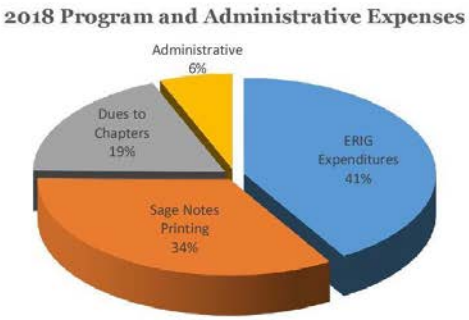
Statement of Financial Position
As of December 31st, 2018

Assets	
Investment - CD	$10,328
Cash	11,063
Advertising Receivable	132
Total Assets	$21,523
Liabilities	
Due to Chapters	376
Total Liabilities	376
Net Assets	
Temp. Restricted Net Assets	
Annual Meeting Fund Reserve	1,000
Total ERIG Fund Reserve	5,546
Forum Storage Fund	200
RPC Fund Reserve	762
Total Temp. Restricted Net Assets	7,508
Unrestricted Net Assets	13,639
Total Liabilities and Equity	$21,523

Statement of Activities
January thru December 2018

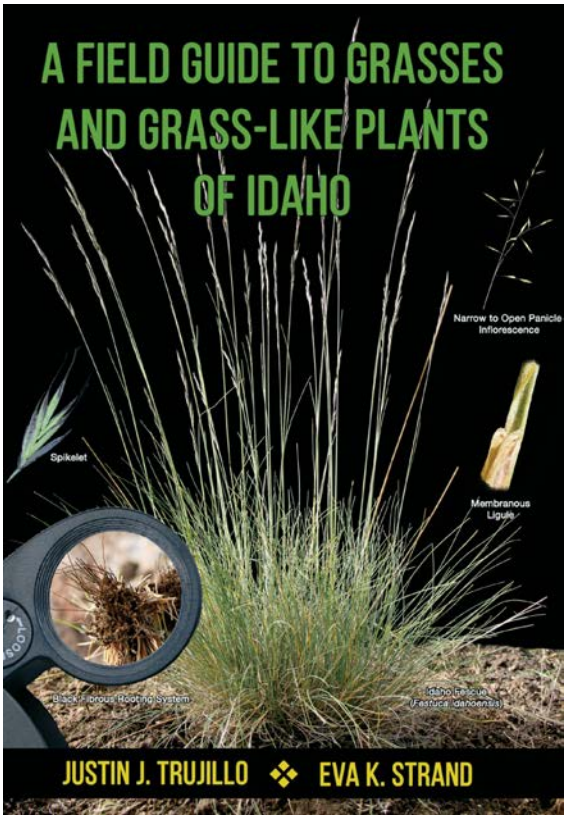
Revenue and Support	
Donations to ERIG	$2,104
Annual Meeting Income	752
Interest-Savings	165
Membership Dues	5,852
Sage Notes Newsletter Ads	132
Total Revenue and Support	9,005
Operating Expenses	
Program Services	
ERIG Expenditures	3,605
Sage Notes Printing	2,954
Dues to Chapters	1,625
Administrative	537
Total Operating Expenses	8,721
Change to Net Assets	$284





Botany Field Camp 2019

Idaho State University/Idaho Museum of Natural History is offering a 2-week, 3-credit botany field class for summer, 2019. The first week will be based from the ISU campus in Pocatello; the second week from a private cabin north of Mackay, Idaho. Both weeks will be a mix of field trips and classroom time. The course focus will be acquiring field plant identification skills and the collection and preparation of botanical specimens. You will learn to sight-recognize regionally important plant families and genera; learn or become more proficient using keys and regional floras to identify unknown plants; be introduced to basic ecological concepts relevant to field botany; and be introduced to field techniques to measure selected vegetation attributes. The course will be valuable for individuals interested in botany, ecology, conservation, education, or related careers. Course instructors are Janet Bala and Michael Mancuso. Join us for exploring and learning the Idaho flora! (See a more detailed class description on the INPS Facebook page.)



