Floristic Inventory of Axton Ranch

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DENVER BOTANIC GARDENS

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Principal Investigators

Jennifer Ackerfield, PhD

Jennifer Ackerfield is Head Curator of Natural History Collections and Associate Director of Biodiversity Research at Denver Botanic Gardens. She oversees the Kathryn Kalmbach Herbarium of Vascular Plants and the Sam Mitchel Herbarium of Fungi. Prior to this, she was a curator at the Colorado State University herbarium for 21 years. Jennifer also taught Plant Identification and Grass Taxonomy at Colorado State, educating approximately 150 students each year. She received her PhD in Botany in 2020. Most notably, Jennifer is the author of the *Flora of Colorado*. She has traveled extensively across the state of Colorado documenting its rich floristic diversity. For the Axton Ranch Mountain Park floristic study, Jennifer acquired funding and oversaw the budget, hired personnel, helped design the sampling strategy, participated in several collecting trips, managed the project, verified all specimens collected, and wrote the final report.

Audrey Spencer

Audrey Spencer is a PhD student at the University of Colorado Denver, and is co-advised by Drs. Jennifer Ackerfield and Leo Bruderle. She is broadly interested in the origins of the flora of the Southern Rocky Mountains and the biogeographical history of disjunct distribution patterns. Audrey is doing her PhD research to clarify the taxonomic relationships as well as the biogeographic history of *Physocarpus* (ninebark) using a combination of phylogenomics, morphology, and geography. For the Axton Ranch Mountain Park floristic study, Audrey organized and led field collecting trips, helped design the sampling strategy, identified specimens, met with Kathy Axton, and made numerous maps.

High School Interns

Six high school interns worked with Audrey Spencer to make field collections and process specimens.

High school students Kaliya Carrillo, Emma Dencker, and Cree Moo, and participated in the 2021 field season.

From left to right: Cree Moo, Kaliya Carrillo, Emma Dencker, and lead botanist Audrey Spencer

High school students Lilja Anderson, Kiley Cole, and Jessie Stong participated in the 2022 field season. From left to right: Jessie Stong, lead botanist Audrey Spencer, botany assistant Collin Schuman, Kiley Cole, and Lilja Anderson (Starr Peak in the background)

Summary

Axton Ranch Mountain Park is a previously private property that was donated to the City and County of Denver for its Mountain Park System in 2021. No previous surveys or collections of plants have been documented from Axton Ranch, and therefore a floristic study of the property fills an important gap in biodiversity knowledge. Our goals for this project were to: 1) provide a baseline knowledge of the plant species and communities, 2) document rare plant species, 3) document all introduced plant species, and 4) identify areas of priority conservation concern. This project also allowed us to provide an immersive learning opportunity for high school students in the Denver metro area to broaden participation in STEM from underrepresented groups.

A total of 319 unique plant species in 62 families were found, representing approximately 10% of the flora of Colorado. Additionally, two rare species were discovered. The most speciose plant families were Asteraceae (17%), Poaceae (13.5%), Rosaceae (5%), Cyperaceae (5%), and Fabaceae (5%). The majority (88%) of species were native, and only seven species of noxious weeds were found. The majority (31%) of introduced species were Poaceae, and were most likely brought in for hay when the property was a working ranch. Eight community types recognized by NatureServe were also documented. Axton Ranch supported wetlands consisting of three montane wet meadows as well as riparian areas along streams and lake margins in lodgepole pine forests. Together, these areas supported 34 obligate and 35 facultative wetland species.

Over 72% of species at Axton Ranch had a Coefficient of Conservatism (C-value) over five, and a Floristic Quality Index of 90 was determined for the overall property. This indicates that Axton Ranch mostly consists of intact ecosystems where ecological processes, functions, composition, and structure have not been (or minimally so) degraded or altered by human stressors. Potential threats to plant communities at Axton Ranch include fire, hydrologic changes, and the spread of noxious weeds. We identified five areas of priority conservation concern that supported rare or noteworthy species. In addition to documenting all plants on the property, we also noted a pond full of neotenic western tiger salamanders.

While we cannot quantify the long-term impacts of providing immersive learning opportunities for high school students yet, we do have evidence in the short-term that this opportunity helped direct the paths of at least three high school interns. Two high school interns are now majoring in the natural resources in college, while another is creating an herbarium of local plants for their high school capstone project.

Introduction

Floristic inventories are a list of all plant species known from a given area. While simple in design, these inventories are fundamental for understanding the biodiversity of an area, which in turn help inform best conservation practices to protect this diversity for future generations. Floristic inventories add valuable information to our knowledge of the distribution of rare and non-native species. Furthermore, in cases where the land has been historically used by people, floristic inventories can provide affirmation of and information for continued good land stewardship. Lastly, these inventories fill in gaps of biodiversity knowledge. Floristic inventories of areas that have had no collections previously made are especially valuable in filling in biodiversity gaps.

Axton Ranch Mountain Park is located in Colorado within Gilpin and Jefferson Counties, approximately 36 miles west of Denver (Figure 1). The property consists of 488 acres and is adjacent to Roosevelt National Forest, and in the vicinity of Arapaho National Forest, Golden Gate Canyon State Park, and Jefferson County Open Space. The property ranges in elevation from 8700 ft. to 10,100 ft., with the high point of Starr Peak (10,500 ft.) visible just outside the property boundary (Figure 1). The ecology of Axton Ranch Mountain Park is diverse, consisting of lodgepole pine forests, aspen stands, wet meadows, lakes, and rocky outcroppings.

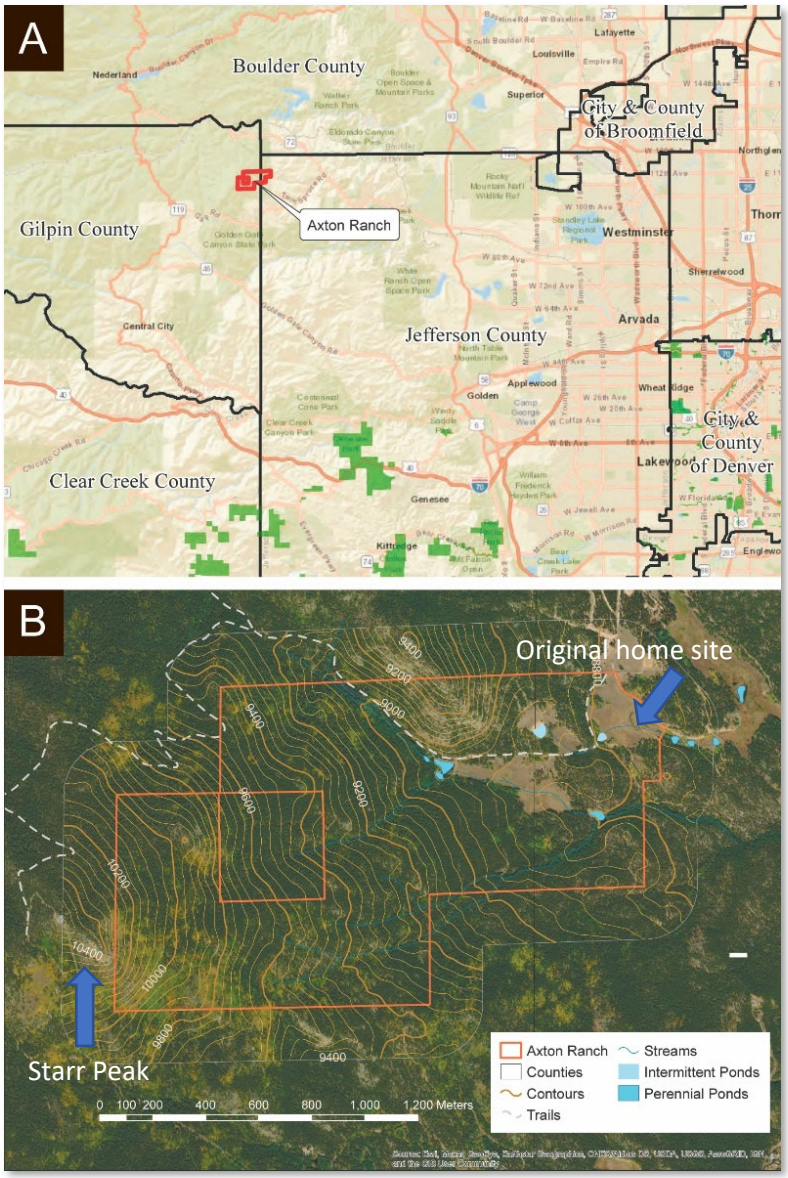


Figure 1. A. Map of Colorado and location of Axton Mountain Ranch, **B.** Axton Mountain Ranch property boundary. Dotted line indicates trail to Starr Peak.

While there have been floristic inventories of the surrounding national forest and state park, no collections have been made in the Axton Ranch property. Therefore, a floristic inventory of this area represents an opportunity to fill in a gap of biodiversity knowledge for the southern Rocky Mountain region.

Proper documentation of plant diversity requires collecting and creating museum-quality herbarium specimens, which serve as vouchers for all species of plants found in an

Figure 2. Example of an herbarium specimen

area. Thus, when conducting a floristic inventory, each plant collected is preserved as an herbarium specimen. An herbarium specimen consists of a plant that has been pressed flat and dried, mounted to a sheet of acid-free paper, and includes a label containing information pertinent to the collection event such as the date, location, and collector name and number (Figure 2). Once complete, these specimens are then deposited in an herbarium for preservation in perpetuity. These specimens are in essence a snapshot of the biodiversity present in a given area at a specific moment in time. As such, they are an invaluable resource for land managers, as they are a permanent record of what was observed when and where. These specimens also ensure accurate identification of plant biodiversity, and provide valuable insight into any future landscape changes.

Historical land use

Axton Ranch Mountain Park was donated to the City and County of Denver for its Mountain Park System in 2021. It is the first new Denver Mountain Park since the donation of James Q. Newton Park in Conifer, CO in 1939. The property was historically operated as a small cattle ranch and has been in the Axton Family since 1954, now spanning four generations. Prior to this, the property was called the Starr Ranch and operated by the Starr's from 1870 to 1953 (Figure 3). Alvin Arneil Axton and his father purchased Starr Ranch in 1953, changing the name to Axton Ranch. Interestingly, the Axtons bought the ranch sight unseen due to travel complications from too much snow. For the next 12 years, the ranch was used by the Axton-Spratlin Construction outfit as a storage yard for construction equipment. The remains of the original home site consisting of a stone cellar are visible near the main entrance road (Figure 1).

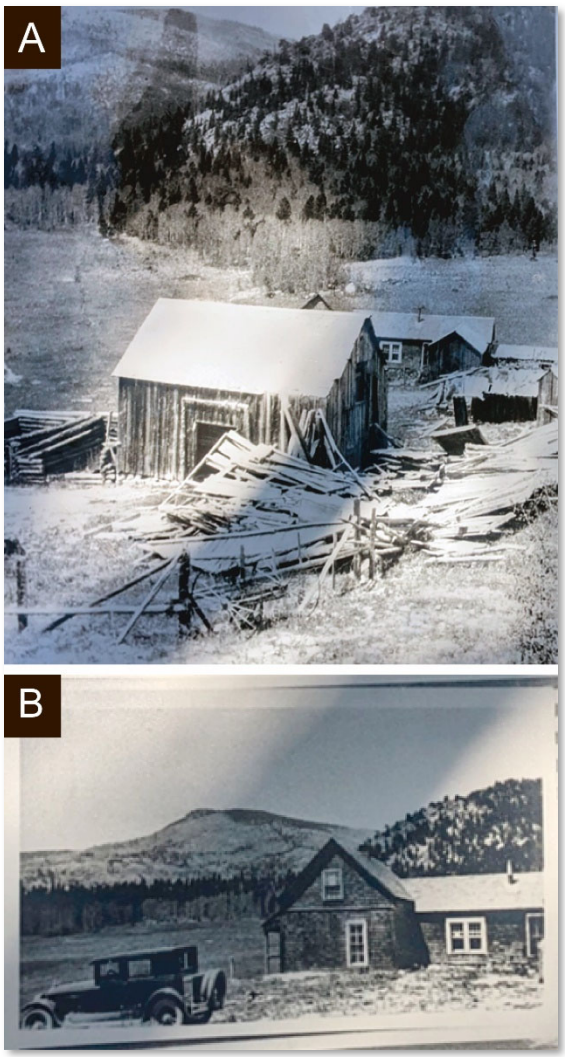


Figure 3. A. Property in 1919-1922, photo taken by Boone Lindermann. **B.** Starr Ranch in 1928.

Human impacts have been significant in some areas of the property. For instance, the meadows along the roads were planted with hay which was used for horses and cattle. Alvin Axton and his father brought approximately 10 horses and four mules to the ranch initially. Later, a small herd of 12-20 cattle grazed in the large hay pasture immediately north of the main entrance road. In the early 1980's aspen trees were cleared from one of the

meadows. Later, in the 1990's a sawmill was active for approximately 10 years, processing pine beetle kill from the local area.

There have been some hydrologic infrastructure changes on the property as well. A pond was added to the property in the late 1950's and stocked with rainbow trout. A ditch was constructed in the upper meadow to help irrigate land from a natural spring on the property. Water from the natural spring flows into a man-made ditch in the lower meadow as well. Despite these obvious impacts, the majority of the property shows little present-day evidence of human disturbance.

Broader impacts

Training the next generation of scientists is a fundamental part of best conservation practices. By training the next generation beginning at an early career stage, these students have the foundation necessary to understand not only the importance of biodiversity but to also become more invested in protecting it for future generations. Reaching students before they even enter college can have significant benefits for the student. Participation in research at this early stage provides an ideal setting to foster interest in pursuing careers in science. Additionally, an immersive, hands-on experience provides a greater understanding of the scientific method and process.

Figure 4. High school interns and Denver Botanic Gardens staff participating in Axton Ranch Mountain Park floristic surveys. Photos by Jennifer Ackerfield.

The floristic inventory conducted for Axton Ranch Mountain Park was funded through a partnership between Denver Mountain Parks Foundation and Denver Botanic Gardens. Denver Mountain Parks Foundation and Denver Botanic Gardens are committed to the principles of IDEA – inclusion, diversity, equity, and accessibility. Through this commitment, a plan was developed to provide immersive learning opportunities for high school students to work with lead scientists both in the field and in the herbarium on this project (Figure 4). Ultimately, this opportunity helped high school students learn about the career

path of a scientist, gain valuable work experience in the natural sciences, provided networking opportunities, and built professional skills.

Objectives

The following objectives guided the design and implementation of the floristic inventory of Axton Ranch Mountain Park:

1. Provide a **baseline knowledge** of the plant species and communities present on the property.
2. Document all **rare plant** species.
3. Document all **introduced plant** species including state designated noxious weeds to assist in prioritizing eradication (if necessary).
4. Identify **priority conservation areas**.
5. Provide immersive **internship opportunities** for high school students.

Materials and Methods

Surveys

Prior to beginning field work, we first searched SEINet (www.swbiodiversity.org) using the Map Search function to determine if any collections had already been made within the property. We also used the Map Search function in SEINet to search the surrounding properties for previous collections made. We used the species acquired from this search to generate a list of potential species present as well as possible rare or species of conservation concern to look for during surveys. We also analyzed the property using Google maps satellite imagery to provide a baseline of vegetation cover and ground type (e.g., rocky outcroppings, forest, meadow). Primary collection sites were determined based on this analysis of vegetation cover and ground type. Only vascular plants were targeted for collection.

Surveys of the property were conducted over the course of two years, between May and August. Each survey consisted of the lead investigator as well as at least one additional assistant. High school interns accompanied the lead investigator, Audrey Spencer, on most survey trips as their schedules allowed (Figure 5). We visited the property at least four times each month during year one. Conducting the survey over two years ensured

Figure 5. High school interns collecting specimens during a survey of the property. Photo by Scott Dressel-Martin.

that the majority of all plant species would be accounted for on the property. Although surveying for two years was necessary to ensure complete coverage, we only made two site visits per month in year two.

Specimen collection and deposition

Specimens were collected and stored in a field press (Figure 6) and transferred to a wooden press at the end of the collection day. Specimens were then dried in the wooden press in a dryer at 100 degrees Fahrenheit for one week. Multiple specimens were collected if the species in question was small. When possible, leaf tissue from the specimens was taken prior to placement in the dryer. This tissue was taken from the specimen collected and placed in a small envelope with the collector and collection number written on the outside. These tissue collections were then placed in a container with silica gel at the end of the collection day. Species that did not lend themselves well to tissue collection (i.e., no leaves present or only very small leaves) were not included. If multiple specimens of a single species were collected from the same locality, a small jewelry tag was placed around the stem of the specimen from which the tissue collection was made to distinguish this individual as the one the tissue came from. Specimens were then mounted on acid-free herbarium paper for deposit in the Kathryn Kalmbach Herbarium of Vascular Plants.

Figure 6. Collecting specimens in a field press. Photo by Jennifer Ackerfield.

We collected at least one specimen of each species on the property when at least five individuals of the same species were present. We collected one specimen for each unique species, regardless of whether they occurred in multiple different vegetation communities, as the property was not large enough to justify multiple collections of the same species. All specimen data was collected using a Juniper Systems tablet enabled with GPS and a customized Survey123 data entry form. We also documented each species collected with a photograph via either a smartphone device with location enabled or the Juniper tablet. This photograph was later uploaded to iNaturalist as an observation. Species in which fewer than five individuals were present were documented on iNaturalist (www.inaturalist.org).

All specimens were deposited at the Kathryn Kalmbach Herbarium of Vascular Plants (KHD) at Denver Botanic Gardens. Specimen identifications correspond to the nomenclature in the *Flora of Colorado* (Ackerfield 2022). The data entered via the Survey123 data entry form was used to generate labels for all specimens. All corresponding label information and digital images of all specimens were uploaded to the Southwest Environmental Information Network (SEINet; www.swbiodiversity.org).

Species assessments

Plant communities

Plant community types were obtained from NatureServe Explorer (https://explorer.natureserve.org/). A list of plant community types was compiled during the first-year field season. It should be noted that plant communities often are not sharply delineated, and different communities can share similar species and characteristics, sometimes blending together along their margins.

Rare plant status

Colorado Natural Heritage Program rare plant field guide used to determine if species were rare or of conservation concern. Rankings at the state (S) levels were included. These rankings range on a scale from one to five, with one indicating species of critical concern and five indicating species that are widespread and secure (Table 1).

Table 1. State rankings for plants of conservation concern

Ranking	Definition
S1	Critically imperiled (5 or fewer occurrences or less than 1000 remaining individuals)
S2	Imperiled (6-20 occurrences or between 1000-3000 remaining individuals)
S3	Vulnerable to extirpation (21-100 occurrences or between 3000-10,000 remaining individuals)
S4	Apparently secure (more than 100 occurrences or more than 10,000 remaining individuals)
S5	Demonstrably widespread, abundant, and secure (considerably more than 100 occurrences or more than 10,000 individuals)

Wetland indicator status

Wetland indicator status for each species was determined using the National Wetland Plant List developed for the Western Mountains, Valleys, and Coasts Region, available at http://wetland-plants.usace.army.mil/ (U.S. Army Corps of Engineers 2020; Table 2). A hydrophyte is defined as a plant which grows only in or on water.

Table 2. Wetland indicator status rankings

Ranking	Definition
Obligate wetland (OBL)	Almost always a hydrophyte, rarely found in uplands
Facultative Wetland (FACW)	Usually a hydrophyte, occasionally found in uplands
Facultative (FAC)	Commonly occurs as either a hydrophyte or non-hydrophyte
Facultative Upland (FACU)	Occasionally a hydrophyte, but usually occurs in uplands
Upland (UPL)	Rare a hydrophyte, almost always found in uplands

Native or introduced status

Native or introduced plant status was determined using the *Flora of Colorado* (Ackerfield 2022) and Plants of the World Online (POWO 2023). Native plants were defined as indigenous terrestrial and aquatic plant species that have evolved and occur naturally in a particular region, ecosystem, and habitat. Plant species native to North America and hence Colorado are generally recognized as those occurring on the continent prior to European settlement.

Some introduced plant species may also be considered noxious weeds. According to the Colorado Noxious Weed Act, a noxious weed is an introduced plant or parts of an introduced plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one or more of the following criteria:

1. Aggressively invades or is detrimental to economic crops or native plant communities;
2. Is poisonous to livestock;
3. Is a carrier of detrimental insects, diseases, or parasites;
4. The direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.

The Colorado Noxious Weed List is separated into three list categories: Lists A, B, and C (Table 3). The lettered lists consist of regulated species with management plans varying according to list.

Table 3. Noxious weed rankings

Ranking	Definition
List A	Newly arrived and/or less common in Colorado. Must be eradicated from all lands in the State
List B	Plants whose continued spread in Colorado should be halted
List C	Plants for which local governments have authority to decide the management strategy

Coefficients of Conservatism and Floristic Quality Index

Coefficients of conservatism (C-values) are numeric values assigned to plant species to indicate their sensitivity to anthropogenic disturbance (Spyreas 2019). C-values were assigned to species if one was available (Smith et al. 2020). C-values ranged from zero to ten, with zero indicating little fidelity to natural areas and thus indicative of a degraded habitat, and ten indicating species that occur only in pristine sites (Table 4). C-values are useful for determining natural areas to prioritize for conservation. For instance, if a natural area has numerous plants with high C-values, then this area may be a good candidate for conservation prioritization. C-values were then used to calculate the Floristic Quality Index (FQI) for Axton Ranch Mountain Park as a means of assessing ecological condition by vegetation composition. The FQI was determined by calculating the mean C-value of all plants multiplied by the square-root of the number of all plants, or $\bar{C}\sqrt{n}$.

The FQI can assist in prioritizing plant communities or habitats for protection, restoration, or management efforts, and to monitor the effectiveness of these actions.

