SECTION 3

Strengthening Botanical Capacity in Montana

SECTION 3
STRENGTHENING BOTANICAL CAPACITY IN MONTANA

BOTANICAL CAPACITY

Montana is a place rich in both plant species diversity and botanical knowledge that comes from Indigenous peoples, emigrants, and a long history of botanical exploration, all of which continue today. Collectively, people have been building botanical capacity since inhabiting the lands that today we call the State of Montana. Yet the recognition and power of this accumulated botanical knowledge and capacity have at varying times been fractured or eroded, and now requires an awakening if we are to conserve Montana's native flora in this rapidly changing world.

Botanical capacity is the human, scientific, technological, organizational, institutional, and resource capabilities that support plant-based education and training, basic and applied research, and environmental monitoring and management (Kramer et al. 2013; Kramer et al. 2010). Botanical capacity is critical to conserving, maintaining, and managing the diversity of Montana's native flora, and the many important ways that plants sustain people, animals, and habitats (Box 3-1). This section, *Strengthening Botanical Capacity in Montana*, hereafter *Botanical Capacity*, addresses the ways people have gained, retained, fractured, and eroded capacity; the need to embrace its components and complexity; and identifies conservation objectives to strengthen Montana's botanical capacity.

Box 3-1. How botanical capacity is defined at the statewide level by the authors of the *Montana Native Plant Conservation Strategy*.

Botanical Capacity is viewed as the knowledge, appreciation, and stewardship of plants and habitats by individual people, their communities, and their cultures (Indigenous and western) across multiple generations.

- Knowledge is gained and shared by people through oral and written communication, scientific studies, and personal observations and experiences.
- Appreciation of plants and habitats comes with reverence for life and is intricately linked to human health and well-being.
- Stewardship of plant and habitat resources requires human leadership, networking, and communication in both oral and written forms, and is manifested in respectful interactions and with the sustainable use of our natural and physical resources.

Botanical Capacity involves, and often relies upon, the capabilities of organizational and institutional resources, such as colleges and universities; herbaria; botanic gardens; places with jurisdictional authority (national forests; wilderness areas; national, state, county, and city parks; Tribal lands; wildlife refuges; etc.); state, federal, local, and tribal management agencies; private landowners; non-profits and NGOs; financial systems; and numerous others.

Botanical Capacity is often correlated with the capabilities of physical, financial, technological, and human resources, such as small and large businesses (plant nurseries; consultants; farmers, ranchers, and other private landowners; small or large companies; corporations; extractive industries; etc.); funding opportunities (grants and donations); financial institutions and investments; technology (equipment; environmental engineering; etc.); and people (leadership; skilled workforce; etc.); and numerous others.

Components of botanical capacity vary by place within Montana.

What does botanical capacity mean to you?

The study of plants and the application of knowledge gained is perhaps humanity's oldest and most important endeavor, particularly when it comes to the environment and human health.

~ Andrea Kramer, Barbara Zorn-Arnold, and Kayri Havens (2010)

Sources of Botanical Knowledge in Montana

To understand what has been gained, we need to first look at how botanical knowledge arose in Montana.

Indigenous Peoples

The growth of botanical knowledge in Montana is well illustrated in *Montana's Pioneer Botanists - Exploring the Mountains and Prairies*, which pays homage to and tells of the First People, Montana's first botanists, and of the many European explorers whose botanical travels began in the 1800s (Potter and Lesica (eds.) 2017). Indigenous peoples have for thousands of years accumulated botanical knowledge on their ancestral lands. Their reliance on the land required an intimate knowledge of plants, passed down via oral tradition (Luna, Matt, and Gopher *in Montana's Pioneer Botanists* 2017). Montana's many Tribes used the plants specific to their unique homelands and Tribal customs for foods, medicines, spiritual needs, implements, and shelter. Plants are entwined with each Tribe's culture, environment, and landscape, guiding them on the use of the land and through the changing seasons. Native people's relationships with plants and animals led to a profound understanding of ecology and the development of practices to ensure the continuation of life.

European Immigration

The beginning of the 1800s saw the start of a different kind of botanical exploration. It arrived with what would become a wave of European explorers, eager to document the plants and animals of this "new" land we now call Montana. These 19th and 20th Century botanical explorers were ministers, doctors, professors, entrepreneurs, traders, and others, self-taught or formally trained in botany, and

Photo Credit: Dee Blank

Photo 3-1. Native grassland along the Rocky Mountain Front near Dupuyer Creek in June.

paid on commission or just pursuing their personal interests. The most skilled European plant explorers paid at least some attention to the immense knowledge of the Tribes whose lands they travelled through, listened to their guides, and watched what women gathered and cooked (Nisbet *in Montana's Pioneer Botanists* 2017). Many explorers gained botanical knowledge through interactions with people, observing plants in the natural world, and by formal education. They shared their botanical knowledge by collecting and depositing plant specimens into agency and university herbaria to further scientific studies and also by publishing their findings.

Photo Credit: Robyn Klein

Photo 3-2. Field-based classes that incorporate botanical keys boosts both observation and plant identification skills.

Expansions, Declines, and Shifts in Botanical Capacity in Montana

Botanical knowledge, whether gained by western culture or Indigenous cultures, has accumulated through time and expanded in ways that include institutions, organizations, and technology. Yet this accumulation and expansion has not occurred at the same time, nor for all parts of the population equally, effectively reducing botanical capacity and hindering plant conservation (see Section 1, Need for a Statewide Native Plant Conservation Strategy, #2). Meanwhile what plants, species diversity, and plant communities offer to humanity has not changed.