Grass Identifcation Book Now Available

Now available from the University of Idaho Rangeland Center and University of Idaho Extension: A Field Guide to Grasses and Grass-Like Plants of Idaho, by Justin J. Trujillo and Eva K. Strand. Grasses and grass-like plants are key to the productivity, function and diversity of Idaho's rangelands, wetlands and forests. Learn to identify almost 100 plant species and understand the value of these plants with this new publication. Rich photographs and detailed drawings set the standard for visually engaging plant identification. This coil-bound paperback is available from University of Idaho Extension Publishing for $29.95 each. To order, call University of Idaho Extension Publishing at (208) 885-7982 or visit http://www.extension.uidaho.edu/detail.aspx?IDnum=2083

Continued on Page 13

Practical Knowledge

Article and Photos by Tina Wynecoop, Forest Landowner, Spokane County, Washington

If one is used to finding all their food and supplies in a supermarket the wild places can seem very bare! Practical knowledge can unlock provision where the 'grocery store' mentality sees nothing. One can look at the wilderness and yearn for a Yokes, Rosauers, Walmart or Fred Meyer; or, one could discover what is already out there for harvest and use.

Several interesting examples come to mind. A native orchid called western rattlesnake plantain *(Goodyera oblongifolia)* whose uses include a reproductive aid, chewing gum, pain reliever during childbirth, tea, tonic, poultice, toy, perfume to attract the opposite sex, and, most surprising to me, a bandage!

Last fall, my Sinixt (Lakes) friend from Inchelium, Nancy Michel, and I were walking along a woodland trail in the upper Columbia region across the border in British Columbia. She noticed a low growing plant colony in the shaded, deep leaf forest litter and told me it was called "frog leaves" by the Indians, and that it was used to cover small wounds, both for protection and for its antiseptic quality. I recognized the plant immediately as a member of the wild orchid family from its leaf structure and bloom. I knew nothing about its practical applications.

Western rattlesnake plantain (Goodyera oblongifolia), a native orchid.

As I was photographing it and listening to her explain how her ancestors used it, a second Sinixt man named Rick Desautel, Colville Tribes Fish and Wildlife game management specialist, joined us and said it was also called "Indian band aid." They showed me how a leaf was picked and rubbed between the fingers to soften it and then split in two along its flat plane. The moist inner surfaces could then be adhered directly onto surface wounds for protection.

The name for this plant in one Interior Salish dialect is "splitting open easily." Since the plant has a widespread range throughout North America, it has other aboriginal names as well. Coastal Indians used words in their dialects meaning "it's got spots," and "medicine for childbirth." East of the Cascade mountain range it has been called "Indian band aid" and "frog leaves." Early settlers called it rattlesnake plantain because they thought the pattern found on its leaves resembled snakeskin. It is not of the plantain family. Nancy told me Indian band aid leaves can be harvested year-round and stored in the refrigerator. I kept a few leaves in a plastic bag for five months just in case I needed to cover a wound—and to test the practice. I found the leaves to be very fresh up to then, and as the photo shows, when I applied one to a cut on my husband Judge's hand, it adhered beautifully.

Rattlesnake plaintain applied to a wound on my husband's hand. It adhered beautifly.

Patti Bailey, another member of the Lakes tribe, one of the twelve tribes of the Colville Confederated Tribes, says the approximate Salish word for the plant is Inceyouse. The leaves were used extensively and commonly by her tribe's elders to draw out infections.

The list of provisions, both food and non-food 'products' available for our benefit is expansive. For example, the cattail (*Typha latifolia)*, a plant found in abundance around wetlands and lake margins throughout the northwest can be made into bread by using the starch in its rhizomes. The tender white portions at the base of the shoots can be eaten raw or cooked; the seeds, pollen, and leaves are edible. The leaves have been, and are still used in basketry, while the brown female flower head, whose downy puffs blow so easily in a wind to every child's joy, has been used for diaper material as well as stuffing for winter moccasin insulation.