Table 4. Coefficients of conservatism definitions (C-values)

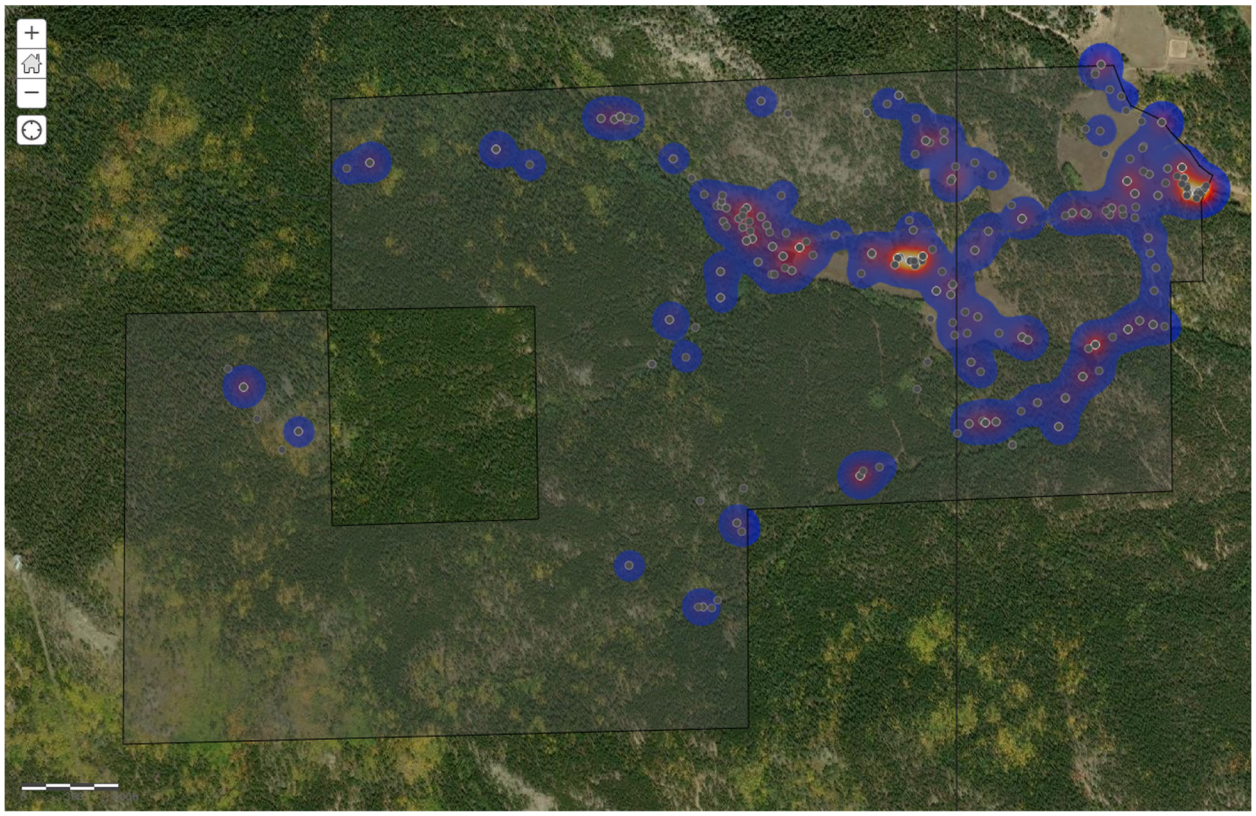
C-value	Definition
0-3	Introduced species (always 0), or native species that occur in moderately to highly degraded sites.
4-6	Native species that show some affinity to natural areas and are often abundant or are present across a wide range of habitats and environments.
7-8	Native species associated mostly with natural areas, but that can sometimes persist in degraded habitat.
9-10	Native species that tolerate very little or no habitat degradation.

Results

Collection sites

The floristic survey of Axton Ranch Mountain Park resulted in 353 total specimen collections (Figure 7). The majority of the southern and western portions of the property consisted of lodgepole pine forests with sparse understory. Within lodgepole pine forests, the floristic diversity also drastically declined. Therefore, fewer collections were made in lodgepole pine forests. The most floristically diverse sites were in the mesic and wet meadows, rocky outcroppings, and in and around lakes. These areas are where most of the collections were concentrated (Figure 7).

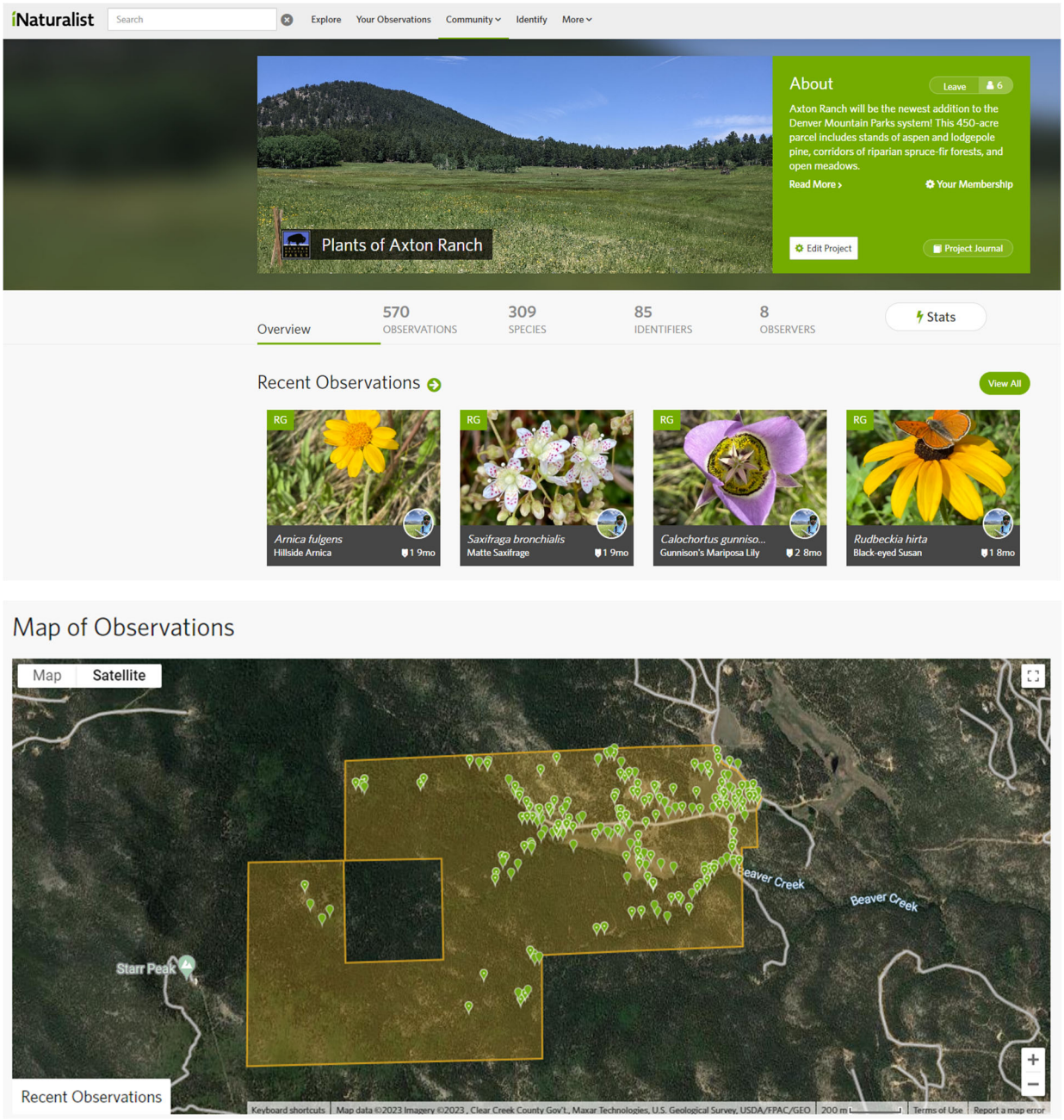
Figure 7. Heat map of specimen collection sites. Areas of collection concentration are shown in red and areas with fewer collections are shown in blue. Individual collection sites are indicated with a circle.



iNaturalist

When possible, photographs were taken of each plant species collected and uploaded as an iNaturalist observation. A collection project for Axton Ranch was created to capture these observations (https://www.inaturalist.org/projects/plants-of-axton-ranch; Figure 8).

Figure 8. iNaturalist project for Axton Ranch Mountain Park showing map of observations.



The iNaturalist project page for Axton Ranch provides photographs of what these species looked like in their “fresh” stage, before they were pressed and dried to make an herbarium specimen. The preservation of each specimen in its natural state as well as an herbarium specimen adds valuable information for each species. In total, 570 observations of 309 species were made. Of these observations, over 64% are considered Research Grade. Once an observation is Research Grade, it is also made available for download on the biodiversity portal GBIF or the Global Biodiversity Information Facility (www.gbif.org).

Floristic overview

The flora of Axton Ranch Mountain Park consists of **319 unique species**, representing approximately **10%** of the total number of vascular plant species (3192) present in Colorado (Ackerfield 2022). Of these, 280 species, or 88% of the total flora of Axton Ranch Mountain Park, are considered native. One species considered rare in Colorado was found on the property, representing 0.3% of the total species at Axton Ranch Mountain Park. Thirty-nine species of introduced plants were documented, totaling approximately 12% of the total species present. Of these 39 introduced species, only eight are also designated as noxious weeds. These results are summarized in Table 5.

Table 5. Floristic overview of Axton Mountain Ranch Park.

Category	Total	Percent of total species at Axton	Total Colorado species	Percent of total Colorado species
Native	280	88%	2827	10%
Rare	1	0.3%	525	0.2%
Introduced	39	12%	525	7.4%
Introduced and Noxious	8	2.5%		

The majority (96%) of the vascular plants documented on the property were angiosperms, or flowering plants (306 total; Figure 9). Eight species of gymnosperms (e.g., pines, junipers, fir) were found (2.5% of total), and five ferns and lycophytes were also documented (1.5% of total; Figures 10-12).

Figure 9. Total vascular plant species per category

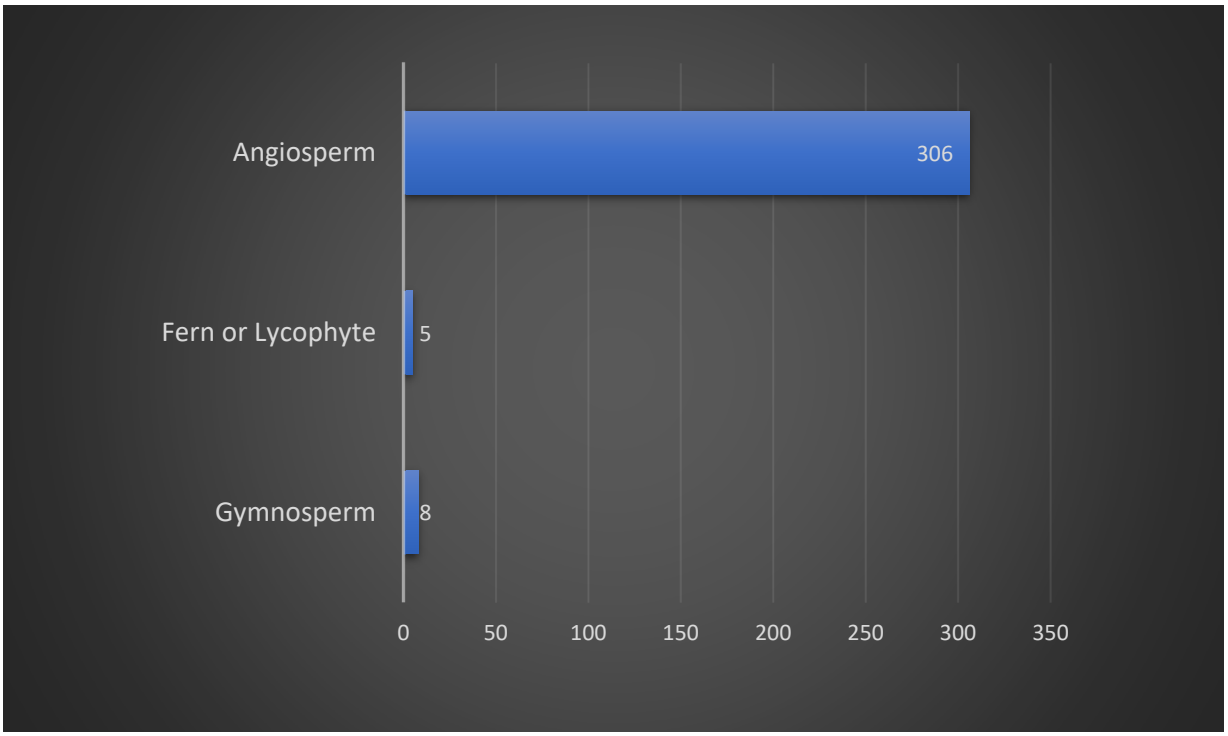
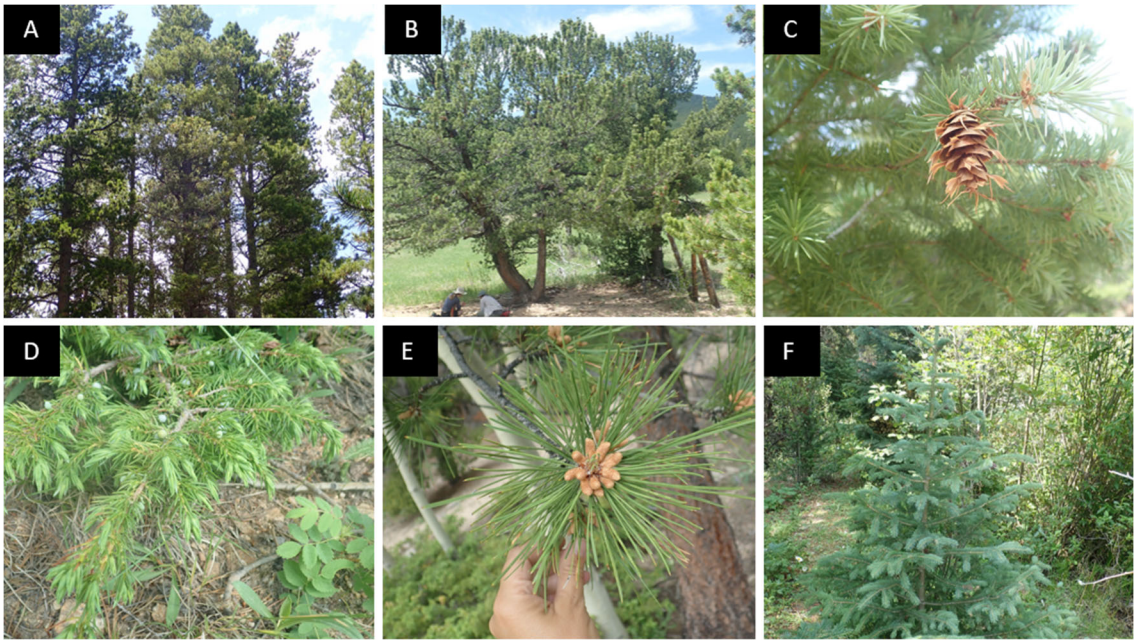


Figure 10. Examples of gymnosperms at Axton Ranch Mountain Park

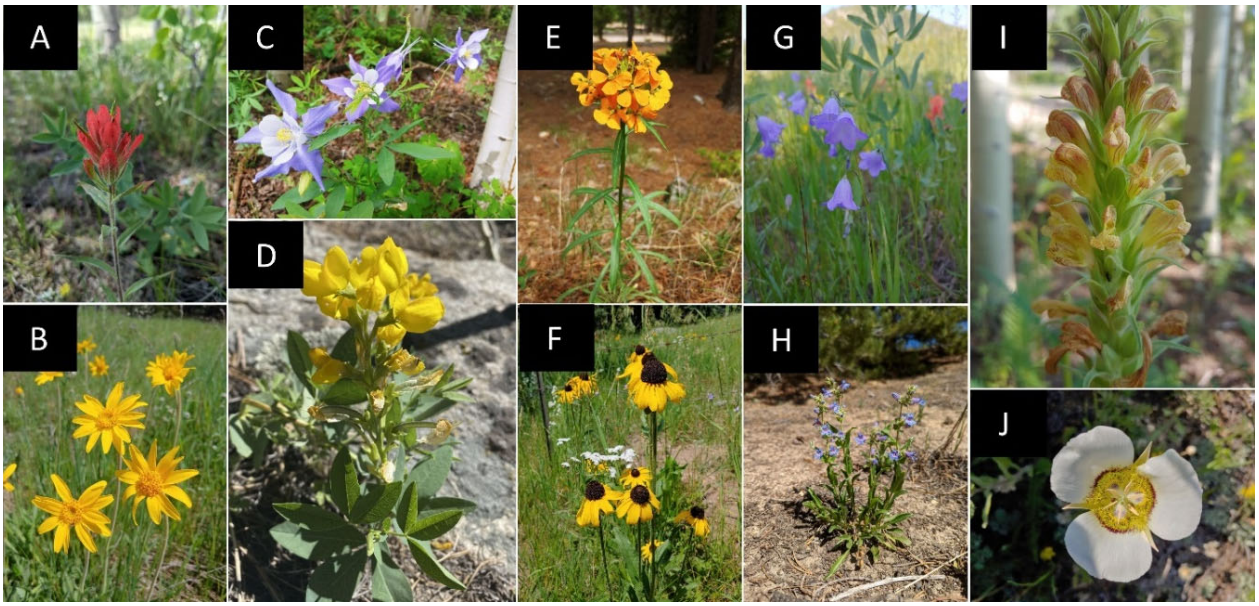


A. *Pinus contorta* Douglas ex Loudon (lodgepole pine), **B.** *Pinus flexilis* James (limber pine), **C.** *Pseudotsuga menziesii* (Mirb.) Franco (Douglas fir), **D.** *Juniperus communis* L. (common juniper), **E.** *Pinus ponderosa* Lawson & C. Lawson (ponderosa pine), and **F.** *Picea pungens* Engelm. (Colorado blue spruce). Photos taken by Audrey Spencer.

Figure 11. Examples of ferns at Axton Ranch Mountain Park

A. *Cystoperis fragilis* (L.) Bernh. (brittle bladderfern), **B.** *Asplenium septentrionale* (L.) Hoffm. (forked spleenwort), **C.** *Equisetum arvense* L. (horsetail), and **D.** *Selaginella densa* Rydb. (Rocky Mountain spikemoss). Photos taken by Jennifer Ackerfield (A, B, and D) and Audrey Spencer (C).

Figure 12. Common angiosperms at Axton Ranch Mountain Park



A. *Castilleja miniata* Douglas ex Hook. (red paintbrush), **B.** *Arnica fulgens* Pursh (foothill arnica), **C.** *Aquilegia coerulea* James (blue columbine), **D.** *Thermopsis rhombifolia* var. divaricarpa (A. Nelson) Isely (goldenbanner), **E.** *Erysimum capitatum* (Douglas ex Hook.) Greene (wallflower), **F.** *Rudbeckia hirta* L. var. *pulcherrima* Farw. (blackeyed Susan), **G.** *Campanula rotundifolia* L. (bellflower), **H.** Penstemon virens Pennell ex Rydb. (Front Range beardtongue), **I.** *Pedicularis procera* A. Gray (giant lousewort), and **J.** *Calochortus gunnisonii* S. Watson (mariposa lily). Photos taken by Jennifer Ackerfield.

Of the 62 vascular plant families present, the top eleven most speciose at Axton Ranch were the: Asteraceae (aster family; 17%), Poaceae (grass family; 13.5%), Rosaceae (rose family; 5%), Cyperaceae (sedge family; 5%), Fabaceae (bean family; 5%), Ranunculaceae (buttercup family; 4%), Brassicaceae (mustard family; 3%), Onagraceae (evening primrose family; 3%), Polygonaceae (buckwheat family; 2.5%), Ericaceae (heath family; 2.5%), and Orchidaceae (orchid family; 2.5%) (Figure 13; Table 6).

These results are comparable to the overall family composition for the flora of Colorado (Table 6; Ackerfield 2023). For instance, the most speciose family in Colorado is the Asteraceae family. Approximately 16% of the flora of Colorado is a member of the Asteraceae family, while approximately 17% of the total species at Axton Ranch Mountain Park are also members of this family. Interestingly, one of the most speciose families of flowering plants at Axton Ranch Mountain Park was the Orchidaceae or orchid family. Although this family comprised 2.5% of the total flora of Axton Ranch, in Colorado this family only comprises 0.8% of the flora (Table 6).

An online, searchable checklist of all vascular plant species at Axton Ranch can be found here: https://swbiodiversity.org/seinet/checklists/checklist.php?clid=97114&pid=0

Figure 13. Number of species per the top eleven most speciose families of flowering plants. Blue indicates the number of native species and orange indicates the number of introduced species.

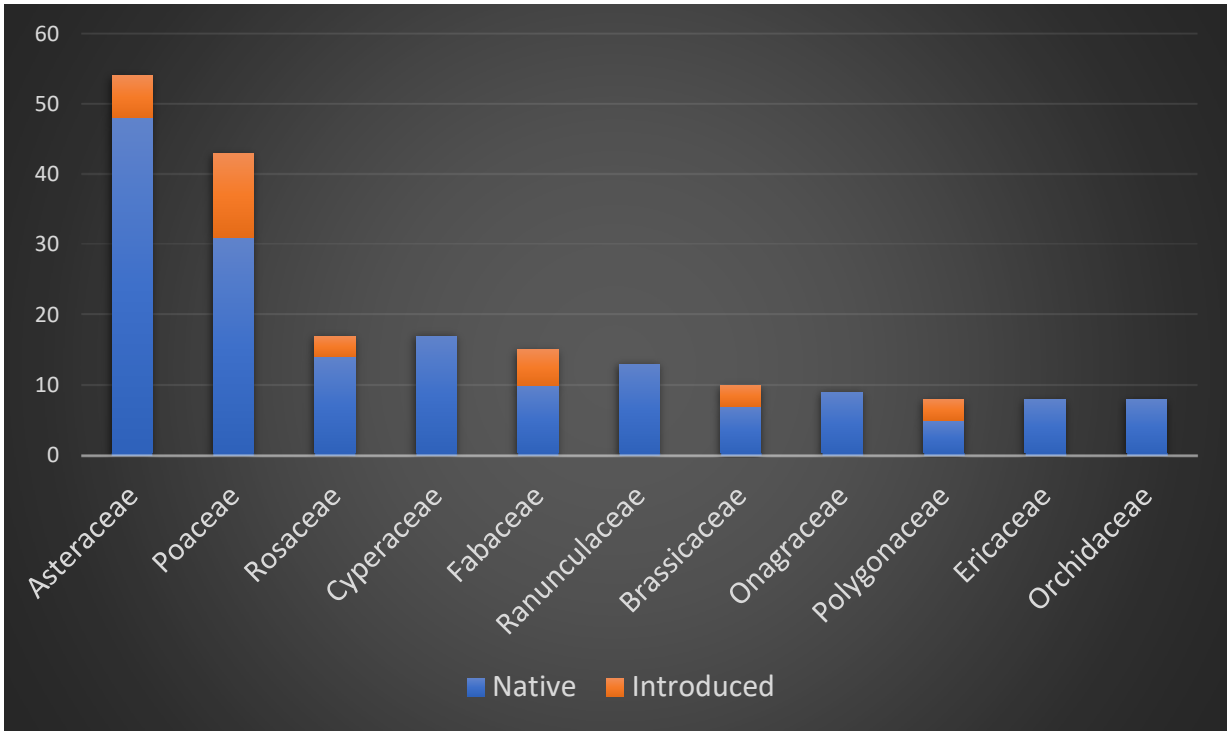


Table 6. Top 11 most speciose vascular plant families at Axton Ranch Mountain Park.

