

**A PROPOSED FRAMEWORK
FOR DEVELOPING
A MONTANA CITIZEN BOTANY PROGRAM**

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TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 BACKGROUND RESEARCH	2
2.1 Citizen Botany Working Group	2
2.2 Partnering Organizations	2
2.3 Citizen Science Programs	3
2.4 Website Interface	4
3.0 PROPOSED MONTANA CITIZEN BOTANIST PROGRAM ELEMENTS	4
3.1 General Overview	4
3.2 Goals and Objectives	5
3.3 Scope of a Montana Citizen Botany Program.....	5
3.3.1 Species and Species Occurrences.....	5
3.3.2 Geography and Land Ownership.....	6
3.3.3 Schedule for Re-visiting SOC and PSOC Occurrences	6
3.4 Volunteer Recruitment.....	6
3.4.1 Reasons to Volunteer.....	6
3.4.2 Qualifications To Be a Citizen Botanist.....	7
3.4.3 Potential Volunteer Recruitment Sources	7
3.5 Website Interface	7
3.5.1 Background	7
3.5.2 Website Interface - Static Webpage	8
3.5.3 Website Interface - Application	9
3.5.4 Website Interface - Plant Data Pre-work.....	9
4.0 PROGRAM ORGANIZATION AND RESPONSIBILITIES	10
4.1 Responsibilities of the Montana Natural Heritage Program Botanist.....	10
4.2 Responsibilities of the MNPS Coordinator.....	11
4.3 Requirements and Responsibilities of the Approved Volunteers	11
5.0 CITIZEN BOTANIST PLANT MONITORING PROCESS	12
5.1 Training.....	12
5.2 Informational Packet.....	13
5.3 Equipment.....	13
5.4 Fieldwork - Data Collection.....	13
5.5 Citizen Botanist Outings	15
6.0 QUALITY CONTROL	15
6.1 Confidentiality	15
6.2 Data Control.....	15
6.3 Data Use.....	15

TABLE OF CONTENTS [CONTINUED]

7.0 DEVELOPING SUPPORT AND FUNDING THE MONTANA CITIZEN BOTANY PROGRAM.....	16
7.1 An Estimated Budget.....	16
7.2 Potential Funding Development Steps.....	17
7.3 Developing Support for a Citizen Botany Program.....	18
7.4 Additional Resources for Developing A Citizen Botany Program.....	19
8.0 CITED REFERENCES.....	19

APPENDICES

- Appendix A - Rare Care Application
- Appendix B - Rare Care Plant Data Interface
- Appendix C - Rare Care Volunteer Agreement
- Appendix D - Cedar Mountain Software Website Interface Proposal

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1.0 INTRODUCTION

Encompassing two floristic provinces (Cordilleran and Great Plains) and bordering on a third province (Boreal), Montana is home to about 4,590 vascular plant, bryophyte, and lichen species, varieties, and subspecies (Lesica et al. 2012; MTNHP 2022). Of these about 543 taxa are designated as Species of Concern or Potential Species of Concern by the Montana Natural Heritage Program because they are intrinsically rare, highly restricted in their habitat or distribution, or face significant threats that put their species' viability at risk.

Stewardship of Montana's rare flora is facing many challenges today. Formally trained botanists are in decline due to fewer botanical courses taught and botanical degrees offered at our universities and colleges. Federal and State agencies responsible for managing our natural resources continue to face funding cuts and staff reductions, often consolidating botany into natural resource, wildlife biology or other positions. Meanwhile threats to our native flora are on the rise and include direct habitat loss, land-use changes, competition from invasive species, poor land management, and changes to our climate. The wave of floristic inventories has waned and informative data on Montana's rare botanical species are getting older, such that population size, trend, and viability are largely uncertain, habitat conditions are unknown, and mapping is rather imprecise. Of Montana's 435 vascular Species of Concern (SOC) and Potential Species of Concern (PSOC), at least 5,500 documented areas (occurrences) have not been visited for the last 20 to 50 years (MTNHP 2022). Despite this, federal and state agencies, consulting firms, and non-profit organizations continue to engage in numerous vegetation projects and make management decisions affecting our native flora based on old data, coarsely mapped locations, and missing information.

There are solutions, and around the nation State Natural Heritage Programs, Native Plant Societies, Master Naturalist Programs, and other similar organizations have joined forces to develop citizen science programs aimed to provide critically needed information on unique and irreplaceable native plant species. Aligned in mission the Montana Natural Heritage Program (MTNHP) and the Montana Native Plant Society (MNPS) are Montana's most prominent organizations that support general education, research, and conservation focused on native plants and their habitats. From these organizations, a Citizen Botany Working Group formed in 2019 to study various volunteer-based science programs and to examine their effectiveness, organizational structure, operating costs, and volunteer-base, as well as, needs for updated botanical data and mapping in Montana.

The Citizen Botany Working Group learned that a Montana Citizen Botany Program if coordinated, structured, and funded would be of use to federal, state, and other organizations tasked with managing botanical resources and could recruit qualified volunteers to re-locate, collect data, and map rare plants, as well as, be used to assist in larger field-based efforts of inventory, seed collection, monitoring, and research. Further the working group found that such a citizen botany program would contribute resources to the missions of both the MTNHP and MNPS. For MTNHP, it creates a coordinated approach to bring forth current SOC and PSOC plant data and mapping, to directly improve the accuracy of state ranks, range maps, and SOC-listing efforts. For the MNPS it could strengthen engagement by members, facilitate plant

identification skills, help Chapters develop field trips, and indirectly recruit younger people to join the Society. Lastly, it would serve as tool to implement certain actions in the Montana Plant Conservation Strategy, which is in process of development.

The Citizen Botany Working Group proposes that the MTNHP and MNPS join resources to establish a Montana Citizen Botany Program aimed to build partnerships and harness the energy and expertise of citizen botanists to obtain critical field-based botanical information. The working group recommends that if created, the initial Montana Citizen Botany Program should focus on addressing the aging vascular plant SOC and PSOC field data and imprecise mapping. With maturity and continued funding the program could grow to include the other previously mentioned activities. In this proposal, the working group outlines a framework for such a program, its structure, organization, and volunteer recruitment, data management, collection, and reporting, along with possible funding sources and a generalized budget.

2.0 BACKGROUND RESEARCH

2.1 Citizen Botany Working Group

Initiated by the MTNHP Botanist and supported by the MNPS Board of Directors, a Citizen Botany Working Group was established to research the idea of using citizen botanists to re-locate, collect data, and map vascular plant SOC and PSOC that have not been visited in at least 20 years (**Table 1**); hereafter referred to as the Working Group. The Working Group met for numerous meetings from December 2019 through March 2020, and corresponded on various topics through about August 2020.

Table 1. Montana Citizen Botany Working Group.

MEMBER	POSITION IN 2019-2020
Andrea Pipp	MTNHP Botanist; MNPS member
Caroline Kurtz	MNPS Kelsey Editor and board member
Elizabeth Bergstrom	MNPS board member
Ryan Quire	MNPS board member
Denise Montgomery	MNPS member

2.2 Partnering Organizations

The Montana Natural Heritage Program and the Montana Native Plant Society are aligned in mission and have a long history of working together to facilitate botanical knowledge on Montana's flora, particularly with rare plants, and to support efforts of empowering people to identify and learn about plants, contribute data, and assist on projects with government, academia, and other organizations.

The Montana Natural Heritage Program was established by the Montana State Legislature in 1983 and charged with the statutory responsibility for the acquisition, storage, and retrieval of information documenting Montana's flora, fauna, and biological communities (MCA 90-15-102). The Program serves as the State's centralized source for information on the status, distribution, and ecology of native and exotic species and habitats, emphasizing those of conservation concern. Data is predominantly acquired through a partnership of federal, state, tribal, and local governments, private industry, academia, and non-profits organizations. The

Program collects and manages species-level data on taxonomy, status (federal, state, and other), origin, identification, habitat, and other aspects. The presence and distribution of a specific species is tracked at the observation-level. For each species ranked as an SOC or PSOC, neighboring observations are also lumped to create polygons called a Species Occurrence (SO; occurrence) that show discrete areas where the plant is found. The Program Botanist is responsible for developing state-level taxa checklists, species conservation ranks (S-ranks), and range maps and for maintaining accurate information on species' taxonomy, origin, ecology, observations, and more. In addition, the Program houses databases for photographs, literature, and other information that populates the Montana Field Guide. To accomplish this workload the Program Botanist relies heavily on a network of individuals with botanical expertise and field-based data. The Program makes the data publicly available through individual requests or website applications provided at <http://mtnhp.org/>. Website applications include the Montana Field Guide, Map Viewer, Species Snapshot, and others.