Native humor is a delight, and our friend Nancy told us that Indians classy-up a well-known adhesive called "Duct Tape"—manufactured by 3M—by calling the silvery kind, "Indian chrome." "We fixed the back bumper with Indian chrome." Natural, plant-based, adhesives abound in the supermarket of the wild.

And finally, although I am barely touching on the subject of available foodstuffs and products, there is "Indian spaghetti," a botanical clover root gathered both on the tidal flats beside the Salish Sea and up to alpine meadows. The harvesters fondly call the roots "Indian spaghetti." In scientific circles the native plant is named perennial clover *(Trifolium wormsijoldii*). For a people

with a diet rich in proteins sourced from salmon, deer, and mountain goat flesh foods, edible plant matter eased the monotonous diet and added carbohydrate balance and variety. The roughage introduced to the digestive system made them a natural dietary laxative, although these plants were not considered medicine.

Both native and non-native ethnobotanists have contributed grocery carts full of traditional botanical information to the storehouse of practical knowledge relating to the culture and customs of the indigenous peoples. These are they who have lived intelligently on the land. Their keen observations have provided a wonderful connection to our region's natural resources.

Here is a small sampling of excellent books on the subject: *Plants of Southern Interior British Columbia* (by Roberta Parish, Ray Coupe, and Dennis Lloyd); *Plants of the Pacific Northwest Coast* (by Jim Pojar and Andy MacKinnon); *Native American Ethnobotany* (by Daniel E. Moerman); *Ethnobotany of the Okanagan-Colville Indians* (by Nancy Turner, Randy Bouchard, and Dorothy I. D. Kennedy); *Ancient Pathways, Ancestral Knowledge* (by Nancy J. Turner); *Ethnobotany of Western Washington* (by Erna Gunther); *Food Plants of Interior First Peoples* (by Nancy J. Turner); and *The Spokan Indians* (by John A. Ross). •

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Lomatiums.....*Continued from Page 1*

between *Lomatium packardiae* and certain subspecies of *Lomatium triternatum*. Science and taxonomy are processes of ongoing discovery with new hypotheses constantly being developed and investigated, so further study was required. Luckily, recent advances in DNA sequencing technology allow researchers to vastly increase the amount of genetic information available for analysis. This can improve understanding of species boundaries in groups that have defied classifications, such as *Lomatium*.

Utilizing these new techniques and additional morphological and geographic data, we uncovered that the difficult-to-classify *Lomatium packardiae* populations from the Owyhees were genetically distinct. *Lomatium packardiae* appears to be a 'real' taxon independently evolving and acting as a species. This finding has important conservation implications because *Lomatium packardiae* is on the Idaho rare plant list and earlier DNA-based studies suggested that it was not a 'real' taxon. Continued conservation measures for *Lomatium packardiae* are warranted based on the results of this research.

Lomatium anomalum. Photo by Mike Ottenlips.

These new DNA-based research techniques also revealed tha t the original collection locality of *Lomatium triternatum* is most closely related to other specimens with similar morphologies and geographic distributions. It is genetically distinct from *Lomatium packardiae* populations in the Owyhees. Lewis's 'lost' *Lomatium* has been found to belong to a genetic group that agrees with its geographic distribution, morphological characteristics, and previously recognized taxonomy.

Lomatium packardiae. Photo by Mike Ottenlips.

This research would not have been possible without the Idaho Native Plant Society's Education Research and Inventory Grant (ERIG) program providing funds for my fuel expenses. The funds allowed me to travel widely and collect a large number of *Lomatium triternatum* and *Lomatium packardiae* populations included in the DNA-sequence-based analysis at the heart of my research. •

The Camas Prairie outside Grangeville, Idaho, where the wider-leaflet Lomatium plants are found and which were causing confusion in preliminary DNA sequence studies. Photo by Emily Washburne.

