



Castilleja

Publication of the Wyoming Native Plant Society

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Posted at www.uwyo.edu/wyndd/wnps/wnps_home.htm



Above: *Trifolium barnebyi*, by Isobel Nichols (from Fertig et al. 1994).

Lucky Clover

Barneby's clover (*Trifolium barnebyi*) is one of nine Wyoming plants recently addressed by the U.S. Fish and Wildlife Service, among 165 species in the Mountains-Prairie Region (Region 6) that were petitioned in 2007 for listing as Threatened or Endangered (Fed. Reg. 74(23): 6122-6128). Last month, the Service found that Endangered Species Act protection was not warranted for this clover, whose luck and habitat are still in place.

Trifolium barnebyi is a state endemic known from five occurrences, growing on sandstone outcrops in the foothills and flanks of the Wind River Range in Fremont County. Its largest occurrence by far is located above Red Canyon Ranch (The Nature Conservancy) on an adjoining BLM Area of Critical Environmental Concern. Wyoming Native Plant Society members will seek out Barneby's clover in the 2009 Annual Meeting, May 30-31, on the second day of adventures. See p. 2 for more information about the upcoming event, and see the "state species abstract" for more information about the clover species (www.uwyo.edu/wyndd).

The original petition included 206 plant and animal species in the 8-state region that are ranked G1 or G1G2 by NatureServe and which are not listed or being considered as candidates for listing under the ESA Act. A 90-day decision is still pending for 39 species, including five other Wyoming plants. BH

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WNPS News

2009 WNPS Annual Meeting: SPRING into summer and mark your calendars for the 2009 Annual Meeting on May 30-31! We will be in hot pursuit of the Precocious milkvetch (*Astragalus proimanthus*), Stemless beardtongue (*Penstemon acaulis*) and other early-blooming state and regional endemics. We'll meet on Saturday, at 8 am, at the Green River Recreation Center, 1775 Hitching Post Drive in Green River, WY and head to the Flaming Gorge area. On Sunday, we head north for Barneby's clover (*Trifolium barnebyi*) at Red Canyon Ranch. Watch the next newsletter and the WNPS homepage for a full itinerary, camping/lodging information and directions. Questions? Contact: Charmaine Delmatier (delmatier@wyoming.com).

Teton Chapter Events

Saturday, March 21, 2009; 10:00 a.m.-12:00
Stems, twigs and buds--first signs of spring
Leader: Susan Marsh (307.733.5744)

For this short, easy excursion we will travel in Cache Creek along the lower Putt-putt trail. Snowshoes are highly recommended although this trail tends to be hard enough to walk on. We'll focus mostly on deciduous shrubs, but if bare patches can be found we'll seek out the greens.

Thursday, March 26, 2009; 7:00 p.m.
WY Game & Fish, 420 N. Cache Street in Jackson
For info call Amy Taylor (307.733.3776)

Botanist Klara Varga will present a slide show and talk, titled "Whack or Rejoice? Determining when to put on your weed wacking hat, and when to be happy to be looking at a native."

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WNPS Board – 2009

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Teton Chapter: PO Box 6654, Jackson, WY 83002 (Amy Taylor, Treasurer)

Bighorn Native Plant Society: PO Box 21, Big Horn, WY 82833 (Jean Daly, Treasurer)

Treasurer's Report: Balance as of 27 Feb 2009 - General Fund: \$2,051.34; Markow Scholarship Fund: \$1,398.50. Total Funds: \$3,449.84.



Message from the President

Dear Fellow Native Plant Lovers,

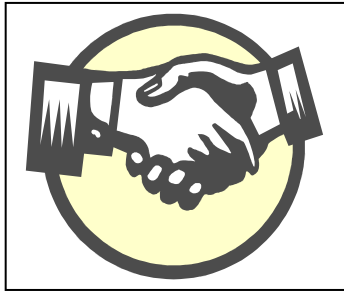
I feel honored having been elected as the new president of the WNPS. Over the past few years, I have had the pleasure of working on the board of directors with Beth Burkhart, the outgoing president and board member. We will miss having her input and energy, but I am sure we can twist her arm into participating in WNPS events.

