



Castilleja linariifolia

Castilleja

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Additions to Wyoming's Flora:

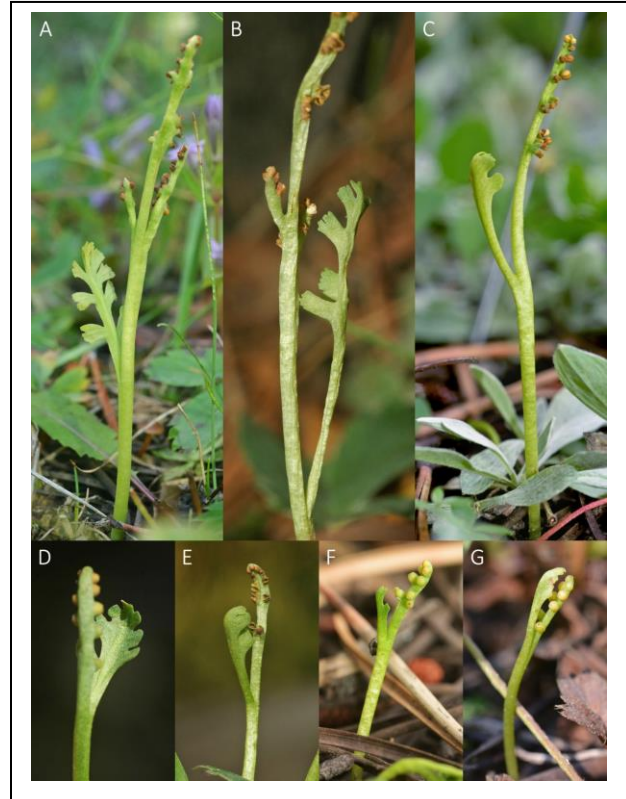
New Species and Records of *Botrychium* (Moonwort)

Ben Legler, Curator, Rocky Mountain Herbarium

Surprisingly, Wyoming's most species-rich group of ferns, representing 25% of our state's total fern diversity, is also among its most elusive and rarely seen. These diminutive and peculiar ferns, called moonworts (genus - *Botrychium*), are easily overlooked even by experienced botanists and, when found, are challenging to identify to species. Therefore, it should be of little surprise to learn that our documentation of *Botrychium* in Wyoming remains deficient. However, thanks to targeted survey efforts in recent years, documentation is improving, and 20 species and varieties are currently known from the state. This represents a dramatic increase from the 7 moonwort species treated in the 3rd Edition of the *Vascular Plants of Wyoming* (Dorn 2001). Wyoming harbors more *Botrychium* species than any other US state except Montana (with 22 species).

Reported here are three *Botrychium* species added to Wyoming's flora in 2024. Two of these were formally described as new species in the March, 2024 issue of *American Fern Journal*, and the third represents a new state record was found during my *Botrychium* surveys for the United States Forest Service in western Wyoming.

***Botrychium farrarii* (Farrar moonwort)** — Although I first discovered *B. farrarii* in 2009, it wasn't formally named and published as a new species until this year (Legler & Popovich 2024). Sometimes it takes a while to gather sufficient data on a species to fill out details about its morphology, distribution, habitat preferences, and relationships with other species to make a proper publication.



Above: Plants of *Botrychium farrarii* from the Bighorn Mountains. This is a small species; most plants are between 1.5–5 cm (0.6–2 in) tall. By Ben Legler.

I credit the discovery of *B. farrarii* to a mix of chance and experience. Chance came in when I made an unplanned detour through the Bighorn Mountains on a return trip to Laramie while a graduate student at the University of Wyoming. While camping off Hwy 16, I realized the area held promise for *Botrychium* and spent part of a day seeking out and searching suitable patches of habitat. (Continued p. 3)

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WYNPS News

Check it out: Look for an insert in this issue with the ballot for the 2025 WYNPS Board, and announcement of 2025 scholarships and grants. Please vote by mail or online at the wynps@wynps.org email address, so that your vote arrives by 17 January 2025. Thank you!