The Montana Native Plant Society was chartered in 1987 with the mission to preserve, conserve, and study the native plants and plant communities of Montana, and to educate the public about the values of our native flora. The Society has 501(c)(3) non-profit status, is governed by a Board of Directors, and has nearly 700 members that mostly associate with 7 local or 2 'at-large' chapters across Montana. The Society and its chapters teach plant identification, ecology, and related topics by hosting field trips, evening classes or short workshops, oral presentations, publishing a quarterly newsletter, and supporting other activities. The Society supports plant conservation efforts through various subcommittees and funds projects through a competitive grant. Members engage within their chapters, through subcommittees, and at the Annual State meeting. The Society hosts a website at <https://www.mtnativeplants.org/> which was developed by Cedar Mountain Software in Missoula.

2.3 Citizen Science Programs

Working Group members, individually or collectively, researched many citizen science programs that focused solely or partially on plants (**Table 2**). From these programs we inquired about many aspects including, how they got established; their purpose, structure, and organization; how they acquire, train, and manage volunteers; types of activities using volunteers; cost/benefit ratio of using volunteers; and funding mechanisms. For many of these programs we conducted in-depth interviews (**Table 2**). Probably the most important common elements that we learned was that the most successful Citizen Science programs have at least one funded Coordinator, is well-structured to develop obtainable and agreed upon expectations, provides some orientation to volunteers, and screens its volunteers to have minimum skill-sets necessary for the task. In the end, a well-structured and organized program will get meaningful information from their volunteers and retain a greater percentage, though there will always be a few who do not work out.

Of the programs examined, Washington's Rare Care program most closely aligns with the needs of the Montana Natural Heritage Botany Program. Rare Care began in 1998 and is operated by a paid, full-time Coordinator who leads the citizen science and research components and a paid,

Table 2. Citizen Science programs investigated by the Montana Citizen Botany Working Group. Interviews were conducted with programs listed in bold.

SELECTED CITIZEN SCIENCE PROGRAMS
Glacier National Park - Citizen Science Program
Montana Master Naturalist Program through Montana Natural History Center, Missoula
Montana Master Naturalist Program through Montana Audubon Conservation Center, Billings
Virginia Master Naturalist Program
Washington Rare Plant Care and Conservation (Rare Care)
Friends of the Inyo - Eastern Sierra
California Native Plant Society - Rare Plant Treasure Hunts
New England Wildflower Society's Rare Plant Monitoring Program
Adventure Scientists
Garden Club of America - Plants for Success

part-time Coordinator who manages the seed vault and partially manages volunteers. In this report, the Working Group proposes a framework for a citizen botany program in Montana modelled after a simpler version of Rare Care.

2.4 Website Interface

Through the interviews the Working Group also learned that a database and a website interface between coordinator and volunteer are critical to managing and tracking volunteers, work assignments, and the data they collect. The MTNHP has a botany database that can house and manage much of the information for a citizen botany program, but lacks an interface for managing personal volunteer information necessary to recruit, screen, and communicate with potential volunteers and coordinate all aspects of their work assignments. In the summer and fall of 2020, Andrea consulted with Cedar Mountain Software on the details of developing a website interface (see *Section 3.5*).

3.0 PROPOSED MONTANA CITIZEN BOTANIST PROGRAM ELEMENTS

3.1 General Overview

The proposed concept uses a paid MNPS Coordinator to oversee the recruitment and management of volunteers and the MTNHP Botanist to oversee the plant data and information provided to volunteers, and who both work together to maintain the citizen botany program. Using a web interface on the MNPS website, interested folks can get information, apply, and if accepted gets access to a password protected snapshot of pre-selected SOC / PSOC plant data. A pre-requisite of this program is for citizen botanists to have basic plant identification skills. The MNPS Coordinator and MTNHP Botanist schedules a one-day training with the accepted Citizen Botanists. The training addresses goals, expectations, importance of the work, how to assess the plant data to select an assignment, and how to use provided materials to successfully complete the assignment. Afterward, each citizen botanist reviews the plant data and selects two Species Occurrences for plant species and locations that fit their skills, level of adventure, and geographical preference. Using materials provided by MTNHP and acquired in their own research, each citizen botanist will re-locate their assigned plant SO. If found they will use a 'reporting form' to collect the required plant and habitat data, photograph, and map the plant using customized forms in Survey 123. The customized form will also be available in hardcopy

format. Citizen botanists may need to make more than one attempt to re-locate the plant's SO and are allowed two years to complete their two assignments.

3.2 Goals and Objectives

The Citizen Botany Program will initially focus on recruiting qualified volunteers, referred to as Citizen Botanists, to re-locate known SOC and PSOC vascular plants in order to collect specific population, plant, and habitat data and to map their location(s). The goal is to re-visit each SOC and PSOC plant SO at least once every ten years.

Two important notions to convey to Citizen Botanists is that: a) They are given a special and unique opportunity to re-locate a rare plant for which the vast majority of people will never see, and b) this assignment needs to be taken seriously and with importance because it has direct consequences for the conservation of this plant at this place.

As the program matures and continues to be funded, the services provided could be increased to include:

- Re-visits to known lichen and moss SOC and PSOC SOs;
- Re-visits to plant, lichen, or moss SOs on private land;
- Seed collecting;
- plant species monitoring;
- inventory; and
- other research or management needs.

A secondary goal of the program is to build a network of Citizen Botanist. This could be accomplished through a few group-sponsored field events or through a sponsored-MNPS event. The MNPS Coordinator and/or MTNHP Botanist could rotate to Montana's various regions to host a weekend camping trip. Here re-visits to known SOC and PSOC locations would be done with groups, allowing for more learning on plant identification, conducting re-visits, and building relationships to ensure this program not only has a volunteer-base, but is also fun. In addition, these events could lead to new occurrences of extending the distribution of a known occurrence.

3.3 Scope of a Montana Citizen Botany Program

3.3.1 Species and Species Occurrences

Initially the Working Group proposes that the target plants for conducting re-visits are the vascular plants designated as either SOC or PSOC by the MTNHP. These plants have assigned State Ranks of S1, S2, or S3, and may also be categorized by the MT/Dakotas BLM as Sensitive, by the USFS as Sensitive or Species of Conservation Concern, or by the U.S. Fish and Wildlife Service (USFWS) as federally threatened or proposed for listing. The goal is to revisit each plant SOC or PSOC occurrence at least once every 10 years. Of these vascular plants, SOs that have not been visited in the past 20 to 60 years (approximately year 2000 to year 1960) and have been mapped with a 0.5-mile radius precision level (location uncertainty) around the given latitude/longitude will be targeted for re-visits and data collection. Species that are taxonomically problematic will be excluded; these could include *Botrychium* species, selected *Carex* species, and other plants with confusing identifiable traits and nomenclature.

3.3.2 Geography and Land Ownership

The target area for conducting vascular plant SOC and PSOC re-visits includes the public lands in the state of Montana. Within Montana, public lands anticipated to be accessed for this purpose are managed by the U.S. Forest Service-Region 1, MT/Dakotas BLM, Glacier National Park, Yellowstone National Park, U.S. Fish & Wildlife Service refuges, Montana Fish, Wildlife & Parks, and Montana Department of Natural Resources and Conservation. The MTNHP Botanist will make good attempts with landowners or managers to get clearance for plant SO re-visits. However, it will be up to Citizen Botanist to coordinate with the local land management agency to ensure that the site can be and is safe to access. Citizen Botanists will be required to contact a local representative of the landowning agency at least one week prior to the site visit. While many rare plant populations occur on private land, this program does not anticipate monitoring these occurrences, at least not in the initial years and could only be done with written private landowner permission. However, a long-term goal is to work with private landowners that wish to participate in the program.

Rare plant species are found in most counties of the state, which, in turn, will require a large volunteer force represented from throughout the state. The MTNHP Botanist will try to provide target species and SOs for each Montana region (northwest, southwest, north-central, south-central, northeast, and southeast). What gets addressed will depend on the participation of the land managing agencies, the priorities determined by the MTNHP, the locations of the volunteer pool, and many other factors.

3.3.3 Schedule for Re-visiting SOC and PSOC Occurrences

The schedule for re-visiting a vascular plant SOC and PSOC occurrence will depend on the life history of the species. The Citizen Botany Program's overarching goal is to get re-visits to each vascular plant SOC or PSOC occurrence once every ten years. Citizen Botanists will be required to visit their target SO when the plant is most identifiable, which is often when it is in flower or mature fruit. Citizen Botanists may visit their SO or attempt to visit it more than once in order to time their monitoring for when it is best identifiable. For SOs that are imprecisely mapped, are remote, or have narrow phenology windows, Citizen Botanists may need multiple visits to locate the plant, if it is found at all. Citizen Botanists are required to complete 2 assignments within a 2-year timeframe. Once the assignment is completed, the population data, photographs, and mapping for what they observed will be sent to the MTNHP Botanist, soon after the site visit and no later than October 31st of that year. Data sent using Survey 123 (or other approved applications) creates efficiencies for both the observer and MTNHP Botanist. *See Section 5.0 for more details.*

3.4 Volunteer Recruitment

3.4.1 Reasons To Volunteer

Volunteer Citizen Botanists would be recruited for through the MNPS and MTNHP and may come from within and outside of Montana. Many people have plant and field skills. The Working Group discovered that people volunteer for Citizen Science type programs for various reasons, including: a) they want to contribute to an environmental cause and in a meaningful way, b) they want to share their observations and photographs of plants, b) they want a purpose for hiking or travelling, c) they like the idea of a "treasure hunt", and/or d) they want to develop

their career, skillset, and experience in plant identification.