Highlights from 2008 include a marvelous gathering of people for the annual field trip and meeting held in conjunction with the dedication of the Murie-Markow Herbarium at the Teton Science School in Jackson. The presence of the Markow family made the dedication ceremony complete. The field trip event brought old and new friends together and broke previous attendance records. We were delighted to see such a great turn out and we wish to thank all of you for taking the time to attend. A very special thanks go to our remarkable Teton Chapter and to Amy Taylor for coordinating such a splendid affair. All of us appreciate your hard work and dedication to putting it together.

The upcoming year looks to be eventful - watch the newsletter and homepage for details! The annual field trip and meeting is going to be coordinated by Charmaine Delmatier and will take place north and south of Green River. There are many interesting plants to see in the area and we are looking forward to seeing state and regional endemics!

This spring will see yet another recipient(s) of Markow WNPS scholarships awarded. WNPS takes great pride in this scholarship program. I look forward to the upcoming year and hope all of you take the time to stop, smell, and look at the flowers. Feel free to contact the board at anytime with ideas or questions. May all of your weeds be wild flowers.

~Lynn Moore



Additions to the Flora

NORTH MEETS SOUTH IN WYOMING

Two publications feature recent discoveries of plant species new to Wyoming where they are at their northern and southern limits on the continent, and with centers of distribution that lie north and south of the contiguous United States.

A Remarkable New Range Extension of the Subtropical *Brachymerium vinosulum* Cardot (Bryaceae)

(Editor's note: The information below is taken from an article under the same title, by Y.I. Kosovich-Anderson and J.R. Spence, 2008; appearing in Evansia 25(4): 90-93.)

A remarkable new range extension of the subtropical Mexican moss species *Brachymerium vinosulum* is reported from Hot Springs County, Wyoming. The species was found on travertine terraces around the geothermal springs of Thermopolis' Hot Springs State Park at 1320 m (4330 ft) in north central Wyoming. This finding represents the first state record and the northernmost occurrence of this subtropical species yet reported for North America.

In the course of field work in north central Wyoming in 2003, several specimens of bryophytes were collected around the geothermal springs of Hot Springs State Park at Thermopolis. During identification work on the collections, the rare moss *Brachymerium vinosulum* Cardot (Bryaceae) was found, and is reported as a new record for Wyoming. *Brachymerium vinosulum* is a subtropical, primarily Mexican species that has recently been found in the Southwest (in Arizona, California, New Mexico, and Colorado), where it is known from very few locations and restricted to calcareous springs, one of which is also a hot spring. The Wyoming find extends the known range of this species northward by ca. 400 kilometers. This species will be transferred to the genus *Plagiobryoides* Spence. Specimens by Y. Kosovich-Anderson are deposited at the Rocky Mountain Herbarium, University of Colorado, and Northern Arizona University.

Major Range Extensions of Two Arctic Vascular Plants: *Carex lenticularis* var. *dolia* and *Festuca viviparoides* ssp. *krajinae*

(Editor's note: The information below is taken from: Massatti, R. and A. Wells. 2008. Noteworthy Collections – Wyoming. Madroño 55(2):178-180.)

Goose-grass sedge (*Carex lenticularis* var. *dolia* (M.E.Jones) L.A.Standl.) (CYPERACEAE) was discovered in Fremont County, in the east slopes of the Wind River Range, ca. 33 km south of Dubois, at 3338 m (10,951 ft). It grew in a shallow, rocky meltwater drainage. Specimens by R. Massatti were verified by L. Standley and deposited at the Rocky Mountain Herbarium and Shoshone National Forest Herbarium.

Carex lenticularis var. *dolia* was previously known within the contiguous United States from five populations, four straddling the Continental Divide in Glacier and Flathead counties in Glacier National Park, MT, and one occurring in the Absaroka Mtns., Park Co., MT. The Wind River population therefore represents a range extension of ca. 260 km to the south of the nearest outlying Montana population.

Northern fescue (*Festuca viviparoides* ssp. *krajinae* Pavlick) (POACEAE) was discovered in Fremont County, Wind River Range, at three locations ranging from 3281-3520 m (10,764-11,548 ft), at Klondike Lake, Dry Creek Ridge, and upper Dinwoody Creek, each on alpine turf vegetation below late-melting snow. Specimens by A. Wells were first determined by M. Lavin (MONT), and specimens by R. Massatti were deposited at the Rocky Mountain Herbarium and Shoshone National Forest Herbarium.