Montana's Western Cultures

The arrival of European settlers brought numerous changes that altered the biological history of North America (Noss and Cooperrider 1994) and the nature of its botanical capacity. With European settlement came different world views, the taming of habitats, and loss of biodiversity (Noss and Cooperrider 1994), along with the quest for scientific knowledge. Settlement and the pursuit of scientific studies, supported by an established US government, grew our nation's botanical capacity, and expanded Montana's in new ways. Some pioneers brought seeds of plants important to their heritage, and many made permanent homesteads. The government created land designations and management agencies that helped promote the disciplines of forestry, agriculture, range science, botany, ecology, and others.

Central to these disciplines were the universities, institutions of research and teaching, and later various extension services that applied the research and new knowledge to practices used by landowners. From at least the mid-1950s, various state and private colleges and universities in Montana offered degrees, laboratories, and/or a spectrum of coursework in botany and other plant sciences. Specialties, shifting trends in subject matter (cellular, taxonomy, ecological, molecular, genetics, etc.) and organisms (vascular, non-vascular, fungi, algae, etc.) to study kept botany in its heyday into the 1990s. These trends permeated the government and private work force and agricultural communities, as well, leading to an expansion of botanical capacity in Montana. Many of Montana's ranchers and farmers also possessed intimate knowledge of the native flora on their lands, and participated

in or organized events, such as rangeland plant identification workshops. To date, few states can claim, as Montana can, published statewide floras for all major taxa: vascular plant (Lesica 2012 and 2022; Booth 1950; Booth and Wright 1966), moss (Elliott and Pipp 2020; Elliott 1993), liverwort (Hong 2002), lichen (McCune et al. 2014), diatoms (Bahls 2021 and 2023), algae (Prescott and Dillard 1979), and (in development) a fungal checklist by Wheeler and Cripps (Montana Natural Heritage Program 2024) (see Box 5-1). Most of these have also been revised or recently published.

In recent times, botanical capacity has declined across our nation's academic institutions and land management agencies. Between 2000 and 2008, undergraduate degrees earned in botany declined by 50%, while degrees in biology rose by 17% (Kramer et al. 2013). A 2009 survey found that almost 40% of more than 400 university faculty respondents said that botany courses in their department had been cut since 2000 (Kramer et al. 2013). The national decline has also affected the work force, with employers struggling to hire adequately trained botanists (Kramer et al. 2013). These concerns have been echoed by several members of this *Strategy's* partnership. The impact today is a significant loss in botanical capacity in academic and government sectors.

For Indigenous peoples, access to higher education and the ability to complete degrees did not begin until 1968 with passage of the Navajo Community College Act (Shanley 2006). It wasn't until the 1970s that the movement to establish Tribal colleges came to Montana (Shanley 2006). By 1984, each of Montana's seven Indian reservations instituted a two- or four-year college (Shanley 2006). After their establishment, Tribal colleges sought accreditations. Each is governed by a Board of Directors without a direct relationship to the Montana University System. In addition, each Tribal college has a mission to maintain the language, history, culture, and world view of their respective Tribal affiliation(s). This mission is perhaps the most challenging to meet in today's changing world (Shanley 2006). During the 2003-2004 academic year in Montana, there were 6,413 Native American students attending college or university, of which 77.5% were enrolled in a Tribal college. While Tribal colleges struggle with budgets, staffing, and rural locations, they have developed into stable, productive institutions that provide higher education to their Tribal citizens, thus empowering their communities and building botanical capacity.

Montana's Indigenous Cultures

While institutional botanical knowledge has flourished at times and for some of Montana's population, traditional botanical knowledge for Indigenous peoples declined. Passed down through each generation, traditional botanical knowledge is directly interwoven into Tribal identity, language, kinship, families, communities, and culture (Gopher 2024). The Native worldview includes the totality of all living and physical beings which are inseparable from the People. After the signing of treaties, many US laws, policies, and practices led to the loss of access and inherent rights to the lands, water, plants, and animals for Indigenous people (Whyte et al. in Status of Tribes and Climate Change Working Group (STACCWG) 2021). The loss has not only been in generational knowledge, but also in the spiritual origins and the understanding of how this knowledge fits with the ancestral teachings of the specific Tribe (Whyte et al. in STACCWG 2021). Consequently, Indigenous peoples have had to work ingeniously to create legal and policy avenues to recover and protect their lands and self-government (Shanley 2006; Whyte et al. in STACCWG 2021).

Despite obstacles, there has been a resurgence in traditional plant knowledge and practices, in

part due to the recognition that this knowledge is threatened by rapid conversion to technology, environmental change, and most recently, the pandemic. Traditional societies and key people within Tribes, such as traditional plant gatherers, want to continue to pass on this knowledge, recognizing that some plants have been impacted by climate change, and others are no longer present on the landscape (Edmo 2024). Gatherers also emphasize the significance of passing on knowledge within each seasonal round to foster continual knowledge, as well as noting plant responses to environmental changes. Cultural practices, such as the timing of gathering plants, as well as desired plant properties, are also changing due to recent climate warming (Gopher 2024). Native peoples have also preserved knowledge of the land's flora through their own native plant collections, such as the Fort Belknap Indian Community, Vascular Native Plant Collection 2010 (Longknife 2024).

The future of each Tribal Nation rests solely in each Tribe's successive generation and their individual ability to protect culturally significant plants (Grant 2024). As relayed by Dennis Longknife (2024) of the Fort Belknap Indian Community, "A nationwide resurgence of 'Immersion & Language Preservation' going on at most reservations is returning what has been on the brink of being lost to real-life teachings. Educating our children allows them to pass this on to the next generation. One Native American book talks about the Seven Generations, and today our children are our Seventh Generation; the seventh generation are the ones that will empower peoples. Our ways of knowing and life go on, we never lost it, we just never shared it."