Mark your calendars: The 2025 Wyoming Native Plant Society Annual Meeting and Wildflower Weekend will be in Fort Laramie, Wyoming, May 30-June 1. *Look for more information in the March newsletter.*

WYNPS Board - 2024

Co-Presidents: Joyce Evans (wyo5lp@yahoo.com) and Mike Evans (iroxranch@yahoo.com), Fort Laramie
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Teton Plants: Amy Taylor, Treasurer; (tetonplants@gmail.com). Check the chapter homepage (<https://tetonplants.org/>) for events.
General questions: wynps@wynps.org

Treasurer's Report: Balance as of 6 December: Scholarship = \$2,291; General = \$11,819; Total = \$14,110.

From September to May, Teton Plants and [JH Bird and Nature Club](#) co-sponsor monthly programs at the Teton County Library on the 2nd Tuesday of each month as part of Nature Night Series. 6:00pm, Ordway Auditorium, Teton County Library, 125 Virginian Ln, Jackson, WY 83001. Check the calendar at: <https://tetonplants.org/>.



Message from the Co-Presidents

As the winter winds howl about the cabin door, the snow drifts shutter-high and we gather inside for a meager meal of corncakes...oops, wrong winter. We have experienced a killing frost but have been spending afternoons on the deck, basking in the sun. It's pretty hard to comprehend that this is the December newsletter and we really are in Wyoming. While one can't help but wonder how our botanical friends will cope with this unusual weather, it is impossible to pass up enjoying the sun.

We look forward to seeing you in 2025.

...Happy Holidays to all of you!

~Joyce & Mike Evans

New member: Please welcome the following new member to WYNPS: Randall Terry, Dubois.

Next issue: Please send articles and announcements for the next newsletter by 15 February to:

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073

Coming to Wyoming in 2025: The North American Rock Garden Society will meet in Cheyenne, 12-16 June – the first time it has met in Wyoming. It will include fieldtrips to public lands and to gardens, including a Saturday fieldtrip to Vedauwoo. The link to the complete agenda and registration information will be printed in the March newsletter.



New *Botrychium*, continued from p. 1

This is where experience comes in—knowing where to look greatly increases your odds of success! My initial searches in the area turned up a few sites with senescing, sad-looking plants of the common *B. minganense* and *B. neolunaria*. Then, I encountered a patch of ground with a mix of species in prime condition. I spent several hours on hands and knees crawling across the site, finding five species: *B. furculatum*, *B. lanceolatum*, *B. minganense*, *B. paradoxum*, and *B. pinnatum*. Among these were some puzzling plants I couldn't identify.

What do you do with an unidentifiable *Botrychium*? At the time, you'd send it to Dr. Don Farrar, renowned authority on *Botrychium* and Professor Emeritus at Iowa State University. Don's lab utilized enzyme electrophoresis as one tool to genetically identify *Botrychium* specimens and deduce relationships among species. He applied this technique to more than 20,000 specimens from across the world, greatly advancing our understanding of moonwort systematics and describing, with colleagues, nine new species between 1986 and 2024. Many Forest Service botanists relied on Don to confirm identifications of plants. I did the same, and mailed him fresh samples of those puzzling plants from the Bighorn Mountains.

Don's reply with the initial electrophoresis test results on those plants came back a few months later. His comments began with "Now for the really interesting plants..." and he went on to say these plants appeared to be a new diploid species matching the genetic profile of a species that he suspected to exist (or, existed but went extinct) based on the presence of its unique alleles in several species of hybrid origin derived from it. Testing of additional plants from the site, along with later DNA-based studies (Dauphin et al. 2017, 2018), confirmed his initial suspicions. Species of hybrid origin are common in plants, especially in ferns, and about half of the 48 *Botrychium* species known today are allotetraploids that formed from past hybridization between two separate diploid species. *Botrychium farrarii*, we learned, was one of those diploids.