Festuca viviparoides ssp. *krajinae* was previously known within the contiguous United States from roughly six populations straddling the Continental Divide in Flathead and Glacier cos. in Glacier National Park, MT. The Wind River populations therefore represent a southern range extension of ca. 670 km to the south. The authors also cited an earlier collection from the west slopes of the Wind River Range in Sublette Co. annotated to this taxon. More recently, it was collected in the Beartooth Mountains in Park County at 3243 m (10,640 ft). The latter two specimens were also deposited at the Rocky Mountain Herbarium.

One-of-a-Kind Outdoor Laboratory¹

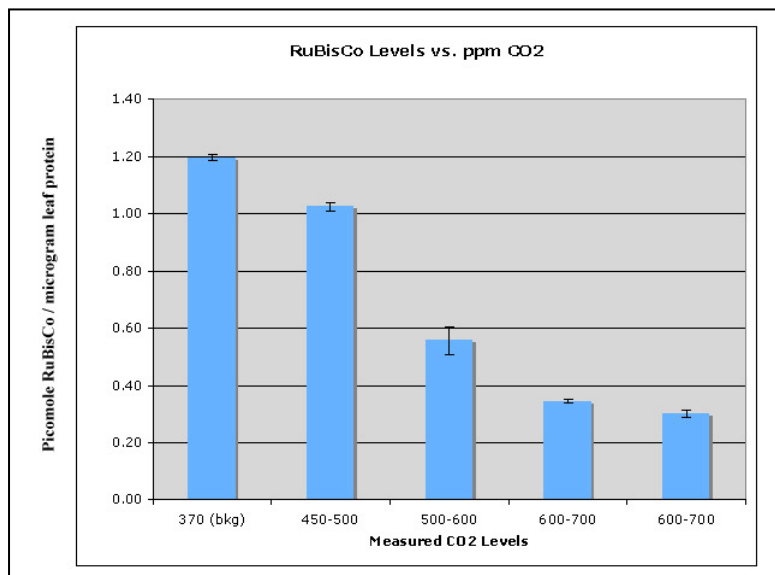
(Editor's note: The following article is extracted from: Tercek, M.T., T.S. Al-Niemi and R.G. Stout. 2008. Plants exposed to high levels of carbon dioxide in Yellowstone National Park: A glimpse into the future? *Yellowstone Science* 16(1): 12-19. An interactive version of the survey results is available online at: www.YellowstoneEcology.com/research/co2/index)

Geysir basins like those in Yellowstone National Park naturally have high CO₂ concentrations and elevated temperatures because of volcanic gas vents and geothermal heat. These exclusive outdoor laboratories also support plant communities adapted to the extreme conditions.

Researchers using portable infrared gas analyzers recently measured the soil-surface CO₂ concentrations at dozens of vegetated geothermal areas within Yellowstone. They documented CO₂ levels that are 20%-400% higher than current atmospheric levels. Many of the high CO₂ level sites have vegetation that could be paired with control sites having comparable vegetation and environmental attributes except for "normal" CO₂ levels. Grass blades of Hot springs panic grass (*Dichanthelium lanuginosum*) were collected from paired sites to determine sucrose concentrations as photosynthetic end product; and concentrations of the leading photosynthetic enzyme, ribulose-1,5-bisphosphate carboxylase (RuBisCo), an enzyme that captures CO₂ and represents the most abundant protein in leaves.

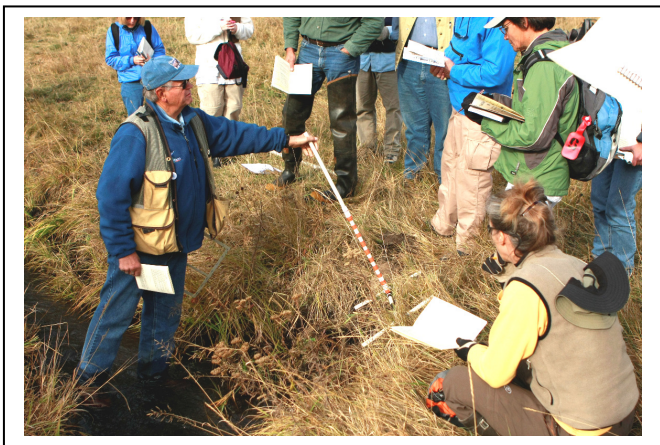
Results indicate that the grass blades collected at high-CO₂ sites typically have lower levels of protein than leaves from control sites (Figure 1) as well as higher levels of sucrose. This means the nitrogen levels are lower, and mirrors the physiological results that have been produced in growth chambers and in "Free air CO₂ enrichment" (FACE) facilities. Results support the validity of using Yellowstone study sites as natural laboratories, the only differences being that Park plants have likely been exposed to elevated CO₂ concentrations and temperatures for possibly centuries in a giant "uncontrolled" experiment.