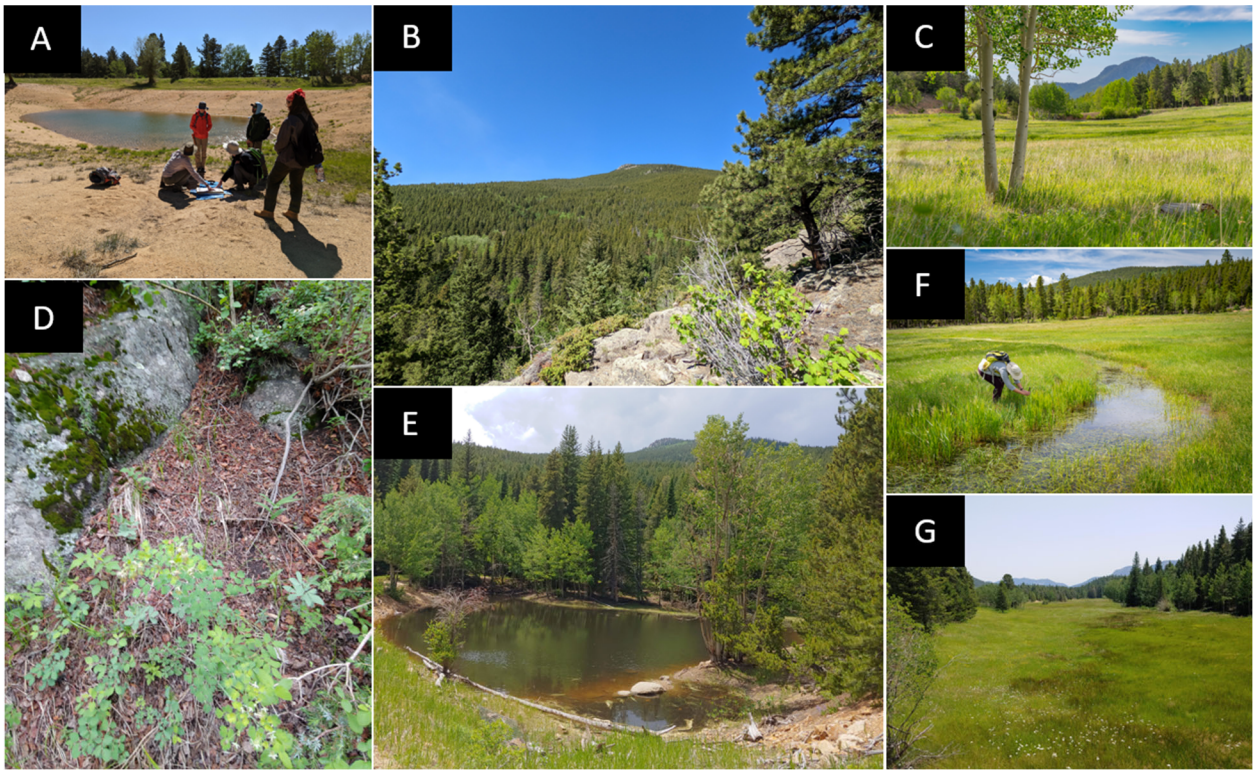
Family	Total native species	Total introduced species	Percent of total species	Flora of CO statistics (total species/percent of total)
Asteraceae	48	6	17%	547/16%
Poaceae	31	12	13.5%	354/10.5%
Rosaceae	14	3	5%	116/3%
Cyperaceae	17	0	5%	163/5%
Fabaceae	10	5	5%	241/7%
Ranunculaceae	13	0	4%	73/2%
Brassicaceae	7	3	3%	187/6%
Onagraceae	9	0	3%	66/2%
Polygonaceae	5	3	2.5%	98/3%
Ericaceae	8	0	2.5%	19/0.6%
Orchidaceae	8	0	2.5%	28/0.8%

Plant community overview

We identified eight plant communities recognized by NatureServe (NatureServe 2023): 1) Rocky Mountain Lodgepole Pine Forest and Woodland, 2) Rocky Mountain-Interior Subalpine-Montane Aspen Forest, 3) Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland, 4) Rocky Mountain Subalpine-Montane Mesic Meadow, 5) Rocky Mountain Alpine-Montane Wet Meadow, 6) Rocky Mountain-Great Basin Montane Riparian Forest, 7) Western North American Freshwater Aquatic Vegetation, and 8) Western North American Ruderal Marsh, Wet Meadow & Shrubland.

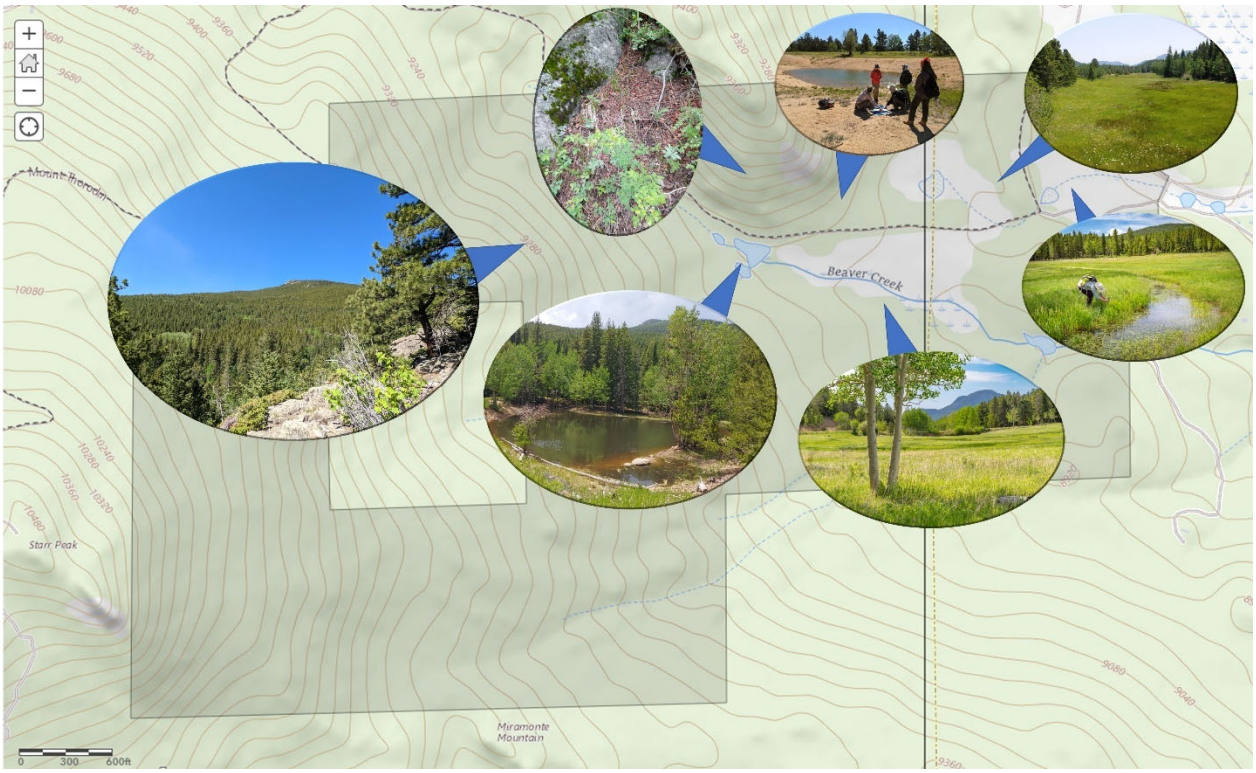
We also included the plant community of sandy, disturbed slopes as this was not a community type recognized by NatureServe but was common along lake margins and old roads at Axton Ranch. Examples of these plant communities are shown in Figure 14. A map of Axton Ranch Mountain Park with the location of the different community types is shown in Figure 15.

Figure 14. Plant community types



A. Sandy, disturbed slopes, **B.** Rocky Mountain Lodgepole Pine Forest and Woodland, **C.** Rocky Mountain Interior Subalpine-Montane Aspen Forest adjacent to Western North American Ruderal Marsh, Wet Meadow & Shrubland, **D.** Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland, **E.** Western North American Freshwater Aquatic Vegetation (aquatic plants in lake and around margins), **F.** Rocky Mountain Subalpine – Montane Wet Meadow, and **G.** Rocky Mountain Subalpine – Montane Mesic Meadow. Photos taken by Jennifer Ackerfield (A, B, E, and G), Scott Dressel-Martin (C and F), and Audrey Spencer (D).

Figure 15. Map of Axton Ranch Mountain Park showing locations of plant community types.



Rocky Mountain Lodgepole Pine Forest and Woodland

These forests are dominated by *Pinus contorta* (lodgepole pine) with shrub, grass, or often barren understories. Sometimes there are intermingled mixed conifer/*Populus tremuloides* (aspen) stands, with the latter occurring with inclusions of deeper, typically fine-textured soils. This community type occurs in the upper montane to subalpine elevations of the Rocky Mountains, north into the Canadian Rockies and east into mountain "islands" of north-central Montana. Annual precipitation in these montane and subalpine habitats ranges from less than 40 cm to over 150 cm, usually with the majority falling as snow. Late-melting snowpacks provide the majority of growing-season moisture.

Soils are variable but are typically well-drained, gravelly, coarse-textured, acidic, rarely from calcareous parent materials with occasionally inclusions of deeper, typically fine-textured soils. Other stands occur on excessively well-drained pumice deposits, glacial till and alluvium on valley floors where there is cold-air accumulation, warm and droughty shallow soils over fractured quartzite bedrock, and shallow moisture-deficient soils with a significant component of volcanic ash.

Threats and stressors to this forest type include altered fire regime, altered stand structure from fragmentation due to roads, logging, mining, or other human disturbances (CNHP 2010). These disturbances can cause significant soil loss/erosion and negatively impact the water quality within the immediate watershed (CNHP 2010). Invasive exotic species can become abundant in disturbed areas and alter floristic composition. Direct and indirect effects of climate change may alter dynamics of indigenous insects such as mountain pine beetle (*Dendroctonus ponderosae*) and cause a buildup in

population size with less extreme winters leading to large outbreaks that can cause high mortality in mature trees.

Lodgepole pine forests comprised a majority of Axton Ranch Mountain Park. Often there was little understory growth and therefore low species diversity present under the lodgepole pines, and therefore fewer collections were made in this plant community type. Common species found in lodgepole pine forests are shown in Figure 16.

Figure 16. Rocky Mountain Lodgepole Pine Forest and Woodland plant species.

A. *Pterospora andromedea* Nutt. (pinedrops), **B.** *Arctostaphylos uva-ursi* (L.) Spreng. (kinnikinik), **C.** *Rosa woodsii* Lindl. (Woods' rose), **D.** *Shepherdia candensis* (L.) Nutt. (russet buffaloberry), **E.** *Calypso bulbosa* (L.) Oakes var. *americana* (R. Br. ex Ait. f.) Luer (fairy slipper orchid), and **F.** *Senecio wootonii* Greene (Wooton's ragwort). Photos by Audrey Spencer (C, D, and F) and Jennifer Ackerfield (A, B, and E).

Rocky Mountain-Interior Subalpine-Montane Aspen Forest

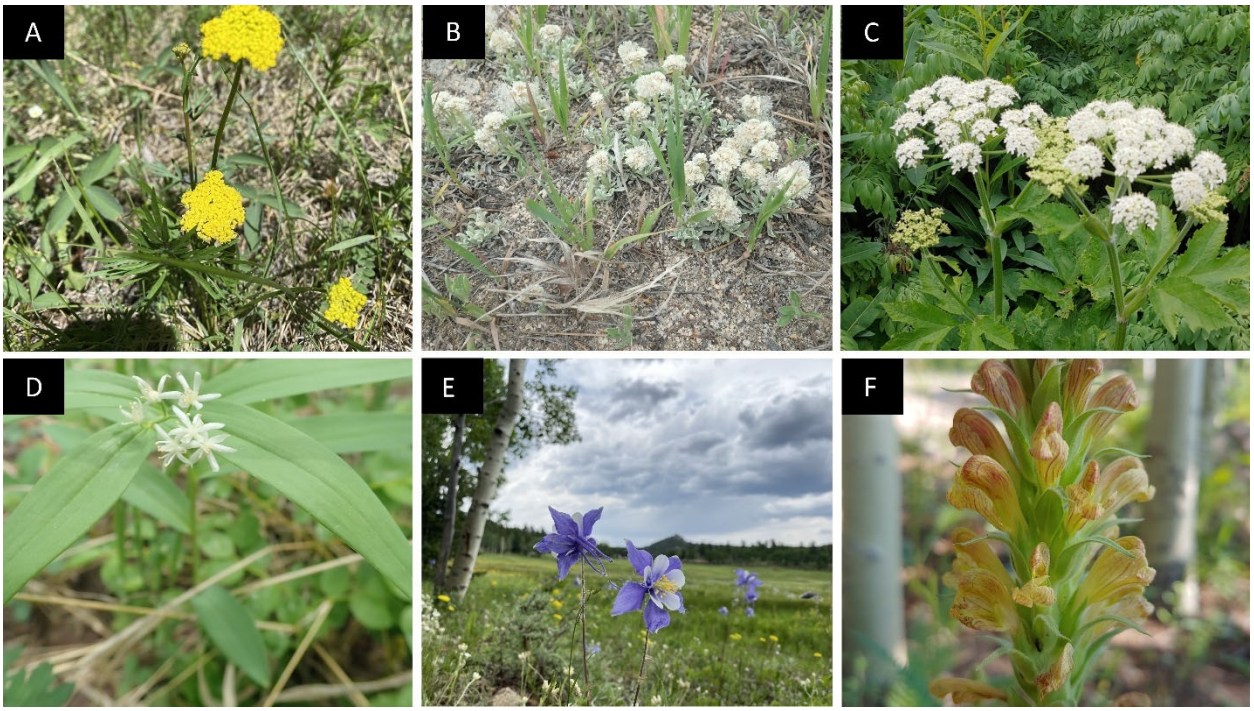
This community type is dominated by open to dense canopies of *Populus tremuloides* (aspen). The open-spaced stems of *Populus tremuloides* often give way to a lush understory consisting of multiple shrub and herbaceous plants because of the ability for light to penetrate through the canopy. Soils are typically deep and well-developed with rock often absent from the soil. Soil texture ranges from sandy loam to clay loam.

Aspen forests often originate from, and are likely maintained by, stand-replacing disturbances such as fire, disease and windthrow, or clearcutting by man or flooding by beaver. The stems of these thin-barked, clonal trees are easily killed by surface fires, but they can quickly and vigorously resprout in

densities of up to 30,000 stems per hectare (Knight 1994). The stems are relatively short-lived (100-150 years), and the occurrences often succeed to longer-lived conifer forest if undisturbed.

This forest type occupied patchy distributions at Axton Ranch Mountain Park, and were mostly found along the borders of mesic and wet meadows. Common species found within aspen forests are shown in Figure 17.

Figure 17. Rocky Mountain-Interior Subalpine-Montane Aspen Forest plant species.



A. *Pseudocymopterus montanus* (A. Gray) J.M. Coult. & Rose (mountain parsley), **B.** *Antennaria parvifolia* Nutt. (small-leaf pussytoes), **C.** *Heracleum maximum* Bartr. (cow parsnip), **D.** *Maianthemum stellatum* (L.) Link (starry false lily of the valley), **E.** *Aquilegia coerulea* James var. *coerulea* (blue columbine) and **F.** *Pedicularis procera* A. Gray (giant lousewort). Photos by Audrey Spencer (A and E) and Jennifer Ackerfield (B, C, D, and F).

Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland

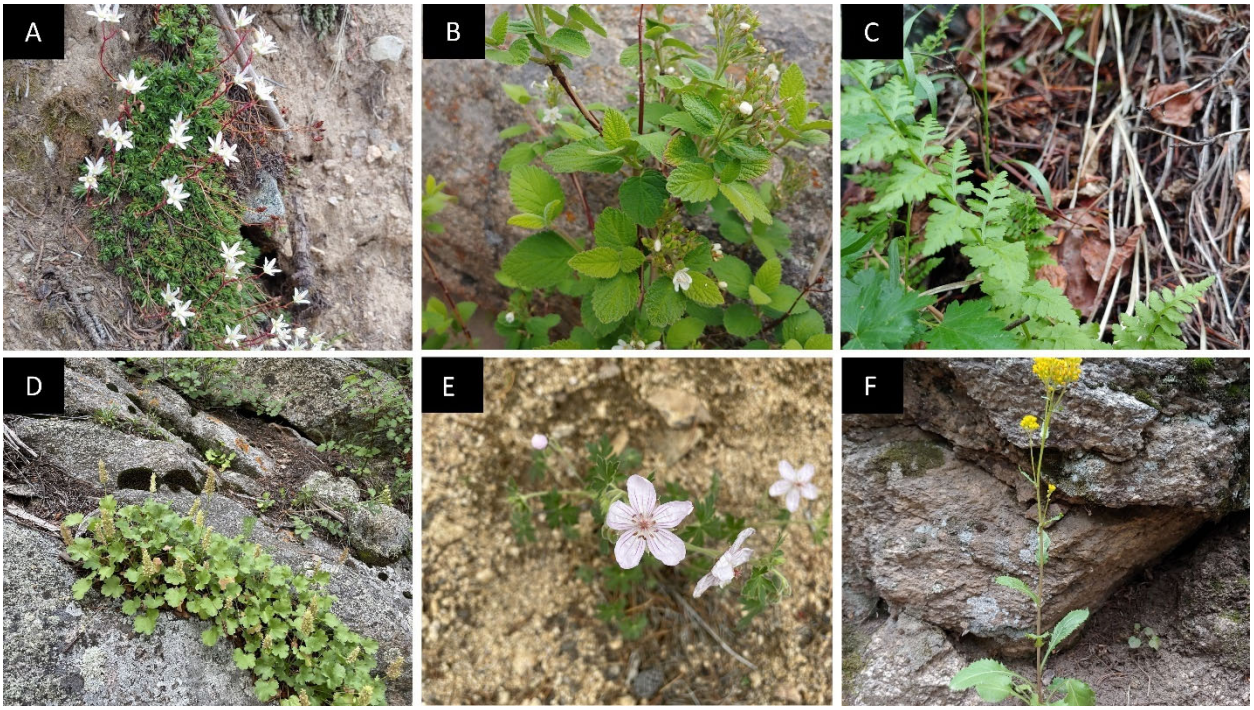
These patchy, rock outcrop and foothill woodlands are found from Alberta and northern Montana south to central Colorado and east on escarpments in the western Great Plains. Vegetation is characterized by an open tree canopy or patchy woodland that is dominated by *Juniperus scopulorum* (Rocky Mountain juniper) or *Pinus flexilis* (limber pine). At Axton Ranch Mountain Park, this community type was dominated by limber pine.

Herbaceous layers are generally sparse, and scattered in rocky crevices in this plant community. These woodlands are restricted to shallow soils and fractured bedrock derived from a variety of parent material, including limestone, sandstone, dolomite, granite, and colluvium. Fire is infrequent and spotty

in this plant community because the rocky substrates prevent development of a continuous vegetation canopy needed to spread fire (Knight 1994).

At Axton Ranch Mountain Park, this community type was present on the northern edge of the property (Figure 15). Plant species common on these rocky outcroppings are shown in Figure 18.

Figure 18. Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland plant species.



A. *Saxifraga bronchialis* L. ssp. *austromontana* (Wieg.) Piper (spotted saxifrage), **B.** *Jamesia americana* Torr. & A. Gray var. *americana* (cliffbush), **C.** *Cystopteris fragilis* (L.) Bernh. (brittle bladderfern), **D.** *Heuchera bracteata* (Torr.) Ser. (bracted alumroot), **E.** *Geranium caespitosum* James (pine woods geranium), and **F.** *Senecio rapifolius* Nutt (openwoods ragwort). Photos by Audrey Spencer (E) and Jennifer Ackerfield (A, B, C, D, and F).

Rocky Mountain Subalpine-Montane Mesic Meadow

This Rocky Mountain plant community is restricted to sites from lower montane to subalpine where finely textured soils, snow deposition, or windswept dry conditions limit tree establishment. Many occurrences are small patch in spatial character.

Vegetation is typically forb-rich, with forbs often contributing more to overall herbaceous cover than graminoids. The soils are typically seasonally moist to saturated in the spring, but if so will dry out later in the growing season.

Mesic meadows at Axton Ranch Mountain Park occur in conjunction with the Rocky Mountain Alpine-Montane Wet Meadow community type, located around the periphery of Wet Meadows. However, mesic meadows are not as wet as those found in the Rocky Mountain Alpine-Montane Wet Meadow

community type. Plant species common in Rocky Mountain Subalpine-Montane Mesic Meadows are shown in Figure 19.

Figure 19. Rocky Mountain Subalpine-Montane Mesic Meadows plant species.