The Western Native Plant Conference

By Peggy Faith, Pahove Chapter

I had wanted to attend the Western Native Plant Conference in Vancouver, Washington for some time. Receiving the Education and Enrichment Award from the Native Plant Society's Pahove Chapter in 2017 made it possible. The award covered conference fee and lodging expenses.

I initially wanted to attend the conference to get some different perspectives on restoration. Because areas west of the Cascade Mountains get much more rainfall compared to southwestern Idaho, I thought their restoration challenges would be different. I also looked forward to learning from presentations on native seed co-ops, seed treatments and propagation research, pollinator habitat restoration, and insect and disease issues. The range of experience from presenters also looked interesting, coming from federal and state agencies, foundations, nurseries, universities, and school groups.

The conference started with a pre-conference field tour of four restoration sites in the Vancouver, WA area, each varying in size and scope. I quickly learned their challenges are similar to ours, but with Himalayan blackberry *(Rubus bifrons)* being our white top (*Cardaria draba)*, or reed canarygrass *(Phalaris arundinacea)* and purple loosestrife *(Lythrum salicaria)* being our cheatgrass *(Bromus tectorum)* and cereal rye *(Secale cereale)* problems. Much discussion was on controlling invasive weeds. Projects had greatly varying budgets, which at times seemed to dictate a project's success. The amount of volunteer hours was also impressive and seemed to be just as important. All restorations were multi-year coordinations of funding, seed collection and plant propagation or purchases, planting, and weed control.

My favorite site was the logically named NE 119th St. Curtin Creek Mitigation Site. This project replaced a man-made ditch with a stream channel and floodplain bench to reconnect the stream to its floodplain. They then planted about 60,000 native trees and shrubs to restore habitat. I was impressed by how they upgraded a ditch system into what will be a more resilient stream system. A 20-year study will document results of the effort.

The next two days were spent inside listening to really interesting presentations. Presenters came from Oregon, Washington, Idaho, Utah, and Montana. In the presentations about pollinators, there was some very useful information which bolstered my suspicions about the vital need for diversity in any sort of planting. And that in targeting one species, you are affecting many others. In tandem, we need to take into account animal behavior as a part of what will help with success. In presentations about restorations, though challenging, a common theme was about trying to be realistic about how many resources you need long-term. Listening to the studies presented, I felt lucky to be the recipient of the results of years of research on plant interactions, propagation, and pitfalls—to help me not repeat missteps. Ultimately projects that we work on in the natural world are way more complex and interdependent than we would like. A more successful approach would include this concept.

The NE 119th St. Curtin Creek Mitigation Site.

One thing that I did not expect was the sheer number of departments, agencies, and organizations interested in sharing information. Another surprise was the amount of information available in the public domain of research and studies which could be really helpful to anyone involved with growing native plants, doing restoration, or planting pollinator habitats. This conference was really valuable to my ongoing understanding of native plants and reinvigorated my curiosity to learn more! •

New Plant Signs for Orton Botanical Garden

Article and Photos by Lamar Orton, President, Board of Directors of Orton Botanical Garden

From the very first plantings at the Orton Botanical Garden, signage has been important to provide plant identification for garden visitors. Over the years, hundreds of signs have been placed in the Garden.

The original signs, with white letters etched into a green face, were plastic signs placed on a single aluminum stake. Each sign had the plant's common name, the scientific name, the plant family and the states in which the plant was found. The signs were attached to the stakes by strong double-sided tape. The idea behind the tape was that if the signs were accidently hit, they would fall off the stake and not be broken. However, we found

Damaged plant identification sign.

that, over time, signs would still be broken. Some were broken by deer (prior to deer fence construction), rock chucks, skunks and other animals. They were also occasionally broken during Garden maintenance and by visitors. All this breakage was relatively minor until 2014, when a marble-sized hail storm hit the Garden. Approximately 60% of the Garden's signs were broken in that event, our worst-ever signage loss.