Steps That Strengthen Botanical Capacity in Montana

It is clear that Montana has a rich and long history of botanical knowledge gathered by all its inhabitants, and lands that still retain large areas of biologically diverse native habitats, from fragmented to fully intact. Despite these assets, components of botanical capacity in Montana are also localized, dispersed, or fragmented across this fourth largest state. Collaborative efforts and definitive actions are needed to reverse the five constraints that have

Photo Credit: Mason Lech

Photo 3-3. Citizen botanists from the Montana Native Plant Society-Flathead Chapter host a workshop to learn how to conduct site visits to rare plant locations.

hampered plant conservation and hindered botanical capacity (see Section 1, Need for a Statewide Native Plant Conservation Strategy, #1-5). Moreover, the Native perspective and traditional knowledge are key to ensuring cultural survival and resilience in addition to helping to achieve many of the recommended plant conservation objectives. We must work on a variety of fronts to strengthen botanical capacity in order to conserve native plants, including Plant Species, Unique Habitats, and Plant Communities of Greatest Conservation Need (GCN).

In strengthening botanical capacity, the essential roles that skilled botanists provide in education, land management, monitoring, and research must be recognized. Botanical competencies can be gained through a variety of means, and result in a diverse skill set, such as in plant identification, plant restoration techniques, designing monitoring studies, and developing seed mixes. As such, botanists are versatile and known by many names. Those with specific botanical skills may work as habitat biologists, natural resource specialists, rangeland specialists, foresters, biologists, ethnobotanists, plant nursery workers, professors, teachers, plant taxonomists, wetland delineators, landowners, landscapers, naturalists, curators, botanists, or in other capacities. What people with botanical skills share is an interest in plants, an ability to notice characteristics of a species, and appreciate our reciprocal nature with them. People who develop good botanical skills expand botanical capacity regardless of their job title.

CONSERVATION GOALS & OBJECTIVES FOR STRENGTHENING BOTANICAL CAPACITY

As we seek to strengthen botanical capacity, it's clear that new communication technologies and ways of viewing the world require botanists to do their work differently. Yet our dependence on native plants, and the reliance by other species, has not changed. Here in the *Strengthening Botanical Capacity* section of the *Strategy*, we present goals and suggest overarching conservation objectives from four areas that are pillars of botanical capacity:

- Information Needs [Inventory, Monitoring, Research]
- Protection and Restoration
- Outreach and Education
- Policy and Regulation

The following specific goals and objectives for strengthening botanical capacity would retain and grow an educated, informed, engaged, and coordinated botanical network across the state. These goals and conservation objectives were developed by a large partnership who shared their own expertise and experiences, consulted literature, and/or discussed topics through interviews and meetings from 2018 to 2024. Input was provided by professional and retired botanists, educators, biologists, and herbarium curators representing federal and state land management agencies, Tribal nations, non-governmental conservation organizations, Montana Natural Heritage Program, academia, and other organizations, all of whom are concerned that botanical capacity is valued, supported, and used to reverse constraints in plant conservation. These voluntary actions can be pursued or implemented by a single entity, or as a collaborative effort by individuals, agencies, and organizations. They are presented in no prioritized order.

Information Needs [Inventory, Monitoring, Research]

Conservation Goal

Strengthen botanical capacity within and among organizations through information sharing and while respecting organizational responsibilities and missions.

Conservation Objectives

1) On the Montana Natural Heritage Program (MTNHP) website[1], develop a page to host the *Montana Native Plant Conservation Strategy*. An online resource would centralize information that is pertinent to working across jurisdictions and improve coordination for implementing the Strategy. The web page could include, but is not limited to, the following:
   - *Montana Native Plant Conservation Strategy* and developed, updated, or revised components. If password-protected, the web page could also store internal information and literature important to partnering organizations, but not for the general public.
   - Internal links to other publicly accessible portions of the MTNHP website, particularly the Montana Field Guide.
   - Species- and habitat-specific monitoring plans, survey techniques, best management practices, educational materials, seed collection and propagation guides, brochures, and other products.
   - Direct links to other websites, web pages, and online documents from other organizations that pertain to the *Strategy*.
   - Password-protected access to allow partnering organizations to post and update Strategy-relevant information (see #3 below).

Photo Credit: Andrea Pipp

*Photo 3-4. Monitoring Lemhi Beardtongue (*Penstemon lemhiensis*) on the Big Hole National Battlefield. Botanists from the MTNHP and USFS assist a team of ecologists from the National Park Service-Upper Columbia Basin Network.*

[1] Montana Natural Heritage Program: https://mtnhp.mt.gov/

2) Create a Strategy Stewards Committee that coordinates the botanical community to maintain the *Strategy's* relevance; assists with the development of relevant working groups; develops conservation profiles for identified Plant Species, Unique Habitats, and Plant Communities of GCN; updates or revises existing sections; and provides overall support for implementing the *Strategy* (refer to Section 1, Box 1-2). The Core Team envisions a Strategy Stewards Committee composed of at least seven members represented by the following organizations[13]:
   - MNPS - Conservation Committee member;
   - MTNHP - botanist and ecologist;
   - USFS Region 1 - Regional botanist;
   - MT/Dakotas BLM - State botanist;
   - MFWP - plant ecologist;
   - MTDNRC - forest ecologist; and
   - Tribal nation - ethno-botanist