Figure 1. Relationship between CO₂ concentration and the primary leaf protein (ribulose-1,5-bisphosphate carboxylase; RuBisCo) in geysir basin samples of *Dichanthelium lanuginosum*



In 2009, intensive field work will begin at two non-thermal but high-CO₂ sites near Mud Volcano. The CO₂ vents for these sites are some distance away, so the soil is not heated and the forests appear "normal" to anyone without a gas analyzer. The goals include documenting long-term patterns of CO₂ enrichment at these sites and confirming that soil temperature and soil chemistry do not differ from adjacent low CO₂ forests. In addition to measuring the current concentrations of CO₂, methane, and H₂S; isotopic analysis of tree cores will be used to reconstruct the atmospheric CO₂ concentration at these sites during the last ~100 years. Yellowstone study sites have experienced CO₂ enrichment for potentially centuries, while the longest running FACE experiments are only about 20 years old. In this next stage of study, the "laboratory" will be tested further using tree ring data, in pursuit of historical context for understanding present and projected climate conditions.

¹ This work is sponsored by an NSF SGER (Small Grant for Exploratory Research).



Instructor Ervin Cowley stands in a stream, demonstrating protocol for locating the greenline. Photo by Dennes Barrett.

Citizen Monitoring: An Example

By Beth Burkhart, Botanist
Black Hills, SD and WY

What do people think of when you say “giving to the government”? A majority would probably say: Paying taxes! Another response that could be more interesting is: Monitoring!

In these days of limited federal budgets, agencies managing our public lands have to prioritize where and how they spend their money. What this means is that decision-makers decide where personnel and supplies are expended, and where they are not. Traditionally, one of the lower priority areas has been monitoring. Agencies are praised for making things happen and are often encouraged by fund and other target tracking systems into making the next thing happen, rather than spending time/money going back to see if actions had expected and/or desired results. Monitoring of natural resource management can be particularly challenging, when the exact path to a desired result is not be known. It may take some time for an action to make a change in a natural system and the change achieved may be a something other than expected – dealing with complex Mother Nature is like that! In this case, it is important to analyze what happened and adjust to correct it if possible, or learn from the experience to move toward better management choices in the future (in the same place as well as other places).

Monitoring is not glorious work – it is repetitive and can be tedious. However, it is crucial

that it be done meticulously, by approved protocols and with an appropriate design. Monitoring data collected without quality control or that is not repeatable is as useless as no data.

It makes most sense for a land-managing agency to monitor its own activities, since the personnel who develop and implement project activities are some of the most knowledgeable and experienced people relative to the resources. The problem is when those people are not given the time to develop and implement monitoring.

In some cases, citizen monitoring can be accomplished to fill data gaps left by lack of agency monitoring to: 1) learn whether its activity was implemented as planned (i.e. as described in the project plan), 2) determine if the activity achieved the goals described in the project plan, 3) contribute to decision-making to revise the activity if goals are not reached in a reasonable timeframe, and 4) provide input on possible revised paths to follow to achieve project goals if the original implementation was not successful.

Adaptive management is a recent buzzword in natural resource management that requires monitoring for it to be successful. Different sources provide different definitions, from basic trial and error management (i.e. keep trying often unrelated things until something works to achieve the goals) to a scientific approach that involves setting a clear goal that is progressively better achieved over time as monitoring results feed back into fine-tuning management. Either way, monitoring is critical.

A citizen monitoring project is just forming in the Black Hills of South Dakota and Wyoming. While recent rangeland management projects there are based heavily on adaptive management, it does not appear that there are adequate personnel (or priority) to perform appropriate monitoring to allow adaptive management to take place. In particular, riparian areas have been observed that do not meet forest plan standards (for bank alteration, bank stability, wetland species composition, etc.). Sometimes, these areas are not acknowledged as having problems in rangeland plans. Sometimes, the plans commit to monitoring being accomplished and it is uncertain that adequate personnel/time will be available. The bottomline is that if

monitoring is not accomplished, nobody knows – not the agency nor the public - and valuable (perhaps in some cases, irretrievable) natural resources, such as riparian areas, are degraded or lost.