3.4.2 Qualifications To Be A Citizen Botanist

To be accepted into the program potential volunteers will need to demonstrate basic plant and field skills on their application. Volunteers must possess all of the following basic skills:

- 1) be familiar and comfortable with botanical terms and the process by which one identifies a plant;
- 2) have completed at least one science class at the high school level or higher;
- 3) be able and willing to independently conduct field work; and
- 4) be able and willing to follow the monitoring protocols.

Applicants that lack the necessary basic skillset will be notified that they need to acquire certain skills and be encouraged to obtain those skills and re-apply. This Montana Citizen Botany program has the ability to strengthen people's plant identification skills and interest in botany. The Washington Rare Care program teamed with the University of Washington and the Washington Native Plant Society (WANPS) to offer a plant identification course for those who do not meet the basic requirements. The course costs around \$150, uses a required book, and encourages participants to become WANPS members. The instructor is a member of the WANPS. People sign up for the course because they are interested in plant identification yet may or may not end up being a Rare Care volunteer. This model could be applied in Montana and provide a source of revenue and volunteers as well as fill a gap in the loss of plant identification skills.

3.4.3 Potential Volunteer Recruitment Sources

This Montana Citizen Botany Program is not only geared to individuals but could be used by groups with a base level of plant identification expertise. For MNPS Chapter Field Trip Leaders this program could be used to access plant information and find a particular plant SO that would make for a good field trip or a mini-inventory project. Once established and with continued funding, there is the potential to develop student internships. The Working Group found a diversity of sources from which qualified Citizen Botanists could be found (**Table 3**).

3.5 Website Interface

3.5.1 Background

The Montana Citizen Botany Program will require a website interface that connects potential volunteers with this program and the MNPS Coordinator. The Working Group examined the website interface used by several citizen programs. The Working Group proposed to model a website system after Washington's Rare Care program. Rare Care, runs on a SQL server platform with a Microsoft Access front-end and an asp.net website. Rare Care's database consists of two parts: a) static web-page [<https://botanicgardens.uw.edu/science-conservation/rarecare/>] with application (**Appendix A**), and b) App web-page with access to plant data (**Appendix B**).

On behalf of the Working Group, Andrea approached the owner of Cedar Mountain Software [<https://www.cedarmountainsoftware.com/>], Bob Jaffe, to help figure out how such an interface

Table 3. Potential sources for finding Montana Citizen Botanists.

<p>MNPS members:</p> <ul style="list-style-type: none"> • Individuals • Chapters could host field trips and projects aimed at re-visiting a particular plant SO to survey the limited area, collect data, and if found, map plants.
<p>Montana Master Naturalist Programs: Master Naturalists who seek certification could use this Program to achieve their goal.</p> <ul style="list-style-type: none"> • Montana Outdoors Science School (MOSS), Bozeman • Audubon Conservation Center, Billings • Glacier Institute Master Naturalist Course, Glacier National Park • Swan Valley Connections Master Naturalist Course, Condon • Helena Master Naturalist Course, Montana Discovery Foundation, Helena • Missoula Natural History Center, Missoula
<p>University and College Students:</p> <ul style="list-style-type: none"> • Target students enrolled in botany, vegetation ecology, wetland, or other-plant oriented classes. • Potential to be a student's senior thesis topic. • Program could develop student internships. • Students who want to gain plant and field skills to build their resume.
<p>High School Advanced Placement Students: this would require a teacher to serve as a mentor.</p>
<p>Professional Botanists: Those who have field crews could use this program to conduct re-visits when staff time and funding allow.</p>
<p>College Graduates: Early-career botanists, biologists, range cons, natural resource specialists, technicians, and others could use this program to gain plant skills and field experience to build their resumes..</p>
<p>Retired Professionals: Retired botanists, biologists, range cons, natural resource specialists, and others often want to contribute to community and environmental work, and could become Citizen Botanists.</p>
<p>Amateur botanists and plant enthusiasts: Many folks have an eye for plants or for particular species, yet don't do this work as a career.</p>
<p>Photographers: Plant photography is quite popular, and many photographers have a keen eye and spend learning plant identification.</p>
<p>Americorp / Montana Conservation Corp: This organization is used to support community projects and requires funding. Some positions are stationed at State parks and in the past some have provided plant observation data to MTNHP.</p>
<p>Volunteers for Adventure Scientists or i-Naturalists: These volunteers often have skills to locate and identify plants, though they may be unsure in their identifications. Collaborating with these non-profits could result in targeted surveys for Montana SOC and PSOC to gain data, photography, and map populations.</p>
<p>Montana Wilderness Association: MNPS and MWA members have done many joint ventures. Collaborating with this non-profit could result in targeted surveys for Montana SOC and PSOC to gain data, photography, and map populations.</p>
<p>Wild Rockies Field Institute: Offers academically rigorous, place-based field courses in complex social and environmental issues. Citizen Botany Program could fit in with their course work. https://www.wrfi.net/</p>

could be developed for the Montana Citizen Botany Program. Cedar Mountain Software built and maintains the MNPS website. In these discussions, Bob and two of his staff easily understood the concept of what is needed and have the technical expertise to create an interface. The interface app would house volunteer application data, track assignment status, house static plant data that gets updated annually, house the annual report, and perform other functions. Cedar Mountain Software has provided a proposal and cost estimate for developing a sophisticated web interface (**Appendix D**).

3.5.2 Website Interface - Static Webpage

The Working Group proposes that an interface be housed on the MNPS website. Our proposed idea is for the citizen botany program to have its own page on the MNPS website. The webpage

would contain static information about the program (**Table 4**).

Table 4. Potential static content to house on the proposed citizen botany webpage.

Webpage Content Ideas
Purpose, need, general approach, and importance of the program
Joint venture and how it connects MNPS and MTNHP
Volunteer need, requirements, and how to get involved
Application link, application, and how to submit it
Annual report or information on what the program accomplishes
Comments from volunteers on their experience with the program
Other details

3.5.3 Website Interface - Application

Potential applicants would apply for the program during a pre-determined timeframe, such as February-April, by completing an application housed on the Citizen Botany webpage of the MNPS website (**Appendix A**). The MNPS Coordinator would screen the applicants and notify them of their acceptance into the program by a pre-determined date. Applicants that lack the necessary basic skillset will also be notified, and ideally would be informed of how they can acquire the basic skills so that they can re-apply to the program (see *Section 3.4.2*).

3.5.4 Website Interface - Plant Data Pre-work

During the early winter the MTNHP Botanist will review the data-set of vascular plant SOC and PSOC that need re-visits using the scoping criteria (see *Section 3.3.1*). We propose a system that is similar to Rare Care (**Appendix B**). A target plant list of 100-200 plants along with pertinent data will be developed. Data will be compiled into a spreadsheet format including names (Scientific, common, and synonyms), family, regions where present (northwest, southwest, north-central, south-central, northeast, southeast), county, latitude/longitude point location, precision distance around point location (also called location uncertainty), months when plant is identifiable, MTNHP priority category, and an ease of identification rating. Each listed SO will be rated as to the level of importance for the MTNHP to have current data and put into categories of: ‘highest’, ‘moderate’, and ‘lowest’. Species on the list will be rated for their difficulty to identify and put into categories of ‘challenging’, ‘moderate’, ‘easy’, and ‘technical key’.

Using the draft target plant list, the MTNHP Botanist will seek information from respective public landowners to get an initial clearance that the site is likely safe and possible for re-visiting. For example, fires, active timber sales, restoration projects, bridge replacements, and other activities in vicinity of the SO could hinder or prevent access or safety. In these situations, the SO would be removed from the current list, but would be available in future years. Once finalized the spreadsheet of plant data would be uploaded onto the website application. Citizen Botanists would access the plant data using a password and peruse the information to select their assignments.

4.0 PROGRAM ORGANIZATION AND RESPONSIBILITIES

Under this framework the Montana Citizen Botany Program would be a partnership between the MTNHP and the MNPS. Both the MTNHP Botanist and MNPS Coordinator are paid positions. The Working Group proposes the idea that the MNPS Coordinator could be housed with the Montana Natural Heritage Program staff at the Montana State Library in Helena. Alternatively, the MNPS Coordinator position could work from their personal home office. Initially, both the MTNHP Botanist and MNPS Coordinator would be responsible for developing the procedures, work agreements, and working materials necessary to have a functioning Montana Citizen Botany Program, and that oversight would come from the Montana Natural Heritage Program Lead and the Montana Native Plant Society President and its Board of Directors. Working materials include the process, format, and information developed to recruit volunteers, develop the training session, track assignments from their selection to completion, provide plant information, review completed data, and annually report on the Montana Citizen Botany Program results.