After that event, we decided that metal signs would last longer. We began purchasing aluminum signs and continued to attach them to the stakes with two-sided tape. These aluminum signs seemed to be the answer for a while. However, within a year or two, some signs became so faded they became hard to read. This was especially true for signs that faced south and were in full sun. Those that were in shade most of the day or faced north rarely faded to the point of becoming illegible. None of the plastic signs had ever faded so drastically.

It became necessary to make one more adjustment to our signage program. We found a very durable metal stake, combined with a sign holder that would protect the signs from damage. The sign-holder edging wraps around the label's margins on three sides. We are now using those holders, into which we place both the plastic signs and the non-faded aluminum signs. This is working very well, with no signs yet broken or bent.

Aluminum identification sign.

We used the 2017 $600.00 grant funds received from the ERIG program to purchase 116 signs for Idaho native plants. All signs are now being placed in the holders with strong metal stakes. We would be happy to share advice about garden signs with others who may be facing signage issues.

The Board of Directors of Orton Botanical Garden would like to thank INPS and the ERIG Committee for providing the funding to substantially improve our garden signage program. •

Stakes protect the plastic and aluminum signs.

Editor's Note: For those of you not familiar with it, the Orton Botanical Garden in Twin Falls is an IRS approved 501(c)(3) nonprofit that provides a quality educational and esthetic experience and is open to the public. Native plants live here.
https://ortonbotanicalgarden.com/

Establishing GLORIA for Long-Term Monitoring of Alpine Vegetation

By Michael Mancuso, Pahove Chapter

Idaho's mountains are important for watershed, wildlife, biodiversity, recreation, aesthetic, and other values. Mountain ranges in the central and east-central part of the state attain elevations high enough to support alpine vegetation, reaching beyond the limits of tree growth. As such, the alpine zone represents an ecosystem at a climate extreme; one that is very temperature dependent and predicted to be a sensitive indicator to climate changes.

Along the Lemhi Mountains crest. Photo by Paul Allen.

GLORIA (Global Observation Research Initiative in Alpine Environments) is a program to establish and maintain a worldwide, long-term monitoring network for comparative study of climate change impacts on mountain vegetation and its biodiversity. The GLORIA monitoring program aims to document vegetation changes over time in alpine environments using plots established on a set of summits that represent a low to high alpine elevational gradient within a target region, typically a specific mountain range or sub-range. Standardized sampling protocols collect data in an arrangement of nested plots positioned within the top 10 vertical meters of the summit. Monitoring focuses on changes in the number of plant species (species richness), plant species loss or gain (species composition), plant species abundance (cover and frequency), soil temperature, and snow cover (indirectly through soil temperature measurements).

The first GLORIA sites were established in Europe in 2001. The program soon expanded to all other continents except Antarctica and now includes target regions in at least 40 countries, ranging from polar to tropical latitudes. In the United States, GLORIA sites have been established in California, Montana, Wyoming, Colorado, Nevada, and Oregon.

In 2018, a team of Idaho botanists and ecologists established the first GLORIA target region in Idaho, in the Lemhi Mountains. Plot establishment and baseline sampling were completed on three summits south of the historic mining town of Gilmore. Elevations for the three summits range from a little more than 10,000 feet, to over 10,700 feet. Located in east-central Idaho, the Lemhi Mountains form one of the longest and highest mountain ranges in the state. They rise above the Snake River Plain and extend northward for approximately 100 miles. Elevations top out at 12,197 feet on the summit of Diamond Peak, with four other named peaks and several other unnamed peaks rising above 11,000 feet. In general, alpine habitats are restricted to a band along the crest of the range above approximately 10,000 feet elevation. Most high peaks repeatedly supported large glaciers in the past.

Townsendia parryi. Photo by Lynn Kinter.