A. *Micranthes rhomboidea* (Greene) Small (diamondleaf saxifrage), **B.** *Allium geyeri* S. Watson var. *geyeri* (Geyer's onion), **C.** *Arnica fulgens* Pursh (foothill arnica), **D.** *Agoseris glauca* (Pursh) Raf. var. *glauca* (pale agoseris), **E.** *Calochortus gunnisonii* S. Watson (mariposa lily), and **F.** *Aconitum columbianum* Nutt. ssp. *columbianum* (monkshood). Photos by Audrey Spencer (A, D, E, and F) and Jennifer Ackerfield (B and C).

Rocky Mountain Alpine-Montane Wet Meadow

These are high-elevation communities found throughout the Rocky Mountains and Intermountain regions, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. These types occur as large meadows in montane or subalpine valleys, or as narrow strips bordering ponds, lakes, and streams. Soils of this system may be mineral or organic. In either case, soils exhibit typical hydric soil characteristics, including high organic content.

Moisture for these wet meadow community types is acquired from groundwater, stream discharge, overland flow, overbank flow, and on-site precipitation. Salinity and alkalinity are generally low due to the frequent flushing of moisture through the meadow. Depending on the slope, topography, hydrology, soils and substrate, intermittent, ephemeral, or permanent pools may be present. These areas may support species more representative of purely aquatic environments. Standing water may be present during some or all of the growing season, with water tables typically remaining at or near the soil surface.

At Axton Ranch Mountain Park, wet meadows were most often associated with peripheral mesic meadows. Wet meadows had streams running through them, and then grading from there to mesic meadows as the distance to the water source diminished. Often, plants were found growing in standing water. Examples of wet meadow plant species are shown in Figure 20.

Figure 20. Rocky Mountain Alpine-Montane Wet Meadow plant species.

A. *Veronica americana* Schwein. ex Benth. (American speedwell), **B.** *Stellaria longioflia* Muhl. ex Willd. (starwort), **C.** *Carex aquatilis* Wahlenb. (water sedge), **D.** *Gentiana fremontii* Torr. (moss gentian), **E.** *Iris missouriensis* Nutt. (Rocky Mountain iris), and **F.** *Primula pauciflora* (Greene) Mast & Reveal (dark-throat shooting star). Photos by Audrey Spencer (B and C), Tohmi Barrett (F), and Jennifer Ackerfield (A, D and E).

Rocky Mountain-Great Basin Montane Riparian Forest

Distributionally, the Rocky Mountain-Great Basin Montane Riparian Forest group is found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into Montana, Alberta and British Columbia, and west into the Intermountain West region and the Colorado Plateau. This plant community contains woodlands dominated by conifer and aspen that line shaded, montane streams. Vegetation is usually in a linear band along streambanks.

Plant species can blend into the surrounding upland forest, and often only the understory herbaceous species indicate the wet nature of the soils. These are communities tolerant of periodic flooding and high-water tables. Snowmelt moisture may create shallow water tables or seeps for a portion of the growing season.

At Axton Ranch Mountain Park, this community type was found along stream and lake margins within lodgepole pine forests. Often, small “islands” of vegetation were present in the middle of slow-moving streams. Most of these communities occurred downstream of lakes in or near stream margins. Shrub cover was limited in these communities.

Examples of plant species found in this community type can be seen in Figure 21.

Figure 21. Rocky Mountain-Great Basin Montane Riparian Forest plant species.

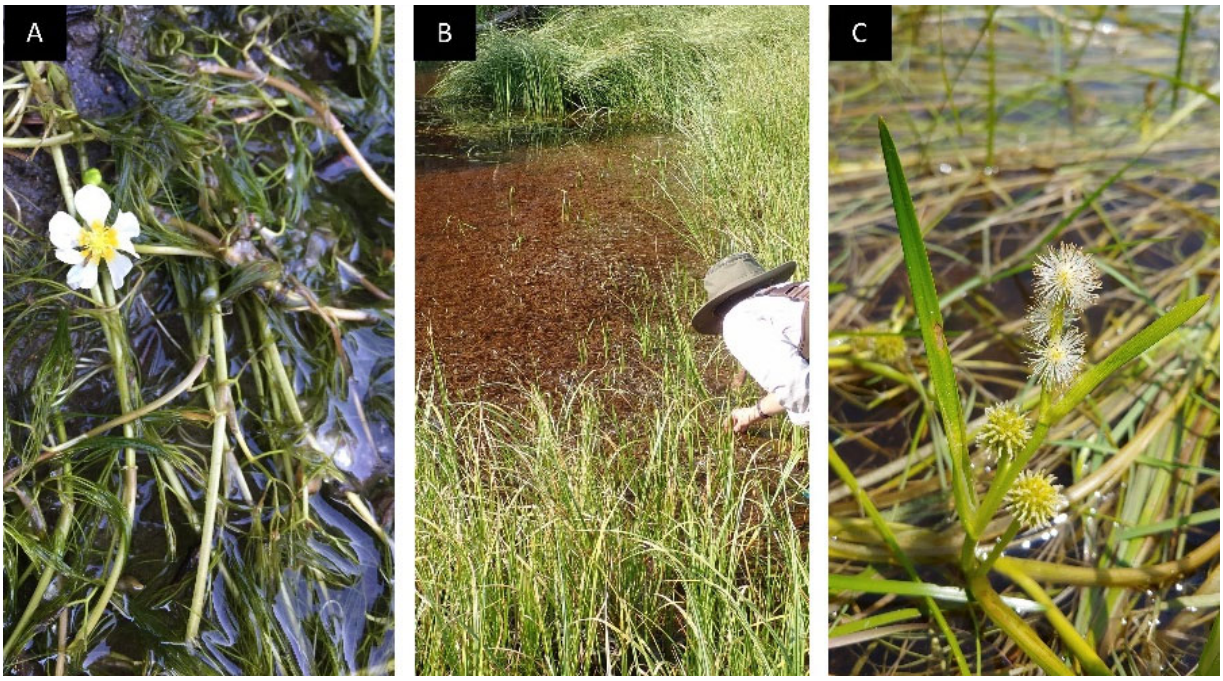
A. *Viola renifolia* A. Gray (white violet), **B.** *Streptopus amplexifolius* (L.) DC. (twisted stalk), **C.** *Mitella pentandra* Hook. (fivestamen miterwort), **D.** *Saxifraga odontoloma* Piper (brook saxifrage), **E.** *Ranunculus flammula* L. var. ovalis (Bigelow) L.D. Benson (creeping spearwort), and **F.** *Platanthera purpurascens* (Rydb.) Sheviak & Jennings (purple-petal bog orchid). Photos by Jennifer Ackerfield.

Western North American Freshwater Aquatic Vegetation

This plant community type consists of rooted, floating, and submerged freshwater aquatic herbaceous vegetation found throughout the temperate regions of western North America. Their occurrence tends to be small-patch or linear in spatial pattern, confined to lakes, ponds, oxbows, and slow-moving portions of rivers and streams. Many dominant aquatic species are also cosmopolitan in distribution, most likely spread by waterfowl and other birds. Soils may be either mineral or organic, often with a mucky or mucky-mineral surface layer.

At Axton Ranch Mountain Park, aquatic plants were found in lakes and along lake margins, and in slow-moving portions of streams running through wet meadows. Examples of aquatic plants can be found in Figure 22.

Figure 22. Aquatic vegetation examples.



A. *Ranunculus aquatilis* L. (white water crowfoot), **B.** *Potamogeton gramineus* L. (pondweed), and **C.** *Sparganium angustifolium* Michx. (narrowleaf bur-reed). Photos by Audrey Spencer (B) and Jennifer Ackerfield (A and C).

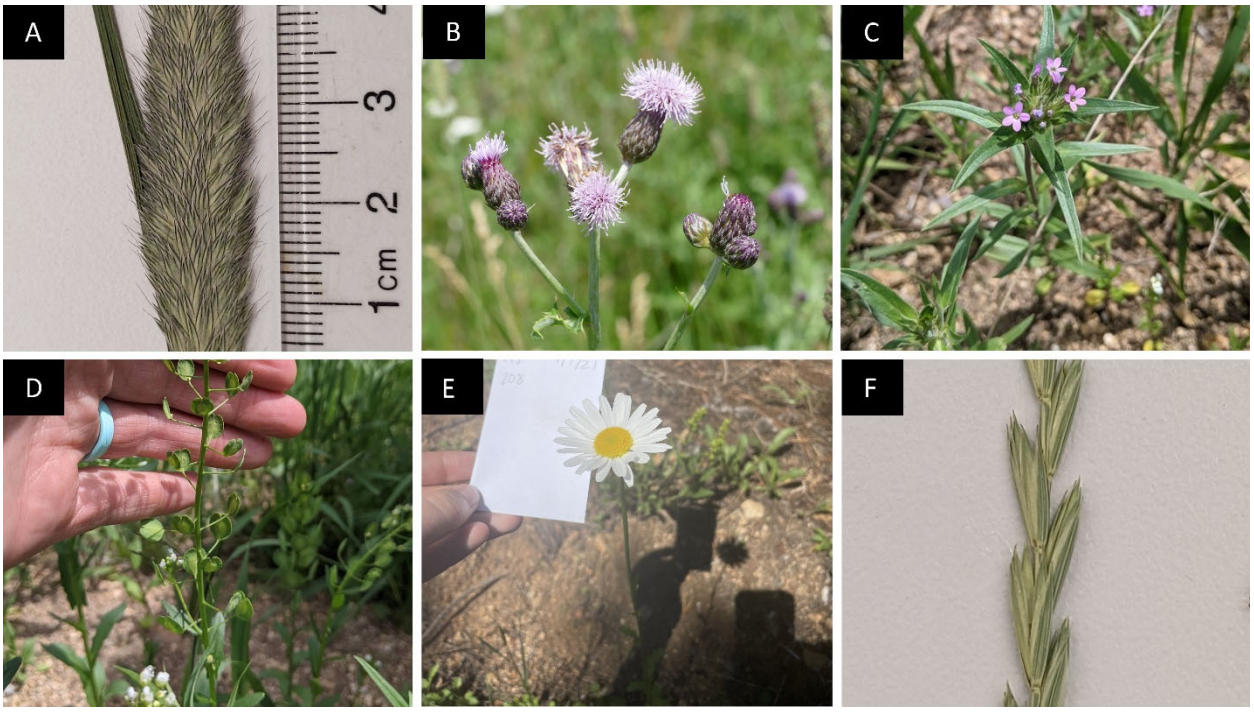
Western North American Ruderal Marsh, Wet Meadow & Shrubland

This community type consists of disturbed natural habitats such as wet meadows and sloughs, as well as waste areas that were once wetlands but are now dominated by introduced or generalist native species. Because of disturbance, soils may be compacted or unnaturally enriched or depleted. Disturbance can be from activities such as severe continuous heavy grazing, abandoned building sites, areas that have been logged, or chained and cleared that occur where wetlands once stood.

Axton Ranch Mountain Park once had active agricultural management regimes that may have consisted of seasonal sheet irrigation for grazing or haying purposes, but these areas now lay abandoned and dominated by the original non-native hay grasses. These wetlands may have been historically uplands, but have become wetlands over time through the repeated application of irrigation water or from seepage off water conveyance and water storage infrastructures (ditches, stock ponds, pumps, etc.).

These meadows were dominated by introduced or generalist native species grass species such as *Agrostis gigantea* Roth, *Alopecurus pratensis* L., *Poa palustris* L., and *Poa pratensis* L. Examples of other plant species found in this community type are shown in Figure 23.

Figure 23. Western North American Ruderal Marsh, Wet Meadow & Shrubland plant species.



A. *Alopecurus pratensis* L. (meadow foxtail), **B.** *Cirsium arvense* (L.) Scop. (Canada thistle), **C.** *Collomia linearis* Nutt. (tiny trumpet), **D.** *Thlaspi arvense* L. (field pennycress), **E.** *Leucanthemum vulgare* Lam. (oxeye daisy), and **F.** *Elymus repens* (L.) Gould (quackgrass). Photos by Audrey Spencer.

Sandy, disturbed slopes

Although not a plant community type in NatureServe explorer, we did see several examples of sandy, disturbed slopes at Axton Ranch Mountain Park. These sandy, disturbed slopes consisted of areas adjacent to ponds or along roads with sandy soil, and were mostly devoid of vegetation. These areas were also evidently the result of human impacts, and probably the result of irrigation work and road building at the ranch.

The majority of plant species on these slopes were introduced. *Spergularia rubra* (L.) J. Presl & C. Presl (red sandspurry), one of the introduced species, is uncommon in Colorado. Some native species such as *Oenothera flava* (A. Nelson) Garrett (yellow evening primrose) and *Plagiobothrys scouleri* (Hook. & Arn.) I.M. Johnst. (popcornflower) were also found on these sandy slopes. These native species just happen to prefer sandy soil or some level of disturbance. For example, *Plagiobothrys* is often found in disturbed areas such as forest clear-cuts. Examples of plant species found on sandy, disturbed slopes are found in Figure 24.

Figure 24. Sandy, disturbed slope plant species.

A. *Ambrosia tomentosa* Nutt. (skeletonleaf bur ragweed), **B.** *Matricaria discoidea* DC. (pineapple weed), **C.** *Oenothera flava* (A. Nelson) Garrett (yellow evening primrose), **D.** *Spergularia rubra* (L.) J. Presl & C. Presl (red sandspurry), **E.** *Plagiobothrys scouleri* (Hook. & Arn.) I.M. Johnst. (popcornflower), and **F.** *Rumex triangulivalvis* (Danser) Rech. f. (dock). Photos by Jennifer Ackerfield (A, C, D, and E) and Audrey Spencer (B and F).

Rare species

Two species considered rare by the Colorado Natural Heritage Program (Colorado Natural Heritage Program 2022) were found at Axton Ranch Mountain Park: 1) *Asplenium septentrionale* (L.) Hoffm. or forked spleenwort and 2) *Senecio rapifolius* Nutt. or openwoods ragwort (Figure 25). *Asplenium septentrionale* is a small fern that grows in dense clusters, and superficially resembles tufts of grass. The fronds are narrow and slightly branched or "forked" at the tips.

Although globally secure (G5), in Colorado *Asplenium septentrionale* is considered vulnerable (S3) with moderate risk of extirpation due to relatively few populations or occurrences. At Axton Ranch Mountain Park, *Asplenium septentrionale* consisted of a small population of just a few individuals located in a rocky crevice/overhang within the Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland plant community type. Its location in the rocky crevice offers this population a good deal of protection as it is difficult to get to and also find. *Senecio rapifolius* is ranked G4 of apparently secure globally and S3 or vulnerable in Colorado due to its narrow distribution along the northern Front Range. *Senecio rapifolius* was found at the base of the Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland plant community type. The population of *Senecio rapifolius* consisted of about 25

individuals. Its location at the base of the rocky outcropping provides it with less protection as this area was relatively easy to reach.

Figure 25. Rare species.

A. *Senecio rapifolius* (S3) and **B.** *Asplenium septentrionale* (S3). Photos taken by Jennifer Ackerfield.

Wetland species

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Because wetlands are places where soils are inundated or saturated with for long or frequent periods of time, this significantly affects the composition of plants that can grow under these conditions.

Although wetlands only cover 2% of the landscape in Colorado, they are some of the most biologically diverse and productive biological communities (Dahl 1990). Wetlands perform many functions beyond providing habitat for plants and animals (Mitsch & Gooselink 2007) such as:

1) Groundwater recharge – replenishing below-ground aquifers
2) Groundwater discharge – movement of ground water to the surface
3) Flood protection – temporary storage of potential flood waters
4) Sediment stabilization – the protection of stream banks and lake shores from erosion
5) Nutrient cycling – the removal of excess nutrients from the water
6) Production support – supplying organic material
7) Water filtration
8) Uniqueness/heritage value – supporting rare and unique plants, animals, and plant communities

In Colorado, wetlands are regulated under the authority of the Clean Water Act. Therefore, a permit is required by the Corps before placing fill in a wetland and before dredging, ditching, or channelizing a wetland.

Wetland species were found in four different plant communities at Axton Ranch Mountain Park: 1) Western North American Freshwater Aquatic Vegetation, 2) Rocky Mountain Alpine-Montane Wet Meadow, 3) Rocky Mountain-Great Basin Montane Riparian Forest, and 4) Western North American Ruderal Marsh, Wet Meadow & Shrubland. Wetland indicator rankings are included in Appendix 1. It should be noted that not all species have a wetland indicator rank.

Wetland species defined as obligate (OBL) consist of species that occur almost always under natural conditions in wetlands. Obligate wetland species include: 1) submerged aquatics (plants that conduct all or most of the growth under water), 2) floating aquatic species (plants that grow with leaves floating on the water surface), 3) floating-leaved (plants rooted in sediment but with leaves floating on the surface), and 4) emergent (plants rooted in inundated sediment but growing above the water level). At Axton Ranch Mountain Park, 34 obligate wetland species were found, all of which are native (Figures 26, 27). Obligate wetland species were found in the Western North American Freshwater Aquatic Vegetation, Rocky Mountain Alpine-Montane Wet Meadows, Rocky Mountain-Great Basin Montane Riparian Forest, and Western North American Ruderal Marsh, Wet Meadow & Shrubland plant communities. Examples of some obligate wetland species are shown in Figure 27.

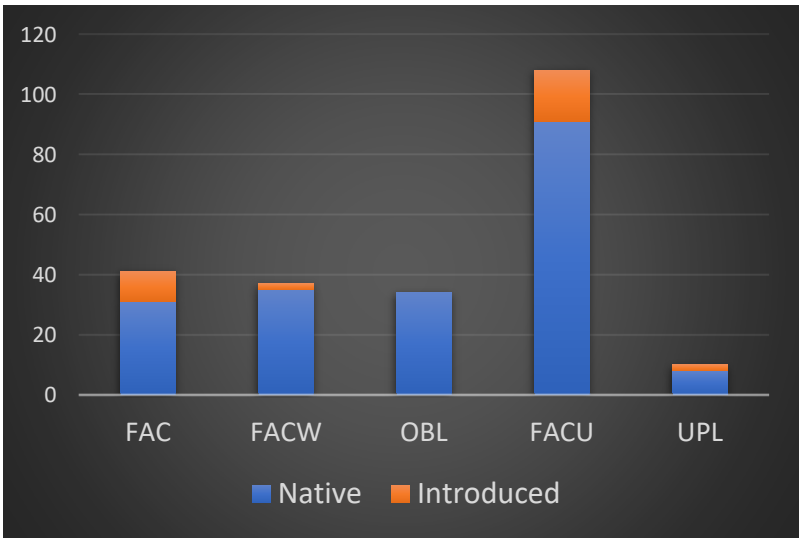
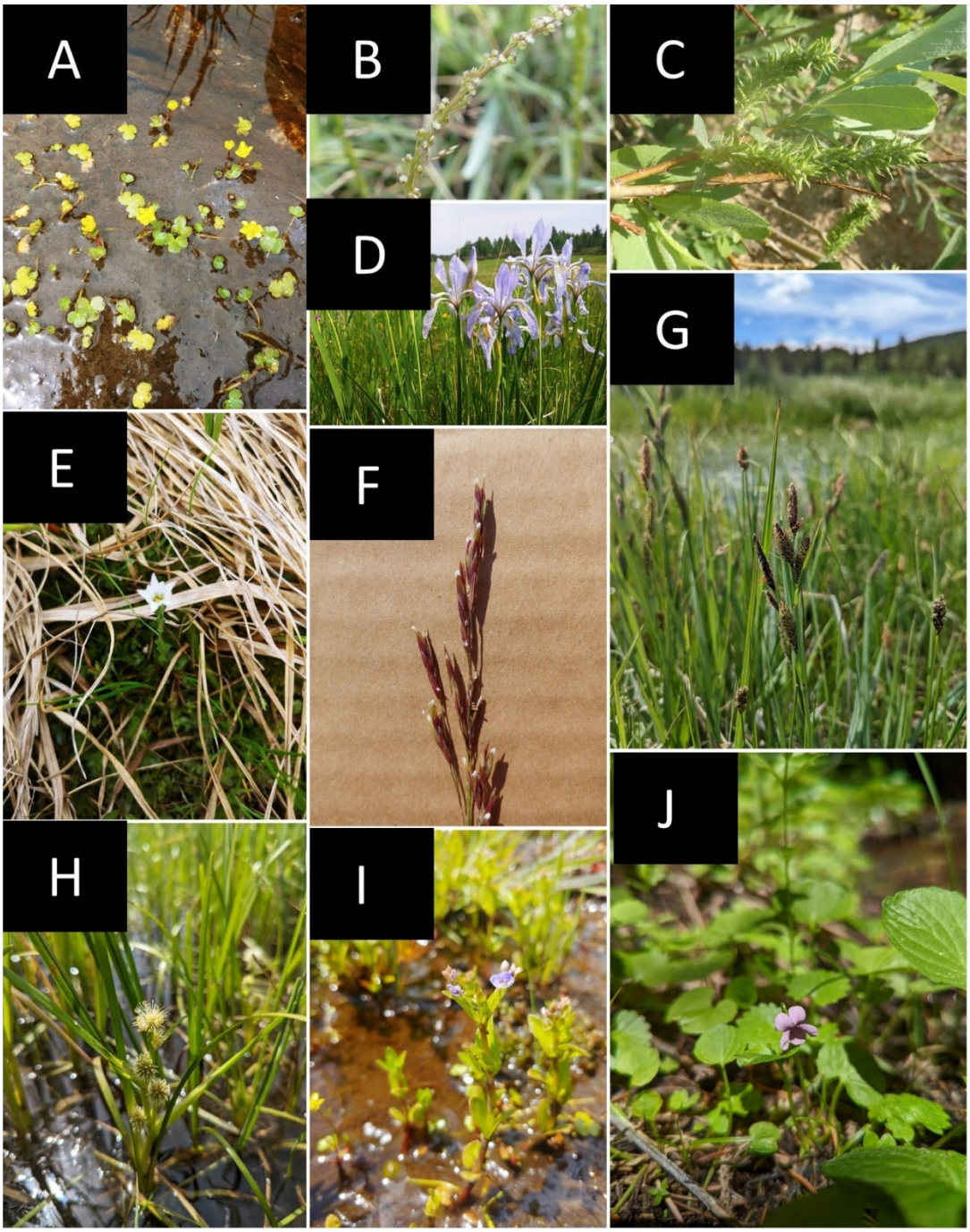


Figure 26. Number of species per wetland indicator. Blue indicates number of native species and orange indicates number of introduced species.