Spurred on by these exciting results, Don and other botanists including Steve Popovich, Bonnie Heidel, Sara Legler, and Forest Service personnel, joined me to search for more populations of the new species in

the Bighorn Mountains and other mountain ranges in Wyoming and Montana where we suspected *B. farrarii* might occur, with additional trips made by several members of our group to sites in Washington and Alberta. Our focused surveys from 2010 onwards uncovered over 350 new occurrences of 19 *Botrychium* species! However, only three of these represented new sites of *B. farrarii*, and all three were found within 2 km of the population I found in 2009. *Botrychium farrarii* proved to be exceedingly difficult to find, even for moonwort experts!

With our hopes of finding many more populations thwarted, the decision was made in 2023 to publish the new species, which we named in honor of Don Farrar. Although we had limited data, its publication seemed important, as this allows the species to be formally assessed for conservation status (indeed, this may be among the rarest vascular plants in North America, with only 30 individuals found thus far!) and brings it to the attention of other botanists who may then discover new populations. I suspect more populations are out there, somewhere in North America, waiting to be found...



Above: *Botrychium rubellum* (left) and *B. lanceolatum* (right), showing differences in color (note red tinge on stalk of *B. rubellum*) and pinnae shape. By Ben Legler.

***Botrychium rubellum* (red lanceleaf moonwort)**

—This is another species published as new to science in 2024 (Stensvold and Farrar 2024). However, like *B. farrarii*, it was known well before then, with early collections dating back to the early 1900s at least. *Botrychium rubellum* belongs to the *B. lanceolatum* species complex, a set of three closely related species that have been variously treated (Cont. p. 4)

as two species (*B. lanceolatum* and *B. angustisegmentum*) or as two subspecies or varieties of a single species.

The presence of two different phenotypes within western North American *B. lanceolatum* has been recognized since at least 1997. These were informally referred to as the “green phenotype” and “red phenotype” based on coloration of the plants and both are found throughout the Rocky Mountains from Alaska south to New Mexico. Enzyme electrophoresis tests by Mary Stensvold and Don Farrar, followed later by phylogenetic analyses using nuclear and chloroplast DNA (Dauphin et al. 2017, 2018), combined with consistent morphological differences between the species (Fig. 2), provided a compelling argument for recognizing the two phenotypes as separate species.

Both phenotypes (i.e., *B. lanceolatum* in the strict sense, and *B. rubellum*) occur in Wyoming. Like other moonwort species, both are undercollected but probably distributed throughout most of the state’s mountain ranges.



Above: *Botrychium tunux* plant (left) and habitat on scree slope (right) near Sheep Pass in the Wyoming Range. The glossy, bright green color, more rounded pinnae, and smaller size help distinguish *B. tunux* from the more common *B. neolunaria*. By Ben Legler.

***Botrychium tunux* (moosewort)** — I have long suspected *B. tunux* to be present in Wyoming, yet failed to find it until this past summer while surveying for *Botrychium* in the Wyoming Range for Region 4 of the Forest Service under an agreement through the Wyoming Natural Diversity Database. *Botrychium tunux* was described as a new species in 2002 (Stensvold et al. 2002) based on a few populations

mainly on coastal sand dunes in southeast Alaska. After its discovery, botanists unexpectedly began finding it at widely scattered subalpine and alpine sites in the mountains of western North America from the Yukon south to New Mexico, Nevada, and California, and even as far as Norway. Wyoming represented a conspicuous gap in its known distribution.

The population I found is near Sheep Pass along the Commissary Ridge Trail and occurs in fine-textured, sparsely vegetated subalpine scree, similar to other known sites in the Rocky Mountains but different from the habitat preferences of most of our *Botrychium* species. I counted over 220 plants, an unusually large population. Similar patches of habitat occur elsewhere in the Wyoming Range, raising the potential for more populations to be found through continued survey work—something I look forward to next summer!