3) Help continue to develop and implement the *Montana Native Plant Conservation Strategy* by reaching out to the Strategy Stewards to initiate involvement and/or contribute information. Ways to get involved and/or share publicly available information include, but are not limited to:
   - Implement a conservation objective or complete a task of a similar nature to that mentioned in a particular section of the *Strategy*, such as in Native American Perspectives on Plant Conservation; Strengthening Botanical Capacity; Plant Species of GCN; Unique Habitats of GCN; Plant Community of GCN; Montana's Herbaria; and Native Pollinator Plants. Share - results, lessons learned, or other components on the *Strategy's* web page.
   - Implement a conservation objective or complete a task of a similar nature to that mentioned in an established conservation profile (see Appendices A-Plant Species of GCN, B-Unique Habitats of GCN, and C-Plant Communities of GCN). Share results, lessons learned, or other components on the *Strategy's* web page.
   - Lead a working group to develop a conservation profile for a Plant Species, Unique Habitat, or Plant Community of GCN identified in the *Strategy*. Provide the draft conservation profile to the Strategy Stewards for review and potential inclusion on the *Strategy's* web page.
   - Provide published literature and unpublished reports on Plant Species, Unique Habitats, or Plant Communities of GCN to the Strategy Stewards for inclusion on the *Strategy* website. Examples include conservation strategies; monitoring plans, techniques, or reports; assessment or status reports; scientific publications; agency publications; brochures/ pamphlets; and any pertinent and informative document.
   - Collaborate on research - identified as a conservation objective or of a similar nature - relative to the specific Plant Species, Unique Habitat, or Plant Community of GCN. Share results, lessons learned, or other components on the *Strategy's* web page.
   - Collaborate on and/or develop management recommendations, best management practices, or other management strategies relative to a Plant Species, Unique Habitat, or Plant Community of GCN. Share future results, lessons learned, or other components on the *Strategy's* web page.

4) Support and fund the development of a MTNHP-MNPS co-managed Montana Citizen Botany Program[2]. An established program would support plant conservation by connecting a network of qualified citizen scientists (possessing basic botanical skills, knowledge, and interests) to federal, state, private, and non-governmental organizations to carry out inventory, monitoring, seed collecting, and other plant-focused tasks. Actions that would support a Montana Citizen Botany Program include, but are not limited to:
   a. Contribute financially to the Montana Native Plant Society to fund an MNPS Coordinator (position or contractor) and develop a User Interface (UI) on the MNPS website.
   b. Apply to be a Citizen Botanist volunteer or recruit others.
   c. Engage land managers to coordinate with the MTNHP Botanist and MNPS Coordinator to develop plant-based citizen science projects that are appropriate and implementable to help achieve land management goals.
   d. Teach or provide training opportunities to existing Citizen Botanists on plant identification, monitoring techniques, field skills, data collection, mapping techniques, and other related topics.
5) Participate in the Montana Native Plant Conservation Conference[3], organized by the Montana Native Plant Society and held every two years.
6) Recognize the Montana Department of Natural Resources and Conservation (MTDNRC) nursery as the production hub of the Montana Native Seed Network (MTNSN) which serves to facilitate research that could include, but is not limited to:
   a. Conduct common garden studies involving Plant Species of GCN and other native plants. Studies can examine and inform practitioners about species' adaptability to climate change and life history traits.
   b. Cooperative studies with faculty at University of Montana, Montana State University, or other Montana educational institutions and research facilities.
7) Consult the technical reference *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998[4]) when developing botanical or ecological objectives or management goals; designing research and

Photo Credit: Andrea Pipp

Photo 3-5. On a Montana Native Plant Society field trip, attendees test a mapping app and survey for Geyer's Lomatium (Lomatium geyeri)*, a Montana SOC.*

[2] A Proposed Framework for Developing A Montana Citizen Botany Program: https://mtnhp.org/Reports/BOT_CitizenBotany_ProposedFramework_2022.pdf

[3] Montana Native Plant Society – Plant Conservation Conference: https://mtnativeplants.org/conservation-conference/

[4] Measuring and Monitoring Plant Populations (Elzinga et al 1998) available at: https://www.ntc.blm.gov/krc/legacy/course/265

monitoring methods; determining sampling unit, objectives, and design; selecting field techniques for measuring vegetation; conducting statistical and other analyses; and managing data for plant-focused projects.

8) Work collaboratively with Montana's Tribal nations, Tribal Historic Preservation Officers (THPO), Montana State Library, Montana State Historical Preservation Office (SHPO), regional and local libraries and museums, and/or others, to identify published ethnographic, ethnobotanical, and historical studies that contain Traditional Knowledge and biodiversity data to ensure their retention and to make them publicly available through loans and digital formats. Published sources include publications, books, theses, dissertations, databases, or other formats. Many publications produced from the 1800s to the late 1900s are invaluable records that are out of print or held in specific institutions and may not be readily available to the public.

Protection and Restoration

Conservation Goal

Secure on-the-ground, site-specific habitat and/or management protection and promote sustainable collection, production, and planting of state-sourced native plant materials in restoration, remediation, and reclamation projects.

Conservation Objectives

1) Support MFWP-administered programs that help conserve native habitats. These programs directly benefit native plants and Plant Species of GCN where they occur within Wildlife Management Areas (WMAs), Conservation Easements (CEs), conservation leases, and other habitat enhancement and restoration programs. These programs indirectly benefit native plants because they maintain the integrity and resiliency of native habitats for animal pollinators and native plant species and are managed to reduce invasive species and improve the ecological function of degraded habitats. Significant MFWP[5] programs to support include:

   a. **Habitat Montana**[6]
      - WMAs: Seventy sites (about 454,000 acres) are managed to benefit wildlife. Plant Species of GCN have been documented in or adjacent to many WMAs.
      - CEs: Approximately 100 easements covering about 634,000 acres of private lands throughout the state are managed to conserve or improve wildlife habitat, implement soil and water conservation, improve ecological function, reduce urban sprawl, increase open space, and maintain rural and agricultural economies.

   b. **Wildlife Habitat Improvement Program (WHIP)**[7]
      This grant program manages noxious weeds on priority wildlife habitats to restore native plant communities.