Facultative wetland (FACW) species usually occur in wetlands but are occasionally found in non-wetlands. Thirty-seven facultative wetland species were found at Axton, two of which were introduced species. Facultative (FAC) species are those that are equally likely to occur in wetlands as non-wetlands. At Axton, there were 41 facultative species, 10 of which were introduced species.

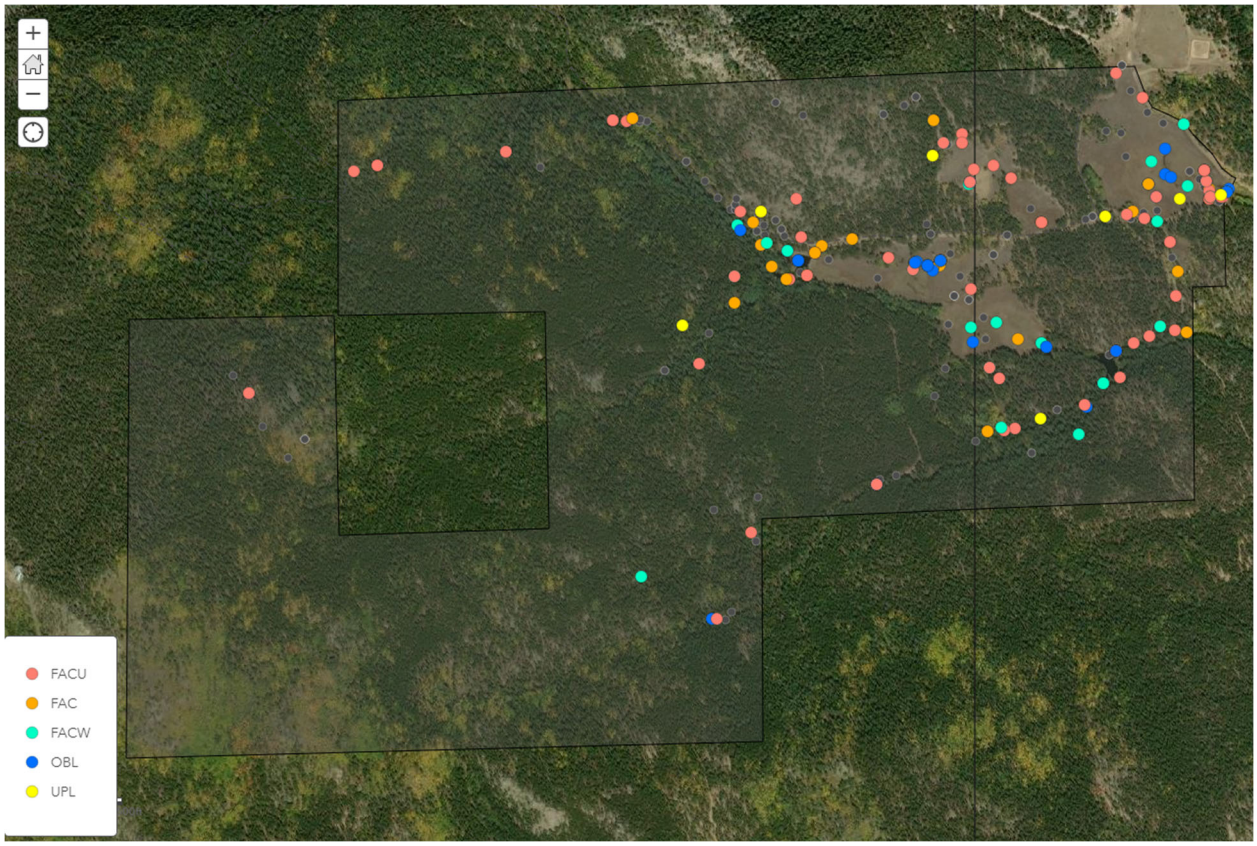
Facultative upland (FACU) species usually occur in non-wetlands but are occasionally found in wetlands. The majority of plant species at Axton were facultative upland species, with 108 total, 17 of which were introduced species. Lastly, upland (UPL) species do not occur in wetlands in the region specified (Lichvar et al. 2012). At Axton there were 10 upland species, two of which were introduced species. These results are summarized in Figure 26. Wetland indicators for each species are indicated in Appendix 1. A map of species by wetland indicator is in Figure 28.

Figure 27. Obligate wetland species examples.



A. *Ranunculus hyperboreus* Rottb. (high northern buttercup), **B.** *Triglochin palustris* L. (marsh arrowgrass), **C.** *Salix monticola* Bebb (park willow), **D.** *Iris missouriensis* (Rocky Mountain iris), **E.** *Gentiana fremontii* (moss gentian), **F.** *Glyceria borealis* (Nash) Batchelder (small floating mannagrass), **G.** *Carex nebrascensis* Dewey (Nebraska sedge), **H.** *Sparganium emersum* Rehmann (European bur-reed), **I.** *Veronica americana* (American speedwell), and **J.** *Viola palustris* L. (marsh violet). Photos taken by Jennifer Ackerfield (A, D, E, F, G, H, I, and J) and Audrey Spencer (B and C).

Figure 28. Map of species by wetland indicator.



Introduced species

An introduced species is one that was not in the area prior to European settlement, and is therefore not native to the ecosystem under consideration. The effects of introduced species within an ecosystem are typically detrimental. They can outcompete native species, reduce biodiversity, lead to habitat degradation, and permanently alter plant communities through direct and indirect effects. Introduced species are generally successful because of one or more of the following reasons:

1. Ability to flourish if population control mechanisms are absent
2. Thrive on disturbed soils
3. Produce large quantities of seed
4. Ability to disperse seeds over great distances
5. Development of aggressive root systems, enabling introduced species to spread quickly
6. Production of chemicals that inhibit the growth of nearby plants

Approximately 39 introduced species were found at Axton Ranch Mountain Park, representing 12% of the total flora (Appendix 1). At Axton Ranch Mountain Park, three flowering plant families contained 59% of the introduced species, with approximately one in three (31%) belong to the Poaceae or grass family, 15% belong to the Asteraceae or aster family, and 13% belong to the Fabaceae or bean family (Figure 29). The majority of the introduced grass species were brought into the property for hay and have since become established (Figure 30). The majority of the introduced species were clustered in the

Western North American Ruderal Marsh, Wet Meadow & Shrubland plant community (Figure 30). This area was primarily used as a grazing meadow for horses. These grasses were brought into the area for this purpose, where they now persist. Additionally, introduced species follow old roads that were built on the property. Examples of some introduced species can be seen in Figure 31.

Figure 29. Percentage of introduced species per flowering plant family.

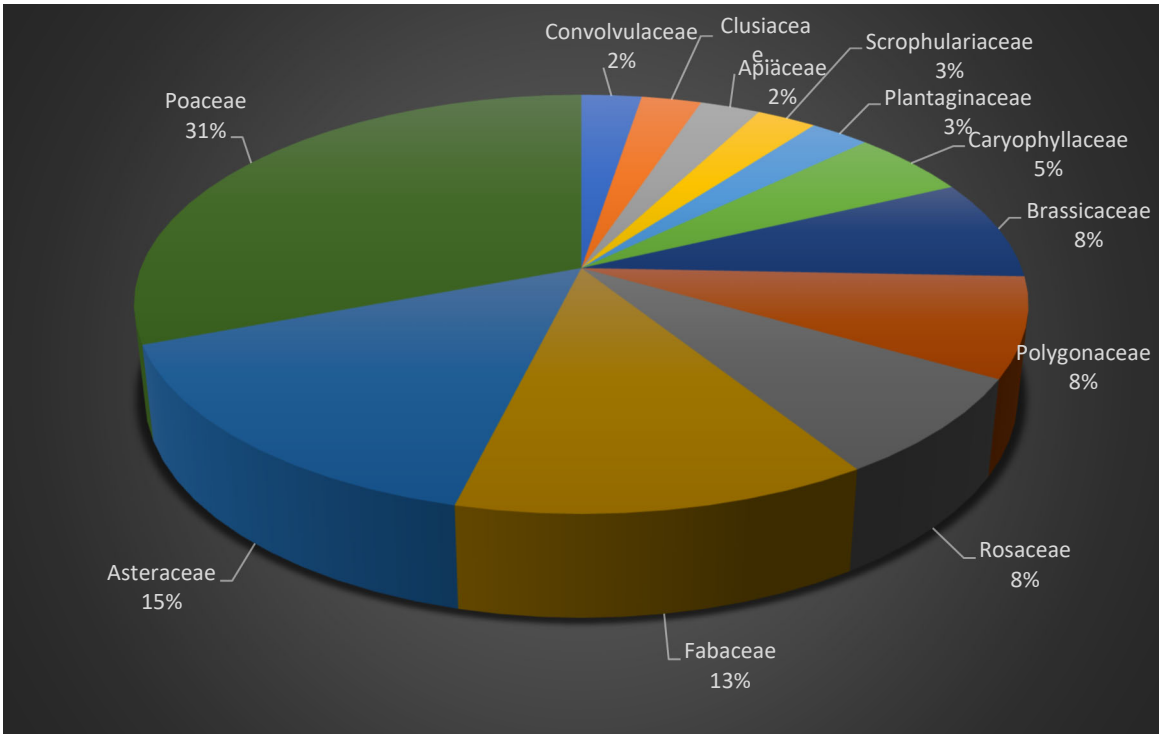


Figure 30. Map of native and introduced species. Green circles indicate native species and red circles indicate introduced species.

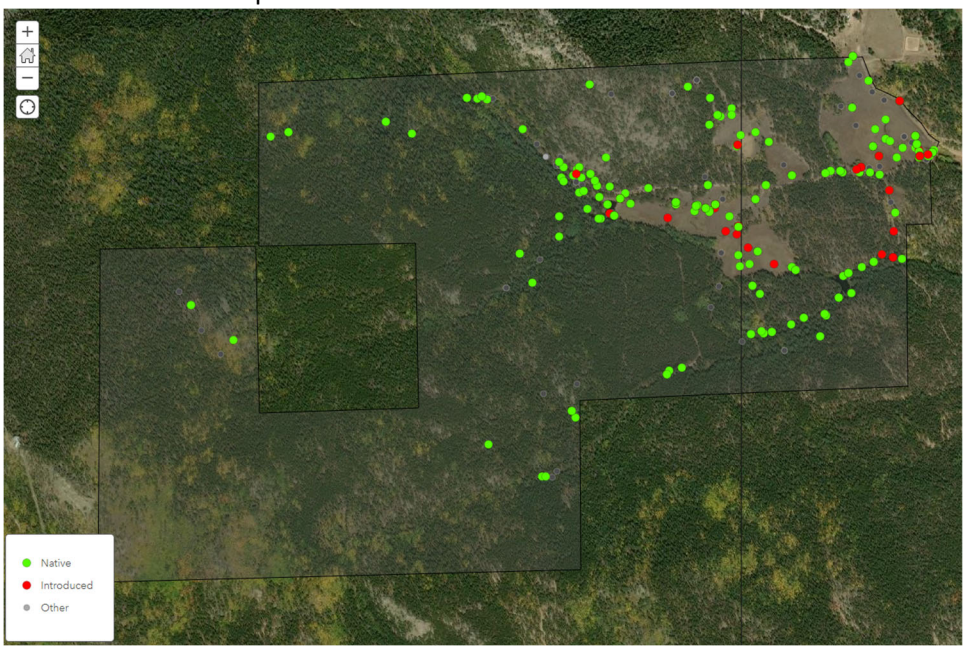
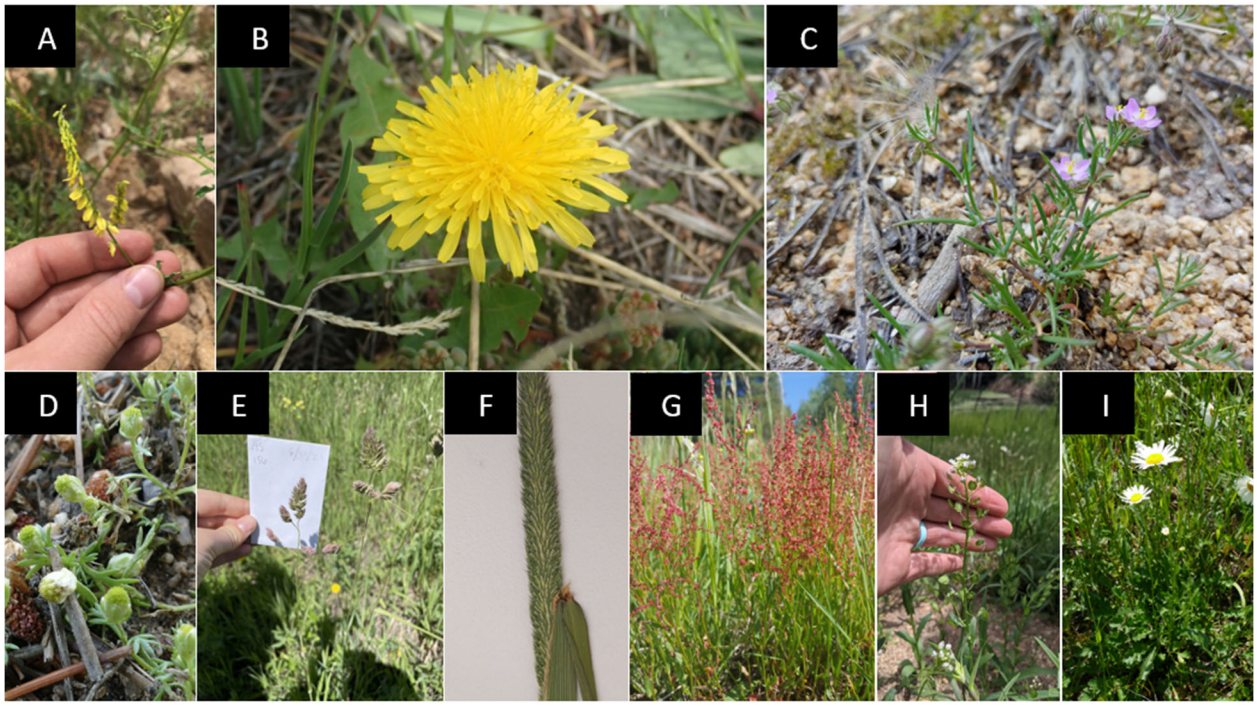


Figure 31. Introduced species examples.



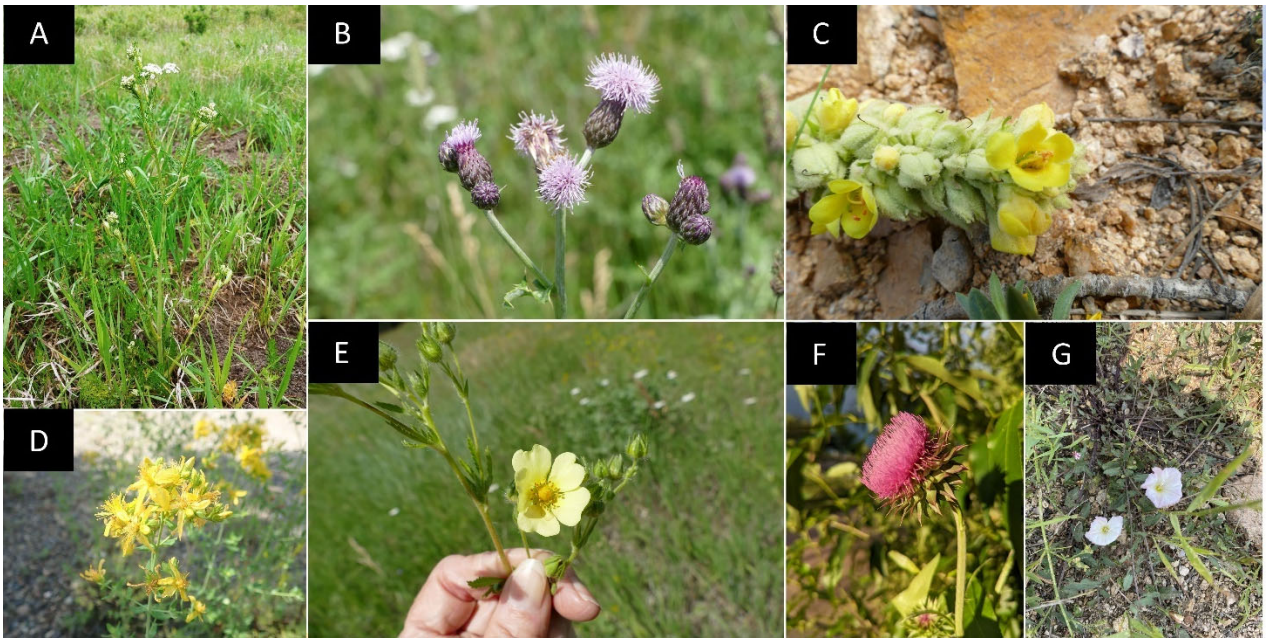
A. *Melilotus officinalis* (L.) Lam. (sweetclover), **B.** *Taraxacum officinale* L. (dandelion), **C.** *Spergularia rubra* (L.) J. Presl & C. Presl (red sandspurry), **D.** *Matricaria discoidea* DC. (pineapple weed), **E.** *Dactylis glomerata* L. (orchard grass), **F.** *Phleum pratense* L. (timothy grass), **G.** *Rumex acetosella* L. (garden sorrel), **H.** *Thlaspi arvense* L. (field pennycress), and **I.** *Leucanthemum vulgare* Lam. (oxeye daisy). Photos taken by Jennifer Ackerfield (C and G) and Audrey Spencer (A, B, D, E, F, H, and I).

Some introduced species are further classified as noxious weeds if they have been designated as such by the Colorado Department of Agriculture. Noxious weeds are those introduced species which are most detrimental to an ecosystem. In Colorado, there are three lists of noxious weeds: 1) **List A**, or species which must be eradicated immediately upon detection, 2) **List B**, or species that whose continued spread should be halted through implementation of a noxious weed management plan, and 3) **List C**, or species for which local governments have authority to decide the management strategy but the goal of which is not to stop the continued spread of these species.

A total of **seven noxious weeds** were found at Axton Ranch Mountain Park (Figure 32). No List A species, or those that must be eradicated immediately, were found on the property. However, there **were four List B** species located: 1) *Carduus nutans* L. (musk thistle), 2) *Carum carvi* L. (caraway), 3) *Cirsium arvense* (L.) Scop. (Canada thistle), and 4) *Potentilla recta* L. (sulphur cinquefoil). In particular, *Cirsium arvense* or Canada thistle should be removed from wet meadows as much as possible. Canada thistle has a deep, underground rhizome which enables it to outcompete native species in wetlands and eventually form a monoculture. Removal is best done when the population is still manageable. *Carduus nutans* or musk thistle is a biennial. Therefore, clipping off the heads of musk thistle before it has a chance to go to seed is a good way to manage for it.

Additionally, there were **three List C** species found: 1) *Convolvulus arvensis* L. (bindweed), 2) *Hypericum perforatum* L. (St. John's wort), and 2) *Verbascum thapsus* L. (mullein).

Figure 32. Noxious weed examples.



A. *Carum carvi* (caraway; List B), **B.** *Cirsium arvense* (L.) Scop. (Canada thistle; List B), **C.** *Verbascum 36mbella* L. (mullein; List C), **D.** *Hypericum perforatum* L. (St. John's Wort; List C), **E.** *Potentilla recta* L. (sulphur cinquefoil; List B), **F.** *Carduus nutans* L. (musk thistle; List B), and **G.** *Convolvulus arvensis* L. (bindweed; List C). Photos taken by Jennifer Ackerfield (A and F) and Audrey Spencer (B, C, D, E, and G).

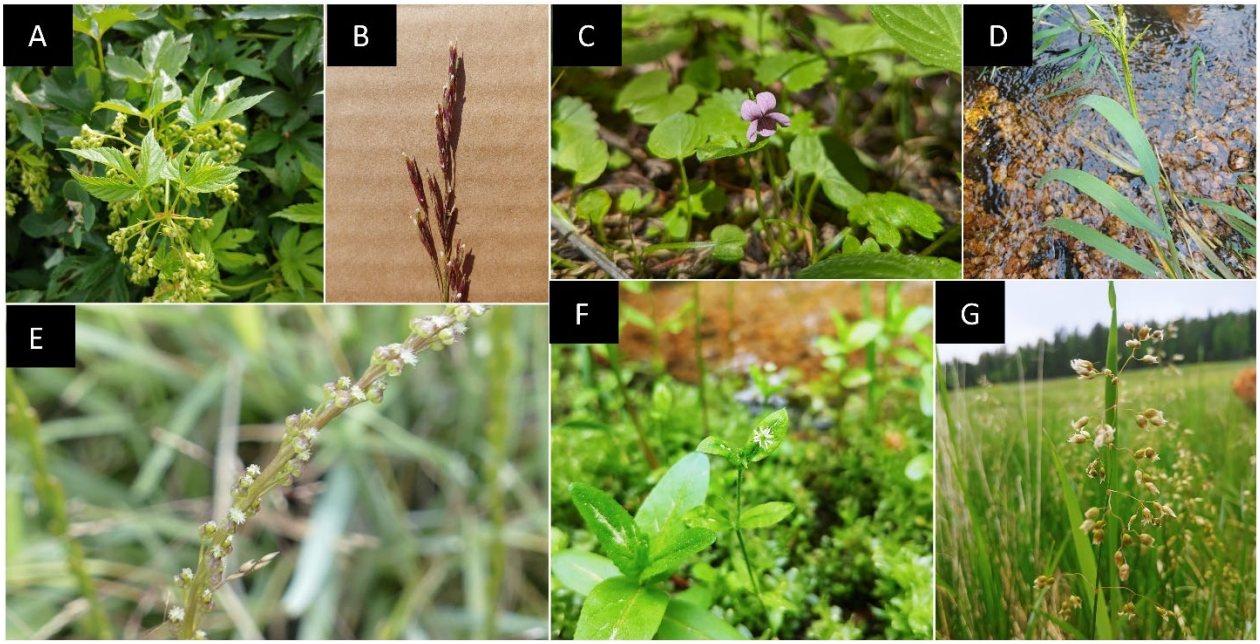
Noteworthy discoveries

At Axton Ranch, we found **13 species uncommon in Colorado** and considered rare in surrounding states, but not currently ranked for the state by the Colorado Natural Heritage Program (Table 7; Figure 33).