The set of GLORIA summits selected to represent a target region need to meet a set of six standard criteria: (1) Summits need to lie outside areas of active volcanism; (2) Summits should be exposed to the same local climate, with climatic differences between summits caused only by their different altitudinal positions; (3) Summits should be composed of similar bedrock to alleviate differences in species richness and composition that could be substrate-related; (4) Summits should not be in areas obviously altered or affected by human interference or land uses such as mining, livestock grazing, or excessive

GLORIA data collection gear. Photo by Lynn Kinter.

recreation; (5) Summits should be of "moderate" geomorphologic shape—very steep, as well as flat plateau-like summits are unsuitable for the application of GLORIA protocols; and (6) Summits should have plant species and vegetation representative for their respective elevational belts.

Anemone multifida. Photo by Lynn Kinter.

GLORIA data collection includes a set of four mandatory and several optional, supplemental sampling protocols. Overall, our sampling recorded a total of 82 vascular plant species at the three Idaho GLORIA summits. Plant diversity at each summit ranged from 35 to 66 species. The aster family with 20 species, the grass family with 13 species, and the mustard family with 8 species combined to account for 50% of the overall recorded plant species richness. Six genera were especially well represented on the GLORIA summits with at least 4 species each, including pussytoes *(Antennaria)*, draba *(Draba)*, sandwort (*Arenaria* sensu lato), bluegrass *(Poa)*, and townsendia *(Townsendia)*. A few common dandelion *(Taraxacum officinale)* plants were recorded at one summit and represented the only non-native plant species encountered at a GLORIA site.

Townsendia condensata. Photo by Lynn Kinter.

Vegetation cover on each summit was dominated by graminoid species, with *Carex elynoides* (black root sedge), and/or *Carex rupestris* (curly sedge) and/or *Calamagrostis purpurascens* (purple reedgrass) being the most abundant. Other graminoid species typically contributed only minor amounts of vegetation cover. Forb diversity was relatively high at each summit, but only a few species such as *Phlox pulvinata* (cushion phlox), *Arenaria obtusiloba* (arctic sandwort), *Hymenoxys grandiflora* (old-man-of-the-mountain) *Eritrichium nanum* (alpine forget-me-not), and *Oxytropis besseyi* var. *argophylla* (Bessey's crazyweed) were relatively common at more than one summit. We also found that it was not uncommon for species to show variations in presence-absence and/or abundance between north, south, east, and west aspects.

Data collection by Rose Lehman and Allison Busier. Photo by Mike Mancuso.

In addition to the collection of floristic data, GLORIA requires the burial of soil temperature data loggers on north, south, east, and west aspects. The data loggers are programed to take a temperature reading once an hour, all day, every day. This design provides information on snowpack duration and climatic conditions for the summit's four cardinal directions. When snow cover is absent, changes in average air temperature will be reflected in the soil temperature, however, soil temperature remains more or less constant at 32°F when snow covers the ground. This provides a way to calculate the snowpack period and associated growing season length. Soil temperature measurement series also enable calculations of temperature indices such as mean, minima, maxima and temperature sums, annually and/or for certain periods. The GLORIA protocol also includes taking over 60 photographs at each summit to help document the vegetation and the plot layout. GLORIA summits are scheduled to be resampled at intervals of 5 to 10 years to acquire long-term trend data. As part of the GLORIA network, monitoring data from the Lemhi Range has a reach well beyond east-central Idaho. It has the potential to be compared and evaluated in a larger context and contribute to efforts to better understand climate-related changes in alpine ecosystems at an international scale.

Anne Halford burying one of the soil temperature data loggers. Photo by Lynn Kinter.

GLORIA monitoring information is relevant to the conservation of plant and animal species that use Idaho's alpine habitats at least seasonally. One example of a potential conservation role of GLORIA in Idaho involves

Continued on Page 12

GLORIA.....*Continued from Page 11*

Pinus albicaulis (whitebark pine)—a federal Candidate species for listing under the Endangered Species Act due

Lynn Kinter at a GLORIA data collection grid, photo by Jodi Brandt.

to rangewide population declines and ongoing serious threats to its long-term persistence as a keystone species. Stands of whitebark pine form the upper treeline downslope of each Idaho GLORIA summit. One possible response to climate change is the upslope migration of whitebark pine into currently unsuitable alpine areas. This could have important conservation implications regarding the long-term persistence of whitebark pine in the east-central Idaho mountains. GLORIA plots are now available to monitor, detect, and document this possibility. GLORIA monitoring information can provide land managers and others interested in high elevation ecosystems a better understanding of the relationships linking climate change and alpine biodiversity. This information has the potential to inform and help guide future conservation activities benefiting Idaho's iconic alpine landscapes.