4.1 Responsibilities of the Montana Natural Heritage Program Botanist

The MTNHP Botanist would serve the Montana Citizen Botany Program mostly through the dissemination, storage, and retrieval of plant information, co-training, materials development, and working with the MNPS Co-coordinator to help ensure there is budget and resources available to make the program and its volunteers successful.

Specific MTNHP Botanist responsibilities include:

- Develop data collection, photography, and mapping methodology and ensure they meet approvals from the MTNHP Program Coordinator and the MNPS Board of Directors.
- Create and maintain the priority plant list and associated data to upload to the website-interface. This includes corresponding with public land managers and owners to get an initial clearance that SO could be re-visited.
- Strive to update and provide complete information for pertinent species profiles on the Montana Field Guide: taxonomy, identification, diagnostics characteristics for look-alikes, habitat, range, and other information that facilitates success for Citizen Botanist re-visits.
- Create and maintain a customized survey within the ‘Survey 123 for ArcGIS’ app that allows the user to collect plant data specific to re-visiting a known occurrence. Multiple GPS points can be generated to create a polygon, thus allowing the volunteer to map the observed occurrence. This app is free and available for upload onto mobile phones (2013 or newer). Citizen Botanists would get a specific link to that allows them to use this specific app. This app would be password protected, allow the user to see the data, but cannot download or store the data.
- Create and maintain a hardcopy form for recording re-visit plant data in the field. This form would be downloaded by the volunteer.
- Provide electronic maps: a) SO polygon boundary, b) all observation point(s) locations with their assigned precision or location uncertainty, and/or observation polygon(s) data. These will be overlaid onto both a USGS topographic map and an aerial image.
- Coordinate with the MNPS Coordinator to create the volunteer application, safety materials, equipment list, links to necessary information, and other materials needed by the Citizen Botanist and the Citizen Botany program.

- Assist the MNPS Coordinator in finding potential volunteers and encouraging them to apply.
- Coordinate with the MNPS Coordinator to develop training materials and train accepted volunteers.
- Assist the MNPS Coordinator in finding and maintaining funding to keep this program viable.

4.2 Responsibilities of the MNPS Coordinator

The MNPS Coordinator would serve the Montana Citizen Botany Program mostly through recruiting and managing the volunteer base, training and assisting volunteers to help them be successful, reporting on this program's results, and working to maintain or increasing funding for this program. A preliminary annual project report would be prepared annually by the Program Coordinator and provided to the MTNHP Botanist by January 31st. This report would validate the value of the Citizen Botany program and help to secure or maintain funding. The report could include the list of monitored populations, summary of the season's activities, and threats to the population. The report could also include the status of the program's volunteers and staff.

Specific MNPS Coordinator responsibilities include:

- Coordinate the entire volunteer process from recruiting to finalizing their obligation, assignment, and contractual agreement. Track volunteer assignments from selection to completion.
- Coordinate with the MTNHP Botanist to create the volunteer application, safety materials, equipment list, links to necessary information, links to necessary information, and other materials needed by the Citizen Botanist and the Citizen Botany program.
- Advertise, find, and secure potential volunteers and encourage them to apply.
- Review volunteer applications to determine if they qualify or not for the program, and inform volunteer.
- Conduct all communications with all potential volunteers and accepted Citizen Botanists.
- Coordinate with the MNPS Coordinator to develop training materials and train accepted volunteers.
- Maintain accurate and timely information on the website interface.
- Write an annual report on the program.
- Assist the MTNHP Botanist in securing funding to keep this program viable.
- Be a member of the MNPS.

4.3 Requirements and Responsibilities of Approved Volunteers

Volunteers, interns, and students provide monitoring services to the program. Potential volunteers apply (**Appendix A**) to the Montana Citizen Botany Program, and if accepted are referred to as Citizen Botanists.

Specific Citizen Botanist responsibilities include:

- Completing the Volunteer Agreement (**Appendix C**) and attend the required 1-day training.
- Adhering to monitoring protocols and standards to help ensure data accuracy and quality.
- Responsible to use their own transportation and field gear.

- Agree to coordinate as directed or needed with the MNPS Coordinator and MTNHP Botanist.
- Provide their re-visit data to the MTNHP botanist either upon completion of the assignment or by October 31st following their site visit.
- Complete 2 assignments within a 2-year window.

5.0 CITIZEN BOTANIST PLANT MONITORING PROCESS

For volunteers who apply and are accepted to be a Citizen Botanist, they would be given password-protected access to another page that houses the plant data. Password-access could also be given to MNPS Chapter Field Trip Leaders. The idea is that Citizen Botanists and MNPS Field Trip Leaders would peruse a series of menus to find a species based on name, geography, level of difficulty in identification, time when plant is identifiable, and MTNHP priority level. We propose a system that is similar to Rare Care (**Appendix B**).

Upon confirmation that the Citizen Botanist has selected an assignment then the MTNHP Botanist will provide more detailed information, such as actual observation data, past mapping, links to study the plant's characteristics and its look-alikes, and much more.

5.1 Training

Citizen Botanists would be required to attend a 1-day in-person training. An in-person training is preferred because it would teach on how to use Survey 123 and techniques to map plants in the field. It's also important that elements of the program strive to build relationships, personal commitment to the task, and reward the volunteer by demonstrating the value of what they accomplished. Trainings would be offered at several locations each year. Trainings do not teach plant identification because that is a pre-requisite for acceptance into the program. Rather the training teaches the Citizen Botanist in the program and how to successfully and safely complete an assignment. This training covers the following topics:

- Program overview.
- How to use the website and navigate the software to select two appropriate plants and locations to re-visit. It is important that volunteers select an assignment that best fits their plant and field skills and geographical interest.
- How to access, use, and understand the plant data, terminology, and maps provided, along with safety materials and other necessary information.
- How to obtain additional maps and access the location responsibly and safely, including who and how to contacting the local managing agency.
- How and what data to collect in the field data. How to document what they observed. How to document 'absence' in the field. How to map and photograph their observation.
- What personal gear and equipment is needed to complete the assignment, while being safe and enjoying the treasure hunt.
- How to make herbarium voucher collections, if required for the particular species.
- How to submit field data.
- What the ground rules are of the program: logging volunteer hours, submitting forms timely and completely; importance of the work; special permissions given to complete

- the work; and expectations.
- Other details.

5.2 Informational Packet

Upon completing training and selecting their assigned plants to re-visit, each volunteer would receive an information packet that provides detailed observation data and maps for their SO assignments. This information would be provided by the MTNHP Botanist, but could be received to the Citizen Botanist by the Program Coordinator. Maps of the occurrences would be provided electronically and/or as hardcopies. The SO boundaries will be provided as a PDF with background layers of the USGS topographic maps and an aerial imagery. Specific to their assignment, volunteers will be provided with landowner contact information to help them determine access routes, road closures, etc. From the training and in their packets volunteers will receive information and electronic links to Montana Plant Field Guide (<http://fieldguide.mt.gov/>), botanical literature to consult, safety measures, volunteer timesheet to record hours, field and data submittal protocols, and others. Citizen Botanists will have a checklist of items that should be secured before leaving on their plant treasure hunt.

5.3 Equipment

Citizen Botanists would download a specific Survey 123 app for collecting plant data and mapping onto their mobile phones, GPS, and/or tablet. Citizen Botanists will collect plant population and habitat data using hardcopy forms provided on write-in-the-rain paper. A preliminary list of equipment includes:

- Information Packet (*see Section 5.2*)
- Mobile electronic device: cell phone, tablet, and/or GPS with batteries and/or backup energy pack
- Survey 123 app, previously downloaded and tested on the mobile device
- Hardcopy plant form, observation data, maps, photographs, and other materials
- Pencils and permanent marker
- Camera with SD card or phone, all with ample storage space, and extra batteries or backup energy pack
- Hand-lens
- Safety materials, such as appropriate first aid kit, flashlight, bear spray, insect repellent, sunscreen, and others
- Food and water
- Appropriate field clothing

5.4 Fieldwork - Data Collection

Prior to conducting the re-visit, the Citizen Botanist would study the necessary maps, aerial photographs, and contact the local land managing agency to inquire and make sure there are no restrictions to accessing the site. The Citizen Botanist would also study the safety, equipment, and plant data materials provided in the information packet along with reading recommended websites and consulting other botanical books. The Citizen Botanist would re-visit the plant during its identifiable window. Depending upon many factors, the site might need to be accessed 2 or 3 times in order to successfully navigate, search and find, or determine the best time to collect data on the plant and its habitat.

With research done and materials at hand the Citizen Botanist will access the SO polygon. Once arrived, they will meander through the mapped occurrence as best as possible, given the polygon size, difficulty of terrain, weather conditions, and any time constraints. Once the plant is located, its identification will be verified with the materials and knowledge obtained. The Citizen Botanist will photograph the plant to validate the observation; this will require multiple photos of the entire plant, close-ups of diagnostic characteristics to the extent possible, and habitat photos. Photos will also contribute to developing a teaching-set for use on the Montana Field Guide and instructional coursework. For some plant the Citizen Botanist may be asked to collect a plant specimen using techniques and supplies provided in the Training.