References

- Dauphin, B., D. R. Farrar, A. Maccagni, and J. R. Grant. 2017. A worldwide phylogeny provides new insight on cryptic diversity within the moonworts (*Botrychium* s.s., Ophioglossaceae). *Systematic Botany* 42: 620–639.
- Dauphin, B., J. R. Grant, D. R. Farrar, and C. J. Rothfels. 2018. Rapid allopolyploid radiation of moonwort ferns (*Botrychium*; Ophioglossaceae) revealed by PacBio sequencing of homologous and homeologous nuclear regions. *Molecular Phylogenetics and Evolution* 120: 342–353.
- Dorn, R. D. 2001. *Vascular Plants of Wyoming*, 3rd ed. Mountain West Publishing, Cheyenne, WY. 412 pp.
- Legler, B. S. and S. J. Popovich. 2024. *Botrychium farrarii* (Ophioglossaceae), a New Diploid Moonwort Species from the Bighorn Mountains of Wyoming, U.S.A. *American Fern Journal* 114(1): 32–48.
- Stensvold, M. C., D. R. Farrar, and C. Johnson-Groh. 2002. Two New Species of Moonworts (*Botrychium* subg. *Botrychium*) from Alaska. *American Fern Journal* 92(2): 150–160.
- Stensvold, M. C. and D. R. Farrar. 2024. A New Diploid Moonwort, *Botrychium rubellum* (Ophioglossaceae), in the Lanceolatum Complex of the Genus *Botrychium*. *American Fern Journal* 114(1): 49–56.

Clues to Refugia Using Herbarium Data

By Chelsea Turner, University of Wyoming

What do *Ginkgo biloba*, cycads, horsetails, club mosses, and mosses have in common? If you were thinking “Wow. Those are some old plants,” you would have been right. These are all very old lineages. It’s incredible that there are still plant genera that exist today which were in existence during the time that plants were first beginning their establishment on terrestrial land. These plants have been able to do what many other organisms have not, live through catastrophic global and mass extinction events. How were they able to do this? Some may have survived solely due to resilient adaptive abilities and tolerance mechanisms, but some may have survived because they were fortunate enough to be existing within a climate change refugium area.

Climate change refugia areas are “...areas relatively buffered from contemporary climate change over time that enable persistence of valued physical, ecological, and socio-cultural resources” as defined Dr. Morelli and her comrades in their paper “Managing Climate Change Refugia for Climate Adaptation.” Basically, these are areas which are experiencing a different climate from the climate occurring regionally or globally. This creates an environment that allows organisms to exist with a generally stable climate even if the climate shifts or changes around this buffered area. Nice place to be if the rest of the world is experiencing volcanic eruptions or is covered with ice.

The concept of climate change refugia has been around for about 200 years. Past paleoecologists were looking at species distribution after and during the Pleistocene a.k.a., the ice age. They found that in addition to species migration to lower elevation or towards the equator, species were also surviving in pocket habitats which were protected from the world’s climate change. These populations were able to contribute to the local persistence of their species.

Today the concept of climate change refugia areas is being looked at in the scope of global warming trends. While the species living through the ice age needed areas which were warmer, the species today will need areas maintaining cooler climates. The authors of the previously mentioned paper propose that areas protected from global warming trends will be in mountain ranges with features such as snowpack, deep cold water lakes, canopy cover, north facing slopes, large crevices for cold air to pool, and

topographically complex terrain. Sounds like my kind of vacation.

The question now is: How can we compare plant populations which are currently living in these wonderful sounding mountain habitats to the populations which existed there in the past? Fortunately for me, I am going to the University of Wyoming, which is where the Rocky Mountain Herbarium is housed. In the herbarium there is access to a million plant specimens that span back to over a hundred years ago. Through using herbarium specimens and data it is possible to compare a past collection from a location to a collection taken from that same location today. Could it be possible to locate potential climate change areas through these comparisons of past and present plant communities with herbarium resources? This is the very question that Dr. David Tank, of the Botany Department, proposed to me as a research project that would allow me to gain an extremely hands-on experience with floristics, not to mention a chance to hike around in the mountains! I, of course, agreed to work on the project.