Table 7. Noteworthy discovery species

Family	Species	Ranking in adjacent state
Cannabaceae	*Humulus neomexicanus*	S3 in Wyoming
Caryophyllaceae	*Stellaria calycantha*	S3 in Wyoming and New Mexico
Cyperaceae	*Carex disperma*	S3 in Wyoming and S2 in Arizona
Cyperaceae	*Carex pityophila*	G3 (globally vulnerable) and no state rankings
Gentianaceae	*Gentiana fremontii*	S2 in Arizona
Juncaginaceae	*Triglochin palustris*	S3 in Wyoming
Orchidaceae	*Dactylorhiza viride*	S2 in Wyoming and S1 in Utah
Poaceae	*Anthoxanthum hirtum*	S3 in Wyoming
Poaceae	*Cinna latifolia*	S2 in Wyoming
Poaceae	*Glyceria borealis*	S2 in Wyoming
Poaceae	*Poa leptocoma*	S3 in Wyoming
Violaceae	*Viola macloskeyi*	S2 in Wyoming
Violaceae	*Viola palustris*	S3 in Wyoming

Figure 33. Noteworthy discoveries.



A. *Humulus neomexicanus* Rydb. (hops), **B.** *Glyceria borealis* (Nash) Batchelder (floating mannagrass), **C.** *Viola palustris* L. (marsh violet), **D.** *Cinna latifolia* (Trevis. Ex Goepp.) Griseb. (drooping woodreed), **E.** *Triglochin palustris* L. (marsh arrowgrass), **F.** *Stellaria calycantha* (Ledeb.) Bong. (northern starwort), and **G.** *Anthoxanthum nitens* (Weber) Y. Schouten & Veldkamp (sweetgrass). Photos taken by Jennifer Ackerfield (A, B, C, D, F, and G) and Audrey Spencer (E).

Rare and noteworthy species were found in three primary habitats: 1) rocky outcroppings, 2) wet meadows, and 3) riparian areas along slow-moving streams in forests. Both rare species (*Asplenium septentrionale* and *Senecio rapifolius*) were found in or at the base of rocky outcroppings on the northern portion of Axton Ranch.

Wet meadows supported *Anthoxanthum nitens*, *Carex disperma*, *Gentiana fremontii*, *Glyceria borealis*, and *Triglochin palustris*. *Humulus neomexicanus* was found along the edge of a wet meadow. Riparian areas along slow-moving streams in lodgepole pine forests supported *Cinna latifolia*, *Poa leptocoma*, Stellaria *calycantha*, *Viola macloskeyi*, and *Viola palustris*. The only species not found in one of these three habitats was *Carex pityophila*. This species was found in aspen-lodgepole pine forests in the western portion of Axton Ranch. *Carex pityophila* is unranked at a state level because some consider it to be synonymous with the widespread *Carex geophila* Mack., and therefore its status as uncommon is questionable. A map showing the locations of the rare and noteworthy species is shown in Figure 35.

Another noteworthy discovery was the high species diversity of orchids found at Axton Ranch Mountain Park. In total, there were eight different orchid species found on the property. One species, *Dactylorhiza viride*, is not listed as rare in Colorado but is uncommon and is ranked as S2 (imperiled) in the adjacent state of Wyoming. At Axton Ranch, only one plant of *Dactylorhiza viride* was found and therefore it was not collected. Instead, an iNaturalist observation of the species was made to document its occurrence. Examples of orchids found at Axton Ranch are shown in Figure 36 and all orchid species are listed in Appendix 1.

Figure 35. Map of all rare and noteworthy species.

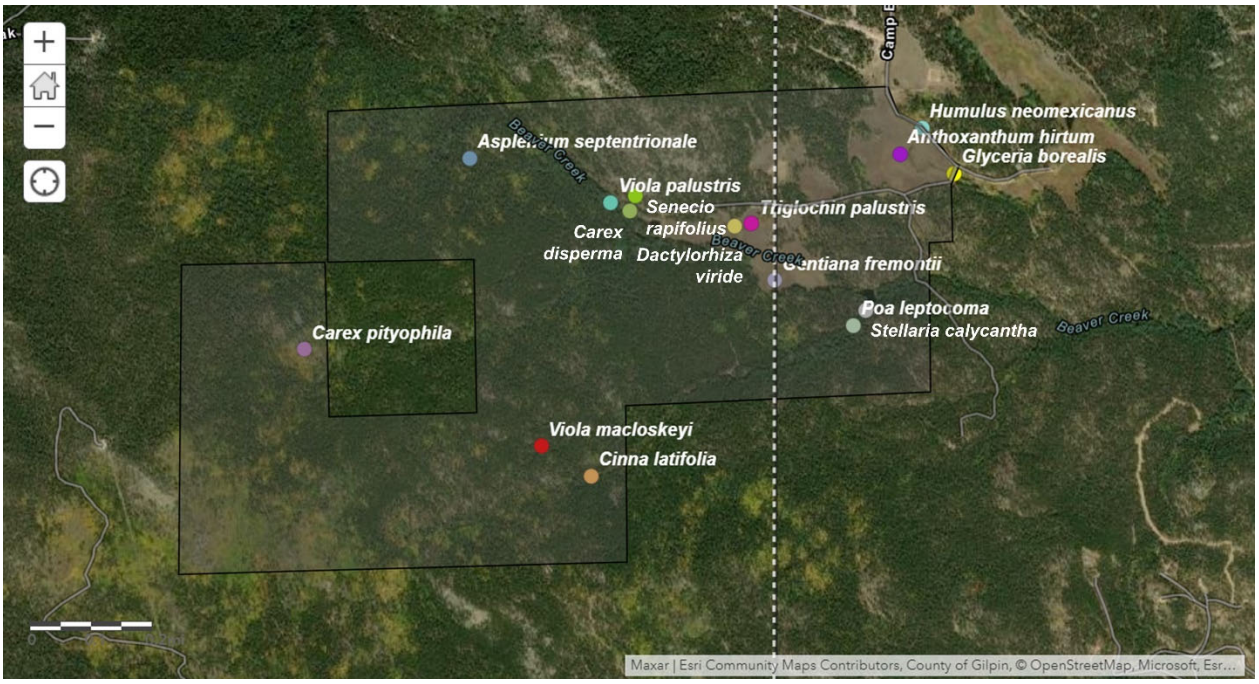
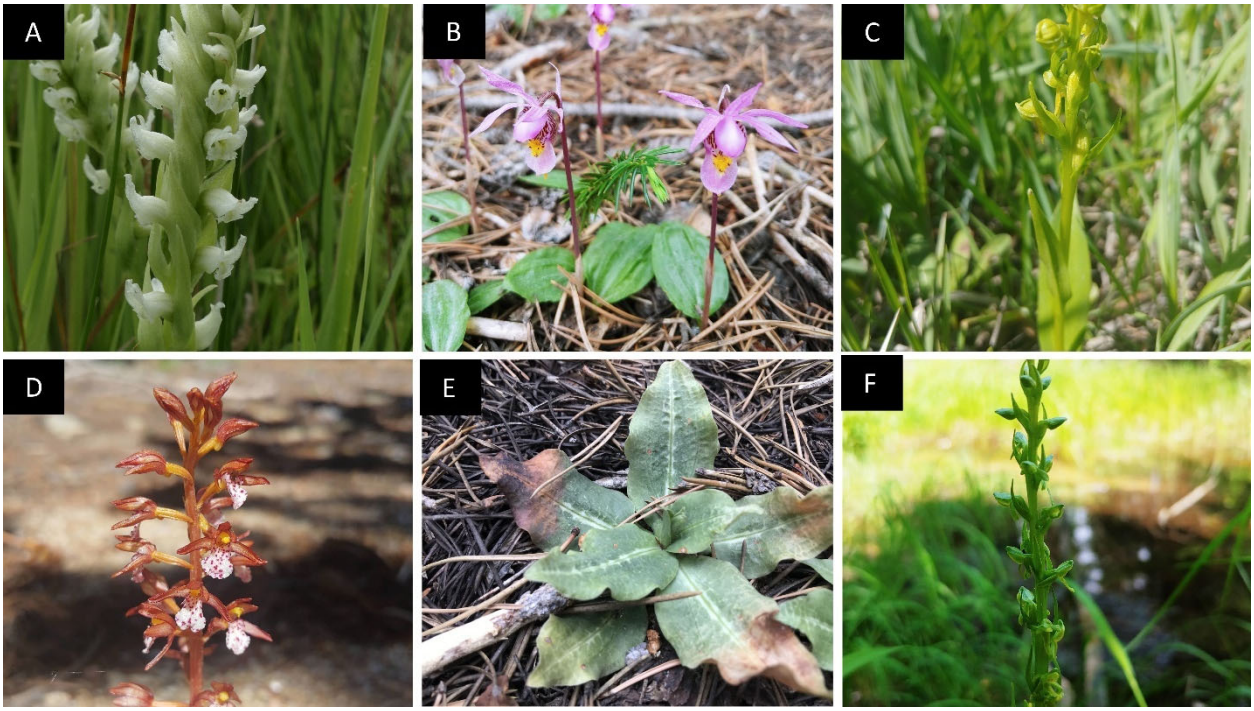


Figure 36. Examples of orchids at Axton Ranch Mountain Park.



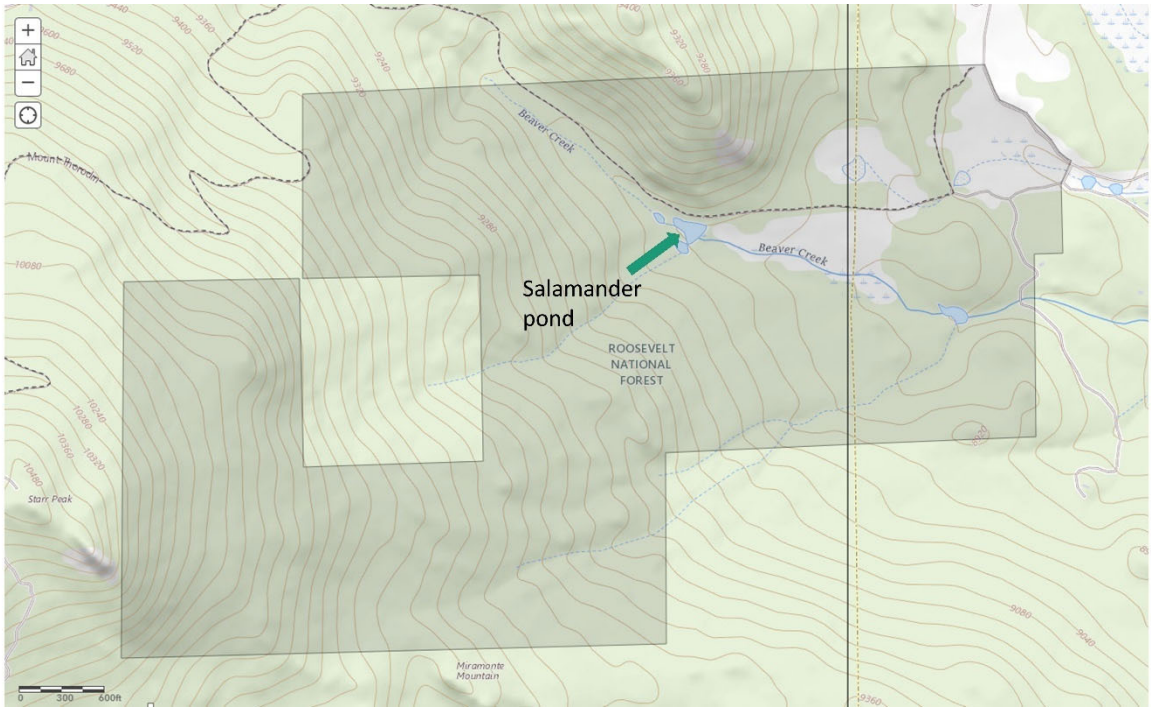
A. *Spiranthes romanzoffiana* Cham. (hooded lady's tresses), **B.** *Calypso bulbosa* var. *americana* (fairy slipper), **C.** *Dactylorhiza viridis* (frog orchid), **D.** *Corallorhiza maculata* (Raf.) Raf. (coralroot), **E.** *Goodyera oblongifolia* (western rattlesnake plantain), and **F.** *Platanthera purpurascens* (Rydb.) Sheviak & Jennings (bog orchid). Photos taken by Jennifer Ackerfield (B, C, E, and F) and Audrey Spencer (A and D).

One additional unique feature of Axton Ranch Mountain Park was the presence of a pond full of western tiger salamanders or *Ambystoma mavortium* Baird (Figures 37; 38). Tiger salamanders have a unique life history in which they have an aquatic larval form with gills and a land form with lungs. In the spring, the tiger salamander is laid as an egg in water. This egg then hatches into a gilled, aquatic larva that spends the summer eating and growing. At summer's end the larval tiger salamanders usually metamorphose into land-dwelling salamanders that have traded gills for lungs.

However, some tiger salamander larvae, especially those inhabiting small lakes, may remain in their larval form permanently, a condition known as "neoteny." Tiger salamanders will remain in neoteny in bodies of water that contain no fish. Tiger salamanders even attain sexual maturity and can breed in this larval form. All tiger salamanders at Axton Ranch were found only in the larval stage (Figure 34). Although the western tiger salamander is not rare in Colorado, the discovery of a pond of neotenic salamanders was unusual.

Figure 37. Western tiger salamanders in the larval form at Axton Ranch Mountain Park. Photo by Jennifer Ackerfield.

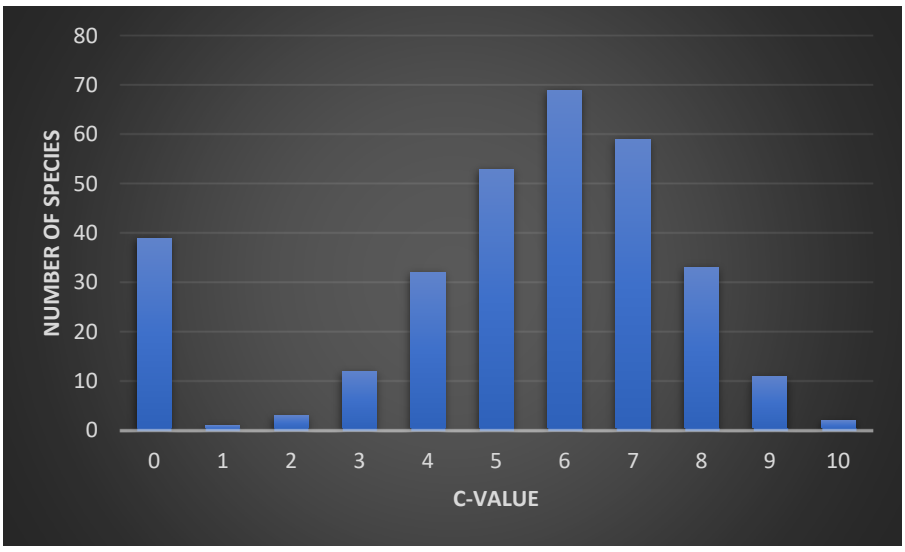
Figure 38. Location of the salamander pond at Axton Ranch Mountain Park.



Coefficients of Conservatism and Floristic Quality Index

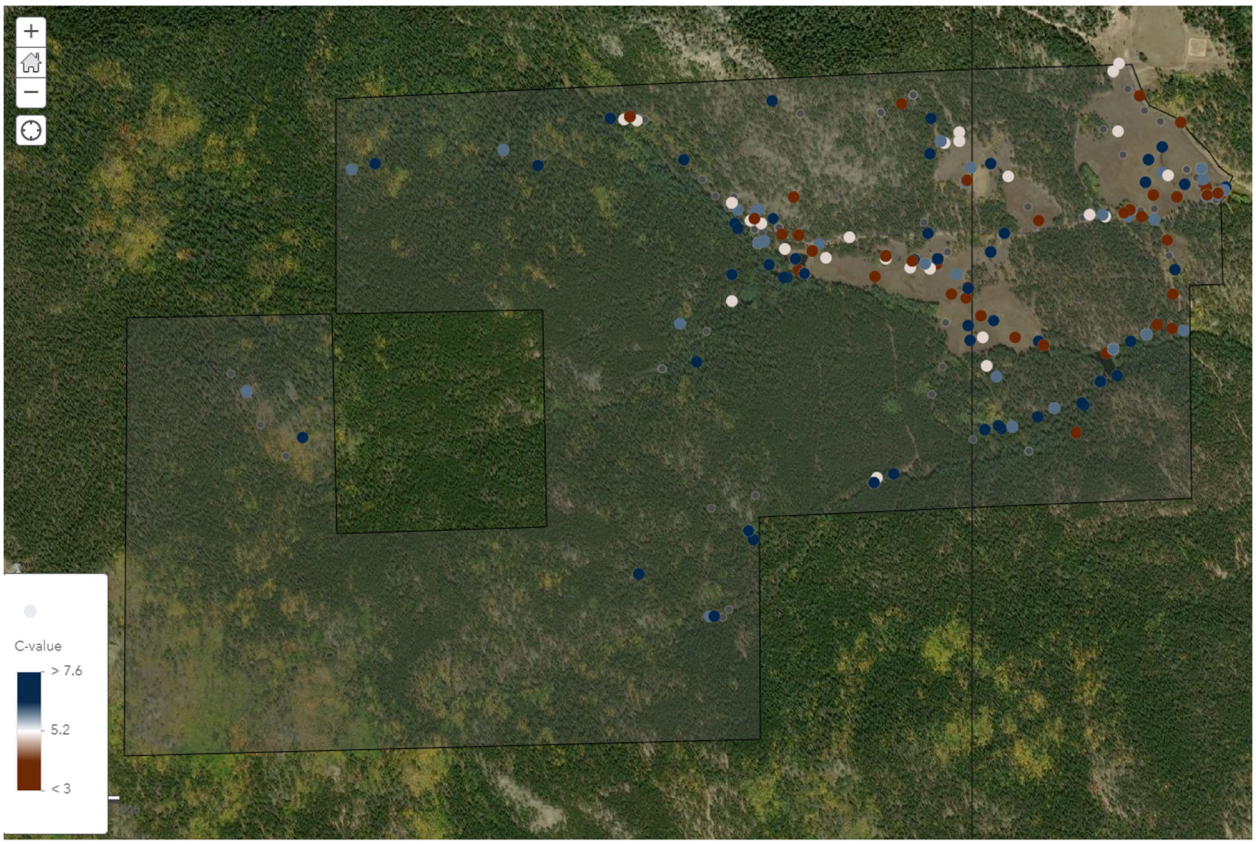
The Coefficients of Conservatism or C-values for all native plant species found at Axton Ranch Mountain Park were distributed in a normal pattern (Figure 39). For the entirety of Axton Ranch Mountain Park, the mean C-value for all species, including introduced species, is five and the mean C-value for only native species is six. This indicates that overall, most native species show some affinity to natural areas and are often abundant or are present across a wide range of habitats and environments.

Figure 39. Total vascular plant species per C-value.



The majority of species with low C-values, including introduced species whose C-value is always zero, were located along the roads at Axton Ranch or in the ruderal hay meadow (Figure 40).

Figure 40. Map of plant species' C-values at Axton Ranch Mountain Park. C-values range from 0-10. Lower C-values are indicated in maroon and higher C-values are indicated in dark blue.

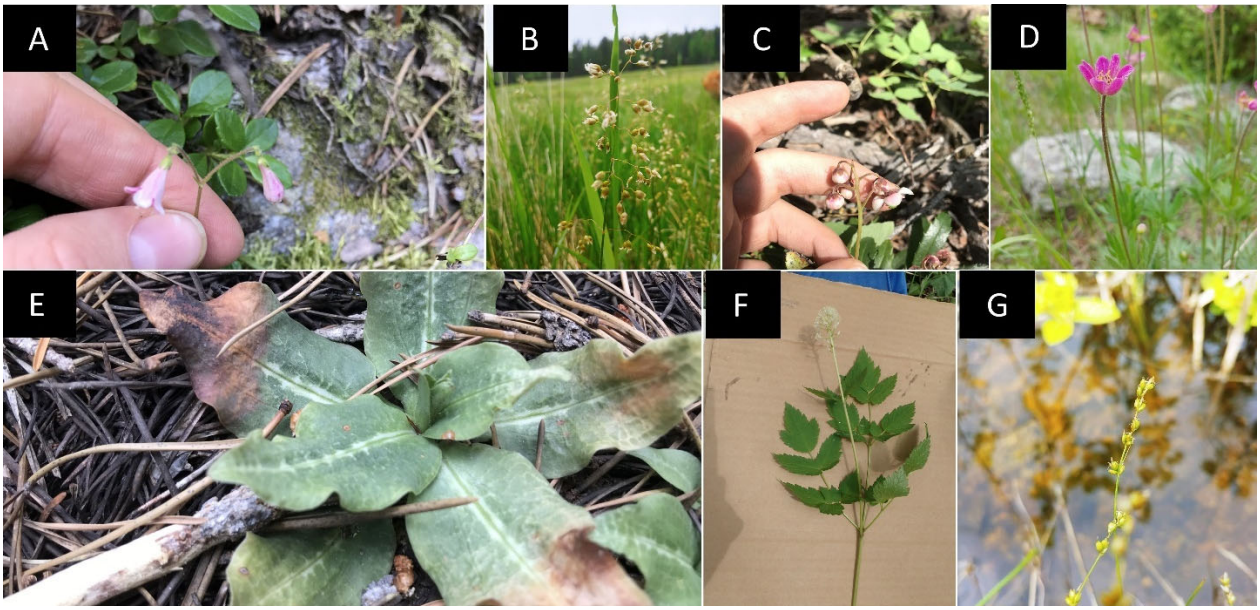


Species with high C-values were primarily found in wet meadows and along riparian corridors within the lodgepole pine-spruce forests. Examples of species with high C-values are shown in Figure 41.