[5] MFWP program reflect information provided in winter of 2023.
[6] Habitat Montana: https://fwp.mt.gov/conservation/landowner-programs/habitat-montana
[7] Wildlife Habitat Improvement Program: https://fwp.mt.gov/aboutfwp/grant-programs/wildlife-habitat-improvement

c. **Habitat Conservation Lease Program**[8]
This program funds 30- or 40-year conservation leases for priority wildlife habitats on private lands, such as for Greater Sage-Grouse (*Centrocercus urophasianus*) habitat, mixed grass prairie, and wetland complexes. The goal is to protect about 500,000 acres of prairie and other types of habitat within the plains.

d. **Future Fisheries Improvement Program**[9]
This grant program funds restoration projects involving rivers, streams, lakes, fish habitat, and associated riparian areas.

e. **Migratory Bird Wetland Program**[10]
This program restores, enhances, or creates wetland habitat for migratory birds and provides permanent protection for unprotected wetlands and associated grasslands. This program has been implemented on grasslands (9,807 acres) and 633 wetlands (5,162 acres, of which 3,700 have been permanently protected).

f. **Candidate Conservation Agreement and Assurances (CCAA)**[11]
This program has benefited the Arctic Grayling in the Big Hole and Centennial Valleys with more than 500 habitat projects, many of which address riparian habitat.

2) Through partnerships, staff time, equipment, and/or funding, help establish the Montana Native Seed Network (MTNSN) by 2028. The MTNSN will bring together public and private conservation practitioners who work in the native seed industry to produce ecotype seeds from Montana's wild populations to restore habitats.

3) Strengthen Montana's native plant material supply chain by fostering partnerships between the public and private sectors. Through contract growing, The MT DNRC Nursery and MTNSN aim to increase private sector capacity to include commercial seed growers and private nurseries, thus ensuring the availability of genetically appropriate native plant materials for restoration.

4) Work with strategic partners to compile a list of successful native plant restoration projects to showcase on the proposed *Strategy* web page or use as demonstration sites. Potential sources for identifying locations of successful native plant restoration projects include:
   - MNPS Small Grants Program. This grant program has funded numerous native plant garden and restoration projects.
   - 2008 and 2024 Montana Plant Conservation Conferences[12] that showcased monitoring and restoration techniques.

[8] Habitat Conservation Lease Program: https://fwp.mt.gov/conservation/habitat/habitat-conservation/lease-program
[9] Future Fisheries Improvement Program (MFWP 2023): https://fwp.mt.gov/ffip
[10] Migratory Bird Wetland Program: https://fwp.mt.gov/conservation/habitat/migratory-bird-wetland-program
[11] Candidate Conservation Agreement and Assurances: https://fwp.mt.gov/conservation/fisheries-management/arctic-grayling
[12] Montana Plant Conservation Conference links to past proceedings are at: https://mtnativeplants.org/conservation-conference/

- MTDNRC Nursery. With funding and staff support, develop a tracking system for seed-based restoration projects that use MTNSN ecotypes. A tracking system can gather pertinent information on how ecotype seeds are used and their growth, survival, and success rates.

5) Develop a restoration working group to address statewide topics with native plants. Alternatively, this could be part of the MTNSN.

   a. A restoration working group should include stakeholders from:
      - Private industry. E.g., nurseries, consultants, seed producers, Montana Nursery and Landscape Association.
      - Federal and state plant nurseries. E.g., NRCS, MTDNRC, MTNSN[13].
      - Federal and state land managers. E.g., BIA, BLM, NPS, USFS, USFWS, MDA, MTDEQ, MTDNRC[13].
      - County planning departments.
      - Tribal nations. E.g., Tribal colleges, Elders, ethnobotanists, plant gatherers, biologists, cultural directors, administrators.
      - NGOs. E.g., TNC, Montana Seed Growers Association, MNPS[13].

Photo Credit: Andrea Pipp

*Photo 3-6. A USFS botanist on the Beaverhead-Deerlodge National Forest collects Lemhi Beardtongue (*Penstemon lemhiensis*) seeds as part of the Seeds for Success program.*

   b. Investigate business models, economics, laws, and other factors that influence the establishment and success of Montana businesses that grow, buy/sell, or supply Montana-derived native plant materials (seed, bare root plants, containerized stock, etc.) to make recommendations. There are significant concerns that the supply of Montana-based native plant materials is insufficient to meet needs and that many plant material sources are not preserving local or regional genetics. The panel addressing this topic should include stakeholders listed under 5a plus economic and business professionals from state departments (MDA, Labor and Industry, Commerce) business consultants, and/or others.

   c. Research to develop 'voluntary best practices' for situations where a ground-disturbing activity may harm Plant Species of GCN, SOC, PSOC, including avoidance, mitigation, salvage, transplanting, translocation, etc. Informed best practices are needed. General consensus is to avoid harm and only consider transplanting into unoccupied, verified habitat as an absolute last step to saving plants.

[13] Refer to the Acronyms and Abbreviations section in the *Strategy*.

6) Adhere to established native seed and plant collecting guidelines. For organizations that lack guidelines, consider consulting these sources:
   - Guidelines for Collecting Native Plants (MNPS 2003)[14]
   - Plant Collection Guidelines for Teachers (MNPS ND)[15]
   - Seeds of Success Guides and Training Resources[16]
   - Native Traditionalists and traditional protocols

7) Consult Montana-developed resources when growing native plants and conducting restoration. Montana-based resources include, but are not limited to:
   - MNPS Native Plant Landscaping[17] web page:
     -*Montana Native Plant Source Guide* (MNPS 2024)
     -*Germination of Wildland Collected Seed* (Majerus 2022)
   - MTDNRC Forestry Assistance and Trust Lands Division[18]
   - Montana Conservation Seedling Nursery (CNRC)[19]
   - Links to more resources are in Section 8-*Native Plants and Pollinators* of this *Strategy*.