Chelsea Turner and friend in the field. By Chelsea Turner.

I searched Herbarium records for locations in the Bighorn Mountains, ancestral homeland of the Crow and Cheyenne, which met some of the proposed features of climate change refugia areas (snowpack, deep cold-water lakes, etc.) that were collected from 1979 or 1980, and which had at least 50 specimens associated with the location. I was also looking to compare results across three elevation gradients – low, medium, and high elevations and found three points for each elevation gradient which met the requirements. This gave me a total of nine locations which I would get to explore over the summer.

The collections taken in the past were made in June, July, and August. We tried to go to collect as close to the day and month (Continued, p. 6)

Refugia, Cont. from p. 5

of the original collection. I started fieldwork in July with Ph.D. student, Caroline Brose, for the first grouping of collections, but we discovered early on that it was a late year. Many of the plants that were in bloom in 1979 were not yet in bloom in 2024. So, we had to shift all the dates back by about a week. For herbarium collections, it is important to collect plants that are in bloom and/or fruit on the plant because these features are often required for identification.

It was important for me to remove these plants from their environment in the best way possible, so I would announce myself and my intentions to the plant community and take a moment to be still with them before I did any collecting. It is herbarium standard to not remove more than 20% of a population to ensure for a continued seed bank. If there is only one plant, you absolutely do not take it until there is evidence of more.

Caroline went with me for almost all the collections. There were a couple weekends when I did not have help from a grad student, and I was unsure of my car's brakes (yikes). These weekends one of my very good friends took me collecting and brought her four-year-old with her. He "helped" me with my collections, but mostly he was just interested in the digging tools I had. Going collecting with them made for one of the highlights of this project.



The products of a day's work in the field—and the making of a lot more work to come! By Chelsea Turner.

The other piece of the project which brought me immense joy was not only getting to camp but getting to backpack into the Cloud Peak Wilderness area and camp. For this five day adventure in the mountains, I was joined by another Ph.D. student, Malia Santos as well as Caroline. I had never been on a backpacking-camping trip before, but I had wanted to go on one for a long time. We hiked up to Emerald Lake where we set up camp before going collecting. What an amazing location for a first-time backpacking trip.

Having Caroline and Malia's help greatly enriched my experience. They each brought knowledge and expertise which helped me form robust collections. We all have different plants of interest, which made it natural to divide and conquer. Caroline would start with the trees (her specialty is willows) while Malia (her specialty is paintbrush) started collecting forbs and I would collect grasses, sedges, and rushes. Our different areas of interest allowed us to teach each other about plants. Well, actually, they mostly just taught me about plants.

Starting in last year's fall semester, I began identifying the 638 specimens that we collected over the summer. The total number of specimens from the past collections was about 600. As of now, I have identified all the conifers and flowering plants except for grasses. Saving the best for last. I have been so fortunate to have the help of fellow Botany student, Dan Coles in identifying my specimens. Undergraduate Research Day is April 20th which means that I need to have everything identified and the data analyzed by then. How exciting!

Getting to go to hike in these amazing locations while learning how to make collections by herbarium standards was so rewarding. I love the Bighorns and I now feel a true connection to the area after spending time weaving through the range as I collected plants. My plant identification skills have improved significantly which also allows me to feel more connected to plant communities of this land. This project was funded entirely by grants, including NASA space consortium, Haub creative grant, Wyoming Research Scholars, and yes, the Markow scholarship awarded through the Wyoming Native Plant Society. I have this funding to thank for this research experience and the ability to spend so much time getting to know the Bighorn Mountains. This undergraduate project inspired me to pursue graduate studies in Botany.

[Editor's note: Chelsea Turner was a 2023 recipient of the Markow Scholarship for undergraduate research. This report was submitted in February, 2024—we hope to get an update with results.]