The Floristic Quality Index (FQI) uses vegetation composition as a means of assessing ecological condition. At Axton Ranch Mountain Park, the FQI was calculated to be 90. The FQI was calculated by taking the mean of all C-values (5) and multiplying it by the square root of the total number of species, both introduced and native (18). This FQI is exceptionally high, indicating that Axton Ranch mostly consists of intact ecosystems where ecological processes, functions, composition, and structure have not been (or minimally so) degraded or altered by human stressors.

This FQI could serve as a useful baseline for future land management and ecosystem monitoring to evaluate the effectiveness of protection projects and management practices (i.e., hydrologic changes, weed control, etc.).

Figure 41. Examples of vascular plant species with high C-values.



A. *Linnaea borealis* L. ssp. *americana* (Forbes Hultén ex R.T. Clausen (twinflower), **B.** *Anthoxanthum hirtum* (northern sweetgrass), **C.** *Chimaphila umbellata* (L.) W.P.C. Barton (pipsissewa), **D.** *Anemone multifida* Poir. (anemone), **E.** *Goodyera oblongifolia* (western rattlesnake plantain), **F.** *Actaea rubra* (Aiton) Willd. (red baneberry), and **G.** *Carex disperma* Dewey (softleaf sedge). Photos taken by Jennifer Ackerfield (B, D, E, F and G) and Audrey Spencer (A and C).

Potential threats

There are two main potential threats to the plant communities at Axton Ranch Mountain Park: 1) hydrological changes and 2) spread of introduced species.

Hydrological changes could threaten wetlands and riparian areas along streams in lodgepole pine forests. Changes to the hydrology could significantly alter the soil chemistry and plant and animal communities which rely on groundwater to survive. Common hydrologic alternations in wetland areas include:

- Drainage
- Deposition of fill material
- Dredging and stream channelization
- Diversion of water to or from wetlands

Wetlands are important for water quality protection, providing habitat for plants and animals, and as natural floodwater storage. A change in the hydrology of the wetlands at Axton Ranch could result in the loss of plant diversity. And once gone, these species may never return if the conditions are altered such that their ecological needs are no longer present. In particular, obligate wetland species are highly susceptible to hydrological changes as they are dependent on water for survival. Therefore, it is important that the wetlands at Axton Ranch Mountain Park undergo active land management and

protection in order to conserve them and ensure that they do not become degraded. Maintaining adjacent buffer strips of land next to wetlands could help reduce potential threats.

Introduced species, in particular those designated by the state as noxious weeds, have the potential to outcompete native plants and lead to degradation of plant communities (Ziska & Dukes 2011). Introduced species often spread quickly and some, such as Canada thistle, have the potential to create monocultures (e.g., the displacement of all other vegetation in an area). Introduced species can have detrimental effects of plant communities including:

- Reduction in native biodiversity
- Loss of habitat for native species
- Changes in biogeochemical cycling

Careful mitigation and management of the introduced species that are classified as noxious weeds would ensure that the plant communities at Axton Ranch remain intact. Early detection and rapid response (removal) of noxious weeds could prevent the spread of introduced species to new areas.

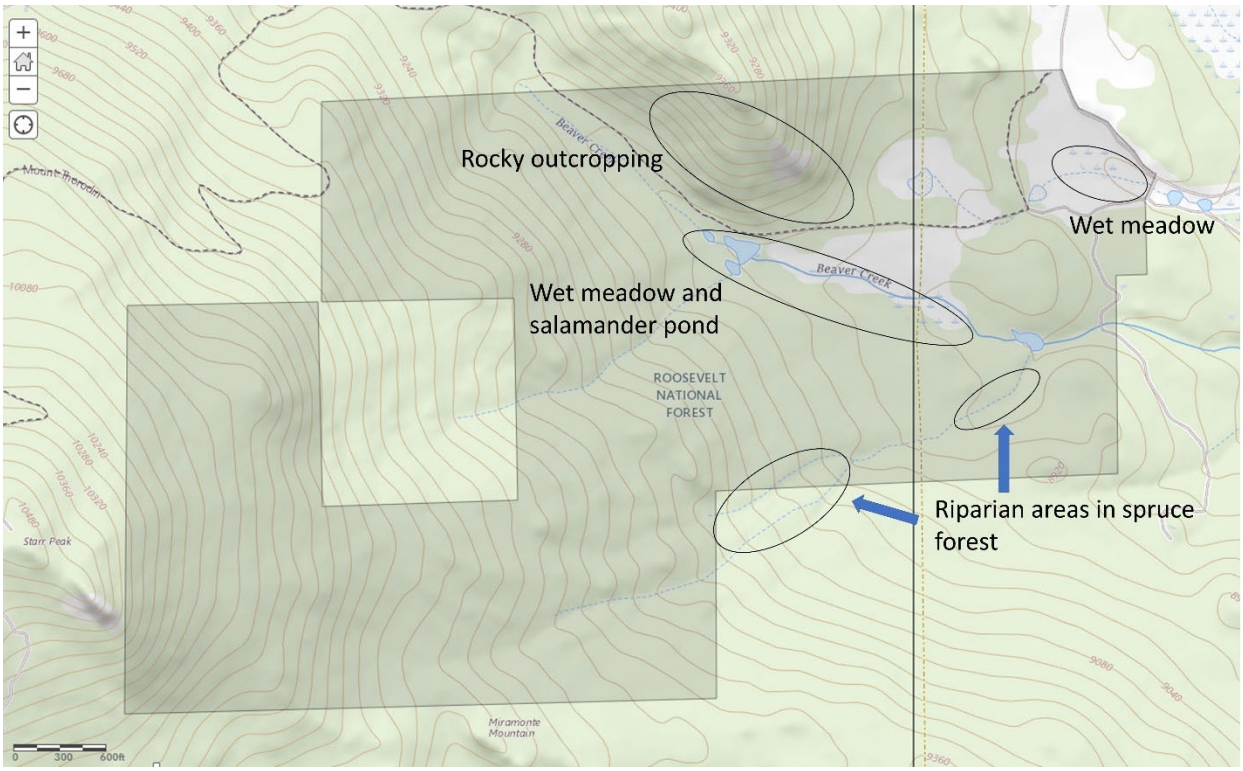
Priority Conservation Areas

Priority conservation areas are locations designated for the protection of natural habitats, rare species, and the preservation of open space for future generations. Priority conservation areas are determined from species' distribution, rarity, and vulnerability. Therefore, the results of the floristic study allow us to determine priority areas of conservation. High priority areas for conservation are locations that contain high species diversity, species with overall high C-values, and rare or noteworthy species, or have an increased potential to be threatened with a loss of biodiversity. Taking these values into consideration, at Axton Ranch the priority conservation were determined to be: 1) rocky outcropping on the northern edge of the property, 2) two wet meadows, and 3) riparian areas along streams in lodgepole pine forests (Figure 42).

Both rare species (*Asplenium septentrionale* and *Senecio rapifolius*) were found in the Rocky Mountain Foothill-Rock Outcrop Limber Pine – Juniper Woodland plant community type, on the rocky outcropping in the northern party of property (Figure 36). We suggest that this area be carefully monitored for introduced species that could displace these or other native species.

Also, if trails are built in this area, we recommend that they bypass populations of the two rare plant species to offer further protection. A likely destination for people at Axton Ranch Mountain Park would be the highest point, Starr Peak, which lies just outside of the park boundary. If possible, redesigning the trail to Starr Peak to avoid the wet meadow, salamander pond, and rocky outcropping would help conserve these areas and reduce the chance of disturbance and reduce the spread of introduced species. The map shows the current location of the trail to Starr Peak, passing directly through these vulnerable habitats.

Figure 42. Map indicating areas of priority conservation. Trail to Starr Peak is indicated by the dotted line. Boundary of Axton Ranch is shaded.



Conclusion

As a snapshot in time, floristic inventories are critical to understanding the present biodiversity of an area. Additionally, by providing a baseline of plant species composition, floristic inventories are an important land management tool central to conserving biodiversity and maintaining ecosystems for long-term sustainability and ecosystem function. This floristic inventory of Axton Ranch Mountain Park will provide a snapshot of the property at this point in time, which will be useful for tracking any future impacts on plant community composition. The historical land use information provided by Kathy Axton was especially useful in determining the origin of some of the present-day species at Axton Ranch. In particular, the introduced grass species that were probably brought in for hay align with this property's past as a working ranch. Gathering historical information from landowners is thus extremely valuable to understanding the present-day biodiversity of an area.

Axton Ranch Mountain Park is a floristically diverse property, with one in every 10 flowering plant species in Colorado found within its boundary. Eight species of orchids were also found on the property, nearly three times the average for the state of Colorado. Overall, the floral composition mostly consisted of native plants, the majority of which show an affinity to undisturbed natural areas. This floristic inventory also provides evidence of historically good land stewardship by the Axton family.

Additionally, wetlands consisting of wet meadows supported a diverse assortment of obligate and facultative wetland species, including some uncommon plant species in Colorado. Two rare species were

found on the rocky outcropping located on the northern portion of the property. Wet meadows, riparian areas along streams in forests, and the rocky outcropping were all designated as areas of priority conservation as they consisted of high species diversity, included rare or uncommon species, and had an increased potential for threats due to hydrologic changes and/or the spread of introduced species displacing native species.

This project also highlights the importance of providing immersive learning opportunities in science to high school students. Overall, six high school students took part in this authentic learning opportunity, many of whom were from underrepresented groups. While we cannot quantify the long-term impacts of providing immersive learning opportunities for high school students just yet, we do have evidence in the short-term that this opportunity helped direct the paths of at least three high school interns. Two high school interns are now majoring in the natural resources in college, while another is creating an herbarium of local plants for their high school capstone project. Ultimately, by training the next generation at such an early career stage, these students now have the foundation necessary to understand not only the importance of biodiversity and are more invested in protecting it for future generations.

High school interns and Gardens' staff in a meadow of *Thermopsis rhombifolia* (goldenbanner) and *Primula pauciflora* (shooting star) at Axton Ranch Mountain Park, June 2021

Acknowledgements

Many people and organizations made this project possible. We would like to thank Kathy Axton and her daughter Annette Iszler for joining us in the field and supplying useful background information on Axton Ranch, all Denver Botanic Gardens staff and volunteers that helped make field collections (Tohmi Barrett, Tiffany Gentry, Sue Janssen, Rick Levy, Anthony Meluso, Jennifer Neale, Katy Saunders, Collin Schumann, and Janet Wingate), all high school interns for assisting with field collections and data entry (Lilja Anderson, Kaliya Carrillo, Kiley Cole, Emma Dencker, Cree Moo, and Jessie Stong), Denver Botanic Gardens Emeritus Curator Janet Wingate for identifying all grass and sedge specimens, Margo Yousse and all Kathryn Kalmbach Herbarium volunteers for helping process specimens, Denver Mountain Parks for assisting with maps of the Axton Ranch boundary and providing access to the property, and Denver Mountain Parks Foundation for their generous support.

From left to right: Kate Fritz (Denver Mountain Parks Foundation), Kathy Axton (original land owner), Brad Eckert (Denver Mountain Parks), and Audrey Spencer (Denver Botanic Gardens and lead collector)

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Appendix 1. Checklist of vascular plant species

Category	Family	Species	Native/ Introduced	C-value	Wetland value	CNHP State Rank	Noxious Rank
Angiosperm	Adoxaceae	Sambucus racemosa L.	Native	6	FACU		
Angiosperm	Adoxaceae	Viburnum edule (Michx.) Raf.	Native	6	FACU		
Angiosperm	Amaryllidaceae	Allium cernuum Roth	Native	5	FACU		
Angiosperm	Amaryllidaceae	Allium geyeri S. Watson var. geyeri	Native	5	FACU		
Angiosperm	Apiaceae	Carum carvi	Introduced	0			List B
Angiosperm	Apiaceae	Harbouria trachypleura (A. Gray) Coult. & Rose	Native	6			
Angiosperm	Apiaceae	Heracleum maximum Bartr.	Native	6	FACW		
Angiosperm	Apiaceae	Ligusticum porteri Coult. & Rose	Native	7	FACU		
Angiosperm	Apiaceae	Osmorhiza depauperata Phil.	Native	7			
Angiosperm	Apiaceae	Pseudocymopterus montanus (A. Gray) J.M. Coult. & Rose	Native	6			
Angiosperm	Asparagaceae	Maianthemum stellatum (L.) Link	Native	7	FAC		
Angiosperm	Asteraceae	Achillea millefolium L.	Native	4	FACU		
Angiosperm	Asteraceae	Agoseris aurantiaca (Hook.) Greene var. purpurea (A. Gray) Cronq.	Native	6	FACU		
Angiosperm	Asteraceae	Agoseris glauca (Pursh) Raf. var. dasycephala	Native	7	FACU		
Angiosperm	Asteraceae	Agoseris glauca (Pursh) Raf. var. glauca	Native	7	FACU		
Angiosperm	Asteraceae	Ambrosia tomentosa Nutt.	Native	3			
Angiosperm	Asteraceae	Anaphalis margaritacea (L.) Benth. & Hook.	Native	4	FACU		
Angiosperm	Asteraceae	Antennaria anaphaloides Rydb.	Native	5	FAC		
Angiosperm	Asteraceae	Antennaria microphylla Rydb.	Native	5			
Angiosperm	Asteraceae	Antennaria parvifolia Nutt.	Native	5			
Angiosperm	Asteraceae	Antennaria rosea Greene	Native	5			
Angiosperm	Asteraceae	Arnica cordifolia Hook.	Native	7			
Angiosperm	Asteraceae	Arnica fulgens Pursh	Native	6	FACU		
Angiosperm	Asteraceae	Artemisia campestris L. var. pacifica (Nutt.) M. Peck	Native	5	FACU		
Angiosperm	Asteraceae	Artemisia frigida Willd.	Native	4	FACU		
Angiosperm	Asteraceae	Artemisia ludoviciana Nutt.	Native	4	FACU		
Angiosperm	Asteraceae	Carduus nutans L.	Introduced	0			List B
Angiosperm	Asteraceae	Cirsium arvense	Introduced	0			List B
Angiosperm	Asteraceae	Cirsium centaureae (Rydb.) K. Schum.	Native	6			
Angiosperm	Asteraceae	Crepis runcinata (James) Torr. & A. Gray ssp. runcinata	Native	6	FACW		

Angiosperm	Asteraceae	Dieteria bigelovii (A. Gray) D.R. Morgan & R.L. Hartman var. bigelovii	Native	3	FACW		
Angiosperm	Asteraceae	Erigeron compositus Pursh	Native	6			
Angiosperm	Asteraceae	Erigeron eximius Greene	Native	7			
Angiosperm	Asteraceae	Erigeron flagellaris A. Gray	Native	3	FAC		
Angiosperm	Asteraceae	Erigeron formosissimus Greene	Native	6	FACU		
Angiosperm	Asteraceae	Erigeron speciosus (Lindl.) DC.	Native	5			
Angiosperm	Asteraceae	Erigeron vetensis Rydb.	Native	6			
Angiosperm	Asteraceae	Gaillardia aristata Pursh	Native	4	UPL		
Angiosperm	Asteraceae	Grindelia subalpina Greene	Native	4			
Angiosperm	Asteraceae	Helianthella quinquenervis (Hook.) A.Gray	Native	7	FACU		
Angiosperm	Asteraceae	Heterotheca foliosa (Nutt.) Shinners	Native	5			
Angiosperm	Asteraceae	Heterotheca villosa (Pursh) Shinners var. nana (A. Gray) Semple	Native	3			
Angiosperm	Asteraceae	Hieracium albiflorum Hook.	Native	5			
Angiosperm	Asteraceae	Hymenothrix dissecta (A. Gray) B.G. Baldwin	Native	5			
Angiosperm	Asteraceae	Leucanthemum vulgare Lam.	Introduced	0	FACU		
Angiosperm	Asteraceae	Madia glomerata Hook.	Native	3	FACU		
Angiosperm	Asteraceae	Matricaria discoidea DC.	Introduced	0	FACU		
Angiosperm	Asteraceae	Oreochrysum parryi (A. Gray) Rydb.	Native	8			
Angiosperm	Asteraceae	Packera fendleri (A. Gray) W.A. Weber & A. Löve	Native	4			
Angiosperm	Asteraceae	Packera werneriifolia (A.Gray) W.A.Weber & Á.Löve ex Trock	Native	7			
Angiosperm	Asteraceae	Pseudognaphalium canescens (DC.) W.A. Weber	Native	4	FACU		
Angiosperm	Asteraceae	Rudbeckia hirta L. var. pulcherrima Farw.	Native	6	FACU		
Angiosperm	Asteraceae	Rudbeckia laciniata L. var. ampla (A. Nels.) Cronq.	Native	6	FAC		
Angiosperm	Asteraceae	Senecio eremophilus Richardson var. kingii (Rydb.) Greenm.	Native	4	FACU		
Angiosperm	Asteraceae	Senecio integerrimus Nutt.	Native	5	FACW		
Angiosperm	Asteraceae	Senecio rapifolius Nutt.	Native	8		S3	
Angiosperm	Asteraceae	Senecio triangularis Hook.	Native	7	FACU		
Angiosperm	Asteraceae	Senecio wootonii Greene	Native	7			
Angiosperm	Asteraceae	Solidago missouriensis Nutt.	Native	5			
Angiosperm	Asteraceae	Solidago multiradiata Aiton	Native	5	FACU		
Angiosperm	Asteraceae	Solidago simplex Kunth var. simplex	Native	6	FACU		
Angiosperm	Asteraceae	Symphyotrichum lanceolatum (Willd.) G.L. Nesom ssp. hesperium (A. Gray) G.L. Nesom	Native	5	OBL		

Angiosperm	Asteraceae	Symphyotrichum porteri (A. Gray) G.L. Nesom	Native	6	FACU		
Angiosperm	Asteraceae	Taraxacum officinale G.H. Weber ex Wiggers	Introduced	0	FACU		
Angiosperm	Asteraceae	Tragopogon dubius Scop.	Introduced	0			
Angiosperm	Betulaceae	Alnus incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung	Native	6	FACW		
Angiosperm	Boraginaceae	Mertensia ciliata (James ex Torr.) G. Don var. ciliata	Native	7	OBL		
Angiosperm	Boraginaceae	Mertensia lanceolata (Pursh) DC.	Native	6			
Angiosperm	Boraginaceae	Oreocarya virgata Porter	Native	5			
Angiosperm	Boraginaceae	Plagiobothrys scouleri (Hook. & Arn.) I.M. Johnston var. hispidulus (Greene) Dorn	Native	3	FACU		
Angiosperm	Brassicaceae	Alyssum simplex Rudolphi	Introduced	0			
Angiosperm	Brassicaceae	Barbarea vulgaris W.T. Aiton	Introduced	0	FACU		
Angiosperm	Brassicaceae	Boechera fendleri (S. Watson) W.A. Weber	Native	6			
Angiosperm	Brassicaceae	Boechera spatifolia (Rydb.) Windham & Al-Shehbaz	Native	6			
Angiosperm	Brassicaceae	Boechera stricta (Graham) Al-Shehbaz	Native	5	FACU		
Angiosperm	Brassicaceae	Descurainia incisa (Engelm. ex A. Gray) Britton ssp. incisa	Native	2			
Angiosperm	Brassicaceae	Draba streptocarpa A. Gray	Native	8			
Angiosperm	Brassicaceae	Erysimum capitatum (Douglas ex Hook.) Greene	Native	5			
Angiosperm	Brassicaceae	Noccaea fendleri (A. Gray) Holub ssp. glauca (A. Nels.) Al-Shehbaz & M. Koch	Native	5			
Angiosperm	Brassicaceae	Thlaspi arvense L.	Introduced	0	UPL		
Angiosperm	Campanulaceae	Campanula rotundifolia L.	Native	5	FAC		
Angiosperm	Cannabaceae	Humulus neomexicanus Rydb.	Native	5	FACU		
Angiosperm	Caprifoliaceae	Lonicera involucrata (Rich.) Banks ex Spreng.	Native	7	FACU		
Angiosperm	Caryophyllaceae	Cerastium arvense L. ssp. strictum Gaudin	Native	5	FACU		
Angiosperm	Caryophyllaceae	Cerastium fontanum Baumg. ssp. vulgare (Hartm.) Greuter & Burdet	Introduced	0	FACU		
Angiosperm	Caryophyllaceae	Silene scouleri Hook.	Native	5			
Angiosperm	Caryophyllaceae	Spergularia rubra (L.) J.& K. Presl	Introduced	0	FACU		
Angiosperm	Caryophyllaceae	Stellaria calycantha (Ledeb.) Bong.	Native	8	FACW		
Angiosperm	Caryophyllaceae	Stellaria irrigua Bunge	Native	8	FAC		
Angiosperm	Caryophyllaceae	Stellaria longifolia Muhl. ex Willd.	Native	7	OBL		
Angiosperm	Chenopodiaceae	Chenopodium spp.	Native				
Angiosperm	Clusiaceae	Hypericum perforatum L.	Introduced	0	FACU		List C
Angiosperm	Convolvulaceae	Convolvulus arvensis L.	Introduced	0			List C