Photo Credit: Peter Lesica

Photo 3-8. A Spalding's Catchfly (Silene spaldingii) *seedling successfully grown from Montana sourced seeds and native grassland innoculum.*

8) Consult other plant-focused strategies and planning efforts, as appropriate, to maximize conservation efforts across jurisdictional boundaries when developing restoration projects for Plant Species, Unique Habitats, and Plant Communities of GCN, and other native plants. Strategies to consult include, but are not limited to:
   - National Seed Strategy:
     - Rehabilitation and Restoration[20]
     - Business Plan[21]
   - National Academies: An Assessment of Native Seed Needs and Capacities (2023)[22]
   - USFS Native Plant Materials Policy: A Strategic Framework (2012)[23]

[14] MNPS 2003 Collecting Guidelines: https://mtnativeplants.org/wp-content/uploads/2018/07/MNPS-Guidelines-for-Collecting-Native-Plants-.pdf
[15] MNPS ND Plant Collecting Guidelines for Teachers: https://mtnativeplants.org/wp-content/uploads/2018/07/MNPS-Plant-Collection-Guidelines-for-Teachers.pdf
[16] Seeds of Success Guides and Training Resources: https://www.blm.gov/programs/natural-resources/native-plant-communities/native-plant-and-seed-material-development/collection
[17] MNPS Native Plant Landscaping: https://mtnativeplants.org/native-plant-landscaping/
[18] MTDNRC Forestry Assistance and Trust Lands Division: https://dnrc.mt.gov/TrustLand/
[19] CNRC: https://dnrc.mt.gov/forestry/Conservation-Nursery/
[20] National Seed Strategy-Rehabilitation and Restoration: https://www.blm.gov/sites/blm.gov/files/docs/2020-12/NationalSeedStrategy_2015-2020.pdf
[21] National Seed Strategy-Business Plan: https://www.blm.gov/sites/blm.gov/files/uploads/programs_natural-resources_native-plant-communities_national-seed-strategy_NSS-BUSINESS-PLAN.pdf
[22] An Assessment of Native Seed Needs and Capacities (2023): https://www.nationalacademies.org/our-work/an-assessment-of-native-seed-needs-and-capacities
[23] USFS Native Plant Materials Strategic Framework (2012): https://www.fs.usda.gov/wildflowers/Native_Plant_Materials/policy.shtml

- Montana Forest Action Plan (2020)[24]
- North American Botanic Garden: Strategy for Alpine Plant Conservation[25]
- Botanic Gardens Conservation International: Global Strategy for Plant Conservation[26]

9) Consult culturally focused strategies and planning efforts, as appropriate, to maximize conservation efforts across jurisdictional boundaries when addressing historical, cultural, and ethnobotanical records, publications, studies, and other plant-related materials, including those related to Plant Species, Unique Habitats, and Plant Communities of GCN. Strategies to consult include, but are not limited to:
   - The Montana Historic Preservation Plan, 2023-2027: Past, Present, and Future (Montana SHPO 2023)

10) Collaborate with domestic botanical gardens to conserve plant species. Recommended botanical gardens include, but are not limited to:
   - Rae Selling Berry Seed Bank, Portland State University, Oregon[28]
   - Denver Botanic Gardens[29]

11) Promote the understanding and use of the Reserved Treaty Rights Lands Program (RTRL) between Montana's Tribes and landownerships outside of Tribal properties. This is inclusive of federal, state, private and other lands where the exclusion of fire has compromised the resiliency and health of priority Tribal natural resources. The RTRL is a funding program administered by the Bureau of Indian Affairs (BIA). As an example, this program is assisting the Confederated Salish and Kootenai Tribes, The Nature Conservancy, and the MT/Dakotas Bureau of Land Management in restoring Common Camas (*Camassia quamash*) populations.

12) Create opportunities to obtain guidance and assistance from Tribes in ways that apply TK protection, preservation, and restoration practices, as appropriate, when conserving and maintaining native plant populations, including Plant Species of GCN.

13) Acknowledge and respect TK, cultural practices, and cultural protocols when handling or collecting traditional plants, including Plant Species of GCN, and their plant parts (seeds, bark, root segments, etc.). When making herbarium specimens, collect only the upper portion and leave the root system so the plant may regenerate.

14) Work with Sustainable Forestry Initiative (SFI) to advance sustainably managed forests and associated G1-G2 Plant Species of GCN and SOC. Use and support SFI standards, certifications, and labelled-products: https://forests.org/

[24] Montana Forest Action Plan (2020): https://dnrc.mt.gov/_docs/forestry/Montana_Forest_Action_Plan_12.22.2020.pdf
[25] Strategy for Alpine Plant Conservation: https://alpinestrategy.org/
[26] Global Strategy for Plant Conservation: https://www.bgci.org/our-work/inspiring-and-leading-people/policy-and-advocacy/the-global-strategy-for-plant-conservation/
[27] The Montana Historic Preservation Plan, 2023-2027: https://mhs.mt.gov/Shpo/docs/MontanaStatePlan_2023_2027.pdf
[28] Rae Selling Berry Seed Bank: https://www.pdx.edu/seed-bank/
[29] Denver Botanic Gardens: https://www.botanicgardens.org/

Outreach and Education

Conservation Goal

Overcome gaps in botanical knowledge, promote plant appreciation through education, training, and teaching of culture and natural heritage, and foster plant-based experiences to combat disconnection with our natural world and guide solutions to environmental problems.

Conservation Objectives

1) Advocate for Montana's institutions of higher education to add (back in) botanical coursework and/or degrees. Botanical coursework and curricula should also meet federal employment requirements for the Botany Series 0430. Higher-level botanical coursework and/or degrees are needed to offset the loss of botanical expertise and under-appreciation of plants, which hinder plant conservation efforts (see Section 1-*Need For a Statewide Native Plant Conservation Strategy*, #2).