Once the plant has been found and validated, the Citizen Botanist will document the location using Survey 123 on their mobile device, with their GPS, and/or by drawing on their hardcopy maps. The technique used will depend upon cell service and their equipment. The intent is for the Citizen Botanist to document the plant's location as precisely as possible for the portion of the population observed. Ideally, it would be great for the entire population to be mapped, but this may not be possible due to time or weather constraints, size and extent of population, and difficulty of terrain. Thus, the Citizen Botanist needs to map the plants as they are found using the techniques learned in the training.

Once the plant population has been found and at least partially surveyed then the plant reporting form should be completed. Using the hardcopy form the Citizen Botanist records the information they observed. The proposed field data to collect when documenting presence includes:

- Report the number of plants observed as an exact number, range, minimum, or maximum depending upon what is reasonable and yet most accurate to report.
- Describe the plant's distribution within the area observed, such as evenly scattered, scattered in patches, sparse, or dense.
- Check off the observed plant phenology of plants: relative percentage in flower, fruit, senesced, and/or vegetative
- Check off descriptors of the plant's observed health and viability; terms are still to be determined.
- Verify or describe the habitat type and condition based on the past data and what is currently observed; guidance still to be developed.
- Check off observed threats to the plant and to the habitat, and their severity, scope, and immediacy. Standards threat types and categories of severity, scope, and immediacy will be provided.
- State if a portion or the entire plant population was found.
- State if a portion or the entire habitat was surveyed.
- Record the dominant associated plants.
- Additional fields may be added.

If the SO Polygon was found, but no plants were found then the Citizen Botanist would follow procedures to document absence, which would be taught in the training. The site would be photographed, plants observed would be documented in writing and/or photographed, and a plant absence reporting form would be completed. The locations where the observer looked would be mapped using Survey 123 on their mobile device and/or with the hardcopy map.

Upon completing the assignment, the Citizen Botanist would notify the MNPS Coordinator. Plant data, photographs, and mapping would be provided to the MTNHP Botanist as soon as is possible and not later than October 31st following the site visit. Any problems accessing the site or locating the plant would be communicated to the MNPS Coordinator. If the site was not accessible, then the Citizen Botanist has the option to select a new SO location and plant species.

With a GPS or the Survey 123 app plants can be mapped by marking individuals or groups as waypoints in order to obtain information on its distribution within the area surveyed. At minimum, data points will be taken from at least four locations along the perimeter of each population.

5.5 Citizen Botanist Outings

In an effort to strengthen the Montana Citizen Botany program, develop a base of volunteers, work to retain volunteers, and promote people's connections with their flora in their state, we propose to host some weekend outings in the 2nd or 3rd year of the program.

6.0 QUALITY CONTROL

6.1 Confidentiality: **To be developed.**

6.2 Data Control: **To be developed.**

6.3 Data Use: **To be developed. Refer to Appendix C for Data and Site Security Agreement.**

7.0 DEVELOPING SUPPORT AND FUNDING THE MONTANA CITIZEN BOTANY PROGRAM

7.1 An Estimated Budget

The Montana Citizen Botany Program as we propose it would require start-up funds and annual funding to maintain; additional funding would be used to grow the program. The most basic element for acquiring current data on our rare flora is to develop a website interface. This interface not only connects potential volunteers to the program and MNPS Coordinator, but stores and organizes a snap-shot of selected botanical data allowing the MTNHP Botanist to efficiently provide time and resources to this program. The second most important element is to fund the MNPS Coordinator. The program could successfully start and operate using a part-time paid coordinator. The third necessary element is to successfully recruit Citizen Botanists and retain a certain portion of them. As a starting point for discussion, we have put together a potential budget (**Table 5**).

Table 5. A potential budget for developing the Montana Citizen Botany Program.

ITEM	TRAVEL EXPENSES	UNIT	RATE	TOTAL
MTNHP Botanist Labor	Accomplished within MTNHP Core Funding			
	State Per Diem ¹	4-10 days	\$ 30.5	\$ 305.00
	Vehicle Mileage ¹	500-800 miles	\$ 0.139	\$ 44.61 - \$ 111.20
	Vehicle Daily Rate ¹	4-10 days	\$ 11.152	\$ 111.52
	Lodging ²	1-4 nights	\$ 85.00	\$ 85.00 - \$ 340.00
MNPS Coordinator Labor		20 hours per week; 50 weeks per year	\$12.00	\$12,000.00
	Per Diem ³	4-10 days	\$ 55.00	\$ 220 - \$ 550.00
	Vehicle Mileage ³	500-800 miles	\$ 0.56	\$ 280.00 - \$ 448.00
	Lodging ²	1-4 nights	\$ 85.00	\$ 85.00 - \$ 340.00
Printing	To Be Determined			
Mailing	To Be Determined			
Website Interface Development				\$ 7000.00
Website Hosting and Maintenance Cost⁴		25-100 per month	\$ 35.00	\$ 420.00
Website Hosting and Maintenance Cost⁴		25-100 per month	\$ 35.00	\$ 420.00
ESTIMATED START-UP COSTS (YR 1)				\$ 20, 242
ESTIMATED ANNUAL COSTS (YRS 2-3)				\$ 14,286

¹ State Travel Expenses would be used to co-train Citizen Botanists and co-host outings. The MTNHP Botanist would use State Motor Pool transportation. Outings are not proposed until years 2 or 3. It is estimated that 10 full or partial travel days could be needed.

² Lodging is anticipated to accommodate some trainings each year. There is potential that Society members could lodge the MNPS Coordinator and/or MTNHP Botanist. Lodging would be at cost and would vary greatly depending upon location. Outings are assumed to be camping events, which may or may not have lodging costs.

³ Travel Expenses would be used to co-train Citizen Botanists and co-host outings. The MNPS Botanist would use personal transportation and be reimbursed at federal rates. Outings are not proposed until years 2 or 3. It is estimated that 10 full or partial travel days could be needed.

⁴ See **Appendix D** for an explanation.

7.2 Potential Funding Development Steps

Step 1: With this proposed framework the Working Group reaches out to the MNPS Board of Directors and MTNHP Coordinator to contemplate this idea and its structure. After ample time for each organization to evaluate this framework, the Working Group would like to host a joint meeting to discuss the possibility of developing a Montana Citizen Botany Program as a joint effort, and to provide direction and any and all possible feedback.

Step 2: If agreed upon by the MNPS board and MTNHP Coordinator to pursue development and funding for a Montana Citizen Botany Program then Step 2 would begin. Funding to create the web interface would be pursued first. The Working Group would reach out to the Cinnabar Foundation [<https://www.thecinnabarfoundation.org/>] as a potential source to fund the website interface and possibly a portion of the MNPS Coordinator in Year 1. General Operating Grants from the Cinnabar Foundation are by invitation only and require a 1:1 challenge "cash" match. In the 2021 grant cycle, the deadline for invited applicants was January 31, 2021.

Step 3: Funding for an MNPS Coordinator would be sought for by the MNPS Board, MTNHP Coordinator, and MTNHP Botanist. Potential funding sources include:

- A Fund-raising effort hosted by the MNPS. A special fund or line-item budget could be developed and a letter written to inspire MNPS members to donate to the establishment of an MNPS Coordinator.
- A Fund-raising effort hosted by the MNPS. The MNPS with support from MTNHP could inquire with the following federal and state agencies to help contribute to a cost-effective program that would in turn current data to help in their resource planning efforts. A preliminary list has been developed for government agencies which might find value in funding a Montana Citizen Botany program (Table 6).

Table 6. Potential government agencies which could contribute to funding a Montana Citizen Botany Program.

FEDERAL GOVERNMENT	STATE GOVERNMENT
U.S. Forest Service: Region 1, Kootenai NF, Flathead NF, Lolo NF, Beaverhead-Deer Lodge NF, Helena-Lewis & Clark NF, and/or Custer-Gallatin NF.	Montana Department of Natural Resources and Conservation
MT/Dakotas Bureau of Land Management: State office and/or individual Districts	Montana Fish, Wildlife, & Parks
Glacier National Park	Montana Department of Transportation
Yellowstone National Park	
U.S. Environment Protection Agency	
U.S. Fish and Wildlife Service	

- Apply on behalf of MNPS and/or MTNHP to existing grants. There are a number of grants that fund efforts to get people to participate in the outdoors and additional efforts to search for these grants is needed. Many grants require match which the MTNHP could potentially provide, depending upon specific guidelines.
 - Montana Noxious Weed Trust Fund - Montana Department of Agriculture
 - Patagonia Store, Dillon, Montana:
<https://www.patagonia.com/actionworks/stores/>
 - NorthFace: <https://www.thenorthface.com/about-us/outdoor-exploration/explore-fund.html>

- Leverage partnerships with organizations in Montana to acquire funding. More effort to find organizations would like result in more opportunities.
 - University of Montana and Montana State University to collaborate in science, developing internships, botanical teaching, getting students field experience, etc.
 - Private Colleges: Providence in Great Falls, Carroll in Helena, Rocky Mountain in Billings.
 - Wild Rockies Field Institute, Missoula, Montana

Step 4: Funding that would develop the web interface would allow for the Montana Citizen Botany Program to be developed. A MNPS Coordinator job announcement would be developed and advertised. Applicants would be interviewed by the select MNPS board members and MTNHP Botanist. The job could be contingent upon funding. Steps 2 and 3 could be accomplished at the same time, with assistance from both an MNPS Coordinator and MTNHP Botanist.