The Black Hills citizen monitoring group started out by acknowledging the need to collect riparian data that the agency would accept as credible and scientific. After a review of riparian monitoring protocols, a decision was made to use the BLM/USFS Monitoring Stream Channels and Riparian Vegetation – Multiple Indicators protocol (nickname: “MIM” protocol for details, see: http://www.blm.gov/id/st/en/info/publications/technical_bulletins/tb_07-01.html). Black Hills National Forest has trained staff in this protocol and is using it in some instances. It is a powerful protocol that is actually a combination of protocols meshed together for ease of implementation and analysis. It is a protocol that will generate quantitative data to compare to quantitative Black Hills NF riparian management standards and Best Management Practices. It will result in a snapshot in time of current conditions and lay the groundwork for repeat visits in future years (the definition of monitoring) to determine if trends are for improving, stable, or degrading conditions.

Funding was provided by the Sierra Club (www.southdakota.sierraclub.org), Norbeck Society (www.norbeckociety.com), and Great Plains Native Plant Society (www.gpnps.org) to bring one of the authors of the MIM protocol to the Black Hills to lead a training session in October 2008. Seventeen people participated in the 1 ½ day training – two evening sessions and a day of field work on Saturday. Because the trainer believes the best training experience occurs with groups of people having varied backgrounds and perspectives, several training slots were offered to land-managing agencies in the Black Hills, including SD Game, Fish and Parks, Black Hills National Forest, and the National Park Service. However, the majority of the participants were volunteers from members of the supporting organizations or general public. The training was very successful – even the weather cooperated!

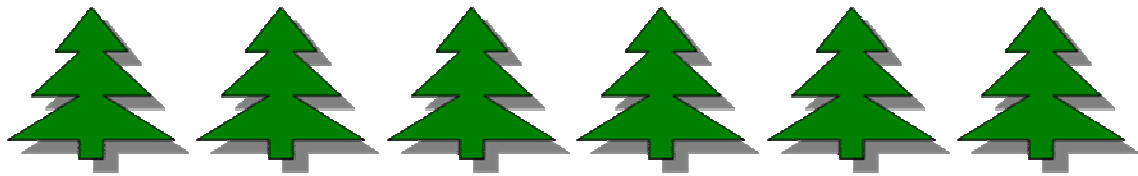
The next step will be to determine a list of riparian areas for the citizen monitoring group to collect data on. These will include streams that

people feel do not meet management standards (for example, the Watershed Conservation Practice standard/design criteria of at least 75% stable banks for a healthy stream). Emphasis will be on choosing streams that the agency does not acknowledge as having management problem (for reasons of lack of data or conflicting information, such as qualitative observations).

This is not a quick or easy project. Volunteers will spend several weekends next year in late summer/early fall working under a project leader such as myself. At this time, it is hoped that we will be able to monitor 6 streams in 2009, 6 streams in 2010, and possibly 6 streams in 2011, before cycling back to monitor the streams again (to gather data to determine trend – and answer the question if adaptive range management is being effective and resulting in upward condition trends).

It is a good question to ask whether a citizen group can accomplish this rigorous monitoring over an extended period of time. In the ideal world, it wouldn't be needed because the land-managing agency would monitor its own activities and respond to results. But in the imperfect world, citizens can contribute to filling data gaps.

I don't advocate that everyone rush out and take on a citizen monitoring program, although even citizen monitoring at a low intensity can be very effective (such as requesting Annual Operating Instructions (AOI) for a grazing allotment you frequent in the course of recreational travels of the Black Hills – and providing feedback to the appropriate district office on observations of livestock in/out of pastures when they are scheduled to be). However, monitoring done inconsistently or with severe bias can be more destructive to the cause of improving resource condition than no monitoring. If you are interested in participating or developing a citizen monitoring program, the best first step would be to gather a group of people of like mind, with commitment and expertise (or knowledge of where to enlist expertise), visit with the managers of the landbase you are interested in about your goals – and then develop a plan that is credible, do-able, and will provide the appropriate data.