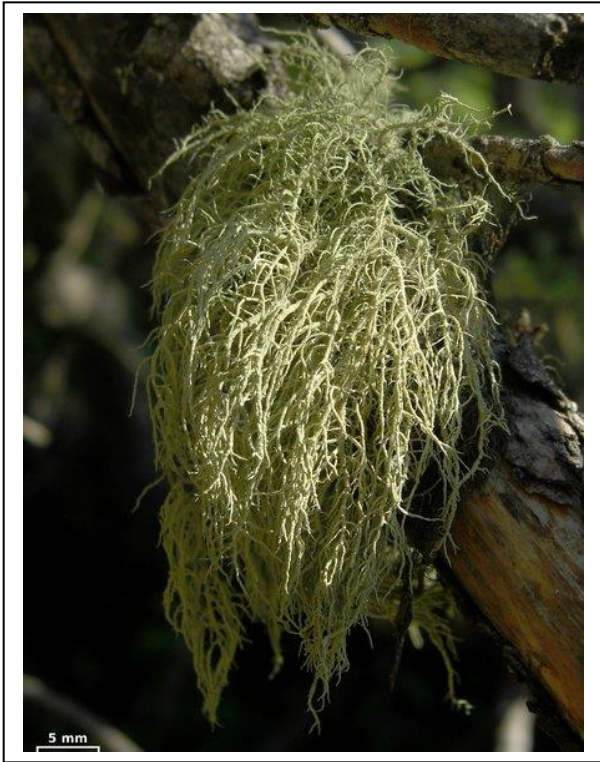
Reference

Morelli, T. L., Daly, C., Dobrowski, S. Z., Dulen, D. M., Ebersole, J. L., Jackson, S. T., Lundquist, J. D., Millar, C. I., Maher, S. P., Monahan, W. B., Nydick, K. R., Redmond, K. T., Sawyer, S. C., Stock, S., & Beissinger, S. R. (2016). Managing Climate Change Refugia for Climate Adaptation. *PLoS One*, 11(8), e0159909–e0159909. <https://doi.org/10.1371/journal.pone.0159909>

Ethnobotany - Part 12.

Old Man's Beard (*Usnea* species)

By Meredith Taylor,
Certified Wyoming Naturalist



Above: *Usnea lapponica*, by Jason Hollinger. Posted in: Ways of Enlichenment – Lichens of North America, at: <https://www.waysofenlichenment.net/lichens/>.

Usnea is a genus of beautiful lichens called Old Man's Beard that grows on the bark of trees and shrubs, and occasionally on rocks, especially in old growth forests. With approximately 400 species world-wide, *Usnea* species can be found in both the northern and southern hemisphere and in tropical and temperate climates. At least seven species can be found in Wyoming. The yellowish-green (a color called usnic-yellow by mycologists), fruticose lichen is heavily branched, upright or pendant. It has an elastic central cord that distinguishes it from other similar-appearing lichens. *Usnea* is in the Family Parmeliaceae of the Kingdom Fungi.

Medicinal use: All species of *Usnea* contain the natural antibiotic usnic acid to treat infections of the lungs and upper respiratory system, intestines, urinary tract, and reproductive system. It is considered a sacred "Herb of the North" by some

native and Chinese cultures who *Usnea* it as an immune stimulant.

Usnea is still used in China to treat tuberculosis (*Mycobacterium tuberculosis*) and whooping cough (*Bordetella pertussis*). In some cases, *Usnea* may be even more effective than penicillin against gram-positive bacteria like *Staphylococcus* and *Streptococcus*. *Usnea* is particularly important because natural antibiotics are uncommon but so valuable to treat diseases with medicinal flora.

The author gathers clumps of *Usnea* year-round in the Greater Yellowstone Ecosystem forests to make a tincture by submerging a cup of the lichen in 2 cups of spirits such as vodka to store in a glass jar with a lid for 2-4 weeks. The dosage is 1-2 ml twice/day taken orally in a cup of water for a week.