The Idaho GLORIA team (minus Beth Corbin taking the photograph).

Efforts to establish GLORIA in Idaho required a team approach. Field team members included Rose Lehman, Anne Halford, Lynn Kinter, Beth Corbin, Jessica Irwin, Allison Busier, Jodi Brandt, Paul Allen, and Michael Mancuso. Several other folks worked behind the scenes to make the project happen, most notably Karen Colson with the U.S. Fish and Wildlife Service. The U.S. Forest Service Intermountain Region and Idaho Bureau of Land Management provided funding for the project. In-kind funding sources included the Caribou-Targhee National Forest, U.S. Forest Service Rocky Mountain Research Station, Idaho Bureau of Land Management, Idaho Department of Fish and Game, Boise State University, and Mancuso Botanical Services. Support was also provided by the Idaho Native Plant Society through their Education, Research, and Inventory Grant program for the purchase of materials needed to fabricate some of the sampling equipment. Check out the GLORIA website (www.gloria.ac.at/) for more information about the program's global reach, objectives, history, and methods. •

How do you spell GLORIA? Photo by Lynn Kinter.

Boise Front Spring 2019 Wildflower Walk Series

The "Treasures of the Boise Front" series of spring wildflower walks is an introduction to a selection of public trails with the best diversity of native wildflowers throughout the Boise Front. While a few hikes are easy rambles, most walks include some "target" species or habitats that are a mile or more from the nearest trailhead. Expect a steady pace to reach these goals within the 2-3 hour timeframe, interspersed with occasional stops to discuss other plants of particular interest. All hikes will be led by Barbara Ertter, a botanist with strong Boise roots and a great enthusiasm to share her knowledge. Further details on each walk will be provided by the Foothills Learning Center, with instructions on how to register, times, and where to meet (https://bee.cityofboise.org/visit/foothills-learning-center). Walks are free, but limited to the first 20 sign-ups. Unless otherwise indicated, walks will begin at 6 pm or later. The following schedule is tentative as some dates may need to be adjusted to account for seasonal bloom times, weather, etc. No pets, please.

April 11: Buena Vista trail in Hillside to Hollow Reserve (Cusick's primrose, Aase's onion)
April 17: Polecat Loop Trail (*Idahoa* and other belly flowers)
April 22: TBD
April 30: Cobb Trail (longer-than-average hike to windswept ridge with Hood's phlox and scabland fleabane, with Andrus's biscuitroot enroute)
May 7 (or possibly May 8): Lydle Gulch near Lucky Peak Dam (hare's-foot milkvetch, Beckwith's violet, Bolander's yampah)
May 14: Currant Creek from Dry Creek Trailhead on north side of Hidden Springs (camas, Tolmie's onion, freckled milkvetch)
May 21: Miller Gulch trailhead to Corrals trail for lupine display (or alternative, TBD, if timing wrong for lupines)
June 4: Oregon Trail from Bonneville Point
June 11: Bob's Trail (syringa, checker-mallow, Nuttall's cinquefoil)
June 18: Hulls Gulch Interpretive Loop from upper trailhead
June 25: Hidden Springs wetlands from Dry Creek trailhead
July 9: Upper Dry Creek from 12 Mile trailhead

Additional wildflower walks might be scheduled at Bogus Basin Mountain Recreation Area and/or Mores Mountain during the summer months, and at lower elevations when the late-season flowers begin to bloom.