Taking it Easy on Trees

Wyoming does not have paper mills, but it DOES have ample supply of waste paper. To take it easy on trees, and promote indigenous recycling efforts, *Castilleja*, the Wyoming Native Plant Society newsletter is finally going to be printed on recycled paper. Moreover, we are going all-the-way to 100% post-consumer content recycled paper. A comparison of the previous 0% recycled content paper supply and 100% recycled content paper supply shows a price differential of about 1.5¢/page (about 60¢ per year) – an affordable change to newsletter costs.

Maybe we were also spurred by sibling rivalry. A front page article appeared in the winter 2008 issue of *Aquilegia*, the Colorado Native Plant Society newsletter, by a CoNPS Board member, John Giordanengo. It featured a critique of the environmental trade-offs of using post-consumer recycled paper and virgin paper (*Aquilegia* 32(4): 1-2). His findings are based on a review of the literature and professional experience working in the recycling industry, and the six-point critique is highlighted below:

- Number of Trees Used: It is clear that recycled paper uses fewer trees than virgin paper, thus lessening demand on forests.
- Landfill Space: Using recycled paper reduces the amount of waste going to landfills by providing a market for recycled materials.
- Energy: Most of the report that the author reviewed indicate that the production of recycled paper uses less energy than virgin paper, though the energy used tends to come more from fossil fuels.
- Greenhouse Gases: It is not clear to date how recycled paper use relates to net CO₂ levels.
- Pollution (Air and Water). State of knowledge is inadequate.
- Water Consumption: The Colorado author's professional experience suggests that the production of recycled paper consumes less water than the production of virgin paper, though this has not been thoroughly evaluated. *To further reduce water consumption/pollution, we are changing to recycled paper that does not use chlorine bleach.*

Please send your comments. The newsletter still need to convey sharp images and arrive to you intact. Wyoming Native Plant Society does not expect to "save" acres of trees by converting the publication of our modest newsletter to 100% post-consumer content. But we do expect to be a regular customer of the Copy Center at the University of Wyoming and promote the stocking of recycled paper by this business decision, and maybe encourage other organizations on shoestring budgets (recalcitrant native plant societies included)! BH

Announcing:

Wyoming Consultants Offer Reclamation Workshop

A first-time workshop "Land Reclamation Basics for Energy Development in Southwestern Wyoming" is being offered, March 31- April 1, in Rock Springs, WY by BKS Environmental Associates. The purpose of this workshop is to increase the knowledge of the basics of land reclamation to recent oil and gas development. For a complete agenda, or any further questions,

please contact: Traca Wheeler of BKS Environmental; twheeler@bksenvironmental.com ; 307.686.0800. The intended audience includes land managing agencies. The array of topics include how to select a seed mix, how to find weed-free gravel, presentations by seeding practitioners, and more. There is a \$300 registration fee (due 27 March) and class size is limited to 100.

New Editorial Policy

As of 2009, WNPS has an editorial policy (below), a product of discussions between the editor and Board, prompted by member input.

WNPS welcomes all newsletter contributions in the interest of promoting appreciation and understanding of Wyoming native plants and vegetation, fostering the goals of the organization.

Furthermore, newsletter contributions from members are essential to enhance breadth of information and member involvement, on subjects that range from popular to technical.

Accuracy, constructiveness, and good taste are weighed in considering newsletter contents.

The newsletter is not peer-reviewed. Members with expertise may be consulted, the Board may be called upon for advice, and the Editor has the discretion to work with the authors on revisions or to reject material.

All contributions reflect on the organization but each are the proprietary goods of the authors. Requests for reprinting will be forwarded to the author.

Letters to the editor are encouraged, consistent with the above.

This editorial policy applies to all contributions. Policy comments by members are welcome at any time.



Wyoming Native Plant Society
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Wyoming Native Plant Society is a non-profit organization established in 1981, dedicated to encouraging the appreciation and conservation of the native flora and plant communities of Wyoming. The Society promotes education and research on native plants of the state through its newsletter, field trips, and annual student scholarship award. Membership is open to individuals, families, or organizations. To join or renew, return this form to:

Wyoming Native Plant Society
P.O. Box 2500, Laramie, WY 82073

Name: _____

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(\$7.50 goes to the Markow Scholarship Fund)

Check one:

- New member
- Renewing member

Renewing members, check here if this is an address change.