Usnea is sensitive to air pollution and is now considered rare but not extinct in some areas of the North. [Editor's note: Read about air pollution monitoring in Wyoming using lichens in *Castilleja*; Dec 2014, Volume 33(4) – 10 years ago!]

(*This article is for educational purposes and does not condone collecting of plants that readers can't identify with certainty. The ethics of wild plant collecting is to tread softly through the plant's habitat and only pick the occasional leaf or flower to protect plant sustainability. Check directly with the agency about their policy if you want to harvest native plants on public land.*)

References

- Brodo, I.M., S.D. Sharnoff, S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven, CT.
- Kershaw, L. 2000. Edible and Medicinal Plants of the Rockies, Lone Pine Press.
- Moerman, D. 1998. Native American Ethnobotany, Timber Press, Portland, OR.
- Tuthill, D.E. 2013. Preliminary checklist of lichens reported from Wyoming. Monographs of the Western North American Naturalist 6(1):1-19.
<https://doi.org/10.3398/042.006.0101>
- USDA - Forest Service. 2024. *Usnea longissima* at: https://www.fs.usda.gov/wildflowers/plant-of-the-week/usnea_longissima.shtml



Plant diversity in Wyoming is an endless source of wonder. Check out this issue for news on additions to Wyoming's biggest species group of ferns, clues to plants of past colder Wyoming climates lurking in herbarium records, and a lichen that really pops out this time of year!

WYOMING NATIVE PLANT SOCIETY MEMBERSHIP FORM

Date _____

Name _____

Address _____

Email _____

Please check all appropriate boxes:

- New member
- Renewing member
- Check here if this an address change
- Annual membership with email notification of newsletters: \$10
- Annual membership with mailed newsletters: \$12
- Annual membership with scholarship support and email notification of newsletters: \$20
- Annual membership with scholarship support and mailed newsletters: \$22
- Life membership with email notification of newsletters: \$300
- Life membership with mailed newsletters: \$300

In addition to the statewide organization, we have two chapters. Membership in chapters is optional; chapter members must also be members of the statewide organization.

- Teton Plants Chapter annual membership: \$5
- Sublette Chapter annual membership: \$5
- Additional donation of \$ _____

Total enclosed: _____

Please write checks to **Wyoming Native Plant Society**

Wyoming Native Plant Society – Renewal and Ballot for 2025

Return to: Wyoming Native Plant Society – P.O. Box 2449 – Laramie, WY 82073 - by 17 January!

Name _____ Date _____
Address _____
Email _____

Please check all appropriate boxes:

- New member
 Renewing member

Check here if this an address change

- Annual membership with email notification of newsletters: \$10
 Annual membership with mailed newsletters: \$12
 Annual membership with scholarship support and email notification of newsletters: \$20
 Annual membership with scholarship support and mailed newsletters: \$22

- Life membership with email notification of newsletters: \$300
 Life membership with mailed newsletters: \$300

In addition to the statewide organization, we have two chapters. Membership in chapters is optional; chapter members must also be members of the statewide organization.

- Teton Plants Chapter annual membership: \$5
 Sublette Chapter annual membership: \$5

Additional donation of \$ _____

Total enclosed: _____

Please write checks to:

Wyoming Native Plant Society

2025 WYNPS BALLOT – Please mail for arrival by **January 17** or email your vote to: wynps@wynps.org

Please vote for one person for each Officer position, and for the vacant At-Large position:

Co-Presidents ___ Mike & Joyce Evans (Fort Laramie) Secretary/Treas. ___ Dorothy Tuthill (Laramie)
Vice President ___ Kathy Lichtendahl (Clark) At-Large (2-yr term) ___ Kim Wahl (Cheyenne)

[The second Board member At-Large position, on the 2nd year of a 2-yr term, is held by Ben Legler (Laramie).]