7.3 Developing Support For A Citizen Botany Program

The concept of a Montana Citizen Botany Program could be introduced to MNPS members and potential partnering organizations to gauge their level of support and/or ability to contribute funds. Andrea Pipp, MTNHP Botanist, is willing to put together a presentation and provide to MNPS members in each Chapter. This presentation could also be presented to various federal and state agencies as a means to discuss if such a program would be useful and possible funding mechanisms. This presentation would address the Citizen Botany Program's goals, need, and importance and explain who are the players and what it takes to be a Citizen Botanist; it would illustrate the process and demonstrate that with basic plant and field skills one can be a Citizen Botanist.

The method to provide relevant materials to the Citizen Botanist, collect plant data, and map plants requires some field-based testing with volunteers. It was on the 2020 MNPS Annual Meeting schedule for Andrea to lead a 'rare plant data collection and mapping session' to test components of this program. However, the onset of Covid-19 caused MNPS to cancel this event and other gatherings. In 2021 Andrea would like to conduct field testing and would be happy to involve the help of MNPS members.

7.4 Additional Resources For Developing A Citizen Botany Program

Additional Resources are available but have not yet been reviewed. The U.S. Environmental Protection Agency has developed a handbook for Citizen Science programs and has a website devoted to these efforts. Websites to consult include:

- https://www.epa.gov/sites/production/files/2019-03/documents/508_csqapphandbook_3_5_19_mmedits.pdf
- <https://www.citizenscience.gov/#>

8.0 CITED REFERENCES

Lesica, P., M.T. Lavin, and P.F. Stickney. 2012. *Manual of Montana Vascular Plants*. Fort Worth, TX: BRIT Press. viii + 771 p.

Montana Natural Heritage Program (MTNHP). 2022. *Query of the Botany Database*. January. Helena, Montana

APPENDIX A

RARE CARE APPLICATION

Volunteer Application Form

Please complete the online application below. The application has 3 pages and includes a few questions that allow us to find out a little about you and what opportunities might be of interest to you. In addition, there is one additional page to complete if you are applying for the Rare Care Monitor or Seed Collector position.

For security reasons, you will not be able to save your edits and complete the application at a later date; therefore allow about 20 minutes to complete it in one session. Information provided on these forms is confidential. Any information transmitted over the Internet is encrypted and secure. Only designated, qualified employees of the University of Washington will have access to this information.

After submitting your application, you will receive a confirmation e-mail message. Thank you for your interest in volunteering for UW Botanic Gardens.

FIRST NAME		LAST NAME	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
PREFERRED PREFIX (optional)			
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ADDRESS (required)			
<input type="text"/>			
<input type="text"/>			
CITY	STATE	ZIP CODE	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
E-MAIL ADDRESS (required)			
<input type="text"/>			
HOME PHONE	WORK PHONE	CELL PHONE	PREFERRED PHONE
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
(At least one phone number and area code is required)			
AVAILABILITY			
Times Available (weekdays, evenings, afternoons, weekends, etc.)			
(For volunteering at UW Farm, first check the online Farm schedule and sign up for one of the available time slots.)			
<input type="text"/>			
REASON FOR WANTING TO VOLUNTEER			
<input type="text"/>			

VOLUNTEER POSITION DESIRED Your preferences from the volunteer positions page appear below. Accept or edit your selections, then rank each preference 1 to 4. You may select a blank line to indicate no preference. At least one preference is required though.

POSITION	<input type="text"/>	RANK	<input type="text"/>
POSITION	<input type="text"/>	RANK	<input type="text"/>
POSITION	<input type="text"/>	RANK	<input type="text"/>
POSITION	<input type="text"/>	RANK	<input type="text"/>

Continue to Next Page

Volunteer Application Form

Part 2 - Experience, Skills, Education, and References

Please fill out this form with your relevant information, then click Continue to Next Page to complete your application.

RELEVANT EXPERIENCE (Paid or Volunteer Positions, not required for UW Farm):		
Company / Organization	Duties	Dates
<input type="text"/>	<input type="text"/>	<input type="text"/>
Company / Organization	Duties	Dates
<input type="text"/>	<input type="text"/>	<input type="text"/>
Company / Organization	Duties	Dates
<input type="text"/>	<input type="text"/>	<input type="text"/>
SPECIAL SKILLS:		
<input type="checkbox"/> Audio Visual Equipment	<input type="checkbox"/> Receptionist/Multi-line Phones	<input type="checkbox"/> Arboriculture
<input type="checkbox"/> Gardening	<input type="checkbox"/> Photography	<input type="checkbox"/> Public Speaking/Teaching/Tours
<input type="checkbox"/> Office Skills	<input type="checkbox"/> Writing/Editing	<input type="checkbox"/> Working with Children/Teaching
<input type="checkbox"/> Library Experience	<input type="checkbox"/> Plant ID	<input type="checkbox"/> Web Design/Maintenance
<input type="checkbox"/> Computers	<input type="checkbox"/> Horticulture	<input type="checkbox"/> Other
specify software:		specify:
<input type="text"/>		<input type="text"/>
EDUCATION (at least one required):		
Please list any formal educational experience you have - e.g. biology, botany, zoology, horticulture, environmental science, etc., and the institution where it was obtained.		
School	Degree or Courses	Date Completed
<input type="text"/>	<input type="text"/>	<input type="text"/>
School	Degree or Courses	Date Completed
<input type="text"/>	<input type="text"/>	<input type="text"/>

School <input type="text"/>	Degree or Courses <input type="text"/>	Date Completed <input type="text"/>
School <input type="text"/>	Degree or Courses <input type="text"/>	Date Completed <input type="text"/>

REFERENCES (at least one required):

If applying for Rare Care's **Rare Plant Monitoring and Seed Collecting Program**, please include at least one reference who is **knowledgeable about your botanical skills**.

Name	Relationship	Phone Number	E-mail Address
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Name	Relationship	Phone Number	E-mail Address
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Volunteer Application Rare Care Supplement Form

Supplement - Rare Care Additional Information

You indicated one or more positions with the Rare Care program in your preferences. These positions require some additional information. Please fill out this form with your availability, field experience, travel interests, and how you learned about Rare Care, then click Continue to Next Page.

AVAILABILITY:

How Many Days per Month or Season Are You Available?

PLANT ID AND DATA COLLECTION

Rare plant monitoring and seed collecting require a high degree of certainty in identifying species (sometimes distinguishing between two very similar species) and comfort with collecting and reporting scientific data. Describe your experience and training in identifying native plants and data collection. Please be specific.

FIELD EXPERIENCE (required)

Monitoring often requires working in wilderness areas away from roads. Describe your experience and skills in orienteering, GPS use, map reading, and wilderness travel.

TRAVEL (required)

What distance are you willing to travel and/or what part of the state are you interested in?

HOW DID YOU LEARN about this volunteer opportunity?

PLEASE NOTE: Site visits are expected to take a full day and multiple visits may be necessary. Initial research on the plant and site may take several hours. Training is expected to take one full day each for both plant monitoring and seed collecting.

Thank you for your interest in the Rare Care program. You will be notified of the date and location of our next training session if accepted into Rare Care's Rare Plant Monitoring and Seed Collecting Program.

Volunteer Application Form

Part 3 - Emergency Contacts, Additional Information, Resume

Please fill out this form with your emergency contact information, add additional information and resume if you like, then click Submit Application. By clicking submit you agree to receive email communication from the UW Botanic Gardens.

EMERGENCY CONTACTS (required):

Name	Relationship	Phone Number
<input type="text"/>	<input type="text"/>	<input type="text"/>
Name	Relationship	Phone Number
<input type="text"/>	<input type="text"/>	<input type="text"/>

SPACE FOR ADDITIONAL INFORMATION IF NEEDED

IF DESIRED, PASTE YOUR RESUME IN THE SPACE BELOW

⏪⏩

📄
📄
📄
📄

(please include your full name on any pasted or uploaded resume)
OR UPLOAD YOUR RESUME:

[Submit Application](#)

APPENDIX B

RARE CARE PLANT DATA INTERFACE

Washington's Rare Care Program – Volunteer Web Application

1. The Approved Volunteer logs in to the 'Assignment Page' of the website.
2. They type in their last name to pull up their information and view the Assignment options (Snip-it 1).