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: Meetings are now being held in the Wildlife Building, North Idaho Fairgrounds, Coeur d'Alene.
Contact: Derek Antonelli, ds.ca.antonelli@gmail.com

Upcoming Events

March 6: Derek Antonelli will present on "Idaho's intriguing orchids."
April 3: Derek Antonelli will present on "Idaho's conifers."
May 1: Derek Antonelli will present on "Diversity of north Idaho's aquatic plants."

Field trips (subject to change)

April 20: Q'emiln Park, Post Falls, meet at trailhead at 9:30 am.
May 11: Blue Creek, meet at Walgreens (US 95 and Appleway) at 9:00 am.
June 8: Marie Creek, meet at Walgreens (US 95 and Appleway) at 9:00 am.
June 28 to 30: Selkirk Botanical Foray, sponsored by University of Idaho herbarium, details TBD.

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

March 21: Kelvin Jones will present on "Caves and seeds."
April 18: Sue from the BLM will present on "Fire restoration."
May 16: Don Morishita from the BLM will present 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://idahonativeplants.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

April 9: Bill Borland will present on "Pond scum."

Native Plant Sale

Through the Pahove Chapter's annual plant sale we encourage people across the Treasure Valley to enhance their yards and gardens with natives by making hundreds of native plants available for sale. This event also helps educate people on the value of native plants and the habitat they provide to bees, birds, and other wildlife. Proceeds benefit Pahove Chapter and the MK Nature Center.
Where: Idaho Department of Fish and Game's MK Nature Center at 600 S. Walnut St, Boise ID.
When: Friday, April 26, 5–7 pm, Members Only, Saturday, April 27, 10 am–1 pm, Open to the Public.

Wildflower Show

Pahove Chapter will host the 2nd Annual Wildflower and Weed Show at the Foothills Learning Center in Boise. Participants will learn about our local flora, including how to identify the wildflowers of the Boise Foothills and the weeds that accompany them.
Where: Jim Hall Foothills Learning Center at 3188 Sunset Peak Rd, Boise ID.
When: Sunday, May 12, 11 am–4 pm.

Boise Front Wildflower Walks

Wildflower walks will be happening spring through summer. (See list on Page 13.) These walks provide the community an opportunity to get outside, hike our foothills trails, and gain knowledge of our local flora. To view details and sign up to attend the hikes—visit the Foothills Learning Center Facebook events page or their website at https://bee.cityofboise.org/visit/foothills-learning-center

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 in the process of being revived.

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. in 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

March 21: Dr. 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.

Native Plant Sale

The White Pine Chapter Native Plant Sale will have a members only opportunity, followed the next day by a sale open to the general public.
Where: The 1912 Building, 412 East Third St., Moscow.
When: Friday, May 17, late afternoon/early evening after the sale is set-up, Members Only, Saturday, May 18, 9 am–1 pm, Open to the Public.

WOOD RIVER CHAPTER

When: Meetings are generally held each month with field trips throughout the summer and lectures during the off season.
Where: Various places.
Contact: Kristin Fletcher at naturewalker7@gmail.com for general information and Lisa Horton at LisaHortonJewelry@gmail.com to be added to the chapter's monthly email list.

Upcoming Events

April 4: Ross Winton, entomologist with the Idaho Department of Fish and Game and Director of the Pacific Northwest Bumblebee Project, will present a program on Idaho's pollinators and the Pacific Northwest Bumblebee Project; 7 pm at the Emmanuel Episcopal Church meeting room, 101 S 2nd Ave. (enter on Bouillon Street) in Hailey.
April 27: Joint field trip with Loasa Chapter; meeting spot and destination TBD.
June 1: Field trip to Orton Botanical Garden in Twin Falls; meeting time TBD.

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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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Submissions: Members and non-members may submit material for publication. Relevant articles, essays, poetry, news, announcements, photographs and artwork are welcome. Authors, artists and photographers retain copyright to their work and are credited in *Sage Notes.* Send all submissions electronically to the editor at the link below. Please provide a phone number and/or email address with your submission. Submission deadlines are January 8, April 1, August 1 and November 1.

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Editor: Michael Mancuso, sage-editor@idahonativeplants.org