Write-in candidate: _____ *Thank you to Heidi Anderson for Board contributions in 2023-2024!*

Candidate Biographies

Mike Evans is a UW grad and Wyoming native who has a broad range of interests, mainly focused on the great outdoors. His botanical knowledge started at childhood with a strong infusion in college and throughout his ranching and Park Service careers. Retired, he now has the time to support the organizations important to him.

Joyce Evans spent her professional career providing speech and language therapy services to people of all ages. As a Wyoming native, she knows what it takes to thrive in the state's harsh conditions. She also knows Robert's Rules of Order thoroughly and has finished her term as mayor, now running a household full of plants.

Kathy Lichtendahl is a Certified Wyoming Naturalist and professional nature photographer who also works as a guide in the Greater Yellowstone Ecosystem to educate visitors about the native flora and fauna.

Dorothy Tuthill has been a member of WYNPS for a long time. She has served on the board in several positions, including as secretary/treasurer since 2018. She recently retired from the University of Wyoming; now she has time to pursue her creative and intellectual passions, including as a volunteer at the Rocky Mountain Herbarium.

Kim Wahl-Villareal (Kim Wahl) serves as the Botanist for the Wyoming BLM, leading the Plant Conservation and Restoration Program with focus on rare plant conservation and native plant materials development for restoration. She has experience with plant conservation and restoration in the tallgrass prairies of the Midwest and the thornscrub forests of the southern Gulf Coast but has been most impressed with the community of science, practitioners, and interest within the sagebrush steppe.



Wyoming Native Plant Society

2025 MARKOW SCHOLARSHIP/SMALL GRANT

Applications are due February 15, 2025. Awards will be made in April, 2025.

Electronic copies of this application are also posted on the WYNPS homepage at:
www.wynps.org

The Wyoming Native Plant Society promotes appreciation, understanding and conservation of native plants and plant communities through its annual scholarship/small grants program. For scholarships, thesis research may address any aspect of botany including floristics, taxonomy, ecology, genetics, plant geography, range science, paleontology, pollination biology, physiology, and mycology. For small grants, projects such as botany curriculum development, public native plant gardens, and other forms of outreach will be considered. **This competition is open to all grad students who conduct research in Wyoming, residents of Wyoming or members of WYNPS.**

Proposals must pertain to native plants/vegetation of Wyoming. Preference will be given to proposals expected to generate research data or promote public understanding. Up to \$1,000 may be covered for a scholarship proposal, and up to \$500 for a small grant proposal. *Awards defray direct project costs, excluding labor or conferences.* Eligible expenses include:

1. Direct costs of travel, meals, and lodging for research or education projects.
2. Supply and service expenses used for the sole purpose of the project (e.g., consumable supplies such as laboratory chemicals, soil and nursery stock, and services such as phone and computer time).

The deadline for proposals is February 15. Awards will be announced in April. The proposal should be no longer than three pages and include the following:

- Applicant's name, mailing address, telephone number (land &/or cell as appropriate), and email address.
- Name, mailing address, contact person's name & phone number for any organization that will be directly involved with the applicant in executing the proposal.
- Short abstract of the study or project (2-5 sentences).
- Description of the study or project: objectives, methods, description of final product, and short description of past similar work (if applicable). Garden proposals should include plant lists, an educational component, and explicitly address long-term maintenance plans.
- Description of how the study or project will benefit native plants or plant conservation in Wyoming.
- Overall budget showing amount requested from WYNPS (\$1,000 or less for scholarships; \$500 or less for grants), the intended purpose of the funding, and other funding sources.
- Timeline for completion of the major components of the study or project.
- Brief statement of applicant's qualifications or biography.
- Name, address, email address or phone number of two people as references.

Successful scholarship or grant recipients will be required to submit a final report (due no later than February 15, 2026) as an article about the study or project, printed in our *Castilleja* newsletter.

Please send completed applications to: Wyoming Native Plant Society, P.O. Box 2449, Laramie, WY 82073; or www.wynps@wynps.org.

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073