Angiosperm	Crassulaceae	Rhodiola rhodantha (A. Gray) Jacobsen	Native	8	FACW		
Angiosperm	Crassulaceae	Sedum lanceolatum Torr.	Native	5			
Angiosperm	Cyperaceae	Carex aquatilis Wahl.	Native	6	OBL		
Angiosperm	Cyperaceae	Carex athrostachya Olney	Native	7	FACU		
Angiosperm	Cyperaceae	Carex aurea Nutt.	Native	7	FACW		
Angiosperm	Cyperaceae	Carex canescens L. ssp. canescens	Native	8	FACU		
Angiosperm	Cyperaceae	Carex disperma Dewey	Native	9	FACU		
Angiosperm	Cyperaceae	Carex duriuscula C.A. Mey.	Native	7			
Angiosperm	Cyperaceae	Carex geophila Mack.	Native	7			
Angiosperm	Cyperaceae	Carex microptera Mack.	Native	5	FACU		
Angiosperm	Cyperaceae	Carex nebrascensis Dewey	Native	5	OBL		
Angiosperm	Cyperaceae	Carex occidentalis Bailey	Native	7			
Angiosperm	Cyperaceae	Carex pityophila Mack.	Native	8			
Angiosperm	Cyperaceae	Carex praticola Rydb.	Native	6	FACW		
Angiosperm	Cyperaceae	Carex siccata Dewey	Native	6	FACU		
Angiosperm	Cyperaceae	Carex simulata Mack.	Native	6	FACU		
Angiosperm	Cyperaceae	Carex stevenii (T. Hom) Kalela	Native	9	FACU		
Angiosperm	Cyperaceae	Carex utriculata Boott	Native	5	OBL		
Angiosperm	Cyperaceae	Eleocharis palustris (L.) Roemer & J.A. Schultes	Native	3	OBL		
Angiosperm	Elaeagnaceae	Shepherdia canadensis (L.) Nutt.	Native	7	FACU		
Angiosperm	Ericaceae	Arctostaphylos uva-ursi (L.) Spreng.	Native	6	FACU		
Angiosperm	Ericaceae	Chimaphila umbellata (L.) W.P.C. Bart.	Native	9			
Angiosperm	Ericaceae	Orthilia secunda (L.) House	Native	8	FACU		
Angiosperm	Ericaceae	Pterospora andromedea Nutt.	Native	7			
Angiosperm	Ericaceae	Pyrola asarifolia Michx.	Native	8	FACW		
Angiosperm	Ericaceae	Pyrola chlorantha Sw.	Native	8	FACU		
Angiosperm	Ericaceae	Pyrola minor L.	Native	8	FACU		
Angiosperm	Ericaceae	Vaccinium myrtillus L.	Native	6	UPL		
Angiosperm	Fabaceae	Astragalus alpinus L.	Native	6	FACU		
Angiosperm	Fabaceae	Astragalus flexuosus (Hook.) Douglas ex G. Don var. flexuosus	Native	6			
Angiosperm	Fabaceae	Astragalus laxmannii Jacq. var. robustior (Hook.) Barneby & Welsh	Native	6			
Angiosperm	Fabaceae	Astragalus parryi A. Gray	Native	4			
Angiosperm	Fabaceae	Astragalus tenellus Pursh	Native	6			
Angiosperm	Fabaceae	Lupinus argenteus Pursh var. argenteus	Native	5			
Angiosperm	Fabaceae	Medicago lupulina L.	Introduced	0	FACU		
Angiosperm	Fabaceae	Melilotus officinalis (L.) Lam.	Introduced	0	FACU		

Angiosperm	Fabaceae	Oxytropis deflexa (Pall.) DC. var. sericea Torr. & A. Gray	Native	8	FACU		
Angiosperm	Fabaceae	Oxytropis lambertii Pursh	Native	4	FACU		
Angiosperm	Fabaceae	Oxytropis multiceps Nutt.	Native	8			
Angiosperm	Fabaceae	Thermopsis rhombifolia (Nutt. ex Pursh) Nutt. ex Richardson var. divaricarpa (A. Nels.) Isely	Native	6	FAC		
Angiosperm	Fabaceae	Trifolium hybridum L.	Introduced	0	FAC		
Angiosperm	Fabaceae	Trifolium pratense L.	Introduced	0	FACU		
Angiosperm	Fabaceae	Trifolium repens L.	Introduced	0	FAC		
Angiosperm	Gentianaceae	Frasera speciosa Douglas ex Griseb.	Native	6			
Angiosperm	Gentianaceae	Gentiana fremontii Torr.	Native	9	OBL		
Angiosperm	Gentianaceae	Gentianella heterosepala (Engelm.) Holub	Native	8	FACW		
Angiosperm	Gentianaceae	Swertia perennis L.	Native	8	FACW		
Angiosperm	Geraniaceae	Geranium caespitosum James	Native	6	FAC		
Angiosperm	Geraniaceae	Geranium richardsonii Fisch. & Trautv.	Native	6	FACU		
Angiosperm	Grossulariaceae	Ribes cereum Douglas	Native	6	UPL		
Angiosperm	Hydrangeaceae	Jamesia americana Torr. & A. Gray var. americana	Native	7	UPL		
Angiosperm	Hydrophyllaceae	Hydrophyllum fendleri (A. Gray) Heller var. fendleri	Native	7	FAC		
Angiosperm	Hydrophyllaceae	Phacelia alba Rydb.	Native	2			
Angiosperm	Hydrophyllaceae	Phacelia hastata Douglas ex Lehm.	Native	5			
Angiosperm	Hydrophyllaceae	Phacelia heterophylla Pursh	Native	6	FACU		
Angiosperm	Iridaceae	Iris missouriensis Nutt.	Native	4	OBL		
Angiosperm	Iridaceae	Sisyrinchium montanum Greene var. montanum	Native	6	FAC		
Angiosperm	Juncaceae	Juncus arcticus Willd. var. balticus (Willd.) Trautv.	Native	4	OBL		
Angiosperm	Juncaceae	Juncus bufonius L.	Native	3	OBL		
Angiosperm	Juncaceae	Juncus confusus Coville	Native	5	FACU		
Angiosperm	Juncaceae	Juncus ensifolius Wikstr.	Native	6	FACU		
Angiosperm	Juncaceae	Juncus longistylis Torr.	Native	6	FACW		
Angiosperm	Juncaceae	Luzula parviflora (Ehrh.) Desv.	Native	7	FAC		
Angiosperm	Juncaginaceae	Triglochin palustris L.	Native	7	OBL		
Angiosperm	Lamiaceae	Mentha arvensis L.	Native	4	FACW		
Angiosperm	Liliaceae	Calochortus gunnisonii S. Watson	Native	7			
Angiosperm	Liliaceae	Streptopus amplexifolius (L.) DC.	Native	7	FACW		
Angiosperm	Linnaeaceae	Linnaea borealis L. var. longiflora Torr.	Native	9	FACU		
Angiosperm	Malvaceae	Sidalcea neomexicana A. Gray	Native	5	FACU		
Angiosperm	Melanthiaceae	Anticlea elegans (Pursh) Rydb.	Native	6	FACU		
Angiosperm	Onagraceae	Chamerion angustifolium (L.) Holub	Native	6	FACW		

Angiosperm	Onagraceae	Epilobium glandulosum Lehm.	Native	4	OBL		
Angiosperm	Onagraceae	Epilobium halleanum Hausskn.	Native	8	FACU		
Angiosperm	Onagraceae	Epilobium hornemannii Reichenb.	Native	6	FACW		
Angiosperm	Onagraceae	Epilobium saximontanum Hausskn.	Native	6	FACW		
Angiosperm	Onagraceae	Gayophytum diffusum Torr. & A. Gray ssp. parviflorum F.H. Lewis & Szweyk.	Native	4			
Angiosperm	Onagraceae	Gayophytum ramosissimum Torr. & A. Gray	Native	6			
Angiosperm	Onagraceae	Oenothera flava (A. Nels.) Garrett	Native	6	FACW		
Angiosperm	Onagraceae	Oenothera villosa Thunb. ssp. villosa	Native	4	FACU		
Angiosperm	Orchidaceae	Calypso bulbosa (L.) Oakes var. americana (R. Br. ex Ait. f.) Luer	Native	8	FACW		
Angiosperm	Orchidaceae	Corallorhiza maculata (Raf.) Raf.	Native	7	UPL		
Angiosperm	Orchidaceae	Dactylorhiza viridis (L.) R.M. Bateman, Pridgeon & M.W. Chase	Native	7	FAC		
Angiosperm	Orchidaceae	Goodyera oblongifolia Raf.	Native	9	UPL		
Angiosperm	Orchidaceae	Platanthera huronensis (Nutt.) Lindl.	Native	7	FACW		
Angiosperm	Orchidaceae	Platanthera purpurascens (Rydb.) Sheviak & W.F. Jenn.	Native	8	FACU		
Angiosperm	Orchidaceae	Spiranthes romanzoffiana Cham.	Native	7	OBL		
Angiosperm	Orobanchaceae	Castilleja linariifolia Benth.	Native	6			
Angiosperm	Orobanchaceae	Castilleja miniata Douglas ex Hook.	Native	7	FAC		
Angiosperm	Orobanchaceae	Castilleja rhexiifolia Rydb.	Native	8	FACU		
Angiosperm	Orobanchaceae	Castilleja septentrionalis Lindley	Native	7	FACU		
Angiosperm	Orobanchaceae	Orthocarpus luteus Nutt.	Native	6	FACU		
Angiosperm	Orobanchaceae	Pedicularis procera A. Gray	Native	8	FACU		
Angiosperm	Papaveraceae	Corydalis aurea Willd. ssp. aurea	Native	5			
Angiosperm	Plantaginaceae	Collinsia parviflora Lindl.	Native	4			
Angiosperm	Plantaginaceae	Penstemon glaber Pursh var. alpinus (Torr.) A. Gray	Native	7			
Angiosperm	Plantaginaceae	Penstemon virens Pennell ex Rydb.	Native	7			
Angiosperm	Plantaginaceae	Plantago major L.	Introduced	0	FAC		
Angiosperm	Plantaginaceae	Veronica americana Schwein. ex Benth.	Native	6	OBL		
Angiosperm	Plantaginaceae	Veronica peregrina L.	Native	2	OBL		
Angiosperm	Plantaginaceae	Veronica serpyllifolia L. ssp. humifusa (Dickson) Syme	Native	6	OBL		
Angiosperm	Poaceae	Agrostis gigantea Roth	Introduced	0	FACW		
Angiosperm	Poaceae	Agrostis scabra Willd.	Native	4	FAC		

Angiosperm	Poaceae	Alopecurus aequalis Sobol.	Native	4	OBL		
Angiosperm	Poaceae	Alopecurus arundinaceus Poir.	Introduced	0	FAC		
Angiosperm	Poaceae	Alopecurus pratensis L.	Introduced	0	FAC		
Angiosperm	Poaceae	Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp	Native	9	FACW		
Angiosperm	Poaceae	Beckmannia syzigachne (Steud.) Fern.	Native	4	OBL		
Angiosperm	Poaceae	Bromus inermis Leyss.	Introduced	0	UPL		
Angiosperm	Poaceae	Bromus richardsonii Link.	Native	6	FACU		
Angiosperm	Poaceae	Calamagrostis canadensis (Michx.) Beauv.	Native	6	OBL		
Angiosperm	Poaceae	Calamagrostis purpurascens R. Br.	Native	7			
Angiosperm	Poaceae	Cinna latifolia (Trev. ex Goepp.) Griseb.	Native	6	OBL		
Angiosperm	Poaceae	Dactylis glomerata L.	Introduced	0	FACU		
Angiosperm	Poaceae	Danthonia parryi Scribn.	Native	8			
Angiosperm	Poaceae	Deschampsia cespitosa (L.) Beauv.	Native	4	FACW		
Angiosperm	Poaceae	Elymus elymoides (Raf.) Swezey	Native	4	FACU		
Angiosperm	Poaceae	Elymus repens (L.) Gould	Introduced	0	FAC		
Angiosperm	Poaceae	Elymus trachycaulus (Link) Gould ex Shinners	Native	3	FAC		
Angiosperm	Poaceae	Eriocoma nelsonii (Scribn.) Romasch.	Native	6			
Angiosperm	Poaceae	Festuca saximontana Rydb. var. saximontana	Native	7			
Angiosperm	Poaceae	Glyceria borealis (Nash) Batch.	Native	8	OBL		
Angiosperm	Poaceae	Glyceria grandis S. Watson	Native	6	OBL		
Angiosperm	Poaceae	Glyceria striata (Lam.) A.S. Hitchc.	Native	6	OBL		
Angiosperm	Poaceae	Graphephorum wolfii (Vasey) Coult.	Native	7	FACU		
Angiosperm	Poaceae	Hordeum brachyantherum Nevski	Native	4	FACW		
Angiosperm	Poaceae	Koeleria macrantha (Ledeb.) J.A. Schultes	Native	6			
Angiosperm	Poaceae	Lolium arundinaceum (Schreb.) Darbysh.	Introduced	0	FACU		
Angiosperm	Poaceae	Lolium pratense (Huds.) Darbysh.	Introduced	0	FAC		
Angiosperm	Poaceae	Nassella viridula (Trin.) Barkworth	Native	4			
Angiosperm	Poaceae	Oryzopsis asperifolia Michx.	Native	7			
Angiosperm	Poaceae	Phalaris arundinacea L.	Native	1	FACW		
Angiosperm	Poaceae	Phleum pratense L.	Introduced	0	FAC		
Angiosperm	Poaceae	Poa annua L.	Introduced	0	FACU		
Angiosperm	Poaceae	Poa compressa L.	Introduced	0	FACU		

Angiosperm	Poaceae	Poa interior Rydb.	Native	6	FAC		
Angiosperm	Poaceae	Poa leptocoma Trin.	Native	8	FACU		
Angiosperm	Poaceae	Poa palustris L.	Native	6	FACU		
Angiosperm	Poaceae	Poa pratensis L.	Native	4	FACU		
Angiosperm	Poaceae	Podagrostis humilis (Vasey) Bjorkman	Native	10	FACW		
Angiosperm	Poaceae	Schizachne purpurascens (Torr.) Swallen	Native	8	FACU		
Angiosperm	Poaceae	Thinopyrum intermedium (Host) Barkworth & D.R. Dewey	Introduced	0			
Angiosperm	Poaceae	Torreyochloa pallida (Torr.) Church var. pauciflora (J. Presl) J.I. Davis	Native	5	OBL		
Angiosperm	Poaceae	Trisetum spicatum (L.) K. Richt.	Native	7	FACU		
Angiosperm	Polemoniaceae	Aliciella pinnatifida (A. Gray) J.M. Porter	Native	5	FAC		
Angiosperm	Polemoniaceae	Collomia linearis Nutt.	Native	4	FACU		
Angiosperm	Polygonaceae	Bistorta bistortoides	Native	7	FAC		
Angiosperm	Polygonaceae	Eriogonum umbellatum Torr. var. umbellatum	Native	6			
Angiosperm	Polygonaceae	Polygonum aviculare L.	Introduced	0	FACU		
Angiosperm	Polygonaceae	Polygonum douglasii Greene	Native	3	FACU		
Angiosperm	Polygonaceae	Rumex acetosella L.	Introduced	0	FAC		
Angiosperm	Polygonaceae	Rumex crispus L.	Introduced	0	FACW		
Angiosperm	Polygonaceae	Rumex densiflorus Osterh.	Native	5	FACU		
Angiosperm	Polygonaceae	Rumex triangulivalvis (Danser) Rech. f.	Native	4	FAC		
Angiosperm	Potamogetonaceae	Potamogeton gramineus L.	Native	4	OBL		
Angiosperm	Primulaceae	Androsace septentrionalis	Native	6	FACU		
Angiosperm	Primulaceae	Primula pauciflora (Durand) A.R. Mast & Reveal var. pauciflora	Native	8	FAC		
Angiosperm	Ranunculaceae	Aconitum columbianum Nutt. ssp. columbianum	Native	8	FACW		
Angiosperm	Ranunculaceae	Actaea rubra (Ait.) Willd.	Native	9	FACU		
Angiosperm	Ranunculaceae	Anemone multifida Poir. var. multifida	Native	10			
Angiosperm	Ranunculaceae	Aquilegia coerulea James var. coerulea	Native	8	FAC		
Angiosperm	Ranunculaceae	Delphinium ramosum Rydb.	Native	5			
Angiosperm	Ranunculaceae	Pulsatilla nuttalliana (DC.) Spreng.	Native	7			
Angiosperm	Ranunculaceae	Ranunculus aquatilis L. var. diffusa With.	Native	3	OBL		
Angiosperm	Ranunculaceae	Ranunculus flammula L. ovalis (Bigelow) L.D. Benson	Native	5	FACW		
Angiosperm	Ranunculaceae	Ranunculus hyperboreus Rottb.	Native	8	OBL		
Angiosperm	Ranunculaceae	Ranunculus inamoenus Greene var. inamoenus	Native	7	FACW		

Angiosperm	Ranunculaceae	Ranunculus pedatifidus Sm. var. affinis (R. Br.) L. Benson	Native	7	FACU		
Angiosperm	Ranunculaceae	Thalictrum fendleri Engelm. ex A. Gray	Native	6	UPL		
Angiosperm	Ranunculaceae	Thalictrum sparsiflorum Turcz. ex Fisch. & C.A. Mey.	Native	5	FACU		
Angiosperm	Rosaceae	Dasiphora fruticosa (L.) Rydb.	Native	4			
Angiosperm	Rosaceae	Drymocallis fissa (Nutt.) Rydb.	Native	5			
Angiosperm	Rosaceae	Fragaria virginiana Duchesne	Native	5	FACU		
Angiosperm	Rosaceae	Geum macrophyllum Willd. var. perincisum (Rydb.) Raup	Native	6	OBL		
Angiosperm	Rosaceae	Physocarpus monogynus (Torr.) Coult.	Native	7	FAC		
Angiosperm	Rosaceae	Potentilla argentea L.	Introduced	0	FACU		
Angiosperm	Rosaceae	Potentilla gracilis Douglas ex Hook. var. elmeri (Rydb.) Jeps.	Native	5	FAC		
Angiosperm	Rosaceae	Potentilla gracilis Douglas ex Hook. var. fastigiata (Nutt.) S.Watson	Native	5	FAC		
Angiosperm	Rosaceae	Potentilla hippiana Lehm. var. effusa (Dougl. ex Lehm.) Dorn	Native	5	FACU		
Angiosperm	Rosaceae	Potentilla hippiana Lehm. var. hippiana	Native	5	FACU		
Angiosperm	Rosaceae	Potentilla norvegica L.	Introduced	0	FAC		
Angiosperm	Rosaceae	Potentilla pulcherrima Lehm.	Native	5	FAC		
Angiosperm	Rosaceae	Potentilla recta L.	Introduced	0			List B
Angiosperm	Rosaceae	Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	Native	4	FACU		
Angiosperm	Rosaceae	Rosa acicularis Lindl. ssp. sayi (Schwein.) W.H. Lewis	Native	5	FACU		
Angiosperm	Rosaceae	Rosa woodsii Lindl.	Native	5	FACU		
Angiosperm	Rosaceae	Rubus idaeus L. ssp. strigosus (Michx.) Focke	Native	5	FACU		
Angiosperm	Rubiaceae	Galium boreale L.	Native	6	FAC		
Angiosperm	Rubiaceae	Galium trifidum L. ssp. subbiflorum (Wieg.) Piper	Native	7	OBL		
Angiosperm	Rubiaceae	Galium triflorum Michx.	Native	7	FACU		
Angiosperm	Salicaceae	Populus tremuloides Michx.	Native	5	FAC		
Angiosperm	Salicaceae	Salix bebbiana Sarg.	Native	6	FACW		
Angiosperm	Salicaceae	Salix drummondiana Barratt ex Hook.	Native	6	FACW		
Angiosperm	Salicaceae	Salix exigua Nutt.	Native	3	OBL		
Angiosperm	Salicaceae	Salix ligulifolia (C.R. Ball) C.R. Ball ex C.K. Schneid.	Native	7	FAC		
Angiosperm	Salicaceae	Salix monticola Bebb	Native	6	OBL		
Angiosperm	Salicaceae	Salix planifolia Pursh	Native	7	OBL		
Angiosperm	Santalaceae	Arceuthobium cyanocarpum (A. Nels. ex Rydb.) A. Nels.	Native	5			
Angiosperm	Santalaceae	Arceuthobium douglasii Engelm.	Native	5			

Angiosperm	Sapindaceae	Acer glabrum Torr. var. glabrum	Native	7	FAC		
Angiosperm	Saxifragaceae	Heuchera bracteata (Torr.) Ser.	Native	8			
Angiosperm	Saxifragaceae	Micranthes odontoloma (Piper) A. Heller	Native	8	FACW		
Angiosperm	Saxifragaceae	Micranthes rhomboidea (Greene) Small	Native	8	FACW		
Angiosperm	Saxifragaceae	Mitella pentandra Hook.	Native	9	FACW		
Angiosperm	Saxifragaceae	Saxifraga bronchialis L. ssp. austromontana (Wieg.) Piper	Native	8	FACU		
Angiosperm	Scrophulariaceae	Verbascum thapsus L.	Introduced	0	FACU		List C
Angiosperm	Typhaceae	Sparganium angustifolium Michx.	Native	7	OBL		
Angiosperm	Typhaceae	Sparganium emersum Rehmann	Native	7	OBL		
Angiosperm	Urticaceae	Urtica dioica L. ssp. gracilis (Ait.) Seland.	Native	3	FAC		
Angiosperm	Valeriaceae	Valeriana edulis Nutt. ex Torr. & A. Gray	Native	7	FACU		
Angiosperm	Violaceae	Viola macloskeyi F.E. Lloyd	Native	7	FACW		
Angiosperm	Violaceae	Viola palustris L.	Native	7	OBL		
Angiosperm	Violaceae	Viola renifolia A. Gray	Native	7	FACW		
Fern or Lycophyte	Aspleniaceae	Asplenium septentrionale (L.) Hoffm.	Native	9		S3	
Fern or Lycophyte	Cystopteridaceae	Cystopteris fragilis (L.) Bernh.	Native	9	FACU		
Fern or Lycophyte	Equisetaceae	Equisetum arvense L.	Native	4	FAC		
Fern or Lycophyte	Selaginellaceae	Selaginella densa Rydb.	Native	6			
Fern or Lycophyte	Woodsiaceae	Woodsia oregana D.C. Eaton ssp. cathcartiana (B.L. Rob.) Windham	Native	7			
Gymnosperm	Cupressaceae	Juniperus communis L. var. depressa Pursh	Native	6	UPL		
Gymnosperm	Pinaceae	Abies lasiocarpa var. bifolia	Native	5	FACU		
Gymnosperm	Pinaceae	Picea engelmannii Parry ex Engelm. var. engelmannii	Native	5	FACU		
Gymnosperm	Pinaceae	Picea pungens Engelm.	Native	6	FACU		
Gymnosperm	Pinaceae	Pinus contorta Douglas ex Loud. var. latifolia Engelm. ex S. Watson	Native	5	FACU		
Gymnosperm	Pinaceae	Pinus flexilis James	Native	7			
Gymnosperm	Pinaceae	Pinus ponderosa P.& C. Lawson var. scopulorum Engelm.	Native	5	FACU		
Gymnosperm	Pinaceae	Pseudotsuga menziesii (Mirbel) Franco var. glauca (Beissn.) Franco	Native	5	FACU		