2 Explore the development of a Montana-based botanical certification program that would allow professionals, skilled non-professionals, and plant enthusiasts to demonstrate their competency in and be acknowledged for their botanical skills (see Section 1-*Need For a Statewide Native Plant Conservation Strategy*, #2). A botanical certification program:

   a. would promote and encourage professional development, growth, and renewal through continual education while maintaining high standards of performance, particularly for people whose work requires plant identification, plant monitoring, wetland delineation, revegetation, etc.

   b. could be developed and offered by a non-profit organization, such as the Montana Native Plant Society, or by any federal or state agency.

   c. could address specific components of botany: plant identification/taxonomy, plant monitoring, seed collection, developing seed mixes, revegetation, or other learned skills and knowledge.

   d. should be modelled after existing programs, such as:

   - Certified Lichenologist for Macrolichens of the Pacific Northwest, Northwest Lichenologist[30]
   - Pollinator Steward Certification[31]
   - Certified in Wetland Delineation, Wetland Training Institute[32]
   - Field/Consulting Certified Botanist, California Native Plant Society[33]
   - Associate/Certified Wildlife Biologist, The Wildlife Society[34]

[30] Northwest Lichenologists' Certification: https://northwest-lichenologists.wildapricot.org/page-1854204
[31] Pollinator Steward Certification: https://www.pollinator.org/psc
[32] Wetland Training Institute: https://wetlandtraining.com/
[33] Field/Consulting Certified Botanist: https://www.cnps.org/education/botanist-certification
[34] The Wildlife Society: https://wildlife.org/

- Professional Brewer Certificate, State of Montana's Registered Apprenticeship Program[35]. This program collaborates with employer sponsors, employer associations, and labor/management groups, and includes technical classroom instruction and on-the-job training.

3) Convene a panel of educators and botanists to develop plant-based curricula that also meet grade-level criteria for primary and secondary education. Curricula that incorporate grade-level teaching requirements are more likely to be used by educators and can bring plant awareness to students earlier. Plant-focused curricula could be merged with other topics, such as art, pollinators, fungi, air quality, and habitat (ecology).

4) Bring native plant-focused projects to youth- and adult-based programs that aim to build skills in the natural science and environmental fields; provide continuing education credit for teachers. Professional botanists and skilled laypeople could teach, lead, or create plant-focused activities and projects, and provide volunteer or internship opportunities. Youth- and adult-based programs that conduct botanical work in Montana include, but are not limited to:

   - Youth Employment Program, Dillon, Montana and Salmon, Idaho[36]
   - Americorps State Programs in Montana[37]
   - Montana Conservation Corps (MCC)[38]
   - Mission Mountains Youth Crew Program[39]
   - Pull Your Share movement[40]
   - Montana-based Master Naturalist Programs:
     - Montana Natural History Center, Missoula[41]
     - Montana Audubon Center, Billings[42]
     - Swan Valley Connections, Condon[43]
     - Montana Discovery Foundation, Helena[44]

5) Help bring native plant-focused educational programs and presentations to established nature-based educational centers. This support can elevate awareness of our connection with

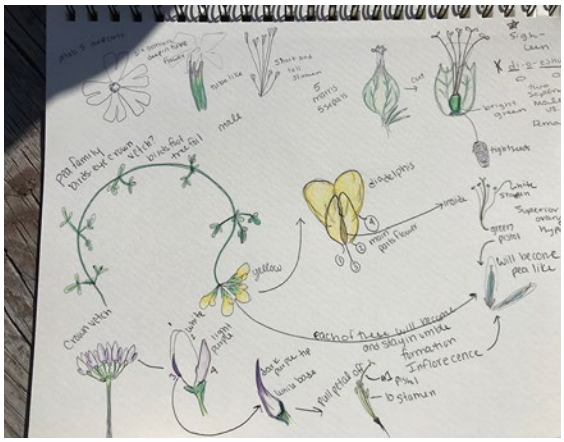

Photo Credit: Robyn Klein

Photo 3-7. Botanical field sketches are a useful tool for training observation skills and learning plant identification.

[35] State of Montana Registered Apprenticeship Program: https://apprenticeship.mt.gov/
[36] Youth Employment Program: https://www.youthemploymentprogram.org/
[37] Americorps State Programs in Montana: https://serve.mt.gov/americorps/ameriCorps-programs
[38] Montana Conservation Corps: https://www.mtcorps.org/
[39] Mission Mountains Youth Crew: https://www.nationalforests.org/regional-programs/northern-rockies/mission-mountains-youth-crew-program
[40] Pull Your Share Movement: https://www.pullyourshare.com/
[41] Montana Natural History Center: https://www.montananaturalist.org/
[42] Montana Aubudon Center: https://mtaudubon.org/center/
[43] Swan Valley Connections: https://www.swanvalleyconnections.org/
[44] Montana Discovery Foundation: http://www.montanadiscoveryfoundation.org/

plants, incite curiosity, and help build a multi-generational workforce of botanists, ecologists, and others. Montana-based nature-centric educational organizations include, but are not limited to:

- Montana Native Plant Society[45]
- Helena-Lewis and Clark National Forest, Montana Discovery Foundation[44]
  - Celebrating Wildflowers[44A]
  - Adopt-A-Species Program[44B]
  - Plant-based public outdoor activities
- Montana WILD[46]
- Montana Natural History Center[41]

6) Garner agency support and funding for a Montana Fish Wildlife & Parks staff position to return "Discover Ecosystems" to the MFWP website or develop a similar program. This program provides foundational material for teaching about habitats; it addresses plants, animals, and abiotic components, and was heavily used by primary and secondary educators.

7) Become a supporting member of a plant-focused non-profit, such as the:
   - Montana Native Plant Society[45]
   - Plant Conservation Alliance[47]

8) Establish or collaborate with another organization to establish a plant conservation award and process for recognizing and/or rewarding landowners, land managers, and individuals for good stewardship of Plant Species, Unique Habitats, and Plant Communities of GCN. The recognition process could be developed, and the award presented by an agency or NGO. Programs that have developed conservation awards include, but are not limited to:
   - The Montana Watershed Coordination Council
   - Montana Wetland Council

9) Partner with non-native plant-focused groups and develop or share educational materials that address topics that promote native plants over invasive species. Refer also to Section 4, Protection and Restoration Conservation Objectives #5. Topics include, but are not limited to:
   - Native plants to plant and what not to plant
   - Integrated Weed Management techniques that are ecologically based, effective revegetation techniques and prescriptions
   - Noxious weed identification and management

10) Participate in Montana Noxious Weed Awareness Week, held annually during the first full week of June. Signed into Montana law in 2021, this official week provides opportunities to promote native plants and educate on the negative impacts of noxious and invasive plants.