Note: These snip-its show "View Everyone's Assignments" because I've logged in under the Program Coordinator's credentials. The Approved Volunteer would not see this option.

Snip-it 1

The screenshot shows the website for the University of Washington Botanic Gardens. The header includes the university logo and name, along with navigation links for 'MAKE A GIFT NOW', 'CLASSES + EVENTS', 'FACILITY RENTALS', and contact information. The main content area is titled 'Washington Rare Plant Care and Conservation'. It features a search form with the following elements:

- A heading: 'Select your Volunteer Record' with a help icon.
- A text input field labeled 'Enter your last name:' followed by a 'Find Me' button.
- A dropdown menu labeled 'Then select your specific record:'.
- Three prominent red buttons: 'Proceed to Search', 'Review My Requests', and 'View Everyone's Assignments'.

Below the form, a note states: 'You must select a volunteer record before proceeding. If you are unable to find any matching records, you might be listed under a hyphenated or maiden name. Please try again or check our list of [Rare Plant Monitors](#) to see how your last name appears in our records. If you still need help, you may contact rarecare@uw.edu.'

3. Volunteers can search tabular data in many ways (Snip-it 2):
 - The entire list of species with information.
 - Geographic area by region or by county. For Montana regions would be: northwest, north-central, northeast, southwest, south-central, and southeast.
 - Time of Year: Early Spring, Spring, Summer, Fall which would match the phenology of the species that can be identified at that time.
 - Month: each month is listed separately from January – December. What they select will match the phenology of the species that can be identified at that time.
 - Priority: Rare Care categorizes EOs as being a 'highest', 'medium', 'lowest' priority for obtaining data.
 - Ease of ID: Volunteers select if they want a 'challenging', 'moderate', 'easy', or 'technical key' plant to re-locate.
 - Genus
 - Species: Provides a drop-down list of all the species available for re-locating that year.
4. Within a box the Volunteer can select several criteria (Snip-it 2).

Washington Rare Plant Care and Conservation

To log out, completely exit your browser when you are finished. Because of the sensitive nature of this information, we ask that you not share the password or the contents of this website with anyone else. Thank you!


[Review My Requests](#)

[View Everyone's Assignments](#)

Wendy Gibble Volunteer ID: 199

Browse Entire List

[Browse](#)

Search by Region or Phenology 

Select one or more criteria:

Region (e.g. Western):

County (e.g. King):


Time of Year (e.g. Spring):

Month (e.g. May):

Priority (e.g. highest):

Ease of ID (e.g. easy):

[Search](#)

Search by Species 

Select one or more criteria:

Genus Only (e.g. *Carex*):

Species (e.g. *Carex pauciflora*):

After entering Genus, it may be necessary to click Search twice:

[Search](#)

5. If selected criteria results in no matches, the volunteer sees Snip-it 3.

Snip-it 3

University of Washington
BOTANIC GARDENS

Washington Park Arboretum
Center for Urban Horticulture

MAKE A GIFT NOW
CLASSES + EVENTS
FACILITY RENTALS
206-516-0780 | rarecare@uw.edu | directions

Washington Rare Plant Care and Conservation

To log out, completely exit your browser when you are finished. Because of the sensitive nature of this information, we ask that you not share the password or the contents of this website with anyone else. Thank you!

New Search
Review My Requests
View Everyone's Assignments

Search Results

Wendy Gibble Volunteer ID: 199

There are no records matching the criteria you selected. Please revise your criteria or broaden your search parameters.

6. If the selected criteria results in matches, the volunteer gets tabular data (Snip-it 4).

Snip-it 4

Washington Rare Plant Care and Conservation

To log out, completely exit your browser when you are finished. Because of the sensitive nature of this information, we ask that you not share the password or the contents of this website with anyone else. Thank you!

New Search
Review My Requests
View Everyone's Assignments

Search Results

Wendy Gibble Volunteer ID: 199

	Priority	Counties	Phenology	Taxonomy	Species	EO Number	Last Observation	Survey Date	Precision	Survey Sites	Managed Area Names	TRS
Select	Highest	Pend Oreille	May, June, July, August	Challenging	Astragalus microcystis	30	6/14/2016	6/14/2016	S	Pend Oreille River - Slate Slopes	Colville National Forest Sullivan Lake RD	039N043E S02 039N043E S03 039N043E S10 039N043E S15 040N043E S35
Select	Highest	Pend Oreille	June, July, August	Technical key	Utricularia minor	F01	9/6/2007	9/6/2007		Lake Leo Boat Launch	Colville National Forest Three Rivers RD	036N042E S03
Select	Medium	Pend Oreille	June, July, August	Technical key	Botrychium paradoxum	21	8/5/1997	8/5/1997	S	Solo Creek	Kaniksu National Forest - WA Portion Priest Lake RD	034N045E S09 SWOFNE
Select	Lower	Pend Oreille	July, August, September	Technical key	Carex rostrata	5	7/12/2004	7/12/2004	S	Meadow 1.25 mi ENE of Stewart Meadow	Colville National Forest Sullivan Lake RD	037N042E S22 NW
Select	Lower	Pend Oreille	late June, July, August	Easy	Geum rivale	20	6/16/1998	6/16/1998	S	TIGER MEADOW	Colville National Forest Sullivan Lake RD	037N042E S35 SWOFSW
Select	Lower	Pend Oreille	late June, July, August	Easy	Geum rivale	21	6/8/2002	6/18/2002	S	DELANY MEADOW	Colville National Forest Newport RD	032N042E S36 SWOFNW
Select	Lower	Pend Oreille	May, June, July, August, September	Moderate	Ophioglossum pusillum	17	6/28/2010	6/28/2010	S	Rabbit Ears Meadow	Colville National Forest Sullivan Lake RD	037N042E S22 NW

- Each row represents a specific EO (element occurrence) for a species. Note: An EO is a polygon where the plant is found. In Montana we call these an SO (species occurrence). Over time as observations are reported, they get lumped into a discrete SO polygon. Depending upon the past observation data the EO/SO can be precisely mapped or broadly mapped.
- The arrows in the header allow the Volunteer to order the column alphabetically or numerically. Only one column can be organized at a time.

7. When the volunteer clicks on ‘select’ (Snip-it 4) they are taken to Snip-it 5.

Snip-it 5

Washington Rare Plant Care and Conservation

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Review My Requests
Return to Search Results

EO Detail ?

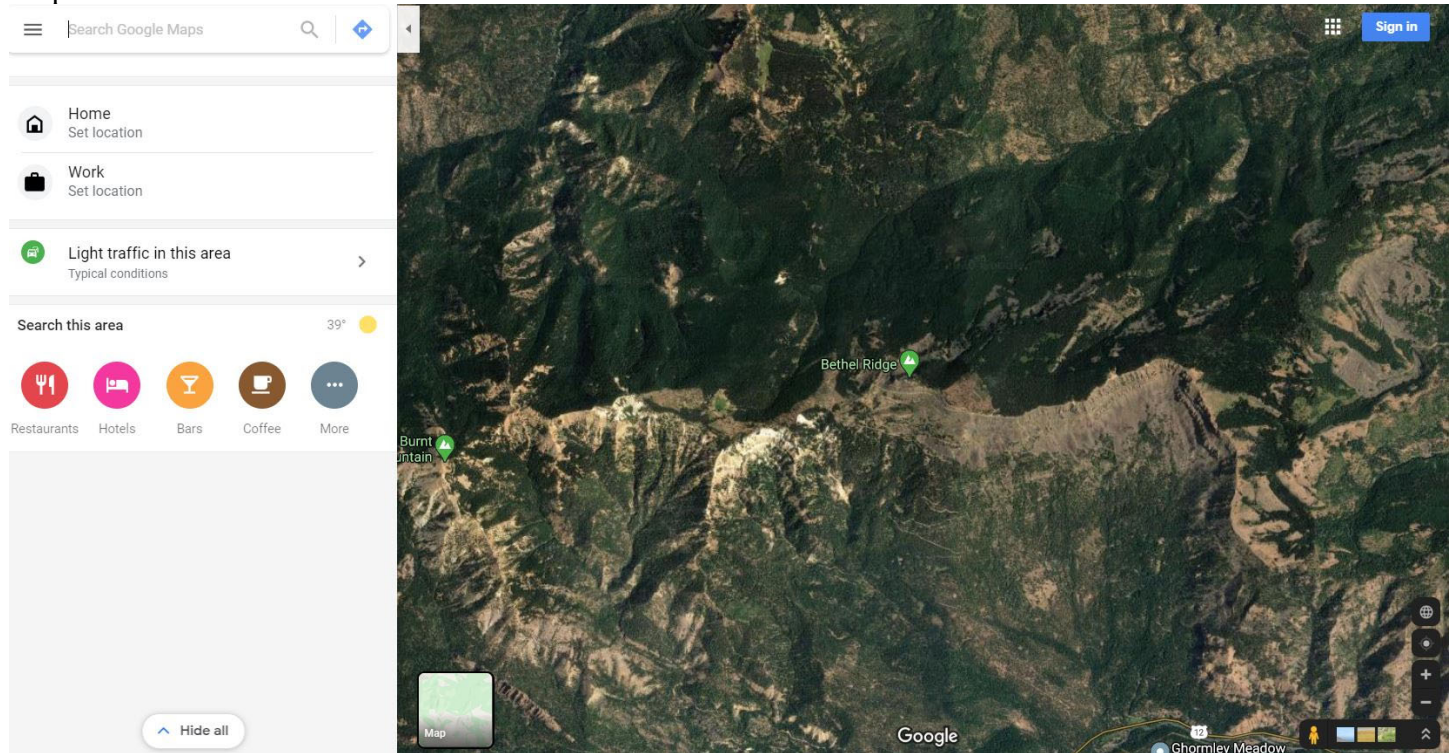
Wendy Gibble Volunteer ID: 199 EO ID: 9033

SPECIES	EO_NUM	COUNTIES	ST STAT	PRECISION
<i>Astragalus microcystis</i>	30	Pend Oreille	S	S
Assignment Notes				PRIORITY
Land manager request. Large EO on Pend Oreille River. REQUIRES boat to access.				Highest
LAST OBS	SURVEY DATE	Phenology	Taxonomy	
6/14/2016	6/14/2016	May, June, July, August	Challenging	
SURVEY SITES		QUADS		
Pend Oreille River -Slate Slopes		4811783 - Boundary Dam		
MA_NAMES		OWNER		
Colville National Forest Sullivan Lake RD		BLMFS PVT		
Township Range Section (TRS)		MIN ELEV	SLOPE	
039N043E S02 039N043E S03 039N043E S10 039N043E S15 040N043E S35		1900	50-80%	
EO_DATA				
2016: Plants obs. from a new location at North Overlook on E side of the river. 2014: 1000s of plants obs. from main population, 75 plants obs. from southernmost site. 2007: More than a thousand to thousands of plants of all sizes obs. along a 1.8 mi.				
GEN_DESC				
Steep, tall, sparsely vegetated and eroding slate slopes on W bank of reservoir. Erosion and landslides actively occur in the area.				
MAPPING - General Vicinity of EO ?				
Latitude	48.893242	Longitude	-117.353483	Map

Add to My List

- Snip-it 5 provides the past and present information about the plant at the specific EO.
- Once they “Add to My List” and then “confirm the assignment” they will be provided hardcopy maps. I think it is at training that they get the hardcopy map of the EO on the background of a USGS map.
- In Snip-it 5 if they click on Map they get sent to Google Maps (Snip-it 6)

Snip-it 6



8. For the Program Coordinator she can track Volunteer Assignments (Snip-it 7):
- I blocked out the name column.
 - Selecting “View Details” takes you to the Snip-it 5 type of details.

Washington Rare Plant Care and Conservation

To log out, completely exit your browser when you are finished. Because of the sensitive nature of this information, we ask that you not share the password or the contents of this website with anyone else. Thank you!

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All Monitoring Assignments

	EO ID	Volunteer Name	Species	EO Number	Counties	Phenology
View Details	6657	Thomas Erler	Trillium albidum ssp. parviflorum	1	Thurston	late March, April, early May
View Details	8840	Paige Hermansen	Sanicula arctopoides	8	San Juan	March, April, May
View Details	1519	Laurie Skinner	Aliciella leptomeria	6	Franklin	May
View Details	2373	Veronica Wisniewski	Leptosiphon bolanderi	6	Klickitat	April, May
View Details	863	Veronica Wisniewski	Erythranthe suksdorfii	8	Yakima	April, May, June, July
View Details	2315	Veronica Wisniewski	Lomatium tuberosum	26	Kittitas Yakima	March, early April
View Details	5966	Ben Cody	Erythronium quinaultense	5	Jefferson	May
View Details	1977	Julia Bent	Meconella oregana	8	Klickitat	March, maybe April
View Details	4894	Julia Bent	Lomatium lithosolamans	17	Yakima	March, mid April
View Details	6497	Julia Bent	Eremothera minor	6	Benton	May
View Details	9681	Cleveland Hall	Leptosiphon minimus	2	Skagit	May
View Details	2519	Cynthia Smith-Kuebel	Erythranthe suksdorfii	17	Kittitas	April, May, June, July
View Details	5514	Cynthia Smith-Kuebel	Erythranthe suksdorfii	7	Kittitas	April, May, June, July
View Details	8843	Andrew Foster	Sanicula arctopoides	11	San Juan	March, April, May
View Details	6453	Andrew Foster	Eatonella nivea	7	Grant	April, early May
View Details	4600	Darcy Dauble	Lomatium rollinsii	4	Asotin	Late March, April, May

APPENDIX C

RARE CARE VOLUNTEER AGREEMENT

Washington Rare Plant Care and Conservation Program
Data and Site Security Agreement
Rare Plant Monitoring and Seed Collecting Volunteers

The Washington Natural Heritage Program (WNHP) maintains accurate, up-to-date information on the state's most imperiled resources. Distribution of exact locations of Washington's rare plant species could compromise their protection. We ask that you read, understand and sign this agreement to help hold this sensitive information in safe keeping and to fulfill our purpose of protecting Washington's rare plants.

1. Rare plant location information shall not be released, shared or discussed with outside individuals or organizations other than cooperating land owners and land managers. Field Data Sheets are to be submitted to Washington Rare Plant Care and Conservation (Rare Care). Rare Care will forward the reports to WNHP and appropriate land owners/managers.
2. All land owners/managers will be notified prior to any site visit by anyone representing Rare Care. Rare Care will obtain the initial permission to monitor or collect on the property. Each volunteer is responsible for contacting the land owner/manager at least one week in advance with details of their upcoming visit, including date, species and location. A volunteer may represent Rare Care only when fulfilling a specific assignment.
3. Rare Care requires volunteers, students and interns to submit original completed Field Data Sheets on existing and new rare plant populations as soon as possible following a visit to a rare plant site, and **no later than 6 weeks after you completed your final site visit.**
4. If Rare Care volunteers become aware of an immediate threat to a rare plant population, they will notify the Rare Care Program Manager as soon as possible at 206-616-0780.
5. Under no circumstance will Rare Care staff or volunteers collect or destroy any plant or part thereof, including but not limited to seeds, propagules, flowers, stems, leaves, or roots. Acceptance into the rare plant monitoring program is not authorization to collect; if monitors question a plant's identity, they are not authorized to collect any portion of the plant for ID purposes unless directly authorized by Rare Care or WNHP.
6. If plant or seed collection is assigned, a scientific collecting permit from the appropriate agency must be obtained. Rare Care staff and volunteers shall adhere to the "Herbarium Specimen Collecting Guidelines" and the "Seed Collection Protocol." (See the Rare Plant Monitoring Handbook or Seed Collecting Handbook.)
7. Under no circumstance will volunteers, students or interns collect plant or seed for any purpose other than the purpose assigned by Rare Care or WNHP. Public resources may not be used for private gain. Any violation of this rule will result in the volunteer's dismissal from the program.

The skilled and thoughtful participation of individuals such as you is greatly valued. Thank you for helping to monitor, manage and protect Washington's rare plants.

Name: _____

Signed: _____ Date: _____

Please keep a copy of this agreement for your records and return a signed original to:

Washington Rare Plant Care and Conservation
University of Washington Botanic Gardens
Box 354115
Seattle, WA 98195

APPENDIX D

CEDAR MOUNTAIN SOFTWARE WEBSITE INTERFACE PROPOSAL



Cedar Mountain Software Proposal for Andrea Pipp, Montana Natural Heritage Program, Native Plant Society Citizen Botany Program.

October 9, 2020

Proposal:

The Montana Natural Heritage Program (MTNHP) for botany and the MNPS are teaming up to design a program that uses skilled citizens to re-visit known rare plants to obtain current population data and site mapping. The goal would be to have someone visit a particular plant at a particular site (geography) every 10 years to obtain current data. The idea is that the interface between volunteers and MNPS Coordinator would occur on the MNPS website, but that there could be potential linking to the MTNHP website.

The interface will have general information about the program publicly available. There will be an application form for interested parties to fill out. When you approve their application, the user will have an account that allows them to access the plant selection tool. The information on the tool will be searchable by plant and/or location.

They will be able to "claim" a plant to survey. Once the claim is approved, that plant will not be available for other users to claim.

The user will have tools for submitting information about their survey of the plant in question.

The administrator will have tools for viewing activity on the site.

In order to drive high participation and continual use, the interface needs to be visually and functionally engaging, intuitive and easy to use. For this purpose, the development team would utilize user experience (UX) and user interface (UI) expertise in the construction of the tool.

With these items in mind, our estimate comes in at \$7,000.

Depending on whether the project is built as a free standing application accessed more as a portal or if it is built as a component of an existing site like montananativeplants.org, will impact the ongoing hosting and maintenance cost which will run between \$25-\$100/month.

If you would like any additional information please do not hesitate to reach out.

Thank you,

Bob Jaffe