[44A] Celebrating Wildflowers: https://www.montanadiscoveryfoundation.org/programs/celebrating-wildflowers/
[44B] Adopt-A-Species: https://www.montanadiscoveryfoundation.org/programs/adopt-a-species/
[45] Montana Native Plant Society: https://mtnativeplants.org/
[46] Montana WILD: https://fwp.mt.gov/education/montana-wild
[47] Plant Conservation Alliance: https://www.plantconservationalliance.org/welcome

Outreach and Education

11) Preserve and protect Traditional Knowledge sharing between generations, and the practices, observations, methods, and technologies held by Indigenous peoples for conserving and enhancing native plant diversity and cultural preservation.

12) Extend invitations to members of Tribal Nations in Montana to engage in conversations, listen to their knowledge, and hear their concerns and needs regarding native plants, including Plant Species, Habitats, and Plant Communities of GCN.

Policy and Regulation

Conservation Goal

Improve citizen participation and amplify the voice for botanical issues in federal, state, and local project and planning efforts and support efforts that strengthen native plant conservation.

Conservation Objectives

1) Contact specific federal, state, county, and city agencies and find out the best ways to comment on proposed projects and planning efforts. Review and comment on issues related to the biodiversity and health of native plants, native plant communities, and Plant Species of GCN, Unique Habitats of GCN, and Plant Communities of GCN.

2) Support federal and state legislative efforts to fund or hire botanists and habitat biologists at a livable wage in the federal, state, and private sectors. For example, the Botanical Sciences and Native Plant Materials Research, Restoration, and Promotion Act [The Botany Bill] introduced to Congress in 2018 included mandates for hiring botanists at the federal level.

3) Adhere to State of Montana laws governing the regulation of wildcrafting [MCA-76-10][48]. This law governs the collection, harvesting, and removal of uncultivated plants and plant parts for the purpose of selling, trading, or exchanging the material for profit. The purpose is to encourage the growth of a statewide wildcrafting industry that encourages stewardship of wild plant natural resources [MCA 76-10-101]. The law requires a written permission or permit to wildcraft from the property from which the material is wildcrafted and specifies those requirements [MCA 76-10-103], definitions [MCA 76-10-103], and violations/penalties [MCA 76-10-107]. The law also invites tribes to enter into state-tribal cooperative agreements with Montana to provide for broader implementation.

4) Acknowledge and adhere to Tribal laws, ordinances, regulations, and policies, and protect Traditional Knowledge of plants as the intellectual property of Tribal Nations and individual Tribal members, including seeds, propagules and other plant parts occurring on Tribal jurisdictional lands.

5) Adhere to all federal regulations, permitting requirements, and harvesting prohibitions that govern the collection, harvesting, and removal of native plant materials (sometimes

[48] MCA-77-10: https://leg.mt.gov/bills/mca/title_0760/chapter_0100/part_0010/sections_index.html

referred to as special forest products). Recognize that each national forest, field office, national wildlife refuge, and other jurisdictional units may have different guidelines, regulations, and permitting processes for managing native plant species and materials.

6) Back state legislation that supports Montana native plants or educates about the threats posed by noxious weeds. Examples of relevant legislation in Montana include, but are not limited to:
   - Montana House Bill 410, introduced in 2021, would have provided state guidance to seed or plant native plants friendly to animal pollinators.
   - Montana House Judiciary Bill 17, signed into law in 2021, establishes the first full week of June each year as Montana Noxious Weed Awareness Week.

7) Through the US Forest Service's Celebrating Wildflowers Program[49], strengthen collaboration with partnering agencies (BLM, USFWS, and NRCS) to increase activities about Montana's rare plants, and help keep information on USFS Region 1 rare plants current.

8) Review and consider providing support for the five-year renewals of the national Farm Bill[50], a package of legislation that has included conservation incentive programs for landowners, such as the Conservation Stewardship Program (CSP), Environmental Quality Incentives Program (EQIP), and Agricultural Conservation Easement Program (ACEP). Actions to protect grasslands that could aid Species and Plant Communities of GCN (WWF 2023) include:
   a. Expand and strengthen the Sodsaver provision in the Farm Bill. This provision reduces incentives to convert native sod to cropland. It could be strengthened by making newly cultivated native sod acreage ineligible for any crop insurance premium subsidy, and by tracking conversion to analyze the effects of Sodsaver.
   b. Bolster Grassland Conservation Reserve Program (CRP). This program pays farmers to remove environmentally sensitive land from agricultural production and to plant species that will improve environmental health and quality. This program could be improved by creating incentives to use native plant species and sustainable grazing practices.
   c. Bolster EQIP. This program provides financial and technical assistance to farmers and ranchers to address natural resource concerns and provide environmental benefits. This program could be improved by creating incentives to use native plant species and sustainable grazing practices.
   d. Support Tribal Nations in having equitable access to Farm Bill programs to support grassland conservation and management.

9) Join the Montana Native Plant Society's Conservation Committee[51]. This non-political committee considers public policy issues and communicates concerns and recommendations on native plants to the appropriate agency.

[49] USFS Celebrating Wildflower Program: https://www.fs.usda.gov/managing-land/wildflowers
[50] National Sustainable Agriculture Coalition: https://sustainableagriculture.net/our-work/campaigns/fbcampaign/what-is-the-farm-bill/
[51] MNPS Conservation Committee: https://mtnativeplants.org/conservation-issues/

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